Multisensorial stimulation

in a vertical standing for visually impaired kids with CP

INTERNATIONAL PATENTED PATENT

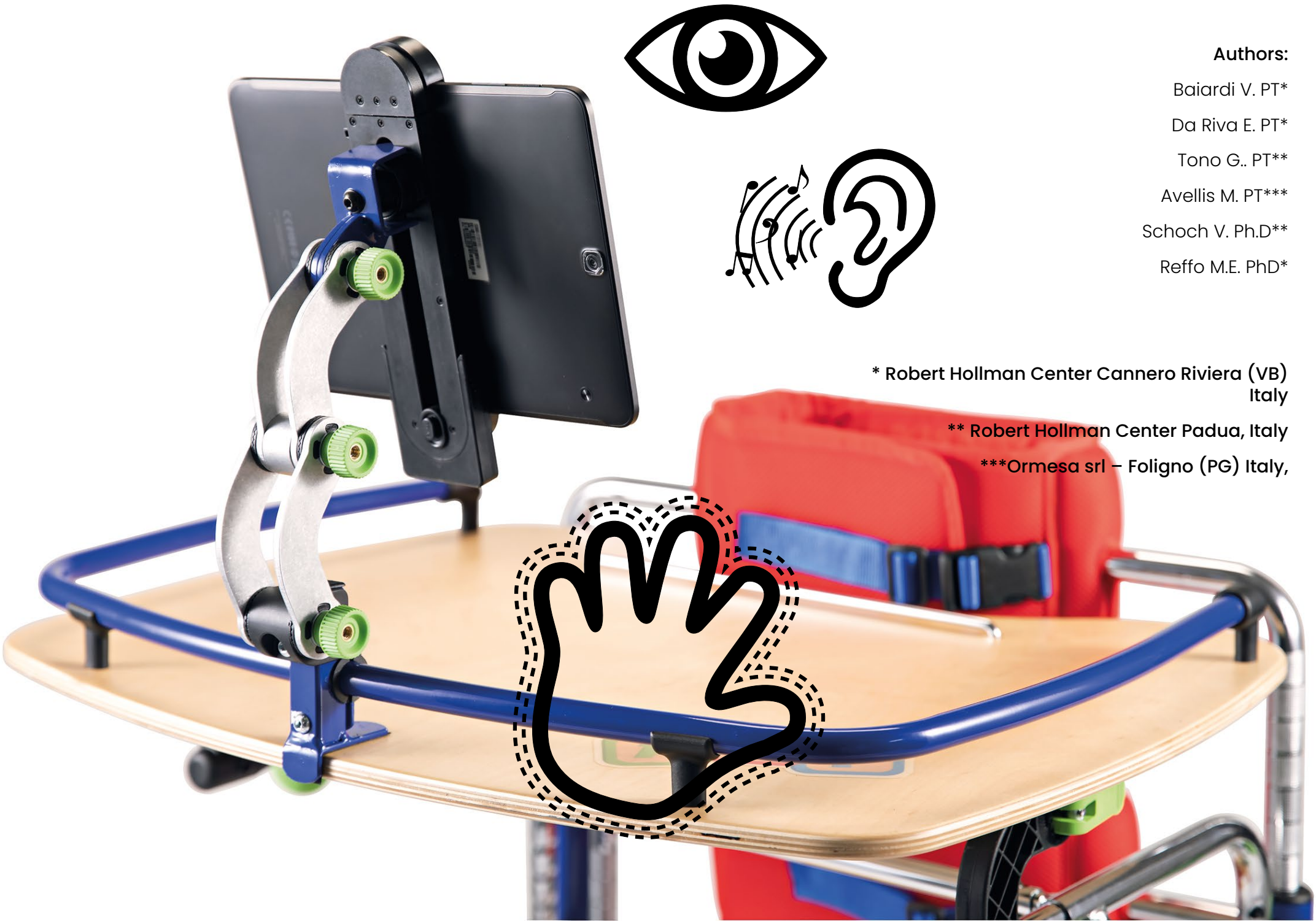
Selected as speaker by the scientific committee:

ISS (International Seating Simposioum)
2022 PITTSBURGH

ATSA (Assistive Technology Supplier Australia)
2022 SYDNEY

ORMESA®
• MADE IN ITALY SINCE 1980 •

APP multisensorial standing



Authors:

Baiardi V. PT*

Da Riva E. PT*

Tono G.. PT**

Avellis M. PT***

Schoch V. Ph.D**

Reffo M.E. PhD*

* Robert Hollman Center Cannero Riviera (VB) Italy

** Robert Hollman Center Padua, Italy

***Ormesa srl – Foligno (PG) Italy,

Introduction

In many clinical descriptions of children affected by CP, we, as Physioterapists, have to face visual impairments or blindness, with sensory deprivation and difficulties in the psychomotor area.

Kids affected by visual impairments find it particularly hard to keep an upright posture even with the aid of vertical stabilizers; this makes it more difficult for them to improve their trunk/ head control and lower limbs loading. Their perception of motion and of their own bodies is also often altered.

Purpose

The multisensorial stimulation is really important for visual impaired or blind kids to give them an experience of sensory

perception and improve their compliance.

Nr. of subjects and materials/ method

10 children have been involved in the research; all of them were affected by visual impairment and multidisability (CP, Dysmethabolic Syndrome, Genetic Syndrome, etc.). The age range was from 21 up to 48 months. The subjects group was splitted in two sub groups, according these inclusions criteria:

- Children treated at Robert Hollman Foundation (both Centers in Cannero Riviera and Padua)

Figure 1

- Visual impairment with visus less of 2/10
- Cerebral Palsy as well as other kind of pathologies with low psyco-motor skills (GMFCS II-V), even in course of diagnosis.

We used the APP Multisensorial Standing for the trials (Figure 1-Figure 2), a vertical stabilizer that provides a sensory

Figure 2

stimulation while the subjects keep the standing position. The multisensorial standing can be connected to an electronic device (e.g., tablet, smartphone, PC, radio…) which provides to the kid audio and visual stimulation, while spreading the vibrations produced by the sound in the whole frame thanks to an electronic hardware placed under the footplate. Our aim was to analyze the differences in compliance, attention, motivation, gratification and performances between the two configurations (just with audio and with audio/pallestesic stimuli).

Each kid could handle a big switch (on/off) put on the standing's tray for six minutes; the switch was connected to a radio or tablet device, (turning on and off the radio depending on their feelings); if the subjects were unable to press the switch by themselves, we helped and assisted them. We looked at how many times the kids activated the switch and how was their compliance. They were asked to push the on/off switch which turned on/off a radio device. After that, the radio was connected to the Multisensorial Standing hardware, in order to produce, beside the audio stimuli, also the vibratory feedback.

The kids have been videorecorded during activities keeping the standing position in the Multisensorial Standing.

We showed to the children for 3 minutes (if they needed them) what they had to do and how the switch worked, for both configurations (with music and with music plus vibrations). Then we left the subjects to use the switch freely for 6 minutes, observing their reactions. When there were any difficult for the children to figure out the task, we helped the kids to push the switch every 30 secs, by supporting the arm and doing the

task together. From these observations some factors have been pointed out:

- Switch use time (secs)
- Switch using times numbers (n°)
- Subjective satisfaction feedback;

The proposed stimuli have been administrated for two consecutive days and reversed, that is first with music and vibrations and after that with just music. This method administration has been thought to have 4 different groups of children which have been subjected to the stimuli in different way and time (Matching Cross).

Qualitative remarks description:

• Most of the children improved the awareness, alertness and the personal acceptance by adding

the vibrations as stimulus with the music (pallestesic stimuli), showing this through smiles and vocals. Some of the subjects, beside vocals, tried to hold the beat with the hands.

The more we proposed known songs and music (known for the kids), the better results we achieved. For most of the subjects the head control improved and some of them asked (through vocals) to have again the vibratory stimulus;

• One of the group showed a great compliance a er just the first explana on about the proposal;

• One subject was not able to hold the awareness about the stimuli, showing that he didn't like them; probably, he had either a very low alerted feeling or tiredness because of the new posture.

RESULTS:

	MUSIC		MUSIC AND VIBRATION	
Group 1	SECS WITH HELP	SECS SELF	SECS WITH HELP	SECS SELF
B1	95	0	115	0
B2	14	22	36	29
B3	0	169	0	151
B4	0	114	0	197
B5	24	130	44	124
Group 2	SECS WITH HELP	SECS SELF	SECS WITH HELP	SECS SELF
B1	0	123	30	155
B2	0	319	26	215
B3	0	255	0	264
B4	0	30	0	158
B5	60	156	0	96
Average per secs	19,3	131,8	25,1	138,9
Delta%			30%	5%

Figure 3

As outlined in Figure 3, comparing the two different group, we have 30% increase in the activation time (secs) with music and vibration.

The kids activated the switch up to 30% more with the multisensorial stimulation configuration than with the simple audio stimulus, improving their compliance, too. In the second administration there were less switch activations: the hypothesis was that the children wanted to listen to the music for a longer time; with both stimuli (music and vibrations), the switch activations were lesser than just with music and that was really interesting. It seemed that the children wished to extend as much as possible that nice time.

According to the satisfaction form, a higher percentage of children showed a good feeling with both stimuli; this could be interesting to get deeper in a new research, evaluating the motor skills improvement after some usage time.

Conclusions:

Almost all of the visual impaired kids showed a better compliance holding the upright position for a longer time and with better awareness.

Clinical relevance:

This kind of stimulation during the upright position can improve the sensory perception, besides enhancing their motor skills (head control and handling tasks).

Note: no conflicts have been disclosed for Baiardi, Da Riva, Tono, Schoch, Reffo

References:

1. Sílvia Leticia Pavão, Fernanda Pereira dos Santos Silva, Geert J Savelsbergh, Nelci A C F Rocha (2014) Use of Sensory Information During Postural Control in Children With Cerebral Palsy: Systematic Review - December 2014 Journal of Motor Behavior 47(4):1-11 - DOI: 10.1080/00222895.2014.981498 – PubMed

2. Wang TH, Peng YC, Chen YL, Lu TW, Liao HF, Tang PF, Shieh JY. (2013) A home-based program using patterned sensory enhancement improves resistance exercise effects for children with cerebral palsy: a randomized controlled trial. Neurorehabil Neural Repair. Oct;27(8):684-94. doi: 10.1177/1545968313491001. Epub 2013 Jun 10

3. Ego A, Lidzba K, Brovedani P, Belmonti V, Gonzalez-Monge S, Boudia B, Ritz A, Cans C. Visual-perceptual impairment in children with cerebral palsy: a systematic review. Dev Med Child Neurol. 2015 Apr;57 Suppl 2:46-51. doi: 10.1111/dmcn.12687. PMID: 25690117 Review.

4. Ciesla K., Wolak T. , Lorens A., Heimler B., Skarzynski H., Amedi A. (2019) Immediate Improvement of Speech-In-Noise Perception Through Multisensory Stimulation via an Auditory to Tactile Sensory Substitution, Restore Neurol. Neurosci; 37(2):155-166 DOI: 10.3233/RNN-190898

5. Shams L., R Seitz A. (2008) Benefits of Multisensory Learning, Trends Cogn Sci. Nov;12(11):411-7 DOI: 10.1016/j.tics.2008.07.006.

6. Peterka RJ, (2018) Sensory Integration for Human Balance Control, Handb. Clin. Neurol.; 159:27-42, DOI: 10.1016/B978-0-444-63916-5.00002-1

COMPANY WITH
QUALITY SYSTEM
CERTIFIED BY DNV
ISO 13485

Ormesa srl - Via delle Industrie 6/8 **|** 06034 Foligno (PG) – ITALY
Tel. +39 0742 22927 **|** FAX +39 0742 22637 **|** info@ormesa.com

www.ormesa.com