

Innovation in Upper Limb Rehabilitation - Computer/ Robotic Based Therapy and Constraint Induced Therapy



Vicki Abraham

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i. Executive Summary

People who have experienced a stroke, acquired or traumatic brain injury or any other neurological condition have a big challenge ahead of them in order to regain their independence in daily activities. It is an important role for occupational therapists to provide these clients with every opportunity to regain maximum function of their affected upper limb, to reach the level of independence and quality of life they desire. CI (Constraint Induced) Therapy and robotic/computer based therapy are being used in clinics overseas as a form of intensive upper limb therapy. This intensive therapy targets increasing functional use of clients' affected upper limbs. Literature reviews indicated positive outcomes of both of these therapies and so further research was warranted.

The objectives of this Fellowship were to learn the background reasoning behind the benefits of CI Therapy and the techniques used during this therapy. Learning the background reasoning behind the use of robotic/computer assistive technologies was also important to understand how these technologies are being used to increase function of upper limbs post neurological injuries. Investigating the link between rehabilitation gains and occupational gains for clients involved in CI Therapy, as well as programs utilising robotic/computer assistive technologies, was another focus of this Fellowship. In order to understand the background of these treatment techniques, and to be able to determine if these strategies would benefit patients and improve outcomes, it was necessary to visit clinics and hospitals in America, Germany, Austria and Israel as they regularly use these therapies. Through direct interviews and observation of staff with their clients, information was gathered and an investigation of the links between rehabilitation and occupational gains by using these therapies was conducted.

Executive research literature demonstrates that in order for neurological rehabilitation to be effective, especially of the upper limb, treatment needs to be intensive and include extensive repetition of desired movements. Without client motivation, therapy may not be successful. Intensive traditional therapy is difficult for both the client and therapist as it can be physically exhausting for them both, often non-engaging (unless the therapist can keep the client motivated throughout each session) and perceived as boring. With tight hospital financial budgets, intensive treatment is not made available. Robotic/computer assisted therapy has addressed all of these issues as the devices cannot become tired during a therapy session, the software keeps the clients engaged and the feedback enables the clients to remain motivated. Therapists using robotic/computer devices can achieve the same if not better outcomes than an intensive conventional therapy session. It is believed that in the long run robotic/computer assisted therapy may even be more cost effective than traditional intensive therapy.

Overseas clinics are routinely using CI Therapy and robotic/computer assistive technologies successfully throughout therapy sessions (either on their own or in conjunction with each other). This research supports public literature findings, that by using CI Therapy and robotic/computer assistive technologies there are significant improvements; and that these techniques are beneficial to regaining functional use of an affected upper limb post neurological injury.

Technology is a growing industry and it has become a part of everyone's daily life. All generations are using various types of technology throughout their daily activities and so it should also be embraced as part of occupational therapy. Australians would benefit greatly from having such devices and therapy techniques routinely made available to them.

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ii. Abbreviations/Acronyms

ABI	Acquired Brain Injury
AOTS	Abraham OT Services Pty Ltd
CI Therapy	Constraint Induced Therapy
MS	Multiple Sclerosis
NDIS	National Disability Insurance Scheme
OT	Occupational Therapy/Therapist
PT	Physiotherapist
UAB	University of Alabama, Birmingham, Alabama, USA

iii. Definitions

CI Therapy

A form of physical therapy that forces a client to use their affected limb by restraining their unaffected limb

Daily Living Activities

Activities that everyone completes in their everyday life

Multiple Sclerosis

A progressive disease of the central nervous system (brain and spinal cord) that results in neurological impairments

Neurological Injury

An injury to the nerves in the body

Neuroplasticity

The brain's ability to form new pathways in order for a part of the brain to take over the function of a damaged part of the brain

Occupational / Functional goals

Goals set by each client with their therapist that are specific to their life and is daily living activities they need and want to do

Occupational Therapist

A therapist who enables people to participate in daily life activities by enhancing an individual's ability to perform the activities or by modifying the environment to support the individual

Occupational Therapy

A client-centred approach to promoting health and well-being through occupation/activity

Robotic/computer assistive technology

Therapy devices for rehabilitation and assessments utilising computer software and robotic functions

Stroke

Occurs when there is an interruption of blood flow to the brain. It usually occurs because a blood clot forms and blocks a blood vessel or a vessel bursts. These events cause damage to the brain due to oxygen and nutrient supply being stopped.

Train the trainer model

Experienced therapists train less experienced therapists so that they are able to use the devices and then train further staff members

iii. Definitions

Transfer package (CI Therapy)

Transferring the gains made during a therapy session into the client's everyday life

Traumatic Brain Injury

An injury to the brain caused by a violent blow or jolt to the head

Tyromotion

Austrian company developing and manufacturing robotic/computer assistive devices for the upper limb

Upper Limb

Includes the shoulder, arm, elbow, forearm, wrist, hand and fingers

Upper Limb Retraining

Training an individual how to use their upper limb after an injury to this limb has occurred

1. Acknowledgements

Vicki Abraham would like to thank the following individuals and organisations who gave generously of their time and their expertise to assist, advise and guide her throughout the Fellowship program.

Awarding Body – International Specialised Skills Institute (ISS Institute)

The International Specialised Skills Institute Inc is an independent, national organisation that for over two decades has worked with Australian governments, industry and education institutions to enable individuals to gain enhanced skills and experience in traditional trades, professions and leading-edge technologies.

At the heart of the ISS Institute are our Fellows. Under the **Overseas Applied Research Fellowship Program** the Fellows travel overseas. Upon their return, they are required to pass on what they have learnt by:

1. Preparing a detailed report for distribution to government departments, industry and educational institutions.
2. Recommending improvements to accredited educational courses.
3. Delivering training activities including workshops, conferences and forums.

Over 200 Australians have received Fellowships, across many industry sectors. In addition, recognised experts from overseas conduct training activities and events. To date, 22 leaders in their field have shared their expertise in Australia.

According to Skills Australia's 'Australian Workforce Futures: A National Workforce Development Strategy 2010':

Australia requires a highly skilled population to maintain and improve our economic position in the face of increasing global competition, and to have the skills to adapt to the introduction of new technology and rapid change.

International and Australian research indicates we need a deeper level of skills than currently exists in the Australian labour market to lift productivity. We need a workforce in which more people have skills, but also multiple and higher level skills and qualifications. Deepening skills across all occupations is crucial to achieving long-term productivity growth. It also reflects the recent trend for jobs to become more complex and the consequent increased demand for higher level skills. This trend is projected to continue regardless of whether we experience strong or weak economic growth in the future. Future environmental challenges will also create demand for more sustainability related skills across a range of industries and occupations.

In this context, the ISS Institute works with Fellows, industry and government to identify specific skills in Australia that require enhancing, where accredited courses are not available through Australian higher education institutions or other Registered Training Organisations. The Fellows' overseas experience sees them broadening and deepening their own professional practice, which they then share with their peers, industry and government upon their return. This is the focus of the ISS Institute's work.

For further information on our Fellows and our work see <http://www.issinstitute.org.au>.

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1. Acknowledgements

Fellowship Sponsor: The George Alexander Foundation

The George Alexander Foundation supports activities in the following two areas:

Education

- to help talented young people achieve their full potential in any endeavour
- to support programs designed to improve educational, employment and leadership opportunities for disadvantaged young people

Environment and Conservation

- to develop partnerships with communities, government and the private sector to prevent irreversible damage to the environment and to encourage the maintenance of biodiversity

The Fellow would like to thank the George Alexander Foundation for providing funding support for this Fellowship.

Supporters

- Barbara Huber, Sales Manager, Tyromotion
- Carolyn Smith, Director, Cantley Medical Services
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- David Morris, Training Director, University of Alabama at Birmingham, Department of Physical Therapy
- Gabi Zeilig MD, Director, Department of Neurological Rehabilitation, The Chaim Sheba Medical Centre
- Jason Abraham, Finance Manager, Abraham OT Services Pty Ltd
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- Maik Hartwig, Clinical Applications Director, Tyromotion
- Rebecca Allen, Member Services Leader, Occupational Therapy Australia
- Robyn Soulsby, Occupational Therapist, Abraham OT Services Pty Ltd
- Therese Desmond, Executive Manager Community Services, Southern Cross Care (Vic)

Employer Support

Abraham OT Services Pty Ltd has supported the entire process of the Fellowship submission as well as the planning and organisation of the overseas trips involved. The occupational therapists employed at Abraham OT Services Pty Ltd were very enthusiastic about the Fellowship and were willing to assist with ensuring that the business ran smoothly throughout the overseas program. In addition, they reported that they welcomed the opportunity this Fellowship provided to facilitate learning and innovation to their practice.

1. Acknowledgements

Organisations Impacted by the Fellowship

The findings from this Fellowship will benefit the following individuals and organisations:

Government

- » Slow to Recover Program
- » Transport Accident Commission
- » Worksafe
- » Department of Veterans Affairs
- » Department of Social Services
- » Department of Human Services

Industry

- » Royal Melbourne Hospital
- » Royal Talbot Rehabilitation Centre
- » The Alfred Hospital
- » Disability Service Providers
- » Caulfield Hospital
- » The Kingston Centre

Professional Associations

- » Occupational Therapy Australia
- » The National Stroke Foundation
- » Cerebral Palsy Australia
- » MS Australia
- » Brain Injury Australia

Education and Training

- » La Trobe University
- » Monash University
- » The University Of Queensland
- » The Australian Catholic University
- » Curtin University
- » The University of Newcastle
- » University of Tasmania
- » Deakin University

Other

- » Clients with various neurological conditions affecting the use of their upper limbs.

2. About the Fellow

Name Vicki Abraham

Employment Managing Director / Occupational Therapist Abraham OT Services Pty Ltd

Qualifications

- Bachelor of Occupational Therapy, Faculty of Health Sciences, La Trobe University, Melbourne, Victoria (1998)
- Assessment of Motor and Process Skills Assessor La Trobe University, Melbourne, Victoria (1997)
- Community Based Rehabilitation for Acquired Brain Injury Level 1 Monash University, Peninsula Campus, Victoria (2013)
- CI Therapy training at the Taub Clinic University of Alabama, Birmingham, Alabama, USA (2013)
- Community Based Rehabilitation for Acquired Brain Injury Level 2 Monash University, Peninsula Campus, Victoria (2014)

Membership/s

- Australian Health Practitioner Regulation Agency (AHPRA)
- Member of Occupational Therapy Australia (OTA)

Short Biography

As a teenager Vicki Abraham experienced an illness that affected her entire lifestyle. After being told by a number of medical professionals that she should not return to school and spend the rest of her life on the couch, the Fellow was more determined to succeed and prove them wrong. This major event in the Fellow's life made her extremely passionate to help others and ensure that they too were able to continue to live their life to their fullest potential. After studying to become an occupational therapist (OT), the Fellow worked within the hospital setting that provided her with the opportunity to meet a variety of people and learn how the health system worked in Australia.

During this time Abraham saw a huge need for additional community based occupational therapy support with people living in their home environments often facing minimum six months waitlists for OT services. With this in mind she began working as a private occupational therapist treating people within their home environments, ensuring that they did not have a lengthy wait. As this need increased over time so did the type and level of service provided. The structure of the business changed over time and the Fellow moved from sole practitioner to running a comprehensive occupational therapy practice providing specialised therapy services that address each individual's needs. The OTs visit each client in their own home environment and provide holistic assessment, client goal directed therapy and assistance/advocacy to ensure clients have essential supports in place to maximise independence and quality of life.

The Fellow's vision has always been to continually evaluate community needs and for the Abraham OT Services Pty Ltd (AOTS) practice to provide timely and evidence based OT services. The latest project has been to develop an evidence based clinic specialising in Neurological Rehabilitation for Upper Limb Retraining so that clients who are unable to use, or have limited use of their arm have the opportunity to regain movement in order to incorporate this arm into their daily occupations (daily living activities). This enhances their independence, wellbeing and quality of life. Development and expansion of this clinic has been planned for the future as the community need and funding body options change to enable a larger cohort of clients to participate.

3. Aims of the Fellowship Program

The Fellowship provided the opportunity to research Constraint Induced (CI) Therapy and the use of robotic/computer assistive technology in upper limb therapy, in particular:

- The underlying processes of CI Therapy
- Best practice related to the provision of CI Therapy
- The benefits and study outcomes of CI Therapy
- To establish a relationship with the original CI Therapy clinic in Alabama, USA in order to be able to reconstruct the clinic within Australia
- How robotic/computer assisted devices can be used to assist with CI Therapy
- Best practice related to the use of robotic/computer assisted devices throughout upper limb rehabilitation
- To establish a relationship with clinics using robotic/computer assistive technology in order to be able to use similar strategies within Australia
- The benefits and study outcomes of robotic/computer assistive technology in upper limb rehabilitation.
- How various upper limb clinics are run in Europe

4. The Australian Context

The Fellow was driven by a vision to establish an occupational therapy upper limb therapy clinic. Conventional therapy options were being provided and alternative evidence based therapy options such as CI therapy and use of computer assistive devices were being explored. The Fellow made contact with therapists who have some knowledge of CI Therapy and robotic/computer based therapy, and reviewed available literature which suggested these therapies could be of great benefit to the neurological client population. Furthermore, an Australian Government report published in 2010 looking at therapy for long-term upper limb impairment after stroke recommended the use of CI Therapy, robot assistive training and repetitive task-specific training¹. Though interestingly, the full use of CI Therapy and robot/computer assistive training is not common practice amongst Australian OTs providing upper limb therapy following stroke. Some therapists are using aspects of CI Therapy theory in their practices but clients are unable to access the full program. Technology use is a growing part of our everyday lives, and preferences for technology and innovative options are particularly apparent amongst younger generations. Therefore, many clients are likely to be interested and benefit from technology use during therapy sessions. The National Disability Insurance Scheme (NDIS) has a strong focus on providing clients with evidence based choices for their therapies and services. Therefore, the Fellow investigated further by identifying and contacting training programs and clinics/ facilities overseas using these therapies. With a strong desire to research these therapy options this research Fellowship evolved.

SWOT Analysis

Strengths

- The use of robotic/computer assistive technologies is exciting for the client
- The use of robotic/computer assistive technology is growing in daily life and can include rehabilitation
- Clients looking for alternatives to conventional therapies have an opportunity to incorporate this into their therapy program
- Functional outcomes can be gained
- Everyday items can be used during the CI Therapy program
- Increases clients self-efficacy and motivation to complete daily living tasks
- A large number of organisations are now wanting to explore assistive technologies creating much interest in this program
- Government policy clearly articulates that strategies need to enhance independence and maximise an individual's strengths.
- For many clients, even a minimum improvement in movement will lead to greater independence and possibly more importantly greater quality of life
- Clients will not have to travel to America or Europe to receive the full CI Therapy program

4. The Australian Context

Weaknesses

- Industry reluctance to trial new therapies
- Funding to assist with cost of therapy is not easy to locate for some clients
- Limited time available for OTs to provide intensive CI Therapy program to client
- Suitable robotic/computer assistive technology is expensive to import from overseas
- Lack of local research and the belief that research from overseas is not always reliable or sufficient evidence
- Lack of research that includes medical conditions other than stroke.

Opportunities

- Complete research not readily available in Australia
- Provide the opportunity for clients to receive innovative therapies resulting in an increase of upper limb function
- Facilitate training to allow additional OTs to be able to provide the services

Threats

- Cost of therapy may be too expensive for clients to fund
- Negative attitudes towards such therapies due to program being intensive and lengthy

5. Identifying the Skills and Knowledge Enhancements Required

There are examples of areas in Australian professions industries where there are weaknesses in innovation, skills, knowledge, experience, policies and/or formal organisational structures to support the ongoing successful development and recognition of individuals and the particular sector.

The focus of all ISS Institute Fellowships is on applied research and investigation overseas by Australians. The main objective is to enable enhancement and improvement in skills and practice not currently available or implemented in Australia and the subsequent dissemination and sharing of those skills and recommendations throughout the relevant Australian industry, education, government bodies and the community.

Specific skill and knowledge enhancement areas addressed through the Fellowship were as follows:

Skills/Knowledge Enhancement Area 1:

Background reasoning behind the benefits of CI Therapy

- » Review research articles provided by the clinic related to the CI Therapy program
- » Observe therapists providing CI Therapy to clients within the clinic
- » Determine whether these processes and practices can be put into place within a suitable setting within Australia

Action: Document the positives and negatives related to information learned about this therapy

Action: Determine whether this therapy would be beneficial to Australian's who are in the process of rehabilitation post injury

Skills/Knowledge Enhancement Area 2:

Observe and learn the techniques used during CI Therapy programs within the clinic setting

- » Observe therapists providing CI Therapy to clients within the clinic
- » Learn the CI Therapy process so that this can be used within a clinic in Australia
- » Identify the changes to client abilities throughout the CI Therapy 3 week program
- » Discuss with the clients what they feel the benefits of CI Therapy are related to their rehabilitation
- » Interpret the results of the observations and discussions in order to determine whether the program is beneficial

Action: Document all related points regarding the observed processes

Action: Participate in the training course to become a CI Therapy practitioner and practice these learned therapy processes on the clients in the clinic

Action: Record any changes to clients abilities throughout their therapy program

Action: Document feedback from clients receiving the therapy

Action: Based on the information learned, develop a business plan on how to successfully bring CI Therapy to clients in Australia

5. Identifying the Skills and Knowledge Enhancements Required

Skills/Knowledge Enhancement Area 3:

Investigate how the CI Therapy clinic in the United States of America, and upper limb rehabilitation clinics in Germany, Austria and Israel, successfully operate and maintain their level of service

- » Identify the clinic policies and processes
- » Observe non-therapy related tasks completed by staff
- » Determine how these findings can be used to ensure a positive outcome
- » Learn new techniques required to run the clinic successfully

Action: Record policies and procedures required regarding CI Therapy clinic management

Action: Record policies and procedures required regarding the management of upper limb rehabilitation clinics

Action: Document tasks completed by non-therapy staff members

Action: Based on findings develop a list of requirements including an education and learning program for support staff to assist with the provision of CI Therapy within Australia

Skills/Knowledge Enhancement Area 4:

Background reasoning behind the use of robotic/computer assistive technologies in upper limb rehabilitation

- » Read research articles provided by the clinics in Germany, Austria and Israel
- » Observe therapists using the robotic devices to clients within the clinics and in their own environments
- » Determine whether modern robotic/computer assistive devices can be considered as an evidence based therapy, which can be used as an alternative to conventional therapies
- » Determine whether these processes and practices can be put into place within a suitable setting within Australia

Action: Document the positives and negatives related to the information learned about robotic/computer assistive technologies used in upper limb rehabilitation

Action: Determine whether robotic/computer assistive devices would be beneficial to Australian's post injury

Action: Document findings related to robotic/computer assistive devices being used as an alternative to conventional therapies

Action: Determine whether robotic/computer assistive devices would be beneficial to Australian's as an alternative to, or in conjunction with, conventional therapies.

5. Identifying the Skills and Knowledge Enhancements Required

Skills/Knowledge Enhancement Area 5:

Observe and learn how robotic/computer assistive technologies are being used in Germany, Austria and Israel to increase function of upper limbs post a neurological injury

- » Observe the therapists using the robotic devices
- » Become familiar with how the robotic device functions
- » Identify the changes to client's abilities after using the robotic devices
- » Discuss with clients what benefits they feel they are receiving from using the devices
- » Interpret the results of the observations and discussions in order to determine whether the use of robotics in upper limb rehabilitation is beneficial

Action: *Document all related points regarding the observed use of the devices*

Action: *Use the devices in order to learn how they function*

Action: *Record any changes to the clients abilities throughout their sessions with the devices*

Action: *Document feedback from clients using the devices*

Action: *Based on the information learned, develop a business plan on how to successfully bring robotic/computer devices to assist in upper limb rehabilitation to Australia*

Skills/Knowledge Enhancement Area 6:

Investigate the link between rehabilitation gains and occupational gains for clients involved in CI Therapy programs as well as programs utilising robotic/computer assistive technologies

- » Discuss with clients their rehabilitation goals for their therapy and their occupational goals once they complete the therapy program
- » Determine how these goals will assist in increasing client's independence in daily tasks
- » Research any documentation related to the correlation between rehabilitation gains and occupational gains

Action: *Document all relevant points from discussions*

Action: *Record any noticeable increase in independence in daily tasks as reported by clients*

Action: *Record finding from research documents*

6. The International Experience

CI Therapy Training, Taub Clinic, University of Alabama Birmingham (UAB), Alabama USA

Contacts: David Morris, PhD, PT, Course Presenter, CI Therapy UAB
Mary Bowman, OTR/L, OT, Course Presenter CI Therapy UAB
Edward Taub, Ph.D, Director of Taub Therapy Clinic, UAB
Staci McKay, B.S., Research Project Coordinator, CI Therapy UAB

Objectives:

The objectives of this visit were:

- To learn the theory behind CI Therapy
- To learn the benefits of CI Therapy
- To learn the techniques used during CI Therapy programs within a clinic session
- To learn the assessment process related to the CI Therapy program
- To learn how the Taub clinic successfully operates and maintains their level of service
- To determine whether CI Therapy can be linked to functional activities and goals
- To determine whether clients felt that the CI Therapy program assisted their recovery

Outcomes:

Constraint Induced Therapy (CI Therapy) is a form of upper limb therapy which improves functional use of a more affected arm and hand by restricting movement of the unaffected arm and hand². The Taub clinic at UAB has over 25 years experience with research and clinical practice³ and they continue to conduct research to expand their knowledge and develop the program further. The current data emphasises how beneficial the CI Therapy program is to clients who have experienced a stroke. Data is starting to be collected on clients with other Neurological issues such as Multiple Sclerosis and Traumatic Brain Injury³. During the CI Therapy training course, both David Morris and Dr Taub stated that the use of CI Therapy with such clients is producing positive results and that these clients are gaining function of their affected arm and hand^{4,5}.

CI Therapy is based on the theory that an affected limb is not being functionally used due to learned non-use, typically because mainstream rehabilitation has limited time to focus on intensive upper limb rehabilitation. CI Therapy is intensive therapy aimed at overcoming perceived barriers to why a task is not completed with the affected upper extremity⁵. The objective of CI Therapy is to make a substantial improvement in function of the affected upper extremity and to not go back to how they were prior to the therapy⁵. The use of repetition within the CI Therapy program is based on the fact that the brain is very plastic and is able to form new pathways in order to replace the damaged pathways in the brain. "Plasticity is the ability for the brain to adapt to lesions that are present as a result of trauma"⁶. "Neuroplasticity is the ability of the brain to adapt in function and morphology to environmental influences such as new experiences (learning) and compensation after damage"⁶. This means that when a person has a stroke or experiences a traumatic brain injury the damaged part of the brain is affected in its ability to perform its associated role. Since the brain is able to continue to learn throughout its life, other areas of the brain may be able to take over the role of the damaged sections. In order for this to occur the person requires increased exposure to the desired movements and this movement needs to be repeated a large number of times in order for the new pathways to be secured in the brain.

6. The International Experience

The CI Therapy process at the Taub clinic in Birmingham Alabama consists of therapy sessions for three hours each day, five days a week, for three weeks. There are four components to CI Therapy that need to be included: First an intensive training program, second shaping of tasks, third a transfer package and finally constraining or restraining the non-affected arm^{2,3}.

The intensity of the CI Therapy program is important as it ensures that the client has increased exposure to using their affected arm, thus providing multiple repetitions of the desired movement³. Repetition of the desired movement is what allows the new pathways to form in the brain. Having this increased intensity during therapy also allows the client to see what they are able to achieve, which generally increases their motivation to continue the required movement at home.

Shaping allows the selected tasks to be tailored to each client by incorporating the specific movements they need to address. Functional goals are set with each client and then the shaping tasks are chosen in order for the client to work towards these goals. Shaping the chosen tasks involves “systematically increasing the difficulty level of the task performed in small steps when improvement is present for a period of time”³. While performing the shaping tasks the therapist also needs to provide the client with feedback relating to the quality of their movement and how the movement is being performed. Verbal feedback and instructions are required throughout the shaping tasks in order for the client to be aware of their progress^{2,3}.

This intensive program also includes a transfer package involving tasks and daily living activities to complete with the affected arm as home practice each night. The transfer package also includes a behavioural contract, a home diary to be completed daily, and a Motor Activity Log administered by the therapist every day of treatment. This transfer package ensures that each client is responsible for their own improvement, that they are more involved in their therapy and that they continue to use the affected limb outside of their therapy sessions. Within each therapy session the clients are asked to repeat activities in order to better their last performance. This has shown to be very motivating for clients as they are trying to improve their previous attempts⁶. Tasks completed during therapy and as home practice are discussed with each client so that they are motivated to complete the tasks asked of them.

In order for the client to use their more affected arm for all activities, the less affected arm is restrained during the intensive therapy program. Having the less affected arm restrained, allows the client to perform all activities throughout the CI Therapy program with their more affected arm, thus altering the learned non-use and ensuring that the more affected arm will be used throughout daily living activities once the therapy program is over.

As part of the CI Therapy training the Fellow had the opportunity to complete shaping tasks with a client who had received the CI Therapy program previously. Dee suffers from relapsing remitting Multiple Sclerosis (MS) and she had experienced a relapse that lead her to participate in CI Therapy. Dee’s level of functioning had greatly reduced due to this relapse, and she was unable to complete daily living activities. In Dee’s case, both of her arms and hands were affected, however she chose to concentrate on her dominant hand so that she could increase her functional level. Dee stated that without CI Therapy she would not be independent in all of her daily living tasks. Dee lives with her parents, as she does require support due to fatigue; however she is now able to use both arms and hands as required. When the Fellow worked with Dee, a couple years had passed since her CI Therapy, and it was not possible to determine that she had weakness in either upper limb. Dee was very proud that she had continued to work hard to maintain her functional level after she completed the CI Therapy program. Standard shaping tasks from the CI Therapy manual was used on the first day of working with Dee, however, on the second day of practice the Fellow decided to use more functional shaping tasks with Dee. It is important as a starting point to use the shaping tasks provided in the CI Therapy manual, however, as improvement is observed these shaping tasks should be more functional. Functional shaping tasks should be chosen according to each client and should be associated with their functional

6. The International Experience

goals. For example, Dee worked with computer programming and so it was important for her to still be able to use a computer keyboard and enter in numbers quickly. A shaping task was formed around the number keypad on a computer keyboard. The more Dee performed the shaping task, the more she was determined to increase her ability at completing the task, which would then increase her ability to complete her required work tasks. As previously stated, Dee found the CI Therapy program extremely beneficial and if needed in the future she would complete the intensive three week program again.

Other participants within the CI Therapy course practiced shaping tasks with other clients. Two of these clients provided feedback to the course participants that they both found the CI Therapy program increased their functional levels and assisted them with being able to complete functional tasks they were not able to complete previously.

Since the Taub clinic has been running for a number of years now, they have comprehensive policies and procedures. Prior to completing an intensive program, each client attends an assessment session. Standardised tests are completed during this session in order to determine whether the client meets the inclusion criteria. The importance of wearing a mitt (on the restrained hand) is explained in detail and the client needs to verbally agree to this at the assessment stage. The transfer package is also discussed with the client at this stage and the importance of completing this is emphasised. Once a client begins their intensive program they sign a contract stating that they will wear the mitt and complete the require activities both during their therapy sessions and at home. If the client is not motivated, refuses to wear the mitt and does not complete their set tasks, either throughout their therapy sessions, or at home, then the CI Therapy program ceases. It is extremely important that the client takes ownership of their rehabilitation in order for improvements to be seen.

From the research available and from the training program, the Fellow was able to clearly see how beneficial CI Therapy is to clients with reduced functional use of one arm. CI Therapy is not a cure, but a way to increase functional use of an affected limb after brain injury. The research on Neuroplasticity has demonstrated that the human brain can continue to learn throughout its life and so it is important to use this information and extend it to assist clients as much as possible. CI Therapy should be available to clients in Australia in order for them to have the opportunity to increase their daily function, thus also increasing their self-efficacy, increasing their roles within their families and also reducing their dependence on carers and the Australian healthcare system. The long term rewards for clients who have had the opportunities to increase their daily function is endless.

The CI Therapy training has demonstrated the need to be fully trained with these treatment techniques, because all of the components are extremely important and if they are not administered correctly then the true benefits of the program will not be received. Therefore, in order for CI Therapy to be provided within Australia it is recommended that only fully trained therapists be administering the program. Dr Taub stressed the importance of all four components of CI Therapy and stated that if one of these components is missing then the outcome of CI Therapy will not be as beneficial to the client⁵. The downfall to this is that the CI Therapy program has strict inclusion criteria and not all clients will meet these categories. The recommendations for these clients are that they continue to work hard with their therapy so that they may be able to be included in the CI Therapy program at a later date.

6. The International Experience

Tyromotion Clinic, Schweinfurt, Germany

Neurologische Klinik, Bad Neustadt, Germany (Neurological Hospital, Bad Neustadt, Germany) MEDICLIN Klinik am Brunnenberg, Bad Elser, Germany

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Axel Friede, Head of OT Department, Neurological Hospital in Bad Neustadt
OT department, Bad Elser

Objectives:

The objectives of this visit were:

- To learn how to use the robotic/computer assistive devices.
- To observe how CI therapy was incorporated into the clinic setting with the robotic/computer assistive devices
- To determine whether therapy sessions can be linked with functional goals using robotic/computer assistive devices
- To determine whether clinics are linking occupational & functional goals when treating clients with neurological conditions
- To determine whether the clients enjoyed using the robotic/computer assistive devices, and the effects these devices had on them
- To determine whether all therapists within each setting used the robotic/computer based devices, whether therapists are confident using them and whether they have full knowledge of machine use

Outcomes:

The space available and set-up of the robotic/computer assisted therapy devices was quite different at each of the three locations visited. This was observed to have significant effect on the therapy experience and likely individual outcomes of the clients. The Tyromotion clinic had one room for the computer based devices and another room to complete other therapy treatments.

The neurological hospital in Bad Neustadt had one big open therapy room with two different groups running at the same time. The computer based devices were set up at one end of this room

The Mediclin Klinik in Bad Elster had the computer based devices all in one small room located in another area of the hospital, not near the therapy area. It was apparent that sufficient space and an integrated therapy area for the use of robotic/computer assistive devices worked best and is essential for clients and therapists, especially if there are a group of clients. The set up at Bad Neustadt was extremely suitable as there was space for multiple wheelchairs, and other clients could walk through the space without disturbing the group. Set up of the therapy area is very important in order to ensure that all clients are comfortable throughout their therapy sessions. When designing a therapy space an open plan would be ideal, however there may also be clients who will be highly distracted by others, or not want to be located next to someone else. Therefore it would also be important to have a private space so that these clients have somewhere they can also receive their therapy.

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The main issue at hand within the settings visited was that it depended on whether the clinic was a private community clinic or a hospital as to the length of treatment provided. Client funding varied considerably between these settings. The hospitals visited differed greatly in how they utilised the robotic/computer assistive devices they had available. The Tyromotion clinic was a private clinic so the referring doctors indicated the number of sessions permitted and then the therapist would decide how regularly these were used. These community clients were involved in scheduling the sessions as they needed to ensure they were able to arrive at the selected time. The length of these sessions varied depending on what funding was available and whether the client was paying privately for the sessions. The neurological hospital in Bad Neustadt had clients using the devices in 30 minute blocks throughout every day of the week, however not each client visited occupational therapy every day. The number of sessions each client received was allocated by the hospital and the therapists had to work within these guidelines. Whereas the hospital in Bad Elser only had group sessions using the devices a few times a week. It was clear that these devices were not utilised to their fullest potential within this setting. The published research indicates that it is important to continue using functional therapy in conjunction with robotic/computer based therapy^{7,8,9}. Having a balance between robotic/computer based devices and traditional therapy is extremely important, however an intensive period of robotic/computer based therapy has proven to be beneficial^{7,9,10,11}. The current studies available offered therapy sessions lasting between four-ten weeks and provided clients with robotic/computer based therapy sessions that ranged from one hour daily, to three hours three times a week. The results were positive for all of these studies; however it would be beneficial to have research available from longer studies with varying intensity of sessions in order to determine the most effective program. Neuroplasticity research suggests that an intensive period of therapy with high repetition of tasks is required to improve function in the acquired brain injury population^{2,3,4,5,6}. This applies to robotic/computer based therapy as it does to conventional therapy approaches.

It was clear to see that the Occupational Therapists (OTs) at Bad Neustadt were more confident using the devices than the therapists at Bad Elser. This demonstrated how important it is for all therapists involved in a clinic who might have access to devices to be well trained and to feel confident that they can use the devices with a wide range of clients. The therapy needs of a client with a hemiparesis due to a stroke may be different than a client suffering from MS. Therefore therapists need to be confident that they have the skills to utilise the robotic/computer based device which best suits each clients needs. Without sufficient training and a chance to practice these skills a therapist will not have the confidence or the knowledge on how to utilise the benefits of robotic/computer based therapy devices. Within Germany the set up appeared to be that the distributor provided training to the therapists and then it was up to each location to train any new staff. Therefore a train the trainer type model is being used, however this appeared to be more successful in one location to another. The Tyromotion clinic had Maik Hartwig, an OT who knew the devices extremely well and so he was able to train further staff and be available to support and provide staff with assistance. At Bad Neustadt Axel Friede (OT) was also very competent with the devices available and he ensured that all of the therapists on his team were sufficiently trained. The team of therapists at Bad Elser were much smaller and no-one within this team appeared to be very confident to use the devices. Further training was being arranged during the Fellows visit so that they would be able to increase the use of the devices with their clients.

It was extremely clear that the 30 minute sessions at Bad Neustadt were not sufficient for the clients. By the time the client arrived from their previous session and was set up on the device they only had 15-20 minutes therapy before needing to finish to go to their next therapy session. Unfortunately for the clients this is how the hospital administrators have set up the therapy sessions. Within a hospital setting the therapists do not have the control of how long the treatment session can be and so they are restricted by the guidelines set by the administration staff. These therapists felt that the clients' sessions on the devices needed to be longer than 30 minutes. The gains by the clients were evident by their improved movement, and so having increased exposure to the devices would have increased

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The occupational therapy treatment room at the Neurologische Klinik, Bad Neustadt, Germany

their gains. The head of the OT Department has tried to have this altered as the outcomes measures showed that the session times and the frequency of the sessions were inadequate to achieve optimum outcomes. These outcomes were determined by observing the functional gains made by each client in conjunction with the data obtained from the devices.

Within Australia this could also occur within a hospital setting or a government based community setting. Session times within these settings are typically restricted to a certain length in order to meet targets. Within a private setting this can be altered and the length of time spent on a device can vary in order to meet a client's needs; however this becomes costly to the client as there is currently no funding assistance available.

At this stage there is no evidence or clinical guidelines as to how long a session should be or how many sessions would be beneficial for certain client groups. This would be a suitable topic for further research as it would provide important information in order to determine minimum requirements to achieve positive outcomes as a means for advocating for funding for clients both as inpatients and within a community setting within Australia.

In order for such devices to be successful within Australia it is essential that the therapists using the machines are trained, and competent to use available devices on a wide range of acquired brain injury clients with varying needs. Without sufficient training the therapists would not use the devices available to them and so the resources will be wasted and a significant cost burden to a clinic. In order to ensure that therapists are competent there would need to be a base of therapists who are extremely knowledgeable on the use of the devices and then a train the trainer type model can be used to expand

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knowledge throughout the OT community. Ongoing mentoring and supervision would be beneficial for professional development in this specialty field. Regular group meetings would also assist as it would provide the therapists with a chance to discuss case studies, give suggestions and gain further insight into how the devices can be utilised.

Unfortunately there was a language barrier during the Fellows visits, however it was clear to see how focused each patient was during their sessions with the robotic/computer based devices. The clients that were able to communicate in English stated that they enjoyed these sessions as they were motivated and kept trying to get better scores on the games they played. Some patients acknowledged that they really needed to concentrate and talking to the Fellow during their session was distracting. Others demonstrated that they were able to concentrate on the task at hand while also discussing their experiences. In general, the patients were observed to enjoy their sessions with the devices and they felt that it was beneficial to keep attending these sessions throughout their stay at the hospital.

The Bad Neustadt Neurological Clinic has been utilising CI therapy in a modified form for a number of years now¹². The need to modify the intensive program set by the Taub clinic in Birmingham Alabama was in order to ensure that this type of therapy could be utilized in a rehabilitation setting. Most studies related to CI Therapy are conducted in a laboratory setting allowing one therapist to be allocated to one client¹³. This means that each therapist has only one client at a time due to the intensive nature of CI Therapy. This level of treatment is not available in rehabilitation hospitals and so modifications need to be made. At Bad Neustadt group CI Therapy is offered at times. It is conducted in groups of four patients with one therapist running the group. The sessions run for 45-60 minutes, five days a week. Each patient is given different functional activities to complete by using their affected arm/hand only while their non affected arm is in a restriction cuff.



CI Therapy restriction cuff used at Bad Neustadt. Photo courtesy of Maik Hartwig

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This means that the modifications made to the program include group sessions not one-to-one sessions, one hour a day instead of three hours a day and no transfer package as the client is an inpatient and would not be able to perform the tasks at home. From discussions with the staff at this hospital, this group can only occur when the insurance companies approve this type of intervention. The staff did, however, report that these clients do show an improvement in upper limb function; however it appears that this improvement is not to the same extent as the clients treated at the Taub clinic in Birmingham Alabama. The Fellow feels that the reduced gains made within this group setting could have been due to the fact that the transfer package was not available for these clients. During the CI Therapy training, the Fellow learned the importance of the transfer package within the CI Therapy program. The need for this component of the CI Therapy program was stated time and time again throughout the training. CI Therapy group sessions were not observed during the Fellows visit to Bad Neustadt.

With the time restriction of the OT therapy sessions within these hospital settings, not all clients were receiving therapy that linked their treatment to occupational and functional goals. The hospital settings visited by the Fellow do provide group sessions addressing activities of daily living, such as cooking, however these sessions are only attended by selected clients. Both hospital settings visited ran regular basket weaving groups and this is used to address functional goals associated with each client's movement requirements. Within the community setting, occupational and functional goals were incorporated into the therapy sessions. Within the Australian setting basket weaving would not be an activity clients would be happy to complete. It is extremely important to ensure that each client is performing functional activities which are meaningful to them as an individual and are related to their occupational/functional goals.

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Tyromotion Clinic, Graz, Austria

Privatkinik Lassnitzhohe, Laßnitzhöhe, Austria

Klinik Judendorf Strassengel, Austria

Contacts: Barbara Huber, Sales Manager, Tyromotion
Monika Fuxjager, Clinical Application Specialist, Tyromotion
Betsy Jansen, Key Account Manager Asia, Tyromotion
Dr Alexander Kollreider, Founder and CEO of Tyromotion
OT Department, Privatkinik Lassnitzhohe, Austria
Lies Beyens, OT, Privatkinik Lassnitzhohe, Austria
Sarah Gallbrunner, OT, Klinik Judendorf Strassengel

Objectives:

The objectives of this visit were:

- To learn how to use the robotic/computer assistive devices.
- To determine whether therapy sessions can be linked with functional goals using robotic/computer assistive devices
- To determine whether clinics are linking occupational & functional goals when treating clients with neurological conditions
- To determine whether the clients enjoyed using the robotic/computer assistive devices, and the effects these devices had on them
- To determine whether all therapists within each setting used the robotic/computer based devices, whether therapists are confident using them and whether they have full knowledge of machine use

Outcomes:

Tyromotion has set up a private rehab clinic in Graz attached to their offices.

The therapists within this setting had detailed knowledge on all of the Tyromotion devices and how to utilise each device in order to maximise therapy sessions. They demonstrated strong abilities to treat clients of varying upper limb movement abilities (eg. Decreased shoulder movement in comparison to full hemiparesis or limited finger movement) and the results have been very positive. These therapists are also ensuring that their clients are using the practiced movement in functional activities when they finish their sessions on the devices and when they are at home. These therapists have the opportunity to visit clients in their home environment as it is a community based clinic, thus allowing the transfer of functional activity to be higher than a hospital setting might be able to achieve. The basis to this is clear in the current literature, which indicates the importance of ensuring that the client utilises the movements gained via robotic/computer based therapy into functional activities^{8,11}. The Fellow had the opportunity to interview one particular client who had been visiting this clinic after experiencing a stroke. This client was very motivated to increase the function of his affected arm and he was eager to

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do as much as possible in order to reach his goals. After using the robotic/computer devices within the Tyromotion clinic he was experiencing movement from his index and middle fingers, something he had not been able to achieve previously. Movement was also occurring in his thumb. Seeing this movement occur motivated the client to continue his therapy in order to regain functional movement of his hand. In order for this client to continue to practice these movements on a day he was not receiving therapy, he completed exercises and tasks provided to him by his therapist. In order for any client to maintain, or increase, movements of their fingers and arms, they must continue to perform the movement outside of therapy, as explained in the CI Therapy section of this report. It is essential that each individual take responsibility for their rehabilitation and their desire to increase function of the affected limb. Without this, therapy alone will not provide them with the outcome they desire.

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The Privatlinik Lassnotzhohe offer individual therapy sessions focusing on traditional therapy approaches of stretches and various exercises. They then offer a group setting with the use of robotic/computer based devices. This demonstrated how the devices can be used in a group setting allowing the clients to continue to work on movements that were focused on during individual OT therapy sessions. Although the concept of a group using the devices is great and provides the client with increased exposure, it did not appear to run very smoothly in this instance. The group at this clinic runs for 1.5 hours with only one therapist in the room assisting four-five clients. If a client does not arrive for the group it is up to the therapist to find out where they are, leaving the other clients to work independently. Although the clients were aware of what to do they still required encouragement and assistance at times. This shows the importance of ensuring that there are enough staff rostered to a group in order to ensure that the clients received the most benefit from the devices as they possibly can. Each group may require a different number of therapists, or assistants, available depending on the number of clients and their needs. In the hospital settings this was not occurring as again staff and client ratios are set by the hospital administrators based on funding. Without sufficient staff levels in a group setting clients will be left waiting when they finish an activity until the therapist is free to assist them. This was observed during the group at the Privatlinik Lassnotzhohe. Along with this, some clients were observed to become frustrated when they were not able to complete the required movement. The therapist did not observe this as she was busy with another client and so the frustrated client became even more frustrated and stopped using the device. It is important that clients are in a well supported environment so that they are able to succeed during their therapy sessions.

A private clinic in Australia would be able to control the therapist/client ratio so that it is suitable for everyone involved. Cost, however, would be a significant barrier for clients given the current absence of funding.

The Klinik Judendorf Strassengel in Graz had a different set up again. At this clinic 2 robotic/computer based devices were available and these were positioned in the last partitioned area of the OT treatment area. Patients were seen in this area while other patients were receiving traditional therapy in other partitioned areas. There were some patients that received both traditional therapy and robotic/computer based therapy throughout the week; however this did not seem like the case for many patients. Not all therapists were trained with the devices and so the devices were not used throughout every day. In this setting the 30 minute sessions were all based around the use of the devices, functional activities were not incorporated into the therapy session. The trained therapists at this setting were very competent when using the devices, however, they did not think of alternate ways to utilise the devices outside the way they had obviously been trained. The Fellow did not observe OT goals being worked into the therapy sessions.

These three locations demonstrated the benefits for therapists to be trained and well supported with alternate use of the devices. The therapists at the Tyromotion clinic obviously had more exposure to the devices and how they can be utilised for each patient. It would be beneficial for this information to be passed on to other therapists using the devices so that they are able to complete similar therapy to their patients.

In regards to functional activities, not all settings have sufficient time or resources to ensure that during each session the movement practised with the robotic/computer based devices are then used to perform a functional activity. Within the inpatient rehabilitation hospitals visited by the Fellow, initial assessments were not observed and so it was unclear whether the therapists had discussed goal setting with the clients. During the therapy sessions goals were not discussed with the client. Within the community settings visited by the Fellow client centred goals were focused on and discussed during each session. Research shows that clients are more motivated when they can see how their therapy activities can be used in their day to day life^{11,13}. This is an important part of rehabilitation and a client reaching their goals. Without this transfer of movement to their daily life activities, many clients

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The Fellow using the Pablo device to work on shoulder movements

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The Fellow using the Pablo device to further increase shoulder movement

are unable to see the benefits of any therapy, let alone a therapy which might be very costly to them. Since therapy should be based around each individual's goals it is important for them to see how they are progressing and how therapy is assisting them to reach their goals.

Sheba Medical Centre, Tel Aviv, Israel

Contacts: Tamar Talmor, OT
Ayala Nota, Head OT

Objectives:

The objectives of this visit were:

- To determine which robotic/computer based devices are being used and in the therapists opinion, which are the most effective, user friendly and liked by clients.
- To learn how to use the robotic/computer assistive devices.
- To determine whether therapy sessions can be linked with functional goals using robotic/computer assistive devices
- To determine whether clinics are linking occupational & functional goals when treating clients with neurological conditions
- To determine whether the clients enjoyed using the robotic/computer assistive devices, and the

6. The International Experience



The Fellow using the Pablo device to focus on hip movements

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The Fellow using the Diego

effects these devices had on them

- To determine whether all therapists within each setting used the robotic/computer based devices, whether therapists are confident using them and whether they have full knowledge of machine use

Outcomes:

Sheba Medical Centre has a number of different robotic/computer based devices available for their clients to use. Some of the devices are large, bulky and take time to set up for each client, while others are movable, less time consuming and easy to use

The therapists decide which device is most suitable for each client. All of the devices are used throughout treatment sessions at one time or another; however it appeared that there were some devices used more than others. This clinic runs with the belief that functional activities should be used alongside technologies. They believe that it is extremely important to provide the client with the most there is to offer. Robotic/computer based therapy and functional therapy are used in conjunction as the therapist interviewed has seen the positive results of this and the gains made by the clients when this occurs. The length of each session depends on where the funding comes from, however, the sessions usually run between 30-45 minutes. The clients, and therapists appeared extremely motivated within this setting and the therapist was able to give each client one to one sessions in order to maximise the opportunity to carryover movement from the device to functional activities. The therapist available during the visit was very knowledgeable on all of the devices available and demonstrated them all to the Fellow. Lengthy discussions regarding the difference between the devices were had and an insight into which devices would be suitable for a private clinic in Australia was made.

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Concluding Remarks:

Once both trips were completed it was clear to see that the basis for both CI Therapy and the use of robotic/computer devices is the same – the brain is very plastic and with repetition it is possible to form new pathways so that the unaffected parts of the brain may take over the roles of the affected parts. Given intensive therapy, through CI Therapy and the use of robotics/computer based devices, home practice, motivation and the drive to improve function, people with reduced use of an upper extremity have the capability to increase the function of this affected limb. Both overseas trips were beneficial as all aims and objectives were met. In fact the Fellow gained increased knowledge outside of the objectives of the Fellowship. It is the Fellow's belief that the information learned during the overseas component should be utilised within Australia so that Australians have access to the same treatment processes available overseas.

The Tyromotion devices seen throughout the Fellows visits would be very suitable to use within a clinical setting within Australia. Tyromotion have four devices available to use with therapy of the upper limb. All of these devices have detailed assessments which can be utilised at the beginning, middle and end of therapy. These devices register the smallest improvements and then graph them in a report format providing useful objective data for therapists to measure outcomes. The programs on each device are the same so that once a client has used one device; they would be able to transfer their knowledge onto another device. The use of all four devices would enable an entire upper limb to be addressed throughout a therapy session.

The Pablo focuses on movement from the shoulder through to the wrist. It can also be used to increase force and strength in the hand and fingers.

The Amadeo is a mechanical rehabilitation device that allows passive, assistive or active therapy of the fingers. Fingers and thumb can be moved simultaneously or independently of each other throughout the therapy.



The Pablo System. Photo courtesy of Tyromotion.

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Motorika ReoGo Robotic Rehabilitation System

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Meditouch Hand Tutor



Biometrics ELink

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Diego is also a mechanical rehabilitation device allowing passive, assistive or active therapy, however it focuses on the shoulder and elbow. The Diego can be used bilaterally or unilaterally and it removes the weight of the client's arm/arms allowing movements to occur which might have been too difficult without this device

Tymo focuses on postural control, balance and strength by using a therapy plate for all activities. The therapy plate can be used in a number of positions depending on the client's function

The software associated with the Tyromotion devices is motivating for the clients to use and it provides visual and auditory feedback. The games available assist with improving motor, sensory and cognitive deficits while the client enjoys their therapy session. The Tyromotion software allows the clients to have fun while completing their therapy activities.

In 2010 a report was completed for the Australian Government called "Robot-assisted therapy for long-term upper limb impairment after stroke"¹. This report was a review of the available research at the time and was overseen by the Health Policy Advisory Committee on Technology. The recommendations within this report for upper limb activity for rehabilitation was CI Therapy, robot assistive training, and repetitive task-specific training. Therefore, why are Australians not receiving these treatment options? It is known that in order for rehabilitation to be effective, treatment needs to be intensive, and include repetition of desired movements. Without client motivation therapy may not be successful. Intensive traditional therapy is difficult for both the client and the therapist as it is physically exhausting to them both, often non-engaging (unless the therapist can keep the client motivated throughout each session) and often perceived as boring. Robotic/computer based therapy has addressed all of these issues as the devices cannot become tired during a therapy session, the software keeps the clients engaged and the feedback enables the clients to remain motivated. It is believed that in the long run robotic/computer based therapy may even be more cost effective than traditional intensive therapy¹. Technology is a growing industry and it has become a part of everyone's daily life. All generations are using various types of technology throughout their daily activities and so it should also be embraced as part of therapy.

6. The International Experience



Client using the Pablo Multiboard at the Neurologische Klinik in Bad Neustadt, Germany

6. The International Experience



Amadeo - Fingers in movement. Photo courtesy of Tyromotion.

6. The International Experience



Client using the Amadeo at the Neurologische Klinik in Bad Neustadt, Germany



The hand piece of the Amadeo

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Diego – Training in Space. Photo courtesy of Tyromotion.

6. The International Experience



Client using the Diego with the support of his OT at the Tyromotion clinic in Graz, Austria

6. The International Experience



Tymo – Therapy on Board. Photo courtesy of Tyromotion.



Client using the Tymo at the Neurologische Klinik in Bad Neustadt, Germany

7. Knowledge Transfer: Applying the Outcomes

As a result of the Fellowship outcomes the Fellow decided that it was unfair for Australians to not have access to the amazing robotic/computer assisted devices available overseas. It has become clear how beneficial such technology can be to individuals with reduced upper limb function. The evidence around CI Therapy also shows how effective this treatment is to increase function in an affected arm. Although there is a need for further research to develop clinical recommendations and guidelines in order to achieve optimum outcomes in different ABI populations, the research clearly demonstrates the benefit of these therapies.

This Fellow highly recommends that these therapies be practiced within Australia to enable further research to be completed.

With all of this in mind the Fellow decided that Australians should not have to travel overseas to receive such treatment. Since the Fellowship overseas visits the Fellow has set up a private upper limb rehabilitation clinic focusing on robotic/computer based therapy, CI therapy and incorporating these into functional therapy. Abraham has purchased three of the Tyromotion devices: Amadeo, Pablo, and Tymo; and has been waiting for the Diego to become available for purchase. The Fellow has also been in discussions with other companies and is still looking further into the Biometrics E-Link and the Meditouch Hand Tutor. Abraham believes that the types of technology assistive devices this clinic has to offer will expand as the need arises. Since it is extremely important for the therapists using the devices to be knowledgeable in how to use them the Fellow arranged for Maik Hartwig (OT from Tyromotion clinic in Germany) to spend the month of February 2014 in the new clinic. The therapists working in this clinic treated clients with Hartwig in order to increase their knowledge and gain further understanding to the use of the devices currently available at the clinic.

Along with this Hartwig presented a four-day workshop at the beginning of his stay in Australia. 30 therapists attended this workshop all residing in areas throughout Victoria and NSW. Hartwig spoke about many assessment techniques and treatment strategies related to the upper limb rehabilitation, however he also spoke about the benefits of robotic/computer based therapy. The devices available were demonstrated to this group and further sessions have been arranged with some of these therapists as they were interested in receiving more information.

The Fellow has been liaising with various government and private agencies, including insurance based agencies and hospitals, in order to share the knowledge learned during the overseas components of the Fellowship. Many agencies have booked times to come and visit the new clinic in order to learn more about the devices available.

In April Melbourne CAREX – Health Aged & Disability Expo was held. This is an expo for therapists, carers, students and individuals with a disability. The Fellow presented the findings from the Fellowship at this expo. The Fellow ensured that part of this presentation involved hands on trials for the therapists attending in order for them to try the devices and gain a greater understanding of how they can benefit their clients. The Fellow also arranged for a client to attend this workshop so that a treatment session could be demonstrated to the therapists in attendance. During the break in the workshop the therapists present were able to discuss the client's therapy experience with him.

At the Victorian OT Conference in May 2014 in Melbourne the Fellow will also be presenting these findings as a poster presentation.

At the National ABI Conference in August 2014 in Bendigo the Fellow will be presenting a report on her Fellowship experience.

Abstracts have been submitted by the Fellow to present at further conferences throughout 2014.

8. Recommendations

Government:

- State health departments managing individual funding packages need to recognise and accommodate funding for suitable clients
- To provide funding assistance for clients without funding packages so that they are able to access this therapy (this may be via a funding subsidy or Medicare)
- Recognition that this treatment is affective for clients with hemiplegia, caused by stroke and other neurological conditions
- Funding grants for further research and studies in this area
- Further research to determine a program structure for the frequency and length of therapy sessions in order to maximise progress
- Further research to determine whether these treatments used within a hospital setting will result in shorter hospital stays and less need for discharge resources due to an increase in recovery rate
- Further research to determine whether it would be best to fund these therapies within the community setting as it allows for greater transfer to functional activities at home, and whether this is more cost effective than funding inpatient hospital stays
- Further research to determine whether these treatments used within a community setting will reduce the need for community supports and decrease the level of carer assistance required due to an increase in recovery rate and functional gains
- Funding support for further research to Universities, state based and Australia wide OT Associations
- Assistance with lobbying to Private Health Insurance companies for rebates

Industry:

- Recognition that this treatment is affective for clients with hemiplegia, caused by stroke and other neurological conditions
- Education workshops on CI Therapy practices and principles
- Recognition that there are other upper limb treatment possibilities other than traditional therapy
- Set up of suitable clinics offering these treatment techniques (both public and private sectors)
- Recognising that therapy of the upper limb is just as important as therapy of the lower limb

Professional Associations:

- Forming clinical guidelines for therapists wanting to provide this type of therapy in order to ensure competent practitioners services
- Forming guidelines associated with computer based therapy devices to ensure that therapists are always involved throughout these treatment sessions
- Education workshops on CI Therapy practices and principles
- Support to increase knowledge and understanding of treatment strategies amongst therapists

8. Recommendations

Education and Training – University, TAFE, Schools

- Include “non-traditional” therapy techniques into the curriculum so that students are aware of all of the therapy possibilities
- Educate students about neuroplasticity of the brain as a core subject
- Increase knowledge regarding hemiparesis and that the result of this is the same no matter how it occurred
- Increase knowledge on the importance of functional gains and providing clients with information on all of the treatment possibilities

International Specialised Skills Institute:

- Funding support for further international studies in this field
- Funding support to assist bringing trainers to Australia

Further Skills Deficiencies:

- The establishment of a clinic focusing on CI Therapy and Computer Based Rehabilitation
- Regular education workshops on CI Therapy practices and principles
- To research ongoing developing technologies within this area
- Educational workshops on how to incorporate new technology like robotic/computer based assistive devices into every day practice so that it becomes a part of best practice

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