



NZOPA Case Study Template

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Job Details

Start Date: 26/09/2019
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Referrer/Prescriber: Neuro Occupational Therapist- Nicola Merrilees
Brief Patient Description: Pt X, a 51 year old male, presented at the clinic with a referral for a L dynamic wrist/hand orthosis. Pt X had suffered a stroke during a right temporal AVM resection in December 2017. This had consequently affected Pt X's left side, in particular his L upper limb mobility and dexterity. Passive ROM was within normal range, however active extension of fingers 1-5 were compromised.
Orthotic/Prosthetic Aims/Requests: The orthotic aim, as per the referral from Pt X's occupational neuro therapist, was to assist with Pt X's dense left hand paresis- an orthosis that could specifically assist with grasp release. Pt X had previously been supplied a resting resotative wrist/hand orthosis for maintenance of wrist/hand ROM.

Abstract

A 51 year old male, Patient X, presented to clinic with a referral for an orthosis to assist with his dense left hand paresis, in particular, to aid in grasp release. He had previously been issued a resting restorative wrist/hand orthosis (RWHO) to aid in the maintenance of wrist/hand range of motion (ROM) during his early days of rehabilitation. He now required a more dynamic brace to assist with building strength and aiding in active ROM, not just passive ROM.

At the initial assessment for the new referral and upon my first appointment with the pt, it was evident that Pt X had good passive ROM through his left wrist and hand, but his active ROM was less than that of normal and his strength was weaker than baseline. He was no longer using the original (RWHO) as it no longer met his clinical needs. The static brace was unable to provide strength training nor actively improve his current ROM range.

A dynamic brace was suggested by the referring clinician. They had suggested a Saebo Glove, which the occupational therapist had previously used with another client who presented similarly to Patient X.

Patient X demonstrated active flexion, facilitating squeezing, but extensor weakness, a compromised ability to release. This clinical presentation, combined with the fact he demonstrated only mild hypertonicity, meant that he was a suitable client for the Saebo Glove.

The glove was measured for, ordered and trialed in clinic. Pt X was thrilled with the grasp release effect it enabled him. The tension on the glove was set so that the pt was still able to actively flex, but strong enough to aid in grasp release against his low hypertonicity.

A follow up email was sent out to Patient X approximately one month after the orthosis was issued, to check in on his current use of the brace and gain some feedback. He reported that he was using the glove daily and felt that great improvements in his strength and range were being made. Pt was informed to book a review appointment back in the clinic if any concerns arose and continue to use the glove as per his rehabilitation goals.

Initial Assessment

Clinical Presentation

Subjective:

Patient X, a 51 year old male, was seen with his wife, a practicing physio, for assessment for a L dynamic wrist/hand orthosis glove. The referring neuro occupational therapist suggested that a Saebo Glove might be beneficial. She had previously referred another similar client for the glove who had gone on to have great rehabilitative success with it.

Pt X suffered a stroke during a right temporal AVM resection in December 2017. When he was first seen by orthotics, it was for a resting left wrist/hand orthosis. Was supplied with a restorative WHO to aid in ROM maintainance. Since then, Patient X had gained increased passive ROM back in his L hand, however, would benefit from a more dynamic orthosis. Pt X is currently not working, but would like to be as independent as possible on a daily basis for all personal cares and chores.

Objective:

Upon assessment, Pt X presented with reduced active extension in left hand and fingers. Passive ROM for all wrist, metacarpophalangeal, proximal interphalangeal and distal interphalangeal joints for the left hand was within functional range. Pt X presented with low hypertonicity, which was triggered through nervousness, excitement and when feeling rushed. Pt had 3/5 for all active wrist/hand flexion movements, but had difficulty in extending his wrist, MCPs, PIPs and DIPs from a closed fist/grasp position. Pt X found that he could only do so with assistance from his right hand by passively stretching out the joints. This made releasing from functional grasp activities, such as cleaning his teeth and self-feeding quite difficult, two of many of the tasks he wanted to become more proficient with. Pt X had in-tact sensation. No skin allergies or sensitivities. R side was unaffected.

Orthotic Aims:

A dynamic orthosis to aid in grasp release from a flexed left hand position presenting with low hypertonicity.

Discussion with Mulidisciplinary Team:

The clinical aim was clear in the referral. No further discussion with other members of the multidisciplinary team was required.

Orthotic Prescription

A left Saebo Glove with tension for each joint to be determined at the fitting appointment. Pt X measured for a left medium splint size and a left medium glove size.

Literature Review

Article 1

Doucet, B., & Mettler, J. (2018). Pilot Study Combining Electrical Stimulation and a Dynamic Hand Orthosis for Functional Recovery in Chronic Stroke. *American Journal of Occupational Therapy*, 72(2).

The pilot study aimed to investigate the effect of a dynamic hand orthosis (DHO) when paired with neuromuscular electrical stimulation (ES) on people with chronic stroke. It aimed to determine whether the study population had any performance improvement when undertaking daily tasks after using the combination of the DHO and the ES. Four people who had suffered a chronic stroke participated in the study and the trial was conducted over a period of six weeks. Each participant used the DHO combined with the ES for five days a week for the course of the six weeks, performing various functional grip/grasp tasks. Active ROM and grip strength were also measured before and after the six-week trial. The study found that all participants tolerated the combination of the two interventions. Improvement was seen from all participants either in the form of increased grip strength, increased active ROM or both. It was noted that improvement in the performance of the daily tasks was evident, most likely linked back to the increase in strength and range from the use of the intervention.

The study could be commended for clearly defining its patient population, both in terms of their ages, genders, type of stroke, time since stroke onset and their affected side. The study also clearly defined participant requirements, most importantly their definition of minimal amount of upper limb movement to ensure that the study population was comparable. However, with such a small population number, the strength of the study is diminished. Too many coincidences can be drawn from a population of four and not enough diversity among patients prohibits the data from drawing more certain conclusions.

The interventions used in the study were both clearly defined in the equipment. Each apparatus could be replicated and repeated if required for further studies. The study detailed donning of both the DHO and the ES and due to the precision in the details, allowed for the interventions to be fitted to the patients in a repeatable manner. This meant that the interventions were used in a repeatable manner and could not have been wrongly donned and therefore corrupted any of the collected data, nor compromised the procedure of the study.

The data collected from the investigation was meaningful to the study, however no calculations were conducted to show if any of the findings proved to be significant. However, with such a small population this is difficult to achieve and if performed, would be considered limited by the small sample size.

The study made a note in the discussion section of the paper of some the limitations due to the small scale of the investigation. They also noted that more critically appraised and reviewed evidence for dynamic hand orthoses should be conducted due to an increase in prescribed braces

such as the Saebo Flex, to see whether the orthosis can prove to be clinically significant in the rehabilitation of upper limb use for post stroke patients. In order to achieve this, a much larger comparative study would be required.

Overall, the pilot study was well conducted, however, as self-stating, its results and the conclusions drawn from them, are limited primarily due to the small study population. Further research of higher qualitative studies is required in order to draw more conclusive results about the effectiveness of dynamic wrist/hand orthoses.

Article 2

Woo, Y., Jeon, H., Hwang, S., Choi, B., & Lee, J. (2012). Kinematics variations after spring-assisted orthosis training in persons with stroke. *Prosthetics and Orthotics International*, 37(4), 311-316.

The purpose of this study was to evaluate the efficacy for chronic stroke patients training with a SaeboFlex orthosis, by measuring their kinematic parameters. It consisted of a test population of five stroke patients who went four weeks of training with the Saebo Flex (different to the Saebo Glove). They each used the brace once a day for five days a week over the four week period. Four different clinical measures were performed both pre-intervention and post-intervention and then the results were compared. The study concluded that dynamic hand orthoses were successful in this case, evident from the improved measured kinematic parameters. Therefore, the orthosis could be considered a treatment option for clinical presentations such as those represented by the tested population. It did state that further investigation was required for more conclusive results due to the limitations of the study. The Saebo Flex is a different orthotic design in comparison to the Saebo Glove. It is indicated for clients with who require strength and ROM conditioning, such as the same user population as the Saebo Glove, but it is indicated for clients with higher tone. The Saebo Glove is only indicated for patients with low hypertonicity. So even though the orthoses are not identical, they are comparable for the sake of investigating the effect of dynamics WHO's on stroke populations.

Article 3

Andriske, L., Verikios, D., & Hitch, D. (2017). Patient and Therapist Experiences of The SaeboFlex: A Pilot Study. *Occupational Therapy International*, 2017(2), 1-6.

The aim of this study, a pilot study, was to investigate the experiences had by both patients and therapists while using the Saebo Flex. The study was conducted using a mix methods approach and both qualitative data and quantitative data were collected from various questionnaires completed by both study populations. For each group of interest, the data was collated and compared. The study found that the Saebo Flex was found to have a mostly positive effect on the patients undertaking the study and therapists found the orthosis an effective rehabilitation tool, however it did pose some barriers such as ease of independent donning and doffing, which in turn effected the patient's motivation to consistently use the device. The study, being a pilot study, did have it's limitations and some of these were noted in the discussion. As per many orthotic studies, the sampled population was very small (eleven patients and five therapists), there wasn't enough variation in the participants, there was no control group and a number of drawn conclusions were made based on the qualitative data collected, rather than conclusions drawn from facts. More quantitative data would be required to have more definitive results.

Article 4

Stuck, R., Marshall, L., & Sivakumar, R. (2012). SaeboFlex Upper Limb Training in Acute Stroke Rehabilitation. *International Journal of Stroke* 7(2), 20–1.

The study aimed to explore the user experience of the Saebo Flex in acute stroke patients. It monitored eight patients, with moderate to severe upper limb weakness following a stroke, over the course of twelve weeks. The participants were involved in specifically designed Saebo Flex training sessions, as well as the standard conventional rehabilitation. Both primary and secondary measures were taken at the beginning of the trial to establish a baseline and then again upon the completion of the twelve weeks of Saebo Flex use. Through the use of the orthoses over the twelve-week period, a clinical improvement of hand function was seen. Patients all performed better than their recorded baseline. The study recognises some of its limitations, that is, its small patient population, limited diversity in the patient population, as well as the controversy that exists around clearly defining what meaningful or significant clinical improvement is. It could also be interpreted that of course clinical improvement would be seen with any kind of rehabilitation and that a control group could be beneficial to the study to then have a greater understanding of the actual effect of the dynamic orthosis, in comparison to the standard conventional rehabilitation.

Visit details

Visit 1 (initial meeting)

Subjective:

Pt X was seen with his wife for assessment for a L Saebo Glove, as recommended by his neuro OT. Pt had a stroke about 2 years ago post a right temporal AVM. He has gained increased ROM back in his L hand, since the onset of stroke. He has previously used a restorative WHO for maintenance of range. However, as per his OT, he would benefit from a dynamic orthosis for further rehabilitation of both strength and extension range.

Objective:

Pt has reduced active extension in L hand and fingers. Passive ROM is within functional range. Pt has low hypertonicity. Has some grasp and grip abilities. Passive flexion within normal strength and range. Difficulty in releasing hand from grasp position. R side unaffected. Pt is R handed.

Action:

Measure for Saebo glove using online measurement form for both the Saebo Splint (Flex) and the Saebo Glove. Check indications and contraindications for Saebo Glove- pt is a suitable candidate. Advise pt of ACC protocols moving forward. Pt reports he currently has a long-term case manager and has a good relationship so far with her.

Plan:

Determine cost of Saebo glove, apply to ACC before proceeding with ordering. Final fit in clinic upon approved order.

Visit 2 (Fitting appointment)

Subjective:

Pt seen with wife for final fitting of L Saebo glove as per initial assessment.

Objective:

Pt has slightly increased tone in comparison to assessment appointment from nervousness and excitement about fitting today. Otherwise pt presents the same as per the initial assessment.

Action:

Able to don glove despite presence of increased tone and fit with bands as per glove recommendations. Recommended band tension appears appropriate for the pt. Pt thrilled with effectiveness of glove- can feel resistance and is comfortable to wear. Sizing looks great. Pt is able to still grasp and flex through the extension resistance provided by bands, but after releasing the bands help to extend and open the hand back up again.

Advise pt to build up tolerance to glove wear. Start with a single hour session a day and progress from there. Pt educated on correct donning and doffing of the glove, as well as how to modify the tensions of the supplied bands across all joints. Care instructions supplied.

Plan:

Review on request. Pt to keep us updated on progress.

NOTE: Pt X has yet to be reviewed in the clinic due to having no concerns with the brace thus far. It has been approximately two months since the fitting and a follow up email has been made to confirm the current use of the brace. Pt X reported that he has increased the amount of wear time with the brace and has been using it for functional activities both with his OT and independently. He has been seeing signs of improvement with both his extension strength and range.

Critical Appraisal of Case Study

What have you learned from this case?

I have learnt, through working with Patient X, about the Saebo Glove and its indications and contraindications. I was unaware of this orthosis before seeing Patient X and impressed to see a simple, cosmetically pleasing, easy to don and highly effective brace for rehabilitation of hand extension. I can now see how effective it would be for an array of my clients in comparison to many of the static or cumbersome dynamic braces that they have been previously fitted with.

What could have been done better?

With the continuing progression of designs and materials in prosthetics and orthotics, combined with a busy clinical client load, it can often be difficult to keep up to date with the latest and greatest available orthoses. Upon Pt X being referred for the Saebo Glove, I spent a considerable amount of time researching the glove to ensure it was the best orthosis to meet the clinical demands of the client. The client himself had also done his own research. It would have been better of me to have known more about the orthosis before the initial assessment was conducted, in order to have better prepared myself. Despite my initial lack of awareness about the orthosis, I am excited to feel confident about a new brace, which has been highly successful for this patient and now be able to apply that knowledge to future patients with similar clinical presentations and orthotic goals.

Does this study contribute to orthotic research/evidence?

This particular case study supports the clinical findings read in the previously mentioned literature. The studies researched and listed above, all supported the use of a dynamic extension orthosis in order to gain active ROM and strength in an impaired, post-stroke population. However, due to the lack of patient populations, as well as other clinical limitations to the reported studies, the majority of the studies reported that further greater population samples, with more diversity and longer trial times, would be required in order to have more concrete evidence. This applies to this case study. A single patient study is not enough evidence to neither support nor deny a hypothesized theory. However, taken into consideration with the results of all of the studies conducted on dynamic hand

orthoses thus far, it could prove advantageous in supporting their theory.