Vision of the future: occupational therapy and neurological vision impairment in New Zealand

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Abstract

Neurological vision impairment (NVI) is a common issue after someone has had a stroke and can lead to debilitating difficulties with mobility and activities of daily living. There are indications in the literature that occupational therapy can have a significant role in the treatment/rehabilitation of but little is known how this is actually done in practice in New Zealand. The aim of the study was to find out how occupational therapists assess and treat for neurological vision impairment in people with acquired brain injury (ABI).

A qualitative descriptive method was used to analyze the data of an online survey send out though the New Zealand Occupational Therapy Association Special Interest Groups. Results indicate that New Zealand occupational therapists find the assessment and treatment of NVI an important part of their role but they tend to focus on using functional activities for assessment and treatment. They indicated that they value being part of a multi-disciplinary team, but that communication around NVI is not necessarily easy or effective. Occupational therapists indicate that they would value greater opportunities for education about NVI at both an undergraduate and postgraduate level.
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1. Chapter 1: Overview

This chapter gives an overview of the research project. It discusses the background information, provides a context for the research and justifies why this particular research has been done. The aims of the research, and the research question itself, will be discussed. Lastly, an overview of the outline of the thesis itself will be given.

1.1. Reason for interest in topic

At the time when this research idea began to take shape, I was working as an occupational therapist for the Royal New Zealand Foundation of the Blind (RNZFB). This organization is the main provider of vision-services to those who are blind, or have low vision, in New Zealand. I noted that the registration office received requests for membership on a regular basis from health professionals and individuals on behalf of those who have neurological vision impairment (NVI). Unfortunately the research has been unable to gain exact data on how many requests were made over a set period of time. Due to RNZFB membership criteria, most of the people with NVI are currently not eligible for membership. Membership with the RNZFB requires a person to have an acuity (detailed vision) of 6/24 or a field of vision no greater then 20 degrees. This means that what a sighted person can see from 24 meters away, a person with vision impairment can see from only 6 meters away or closer. The other criteria is a a field of vision no greater then 20 degrees (RNZFB website). Unfortunately, often a person with NVI has an acuity better then 6/24. If a field deficit is present it is usually still greater then 20 degrees due to the way the field loss is located in each eye. Instead of radiating from both
eyes towards the nose, a person with NVI might have one half of each eye ‘missing’ (figure 1). This essentially means that they still have a high degree of field of vision in each eye.

However, due to the way vision is situated in the field it still has a huge impact on the management of everyday tasks but sufferers are not eligible to receive specialized services through the RNZFB.

The question that arises is: what happens to these individuals with NVI who are not eligible for membership?

Lynley Hood, a well-known figure on the New Zealand literary scene who is suffering vision impairment, has also expressed concerns relating to the absence of low vision services. She describes the dilemma that New Zealanders and the RNZFB face at present:

*So if Foundation won’t help, who will? I phoned everyone I could think of: Age Concern, hospital disability services, community disability services, occupational therapy services, my MP, the Consumers Institute, the Retirement Commissioner, the Health and Disability Commissioner. The response was, “Have you tried the Foundation?” or, “Yes, there is a gap in the services, we’ve had a lot of complaints.” (Hood & Sanderson, 2012).*

As an occupational therapist I felt it would be logical for the occupational therapy profession to take over the assessment and treatment of NVI but, so far, no research has been done on this. It is my belief that this research will help determine the role of the occupational therapist in the assessment and treatment of NVI within New Zealand.
1.2. Justification for the study

Neurological vision impairment can have a significant impact on people’s everyday functioning, including difficulties with mobility, reading and cooking (Warren, 2009). It also has a great impact on rehabilitation and on the learning compensatory strategies (G Clarke, 2010).

Occupational therapists, due to their high profile in rehabilitation settings and their, are in a good position to play a key role in the
rehabilitation of NVI. They have an understanding of perceptual and cognitive processes and other deficits in terms of everyday function (Mather, 2012). However, there has been concern expressed that occupational therapists are not trained enough to ensure that right diagnoses (I. B. Suchoff & R. Gianutsos, 2000) and treatments are implemented (Lampert & Lapolice, 1995; Warren, 1993). Currently there is no literature available on how New Zealand occupational therapists conduct assessment and treatment of NVI.

1.3. Project aims and research question

Neurological vision impairment (NVI) is a common problem after someone has suffered an acquired brain injury, including stroke, and can lead to debilitating difficulties with mobility and the activities of daily living. There are indications in the literature that occupational therapy can play a significant role in the treatment/rehabilitation of NVI, but little is known how this is actually done in practice within New Zealand. The research question is therefore: What assessment and treatment methods are occupational therapists in New Zealand using to treat NVI following an acquired brain injury?

1.4. Overview of the chapters

Chapter 2 will cover a review of the literature. This chapter gives an overview of demographic information regarding acquired brain injury in NZ and includes information regarding the incidence of NVI in acquired brain injury world wide. The chapter also provides an overview of NVI and its impact on occupation - including the different types of NVI - and gives an overview of a theoretical framework for visual function to provide background information. Assessment and treatment methods in current
studies will also be examined. Lastly it will explore the role of occupational therapy within the area of NVI.

Chapter 3 will outline the methodology and methods used to conduct the research. The research method is that of a qualitative survey design and explanation is given as to how survey questions were developed.

An outline of the findings of the data collection is discussed in chapter 4. This chapter will include qualitative data and will include charts to illustrate findings.

Chapter 5 will consider implications of the findings. It includes discussion regarding the future role of occupational therapy, in particular, recommendations on how this area can be further developed. Recommendations will be given regarding potential for further research. Recommendations will also be given regarding the future incorporation of the area of NVI into the under-graduate and graduate curriculum.

1.5 Summary

This research was developed in the context of my work environment. There appears to be no literature highlighting the role of NZ occupational therapist in regards to the assessment and treatment of NVI.

The findings highlight the fact that occupational therapists in New Zealand have a strong role within the assessment and treatment of NVI. The participants of the survey represented a highly skilled group of therapists with
many years experience working in the area of NVI. At this stage, assessment of NVI is inconsistent throughout New Zealand.
2. Chapter 2: Literature Review

2.1. Demographics

It is difficult to accurately assess the prevalence of visual disorders associated with brain injury. However, it is estimated that the incidence of neurological vision impairment following brain injury ranges between 30 to 35% (G. Clarke & Hayes, 2006).

The incidence of stroke is significant, with approximately 6000 New Zealanders having a stroke each year (Tobias, Cheung, Carter, Anderson, & Feigin, 2007). Similarly with traumatic brain injury, it is difficult to get exact estimates of the prevalence. However, a recent study indicates that traumatic brain injury is grossly underestimated in New Zealand and is said to be at epidemic proportions, with around 36,000 new traumatic brain injuries occurring in New Zealand each year (Feigin & Barker-Collo, 2008).

If current trends continue, then the number of stroke survivors will increase within New Zealand and there is nothing to indicate any decrease in the rate of traumatic brain injury. It is therefore paramount that health professionals work to improve the independence of people with acquired brain injury within their communities (Feigin & Barker-Collo, 2008). Traumatic brain injury can often lead to longstanding significant deficits and only 30% of stroke survivors achieve independence in activities of daily living (Bonita, Solomon, & Broad, 1997). However, with timely treatment some of the deficits can be avoided or managed well (Bonita et al., 1997). Treatment of neurological vision impairment is one key factor in creating a capacity for wellness in the patient with acquired brain injury.
2.2. Theoretical framework for visual function

Approximately 30% of the brain is involved in comprehending and organizing visual information, making the visual system one of the most complex systems in the body (Scheiman, 2011) in Mather, 2012). Therefore, in order to understand the effect of brain injury on vision, it is necessary to have an overview of normal visual functioning. A theoretical framework was developed by Warren (1993) to describe the place of visual performance within a hierarchy of visual perceptual skills. This hierarchical approach is helpful in occupational therapy assessment to establish the nature of impairment (Mather, 2012). Below is an adaption of the hierarchy of visual perceptual skills by Mary Warren (1993). The hierarchy consists of seven levels, with at the top of the hierarchy the adaptation through vision, which is achieved through the integration of all the levels below. At the bottom of the hierarchy are the visual foundation skills, comprised of; ocular-motor skills, visual acuity and visual fields. Above this is visual attention, achieved by being alert and attending. Above this is the ability to scan, followed by pattern recognition on level four. Level five is visual memory. Lastly there is visuosognition. The following is an overview of each of the skills featured in the hierarchy, starting at the bottom and working its way up.

**Ocular motor control** is the ability to accurately conjugate the eyes to ensure scanning is possible.

**Visual fields** are the ability for the eye to take in the surrounding environment so that the central nervous system receives complete visual information.

**Visual acuity** ensures that the visual information is accurate. Visual acuity is affected by size, contrast and illumination. Therapists need to be aware of this and consider the environmental factors in their treatment (Warren, 1993).
The three basic (foundation) skills of ocular motor control, visual field and visual acuity, control the image generated by the brain. It is therefore crucial that these skills work sufficiently in order for the higher level visual skills to perform accurately. Any brain damage can have an influence on the ocular health or function of the eye, damage to the visual pathways or the visual cortex and visual association areas which can result in vision disorders (Mather, 2012).

Next come the visual skills that are higher up in the hierarchy

**Scanning** is the ability to visually scan the visual environment. This is required for successful pattern recognition. Scanning also involves applying an accurate scan path so that visual information is taken in, in a systematic way. Scan paths are reliant on visual attention, which is comprised of good foveal fixation, that is, the ability to focus on an object. Scanning also involves the identification of critical and non-critical visual information and discarding that which is not important. Visual attention is influenced by global attention. This is controlled by the arousal system, which has been described as being asleep, awake and alert. For the visual system to work effectively the nervous system must be adequately aroused (Warren, 1993).

**Pattern recognition** is the ability to see an object as a whole but also identify more specific features. See the article by Warren (1993) for an example.

Both the holistic identification and finer features are needed to be able to recognize objects in the environment. (Warren, 1993).

**Visual memory** is the ability to retain an image in our mental capacity, see Warren (1993) for an example. Visual memory requires the person to access the image from short and long term memory. (Warren, 1993).

**Visual cognition** is the ability to integrate visual information with different sensory information in order to successfully make plans and decisions needed for
problem solving. It is one of the most complex tasks and is used for most academic endeavours, such as writing, mathematics and reading. As such, it is one of the abilities needed for most employment opportunities. (Warren, 1993).

2.3. Neurological vision impairment

The most well-known types of NVI associated with brain injury and, in particular, stroke, are hemianopsia and (visual) neglect. Hemianopsia is discovered in about 20-30% of all strokes, and neglect is detected in about 65-82% of all strokes (Gottlieb & Miesner, 2004). Hemianopsia is associated with decreased awareness of the environment resulting in decreased ability to adapt to the environment. It is caused by blindness in one half (or quarter) of the visual field in one or both eyes (Woodson, 2002), and may or may not include loss of central vision (acuity). People with hemianopsia will often report that they have lost vision in one eye only, therefore, therapists need to be aware not to confuse it with other eye dysfunctions (Mather, 2012).

Neglect (and any visual forms thereof) is characterized by a decreased awareness of visual and other stimuli in the environment. Neglect is the failure to respond to stimuli on one side of the body (Trombly & Radomski, 2002). Neglect is often called other things such as unilateral neglect, spatial neglect or visual inattention. For the purpose of this study it is referred to as neglect.

Hemianopsia and neglect are neurological visual disorders that can be identified reasonably easily, although are often misdiagnosed as they have similar presentations to each other (Mather, 2012). However, more subtle disorders such as impaired eye movement (ocular motor impairment), decreased visual acuity and some visual field deficits are much harder to detect (Rowe et al., 2009), but also common.
Other visual disorders due to acquired brain injury may also occur. What follows is a brief overview and explanation of what other visual impairments may occur. The health professional needs to have an awareness of these possibilities in order to begin to assess issues related to vision:

**Ocular health disorders:** glaucoma, cataracts, retinal damage, corneal scarring, optic nerve damage and lens damage.

**Accomodative dysfunction:** the inability for the lens/muscles to contract or relax in order to facilitate focusing.

**Binocular dysfunction:** the inability of the two eyes to work together, often resulting in diploplia (double vision).

**Strabismus:** misalignment of the eyes. The brain usually adapts by ignoring one of the images that the eyes produce. Sometimes people are able to use their eye muscles to correct the misaligned eye, often causing fatigue and headaches.

**Convergence insufficiency:** the eye keeps drifting out when needing to focus on close up tasks. Discomfort and eye strain, head tilting and turning are symptoms associated with convergence difficulty.

**Ocular mobility disorders:** difficulty moving the eye resulting in the eye struggling to fixate and perform saccades and pursuits. Sufferers will have difficulty in tracking, scanning and relocating gaze. Symptoms include excessive head movement, poor attention, problems reading and difficulty copying drawings. These symptoms are more likely to be picked up by health professionals than other eye disorders, through the use of observation assessment.

**Nystagmus:** involuntary jerking of the eye leading to difficulty with fixation and focusing on a visual stimuli.
Voluntary saccadic movements: the inability to shift the vision between objects.

The disorders listed above often result in difficulty with reading (Mather, 2012).

2.4. Impact on occupation

All vision impairment, and particularly neurological vision impairment, can have a significant impact on a person’s everyday functioning. For example, people with hemianopsia may experience difficulty with walking or wheelchair use, and may have poor balance, leading to an increase in falls (Goodrich, Kirby, Cockerham, Ingalla, & Lew, 2007). NVI can lead to the impaired ability to read, write, navigate during mobility, drive and recognise people or places (Woodson, 2002).

A pilot study done by Warren (2009) indicated that 41% of people with hemianopsia had difficulty with personal grooming and feeding. Participants had difficulties when food was the same colour as the plate and were prone to knocking items at the place setting. A further 98% of participants in the study had difficulty driving (all had given up except one), which has a huge impact on maintaining independence. Shopping (94%), financial management (89%) and meal preparation (50%) were also affected. Mobility was affected, thus impacting on people getting to the store, navigating around the store and increasing the likelihood of colliding with people and displays. Participants expressed difficulty in locating items on shelves, reading labels accurately and identifying food items. Financial management was affected in terms of decreased confidence in writing checks and using the numerous different card readers (EFTPOS machines). Almost half of the participants felt anxious when moving in crowded environments and this stopped them from attending community environments (Warren, 2009).

Proto et al (2009), reports that people who have visual neglect often overestimate their capabilities and do not see the importance of rehabilitation. This is a concern for rehabilitation specialists as it can greatly affect motivation to participate in treatment.
Although spontaneous recovery does occur in 63% of patients, most will have some ongoing deficits and will need to learn strategies to compensate for these. (Proto, Pella, Hill, & Gouvier, 2009).

There has been some work exploring the phenomenological experience of people with neglect. People who have neglect have to go through a process of discovering the other half of the world or their bodies. They often experience the world as chaotic because the familiar suddenly is unfamiliar and their actions have inexplicable consequences. For example, the participants indicated that when they banged into an object they would hear a sound that appeared, for them, to come out of nowhere. The participants ‘life-world’ was unfamiliar and created anxiety. The four participants in this study participated in a specialised occupational therapy program aimed at improving their awareness of the neglect. This treatment lasted for five weeks, five days a week for 1-2 hours a day. However, most of the useful input for the participants was done by non-professionals, such as family. The participants found that as their experience of the neglect changed, so did the strategies that they found helpful. For example, at the beginning of their experience the treatment that they received provided order into their everyday world. (Tham & Kielhofner, 2003).

2.5. Treatment implications of NVI

Given the complexity of visual impairment it is unsurprising that therapists are often unaware where in the hierarchy the visual deficits lie (Warren, 1993). However, it is arguable that without this knowledge it is impossible for them to design appropriate assessment and treatment programs. Warren (1993) proposes that therapists should us a bottom up approach, considering visual functioning from the hierarchical skill level. She argues that therapists are often too caught up concentrating on assessment and treatment of perceptual difficulties and not on lower level visual functional skills. If therapists concentrate on lower level hierarchical visual skills, often perceptual difficulties will be improved.
This is supported by Proto et al (2009), who believes that rehabilitation professionals such as occupational therapists should focus more on the real-world tasks of daily living in a “top-down” approach, which is useful for identifying areas of functional impairment:

*The functional impairment approach is not in and of itself sufficient for highlighting the underlying cognitive or perceptual causes of a general functional impairment* (Proto, et al. 2009, p152).

Neurological vision impairment can be addressed and it is possible to increase both function and independence (Gottlieb & Miesner, 2004). The rehabilitation of NVI relies heavily on compensatory strategies and the learning of these relies on our vision (Gottlieb & Miesner, 2004). NVI can seriously influence someone’s rehabilitation progress (G Clarke & Hayes, 2006):

*Vision is required for many general rehabilitation techniques and being accurately informed of visual impairment will target alternative therapy options for stroke patients to enhance outcome* (Rowe et al., 2009).

In addition, Foster (2010), reports that the physical rehabilitation environment can also influence the rehabilitation process. For example, wards can be aesthetically pleasing but have no object definition making it difficult for a person with vision impairment to orientate themselves. Combined with being in an unfamiliar environment a person’s functional performance can be hindered and can lead to confinement in a chair as they are afraid to move out into the unknown. This leads to a decline in function and makes people reliant on assistance, hindering the rehabilitation process and a person’s independence. (Foster, 2010).
2.6. Assessment methods

Warren (1993) suggests that the hierarchy of visual perceptual skills frame work is used to assess the visual foundation skills of ocularmotor function, visual fields and acuity as well as higher level skills. Evaluation is important so that therapists can determine,

*where the patients strengths and weaknesses lie in the visual system and how the weaknesses can be minimized and the strengths exploited to enable the person to best adapt to the environment* (Warren, 1993, p.60).

Formal evaluation should be undertaken and include careful observation. Often, behavioural symptoms associated with NVI such as: headaches, difficulty reading, fatigue, sleepiness, squinting, closing of one eye, avoidance of close distance work (Mather, 2012), head movement/tilting, an increase in muscle tone of the neck, jaw and shoulders, are mistaken for other physical dysfunctions, perceptual or cognitive impairment (Warren, 1993).

A careful visual history should be taken since many patients have premorbid visual impairment which can seriously affect their visual functioning and ultimately determine whether treatment interventions would be successful (Warren, 1993).

Visual field deficits can be examined by a simple confrontation test. However, research (Trobe, Acosta, Krischer, & Trick, 1981), suggests that these methods have low sensitivity, therefore, a more comprehensive perimeter test should be done (Berryman, Rasavage, & Politzer, 2010). A manual perimeter test requires time and skill from the examiner. An automated test is also available and will provide clinicians with accurate data. However, the latter is not available to all rehabilitation facilities (Warren, 1993). It is therefore important that a good link is established between occupational therapist and ophthalmologist or optometrist and, when field deficits are suspected, the patient is referred on to these specialists (Mather, 2012; I. B. Suchoff & R. Gianutsos, 2000).
Visual acuity is traditionally examined with a Snellen chart. However, a Snellen chart only tests visual acuity in a high contrast, well illuminated, setting and is therefore not always applicable to real life environmental situations. Therefore a contrast sensitivity function test can be completed (Warren, 1993). By knowing the contrast and acuity limitations of patients, the therapist can increase contrast and illumination effectively within their environment (Warren, 1993).

Ocular motor and visual field function is difficult to test and needs much skill from the clinician to make an accurate diagnosis. Warren (1993) therefore recommends that there is a strong partnership between therapy, ophthalmology and optometry services. The role for the occupational therapist is to screen for the problems and then get more in-depth evaluation from a specialist (Warren, 1993). Therapists should attempt to evaluate if both eyes work together, and where visual control and eye movement is most efficient. “A screening test should therefore include measurement of eye alignment, binocular fusion, range of motion, fixation, localization, and control.” (Warren, 1993, pp. 58).

Visual attention and scanning function together and are difficult to separate from each other when examining the patient. Often the letter cancellation and line bisection screening tools are used to examine deficits in this visual function area. These tests are easy to administer, require small amounts of time and are easily interpreted.

There are a number of standardised assessments available to measure visual perceptual skills. They include:

- The Rivermead Perceptual Assessment Battery (RPAB)
- The Ontario Society of Occupational Therapists Perceptual Evaluation (OSOT)
- The Chessington Occupational Therapy Neuropsychological Assessment Battery (COTNAB)
- The Cerebral Vascular Accident (CVA) evaluation battery of St. Marys Hospital
- The Loewenstein Occupational Therapy Cognitive assessment (LOTCA)
The LOTCA-GT\textsuperscript{M} (Geriatric version of the LOTCA)

- The Baylor Adult Visual Perceptual Assessment (Cooke, McKenna, & Fleming, 2005).

A fully detailed description of each assessment can be found in (Cooke et al., 2005). It is out of the scope of this literature review to go into such detail.

### 2.7. Treatment methods

A literature review indicates that there are several kinds of rehabilitation methods available. Some are specifically designed for occupational therapy intervention and others fall under the general umbrella of rehabilitation, without clear definition of who would administer the treatment.

Functional ADL and standardized measures that are used in regards to the rehabilitation of neglect fuel a debate about whether rehabilitation strategies are effective. However, research does suggest that a combination of remedial and compensation must be applied in treatment (Neistadt, 1990). Three basic treatment strategies are suggested (Berryman et al., 2010; Warren, 1993). The first is to remediate or minimise the sensory deficit, which is directed to the foundation skills of visual functioning, the second is to teach compensatory strategies and the third is to provide education. What follows next is a short outline of research available in the literature of each treatment strategy.

In terms of remediation, Warren (1993) suggests directing attention to the foundation skills of visual functioning. Some examples of remediation include prism glasses, which are used to “shift the visual field to the right in order to promote exploration of the left visual field” (Proto et al, 2009, p. 151). Turton, O’Leary, Gabb, Woodward and Gilchrist (2009) from the Occupational Therapy Department University of Bristol, conducted a pilot study in the form of a randomized control trial
to assess the impact of prism adaptation on self-care tasks. Treatment was administered for two weeks. Before each treatment session participants were asked to undertake pointing accuracy tests. Self-care tasks were measured by observation and the Behavioural Inattention Test (BIT) was also completed. The treatment was given five days a week for two weeks as well as receiving ‘normal’ rehabilitation. The authors do not specify what normal treatment consists of. Results showed improvement in pointing tasks for participants of prism glasses but “there was no effect on everyday neglect behaviour” (p.192). The authors recommended that further study should be done around optimum treatment sessions (length/duration) and optimum prism strength and adaptation methods.

Another group of occupational therapists (Shiraishi, Yamakawa, Itou, Muraki, & Asada, 2008), did research that was designed to find out the long term effect on activity performance after using prism adaptations. Prism glasses were used for 8 weeks of intervention. The Barthel Index was used to measure ADL capabilities. Intervention consisted of participants performing peg board and ring tossing tasks. Results showed that there was no significant improvement in ADL Barthel Index scores, however, subjects reported a qualitative improvement of ADL,

where some patients bumped their left legs and shoulders into furniture, tables, or chairs less frequently at home, and they were able to find and take out food from the left side of their refrigerators (pp.146).

The authors reported that this type of intervention could improve eye movement to the neglect side and that further research, both quantitative and qualitative, was needed to find the effects of prisms in daily activities.

Oclusion is another remedial technique and it involves the covering up of the ‘good, working’ eye, therefore allowing the ‘bad’ affected eye to do more work with the hope that it will start functioning normally.
Barret and Burkholder (2006) completed a study to explore monocular patching on subjects who had had a stroke. Subjects were asked to perform the line bisection test while watching their performance on a video monitor. They were tested with and without the use of right and left eye patches. The study result showed that “both right and left patches decreased individual subject PA (perceptual-attention) spatial bias” (pp.337). The authors suggest that further study is needed in regards to the effectiveness of patching.

Scanning is a compensatory technique aimed at improving a person’s ability to scan to the affected side with the intention of improving abilities in activities of daily living. It is one of the most recommended and researched intervention and its application is found in almost all activities of daily living (Berryman et al., 2010). Results are usually measured by line cancellation, bisection and copying tasks. Generalization to other tasks has been shown to be low (Proto et al., 2009).

Virtual reality computer systems is a fairly new compensatory rehabilitation technique which aims to increase head movement, gaze tracking, and visual cueing (Proto et al., 2009). This treatment method seems to be growing within rehabilitation settings. It includes the use of virtual reality (VR) which,

\begin{quote}
entails the use of advanced technologies, including computers and various multimedia peripherals, to produce a simulated (that is, virtual) environment that users perceive as comparable to real world objects and events (Weiss, Naveh & Katz, 2003, p. 39).
\end{quote}

More recently (Weiss, Naveh, & Katz, 2003) conducted research to see if a VR system could be used to train people with “unilateral spatial neglect to cross streets in a safe and vigilant manner”. (p.39). This study included a group of twelve subjects ranging between the ages of fifty-five and seventy-five, six with neglect and six without. The group received twelve training sessions given over a period of four weeks, each session lasting about thirty minutes (p47) using a VR system. The study
shows that VR is suitable in training people who have difficulty with street crossings. It describes the benefits of such a system with vulnerable groups of patients:

*It is dangerous to teach an elderly man with Parkinson’s disease to cross a busy street, yet impractical to construct a realistic physical mock-up of such a task . . . as a result, patients have few opportunities to engage in purposeful and meaningful tasks (Weiss, Naveh, & Katz, 2003, p. 43) (Weiss et al., 2003)(p43).*

However, the authors propose that more research is needed to find out if skills learned using the system can be transferred to other tasks.

Such computer systems have many advantages. For example, it can be relatively easy to change the virtual environment. It makes it possible to grade task difficulty and to adapt tasks according to the patient’s capabilities. The advantages of VR are important to note because they contain features that are essential to cognitive and motor remediation (p. 42). Studies have also found that such systems may increase motivation (Weiss et al., 2003), since they provide immediate feedback. When participants were interviewed they reported that the tasks were interesting and stimulating, and that they also had functional relevance to their everyday lives (p48). The VR tool also allows for self-training and learning/practice in a safe environment and can come at a relatively low cost as it allows for customized training programs.

*Education* aims to increase patient awareness of their deficit (Gianutsos & Matheson, 1987), which is of great importance, especially in the treatment of neglect (Berryman et al., 2010). Most studies show that regular systematic treatment is important to consolidate skills and this includes the use of the interdisciplinary team (Berryman et al., 2010). Although utilizing family members and multidisciplinary team members in a rehabilitation program for people with neglect seems logical in order for the person to become aware of their neglect, there is little evidence in the literature that this is happening (Proto et al., 2009). However, two articles were found that
emphasized the importance of interdisciplinary teams, family support and education within the process of rehabilitation.

Occupational therapists (Tham & Kielhofner, 2003), conducted a qualitative study in which four women with unilateral neglect were interviewed over a period of four months. The analysis of the study focused on how these persons with unilateral neglect experienced and responded to others in their everyday lives (Tham & Kielhofner, 2003, p.403). The article explored how a range of such interactions helped the women become more aware of their neglect and learn to utilize strategies to compensate.

Another compensatory method is described by Niemeier (1998) as the Lighthouse Strategy. This is a visual imagery technique in which subjects have to imagine that they are a lighthouse, using their eyes to scan/sweep the landscape. They are given posters to put in commonly used places in their home as a reminder. The effectiveness of this approach was increased by providing education across the interdisciplinary team and significant others, who could reinforce the scanning techniques. Results of the study show that treatment groups had improved assessment scores and family members reported observing that they had noticed improved mobility and safety judgement.

2.8. The role of occupational therapy

Many of the above approaches are described as being carried out by occupational therapists. There is some current evidence that other disciplinary areas are involved with the assessment, treatment and research of NVI, such as optometry service (Ciuffreda et al., 2008; I. Suchoff & R. Gianutsos, 2000). Occupational therapists are in a good situation to play a crucial role in the rehabilitation of NVI, due to their predominance in the rehabilitation setting and their general understanding of perceptual and cognitive processing. They are also in a position to make observations on functional visual problems during their assessments (Scheiman, 1997). However,
Warren (1993), reports that although visual perception dysfunction is a major concern of occupational therapists working with acquired brain injury patients, there appears to be little agreement with what is best practice for assessment and treatment in this area (Copolillo, Warren, & Teitelman, 2007). It is no surprise then that it is one of the least understood areas in terms of assessment and treatment (Warren, 1993).

In addition, there is some concern that occupational therapy training is not detailed enough to ensure that graduates can correctly identify and treat some vision disorders (Lampert & Lapolice, 1995). The world health organisation (2005) explains that this is likely due to the fact that

“The relationship between low vision and blindness has only recently been well understood, low vision has received very little attention by societies worldwide, and in most places has not yet been successfully integrated into the healthcare, education or rehabilitation systems, nor indeed even into public consciousness.” (Arditi, Corn, Goodrich, & Inde, 2005).

The WHO goes on to say that low vision should be a part of all educational curricula for those professionals likely to work with vision impairment.

It is also suggested that occupational therapists introduce a model of visual screening and functioning in the rehabilitation setting and that standardized assessment of all brain injury clients is introduced, especially since not all clients are able to recognize that there is a visual problem (Mather, 2012).

As low vision (including NVI) is an increasingly growing area for occupational therapists it is important to examine their role and the part they play within the multidisciplinary team.

However, there has been little to no description on the role of occupational therapy in the area of low vision and the types of services they
are currently providing. “This absence hampers the ability to expand models of practice or conduct outcomes research” (Copolillo et al., 2007).

2.9. Summary

This chapter has given an overview of the literature available regarding NVI, its assessment and treatment. It has discussed in detail the hierarchy of visual perceptual skills as suggested by Warren (1993). A brief overview has been given of normal visual functioning, in order to provide a background to understanding NVI. Impact of NVI on occupation has been described. This chapter has also given an overview of assessments and treatment options available in current literature and a description of the role of occupational therapy within this area.
3. Chapter 3: Methodology

This chapter is intended to give an overview of the research design method and underlying research methodology. An overview will be given of the development of the research tool (survey design), the selection of participants, and the ethical considerations. Lastly it will outline how data collection and data analysis were achieved.

3.1. Methodology

A naturalistic inquiry paradigm approach has been taken for this research study, as it allows for the study of a phenomenon in its natural state (Sandelowski, 2000), in this case, occupational therapists working in the New Zealand context. Within a naturalistic paradigm there is the assumption that there is more than one reality and behaviour is influenced by context (Guba, 1981). In this particular case, there are multiple occupational therapists working in a variety of different contexts and settings. It is the researcher’s job to represent the multiple realities of the research participants (Krefting, 1991). Therefore, the researcher is interested in finding both similarities and differences between participants in order to seek a greater understanding of what is happening. In such a study, the assumption is that generalisation is not possible but that “working hypotheses” are made in relation to the study’s particular context (Guba, 1981).
In order to achieve this, a qualitative descriptive methodology has been used. Qualitative descriptive designs are, ‘typically an eclectic but reasonable and well-considered combination of sampling, and data collection, analysis and representational techniques (Sandelowski, 2000). Currently, there is no evidence in New Zealand of what is happening in the area of NVI and occupational therapy intervention and a qualitative descriptive approach is most suitable to use in an area where there is relatively little research (Sandelowski, 2000).

There are many theoretical positions that can be taken in relation to qualitative research and the field is neither unified nor well-defined. For example, within the literature there is much debate about what is considered qualitative research. Some literature suggests that there is too much emphasis placed on the link between theory and method, particularly in health care research, which is aimed at specific practical problems and issues (Pope & Mays, 2006). This means that theory can guide the determination of methods, rather than the question or issue. Sandelowski (2000), also states that ‘no method is absolutely weak or strong, but rather more or less useful or appropriate in relation to certain purposes’ (p.335).

There is growing recognition that the distinction between qualitative and quantitative research is unhelpful and inaccurate within health and social science (Pope & Mays, 2008). As Pope & Mays (2008) point out, qualitative research is often, in its most basic form, a technique for discovering the common terminology and understandings of a group, which is often helpful in subsequent quantitative studies. Qualitative research deals with people and the complexity of human interactions, and this is especially the case in health care. The qualitative research is needed before behaviours and events can be quantified. In the case of this research, the aim is to describe the behaviours occupational therapists
display in terms of their assessment and treatment. Two survey studies were found done in other countries, one regarding NVI (Taylor, Poland, & Stephenson, 2002) and one regarding the role of occupational therapy in the treatment area of low vision (Copolillo et al., 2007). This is especially the case since there is no similar research available in New Zealand.

A topical survey is classified by Sandelowski and Barroso (2003) as a study that contains more listing and categorizing of the participants answers. Topical surveys can be valuable descriptive studies, however, they often do not meet the purposeful sampling and fundamental interpretive data associated with qualitative research. (Sandelowski & Barroso, 2003). Often the topics or ‘themes’ generated in this type of research are pre-set by the interview questions. The data is often treated as simple facts and feelings (Sandelowski, 2000). These themes are then supported by a few quotes. Percentages generated in such a survey are generally used in a descriptive manner only, e.g. 10% of the participants said ‘x, y or z’. Sometimes the survey as a method can appear to exist in a ‘no-man’s land’ between quantitative and qualitative methods. For example, statistics can be used descriptively in a topical survey. This does not make the study quantitative, since these statistics are being used in relation to a sample that does not meet the criteria for a quantitative study.

In contrast to the topical survey, the thematic survey is a study that uses a greater degree of data transformation, meaning that data is organised in themes and patterns, rather then lists and categories. It attempts to describe themes with only a small amount of listing and categorizing. What distinguishes thematic surveys from topic surveys is the extent to which the data is transformed through interpretation. Thematic surveys move the data from mere listing and categorizing to more detailed experiences gathered from the data. (Sandelowski
& Barroso, 2003). These are designed to elicit responses that explore experiences and allow for the formation of themes.

This study is based on the use of a topical survey. See the appendix 3.A for the research survey. Themes were generated but analysis stayed on the surface, close to the data itself. Categorisation and listing were used to analyse data. This research can be seen as a pilot to create further questions and instigate further research in the area of NVI. Pilot studies such as this are often used to collect preliminary data and develop a research question and a research plan for further studies. (Teijlingen van & Hundley, 2001).

3.2. Method and data collection

Within the overall context of a qualitative descriptive approach a topical survey was chosen as the best method of achieving an understanding of the research question. This enabled both numeric and narrative data to be collected, both of which were used to describe the phenomenon in question.

Advantages of the survey method is that they:

a) are quick to do, so respondents may be more inclined to take part
b) are good at measuring attitudes and eliciting other specific content from research participants
c) are inexpensive.
d) enable the researcher to reach a larger number of respondents than a strictly qualitative approach (DePoy & Gitlin, 2005).

The disadvantages of surveys is that they must be kept short and inevitably lack the depth of face to face interviews, the researcher has less control over the
quality of the data and respondents may simply choose to skip particular questions. In addition, it is more difficult to target specific individuals who may have a worthwhile perspective. However, in an exploratory study such as this, these disadvantages are usually likely to be less serious.

The length of the survey is crucial for the research. A balance must be struck between having it short enough not to be too formidable for a potential participant (Matthews & Kostelis, 2011) but long enough to include the questions that enable the research question to be answered. In terms of design, it is important that questions should be concise and clear, containing one single thought, allowing no room for misinterpretation (Matthews & Kostelis, 2011).

The language used should keep the demographic target audience in mind (Matthews & Kostelis, 2011), in this case a professional group specialising in the area of brain injury rehabilitation. However, even with such a group it is important to check out assumptions about general and specific levels of understanding and so using a pilot as part of the development is considered important (Matthews & Kostelis, 2011).

Pilot studies are often used to improve internal validity of the survey. This is done by administering the survey to pilot subjects in exactly the same way as it would be administered in the main study. Subjects are asked for their feedback regarding ambiguities, difficult questions and re-wording of questions. Time taken to complete the survey is evaluated and all unnecessary questions are identified and illuminated. Answers are evaluated in terms of information and response range. The survey is amended and piloted again if possible. (Teijlingen van & Hundley, 2001). In this case the survey was piloted with three different people at three different times. One occupational therapist with numerous years of experience working with acquired brain injury and NVI. One occupational
therapist with knowledge regarding qualitative research and surveys. Lastly, it was piloted on someone who is a researcher.

The pilot helped to establish the right language to use in the survey, established the flow of the survey and helped to determine the length of the survey. The first time it was piloted, the survey was too long (45 minutes) and the length was adjusted to take under 30 minutes. Of course this did depend on the individual filling out the survey. The last time the survey was piloted, (by a researcher), the question was asked whether the survey was qualitative ‘enough’. The honest answer was the the survey would fall somewhere between quantitative and qualitative. It was decided to leave the survey as it was, as all the questions were important.

The medium is also important. There are several advantages and disadvantages in using a web-based survey versus a paper-based mail out of surveys (Archer, 2003). Advantages of a web-based survey are that there is relatively little cost associated with it. In this case, the only cost was membership to SurveyMonkey to create the survey and this cost was eliminated because my employer gave me free access to the site. It is also possible to reduce time creating the web-based survey versus a paper survey, as the format is often already pre-determined and thus eliminates the editing work. The web-based survey allows for response data to be collected almost instantly as well as response data to be available in graphs and numerical data. Reminders can be set-up to go out automatically, saving the researcher time. Data from the web-based surveys can often be automatically put into data analysis software programs (Archer, 2003).

The look, or aesthetic, of the survey also needs to be taken into account, as people are more likely to participate in something that looks attractive (Matthews
& Kostelis, 2011). In this case the researcher had access to the survey development tool, SurveyMonkey.com. SurveyMonkey allows for surveys to be created relatively simply by using an online site (surveymonkey.com). It offers different formats for asking questions (open-ended, closed-ended, likert scale etc.). The site allows you to collect responses, within your own time frame. Collection is done via an online link that can be placed on websites such as NZAOT special interest groups. All respondents have to do is click on the link and they will automatically be taken to the survey.

The survey development tool very much determined the lay out, although some aspects were able to be altered, such as color and background. A limitation to the use of SurveyMonkey is that it has a set format in asking questions and this can be restrictive in the way you ask a question and how you organise the answer set, for the multiple choice questions for example (Rosebaum & Lidz).

SurveyMonkey does not perform advanced statistics like standard deviations, means, chi-square tests etc. If these are necessary it is possible to export the data into a spreadsheet and move into a statistical program like SPSS. At a more basic level, SurveyMonkey can tabulate data into bar charts and tables, providing response percent and response count. This level of descriptive statistics was all that was required for this study.

Questions in a survey can consist of both open and closed questions. The closed questions can be based on empirical and theoretical literature. Obviously such questions are inflexible in nature, coercing participants into choosing answers that are predetermined by the researcher (Forsyth & Kviz, 2006). Such closed
questions can then be followed by open-ended questions that elicit a series of topics from which themes can be derived (Teddlie & Tashakkori, 2009). Such a split between closed and open-ended questions can be useful in eliciting the degree of expertise in a group of therapists with reference to the wider field. My survey contained both closed-ended and open-ended questions (Teddlie & Tashakkori, 2009).

I used categorical questions in such a way that the participant needed to choose an answer. These questions allowed for specific response choices. All questions that required a multiple choice response gave the option of allowing respondents to explain their choice, thus allowing them to clarify their option in their own words (Matthews & Kostelis, 2011). Answers to such open-ended questions allowed themes to be generated (Forsyth & Kviz, 2006) in ways that were quite distinct from the themes generated through the literature. It is recognised that this approach to categorizing the data and creating themes can be challenging (Forsyth & Kviz, 2006). In addition, such open-ended questions can make the survey much longer to complete. For this reason I used only a small number of open-ended questions.

The survey was split into four sections: demographics, assessment, treatment, and therapist education. The demographic questions were developed with a view to understanding the extent of therapist experience and the places of employment. There was also due regard for questions of ethnicity. The survey questions about assessment and treatment were developed from the literature review. A small amount of assessment (Warren, 1993) and a broad spectrum of treatment (Barrett & Burkholder, 2006; Niemeier, 1998; Shiraishi et al., 2008)
methods were identified from the literature. This intention was to identify both what occupational therapists are doing and also to identify potential gaps in assessment and treatment practice. Finally the questions about education of therapists were developed in order to assess the significance therapists assigned to their area of practice and to gauge the extent of their enthusiasm for developing the role of the therapist within this area.

3.3. Sampling

Within a qualitative descriptive methodology, sample size is usually small and tends to depend on purposeful and convenient sampling methods (Magilvy & Thomas, 2009). In New Zealand the most efficient way of communication with the larger professional group is through special interest groups (SIGS) that are hosted by the the New Zealand Association of Occupation Therapists (NZAOT). The NZAOT web-site is accessible to the community of occupational therapists who have paid for membership of the association.

The Leaders and Managers SIG (LaMSIG) has 126 members, the Health of Older People SIG (HOPe SIG) has 287 members and the Neurology SIG (NeuroSIG) has 300 members. (New Zealand Association of Occupational Therapy, October 22, 2013).

Purposive sampling was used to approach all members of the Neurological special interest group (NeurologySIG) and Older Persons special interest group (HOPeSIG).
However, there may be a proportion of occupational therapists who do not choose to join the NZAOT and therefore would not have access to the special interest groups.

A downside of using web-based surveys is that not every possible respondent is connected to the internet (Dillman, 2000 in Archer, 2003), thus potential participants may be missed. To reach such potential participants, I posted on the Leaders and Managers special interest group, asking them to spread the survey through their networks (LAMSIG). Effectively, this added a ‘snowball’ approach to the overall sampling (Davidson, 2003). Snowballing or networking is used when researchers do not have direct access to the population and thus use a single subject to target others who meet the criteria of the study (DePoy & Gitlin, 2005). It was not possible to identify how many surveys were distributed to therapists.

A reminder was sent out to the SIGs after the survey had been online for three weeks, thanking those who had already participated and encouraging those who hadn’t. During the initial roll out of the survey there were two participants who were unable to connect to the survey. The link was posted again onto the NZAOT SIG website. There were no further issues with the SurveyMonkey tool.

Inclusion criteria was that the survey was intended to be filled in by occupational therapists working with people who have had an acquired brain injury in New Zealand. Conversely, the only exclusion criteria were those occupational therapists working in neurological rehabilitation who did not have access to people who have had acquired head injury.
3.4. Ethics

Ethical permission was gained through the Otago Polytechnic Ethics Committee (appendix 3.B). There were two concerns raised: firstly, regarding the paper-based consent form and secondly regarding the cultural sensitivity process. The first issue was resolved by the Ethics Committee stating that no separate informed consent form was needed for the paper-based copy of the survey.

The second concern was raised regarding the cultural sensitivity and consultation process with the Otago Polytechnic Kaithohutohu Office. Cultural considerations are important in this research as within New Zealand, Māori tend to have a higher incidence of stroke (Ministry of Health, 2003) and so consultation was needed to ensure that the online survey was culturally sensitive. Before the ethical permission was given, there was considerable communication with the Kaithohutohu Office (Appendix 3.C). The proposal was also communicated to the following groups: the New Zealand Association Māori Occupational Therapy group and Ngāti Kāpo (an organization that has been established to improve the quality of life of kāpo (blind) Māori and their whānau (family or family group). The organization is a national health and disability service provider for Māori and is driven by and for Māori disability consumers and is open to anyone who supports their vision. ([http://www.kapomaori.com](http://www.kapomaori.com) retrieved on 19 October 2013).

Ethical permission was also sought from the New Zealand Association of Occupational Therapists (NZAOT), since this is part of the process of posting online surveys through the SIGs.
An informed consent letter was placed at the beginning of the survey (Appendix 3.D), which meant that this was completed before the therapist engaged with the rest of the survey. This informed consent sheet advised participants that completing the survey would be taken as consent to use the material in the manner described. This had the additional benefit of de-identifying the data, since therapists were not required to sign anything and so confidentiality was assured. Settings on the survey site were changed so that the IP internet address was not collected, hence surveys could not be traced to certain email addresses or computers. The informed consent clearly pointed out that once they had completed the survey, therapists would not be able to withdraw their participation. Participants were offered the opportunity to ask questions of the researcher or supervisor, but such queries could not be directly linked to individual surveys. Potential harm to participants was considered to be minimal. The survey required about thirty minutes of their time and involved critical reflection on practice. Participants were all registered occupational therapists who had access to regular supervision to discuss any issues that may have arisen.

The survey was online for six weeks and was taken offline immediately following the period of collection. At this point paper copies were printed off for analysis and eventual storage for seven years at the School of Occupational Therapy. The only people who had access to the raw data included the research supervisor, student researcher and the quality improvement manager of the Royal New Zealand Foundation of the Blind (RNZFB). It was agreed that the quality improvement manager should be allowed access to the online survey in case there should be any technical issues. This was considered highly unlikely, but it was worth including in the ethics application as a possibility.
This research project was supported by the Royal New Zealand Foundation of the Blind, my former workplace. This support was granted in the form of paid study leave and the use of their subscription to SurveyMonkey. It was not considered these conditions offered any significant conflict of interest.

3.5. Data Analysis

When all the information was collected the data was ‘cleaned’, which involved examining it to detect errors, inconsistencies and missing answers (Wikibooks, 2013). At this point it was found that six therapists filled in the demographic section and did not proceed further. These forms were excluded from the data analysis.

Once data collection and cleaning were complete, I made folders for each individual survey section. Within each folder there were files related to each question within that particular section. Each document contained both the raw data and the phases of analysis. Some data went through three phases of analysis, and some went through four, depending on the depth of the data. Within each of these files there was also a section for reflection where the researcher wrote down ideas or thoughts, linking ideas and questions together. Each section of raw data, analysis and reflection was color coded (Appendix 3.E).

The narrative data was analysed by initially coding the material in the open-ended questions. Due to the nature of a qualitative survey and a qualitative descriptive method, the themes and interpretations made stayed close to original findings (Sandelowski, 2000).
3.6. Trustworthiness

The research supervisor read all the raw data, and checked each phase of the analysis as it was completed. Trustworthiness was maintained by ensuring the following criteria were met:

Credibility refers to the research findings giving a true picture of the phenomenon being studied. This true picture is based on the reality of the participant’s experience, not on the researcher’s assumptions. Peer debriefing was used with the supervisor during the data analysis phase of research to check themes and minimize bias, which helps to confirm the credibility and plausibility of the research findings (Guba, 1981).

Transferability refers to the ability of the method to be transferred to other settings (Guba, 1981). This research very clearly related to the New Zealand context of occupational therapy. There was no attempt made to suggest that these findings were automatically transferable to other settings. However, the intention is that enough information should be given in order to enable readers to make up their own mind if the findings are applicable to their practice setting (Finlay, 2006).

Confirmability refers to the ability for the research to show that the findings were not shaped by the researchers own hopes and expectations. This produces bias within the research and findings. The possibility of this was recognised because of the researcher’s immersion in the area of practice and intense desire to understand more about the practice of OTs in this area. In order to circumvent
this possibility reflective practice was used in conjunction with the supervision process. In addition, reflective notes and analysis meant that an audit trail was kept.

Potential bias was identified in relation to the academic, professional and personal background of the researcher. Researcher bias was minimized by having regular supervision sessions and by keeping a reflective diary. The formation of themes has also been checked by the research supervisor, thus eliminating some of the researcher bias.

3.7 Summary

This chapter has discussed the methodology and method of this research. In particular it has discussed the survey design and how it fits into qualitative research. The ethical approval process has also been described in detail as well as how this research meets trustworthiness criteria.
4. Chapter 4: Findings

This chapter reports findings from the survey, opening with a description of demographic data relating to the group of therapists who responded to the survey. This includes qualitative data from open-ended questions, as well as descriptive data (in the form of graphs) from the quantitative questions. The findings are largely organised under the broad themes developed for the survey: assessment, treatment and, lastly, education of the therapist. Responses to the open-ended questions have been coded, analysed and organized into sub-themes. These quotations are often concise and lack the richness that one might expect from interview data. However, in total they represent a rich source of information of the collective expertise in the area of NVI.

Quotations are numbered, with each participant being assigned a letter (A, B, C etc). Each participant then has a number in brackets beside the letter, indicating the number of the years the therapists has worked in an area where they encounter NVI. For example: participant K worked for 2-5 years in the area of NVI and so this participant is indicated by K(2-5).

4.1. Demographics

The first part of the survey consisted of questions regarding demographics of the survey participants. This adds to the body of knowledge that we have about New Zealand occupational therapists working with those who have
acquired brain injury. It helps establish the wide variety of areas that occupational therapists work in and, on average, how much experience they have working within this specialized area.

Twenty-nine (29) occupational therapists participated in the survey. Unfortunately, seven (7) of the participants did not proceed past the demographics section. Therefore, only those twenty-two (22) participants that completed the whole survey are included in the findings. The surveys were de-identified and so participants were not asked whether they were members of the New Zealand Association of Occupational Therapists. It was not possible to ascertain whether the surveys came via the special interest groups (SIGs) or whether they came through word of mouth, via snowballing. In these circumstances it is not possible to know the response rate. However, this would only be considered an issue if the study claimed to be quantitative in nature. It is not an issue in this study, which aims to simply describe the field.

All of the twenty-two participants are female and none of the participants identify themselves as being Māori. The majority of participants had been working for more than ten years in the area of stroke or acquired brain injury, with only two participants working for two or fewer years. This meant that a significant number of participants had at least ten years experience working as occupational therapists (Figure 4.1).
The majority of therapists worked in general positions, with only a small minority working in specialist neurorehabilitation positions (Figure 4.2).
4.2. Findings

There are four themes that emerged here: the role of the OT, assessment, treatment, and education.

Within each of the themes several sub-themes emerged and these have been developed following a careful analysis of the qualitative, open-ended questions that followed quantitative survey questions.

In both the assessment and the treatment section there were three sub-themes: assessment (role of MDT, use of function and assessment of visual
foundational skills); treatment (use of function in treatment, education of client and education of significant others). The section on further education was very short and no sub-themes were identified.

**4.3. Role of the occupational therapist**

Almost half of the therapists surveyed take responsibility for assessing NVI in every patient, indicating that therapists see this as a significant part of their role (figure 4.3).

![Figure 4.3 Frequency that therapists assess for NVI after stroke](image)

These therapists describe their role in relation to NVI assessment as both complex and involved:
Assess how the change in vision caused by neurological event impacts upon person’s function and to understand intact components (cognition, physical, affective) which can be utilised to compensate for the change in vision T(2).

Participants were asked whether they took a history of their client’s previous visual functioning, because underlying or long-standing visual deficits can have an effect on NVI occurring subsequent to the brain injury. Nearly half of all therapists said that they assessed every client for previous visual deficits. For example:

“Ask about glasses, last visit to optometrist, previous concerns K(2-5).

Participants were given the option of elaborating on this question. The following therapist gives us an insight into the clinical reasoning she uses when taking a visual history:

Really important to rule out previous impairments and e.g. if they wear glasses etc. to get accurate assessment results. Also really important to establish if patient themselves has noted any changes and their description of same J(2).

Therapists indicated that they spent, on average, from 0-5 hours on treatment. However, they found this a hard question to answer as treatment hours depended on the individual case:
I may only see individuals 1 time and only treat vision or not at all (5 mins to 60 mins), may see them weekly for 6 months and primarily focus on vision or not at all (if no deficit) I(10).

Varies widely depending on the patient and severity of NVI if patient has significant NVI would be incorporated into every treatment session J(2).

The following participant elaborated on how particular environments influenced the treatment they provided.

This rather depends on the setting and on the caseload priorities. In AT&R it will be more, in an acute setting less and in the community it will vary depending on the focus of that position - rehab v environmental check D(10).

Other therapists indicated that they have access to therapy assistants who work under their direction, enabling them to increase therapy input hours, thus creating consistency and continuity:

Patients may also be seen by therapy assistants on therapist’s behalf/under therapist guidance as therapy inpatient time often restricted T(2).

Therapists were asked if they refer to other specialist vision organizations. Figure 4.4 represents the agencies that therapists refer to and how often.
Figure 4.4 Agencies and the frequency that therapists refer to them

Therapists gave the following reason why referrals might be made to other agencies:

*Foundation for blind for aids and resources for activities of daily living and community.*  
*Ophthalmologist for visual field testing.*  
*Optometrist if previous problems with visual acuity needing review L(10).*
Setting up treatment protocols was often difficult within an inpatient setting.

For many therapists the lack of knowledge and understanding of NVI by the multi-disciplinary team was frustrating:

Once set up I can monitor more. However due to a lack of knowledge or understanding, often the strategies aren’t implemented by other MDT members, and therefore (I) need to be more involved. Also the set-up can be confusing especially with a variety of problems V(2-5).

Some therapists provided education to the MDT members regarding types and causes of NVI. This included education around the role that the occupational therapist and MDT members have in the assessment and treatment of NVI. One participant described how she implements this education in her everyday practice, giving examples of functional practical strategies that she uses:

I advise team on how to work with them in light of visual impairment, for example, positioning of food/drink. Not requiring them to do reading or visual tasks as part of therapy until they are able to cope with this. Helping them to find their possessions e.g. sponge bag, towel. Clothes etc., not leaving them to struggle G(10).

When asked what therapists believed their role to be in the assessment and treatment of NVI, therapists gave varying answers. For example there were a
number of therapists who indicated that they do not believe assessment for NVI is necessarily part of their role. These therapists explain that they only complete a visual screening and then refer to other specialist for more detailed assessments:

*Complete a visual screen and refer to appropriate specialists. O(2-5).*

Other occupational therapists identified that they have a role screening and passing on relevant referrals. However, it seems that the process of referral can be erratic and many potentially affected clients may go unnoticed:

*However this is only if I promote a referral or the doctor feels a referral is required. I’m sure a lot get overlooked V(2-5).*

When asked if other multidisciplinary team members take responsibility for assessment of NVI, some therapists indicated that they believe this to be the role of doctors (see figure 4.5). However, again there was a degree of ambiguity about whether doctors take this responsibility in practice.

*A medical doctor or eye doctor should diagnose and then the occupational therapists can teach compensatory techniques. Unfortunately it is often very difficult to get a doctor to assess and diagnose the problem leaving the occupational therapist to try and assess as well as treat in some way M(2-5).*
Answers highlighted the importance of networking and teamwork. Therapists clearly felt the need for in-depth assessment by more specialist professionals. Therapists used other agencies and specialists to give the client an informed choice about their treatment options, acknowledging that they might not have all the skills and equipment necessary:

To enable an individual to be able to make informed choices about treatments, services and equipment available to them for their visual impairment

Figure 4.5 Other MDT members who therapists believe assess for NVI
One participant mentioned that NVI might be picked up via the initial neuro assessment used within Rehab Ward, indicating that the responsibility might be diffused across the team. However, it was unclear what assessment was being referred to and so it is difficult to know how effective such assessments might be in practice.
4.4. Assessment

We know from the literature that the assessment of NVI is crucial in gaining a correct diagnosis and for setting up a treatment program. The assessment part of the survey was mainly designed around the hierarchy of visual functioning as designed by Warren (1993), in order to understand where deficits lie in the visual hierarchy.

4.4.1 *Standardised and non-standardised assessments of visual foundation skills*

The most common NVIs that therapists encountered included hemianopsia, neglect, and double vision. Some therapists indicated that they had also experienced clients who had deficits in the lower as well as the higher levels of the visual hierarchy. For example this therapist has come across visual deficits that lie within the whole of the hierarchy, not just higher or lower levels:

*Reduced scanning (decreased oculomotor), contrast sensitivity, diplopia, reduced visual attention, nystagnmus, vestibular dysfunction, poor acuity (distance and reading), cortical blindness, light sensitivity, reduced pupillary responses, impaired visual fields, reduced visual processing, glaucomas L (10).*

There are a large number of visual skills that can be affected by brain injury. Figure 4.6 illustrates the number of therapists who assess for each of these.
Scanning is assessed most frequently, whereas lower level visual functioning skills such as ocular motor, acuity and field deficits were assessed for the least.
Figure 4.6 Participants assess for the following NVI deficits.
There are a wide variety of assessments that occupational therapists use, both standardized (Table 4.1) and non-standardised (Table 4.2).

Non-standardised assessments included assessment of foundation skills lower in the visual hierarchy such as acuity. Interestingly, ocular-motor did not seem to be assessed for (i.e. muscles that move the eye), unless these were subsumed under tracking. They also assessed for perceptual skills, which are higher in the visual hierarchy. This categorisation has been developed through analysis and is open to further interpretation.
<table>
<thead>
<tr>
<th>Category 2. Non-standardized assessments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lower level skills</strong></td>
</tr>
<tr>
<td><strong>Acuity</strong></td>
</tr>
<tr>
<td>Reading paper, different font sizes</td>
</tr>
<tr>
<td><strong>Visual field tests</strong></td>
</tr>
<tr>
<td>Confrontation testing</td>
</tr>
<tr>
<td>Moving pens visual field chart</td>
</tr>
<tr>
<td>Bilateral simultaneous stimulus</td>
</tr>
<tr>
<td>Figure 8 tracking</td>
</tr>
<tr>
<td>Tracking using finger/pen to look at tracking</td>
</tr>
<tr>
<td><strong>Higher level skills</strong></td>
</tr>
<tr>
<td>Attention tests</td>
</tr>
<tr>
<td>Scanning assessment</td>
</tr>
<tr>
<td>Circling odds and evens,</td>
</tr>
<tr>
<td>Design copy</td>
</tr>
<tr>
<td><strong>Other</strong></td>
</tr>
<tr>
<td>“Neuro-visual screen”</td>
</tr>
<tr>
<td>CVA driving assessment</td>
</tr>
<tr>
<td>Mather-Veale Occupational Therapy neurological</td>
</tr>
<tr>
<td>Visual Screening Tool (6)</td>
</tr>
<tr>
<td>Observation</td>
</tr>
</tbody>
</table>
Some of these non-standardised assessments are based on home-made assessment items. For example: *taping numbers and letters to the walls N(6-10).*

### 4.4.2 Functional assessment

Therapists were clear that the visual deficits impacted on function:

> *Often problems aren’t picked up initially but the visual difficulties are lasting and have a significant effect on function C(6-10).*

Much of the material in the survey suggested that therapists rely heavily on functional observation as an assessment tool. Participants were asked what behaviours they observed that would indicate that NVI might be present in a client. This was an open-ended question that allowed the therapist to list a variety of different behaviors.

The full list of functional behaviours that occupational therapists looked for is summarised in Table 4.3. This was an extensive list and although answers were short they indicated a rich vein of behaviours that therapists recognised as related to NVI. These behaviors were analysed and sorted into categories: experiences as reported by clients, observations of postural changes, behavioral changes in function tasks, changes in mobility and material regarding behavior gathered from other sources.
<table>
<thead>
<tr>
<th>Experience as reported by client</th>
<th>Observation of posture</th>
<th>Functional tasks</th>
<th>Mobility</th>
<th>Information from other sources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Headaches</td>
<td>Poor balance and weight distribution</td>
<td>Overfilling glasses</td>
<td>Placing objects towards one side or going through doorways/halls near one edge (or hitting)</td>
<td>Review medical notes</td>
</tr>
<tr>
<td>Eyestrain</td>
<td>Squinting</td>
<td>Not recognising familiar objects</td>
<td>Inability to walk in a straight line</td>
<td>Brain scans</td>
</tr>
<tr>
<td>Light sensitivity</td>
<td>Changes in gait</td>
<td>Missing objects when searching</td>
<td>Poor/ altered mobility/negotiation of environment, keeping balance</td>
<td>Family feedback</td>
</tr>
<tr>
<td>Nausea</td>
<td>Looking out of the corner of eyes</td>
<td>Avoidance of driving</td>
<td>Avoidance or increased anxiety and difficulty in navigating visually complex situations e.g. supermarket, shopping malls</td>
<td>Discussion with MDT</td>
</tr>
<tr>
<td>Dizziness</td>
<td>Excessive use of hands within a task as a guide, running finger along wall</td>
<td>Wearing sunglasses, reduced function with low light</td>
<td>Difficulties locating steps or curbs, misjudging distances when catching a ball, walking up steps</td>
<td>Observation by nurses.</td>
</tr>
<tr>
<td>Double vision</td>
<td>Cocking head to one side</td>
<td>Poor concentration and visual attending</td>
<td>Banging, knocking or walking into things, frequent falls</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>Rubbing eyes</td>
<td>Using a finger to locate the next line of text</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seeing squiggly lines</td>
<td>Poor hand–eye coordination</td>
<td>Poor reading and tolerance for computer activities, reading etc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor facial recognition</td>
<td>Visual midline shift</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.5. Treatment

Treatment of NVI is based on an effective assessment and therapists were clear about the relationship between assessment and treatment.

*If the OT is proficient at assessing NVI, timely input can often be initiated.* If the visual input entering the CNS is optimal it becomes clearer what the cognitive problems are and what remedial/coping strategies can be incorporated into interventions C(6-10).

The following table summarises the treatment approaches indicated by therapists. Average ratings indicate that the most commonly used approaches are education and environmental set-up, followed closely by scanning. The approaches that were used least frequently include a raft of potentially useful approaches including prisms, public identifiers, ‘other’ equipment and computer technology. Approaches that were used relatively frequently included lighting, contrast, size, glare reduction, tracking, fixation, maximizing other senses,
Figure 4.9 Treatment strategies used by occupational therapists
In the open-ended question therapists gave a range of interesting details to describe their approaches to treatment. Some therapists indicated an approach that focused on specific skills:

Education in use of techniques around use of contrast, size, scanning, lighting (positioning, type, etc.); tracking and fixation (both for mobility and activities of daily living); use of eccentric vision mainly within functional tasks (as patients tend to only be able to use this for limited time) P(6-10).

However, there was a significant emphasis on the integration of specific techniques into an overall functional approach. For example, this therapist gave a very detailed example of functional and practical treatment strategies that she uses:

. . . trials of different techniques, for example, a client with one arm who walked into closed doors while carrying items (so had no arm to physically check). We trialled placing contrast lines around the door, but straight lines did not work for her. A simple cut out image on the door worked. A lady whose vision makes her feel everything is moving, needs to hold walls for stability, have seat for showering, hold handle when walking outside. Listening to explanations given by client and working together for a solution- N(6-10)

The following therapist gave good examples of strategies she used and how she incorporated grading and complexity:

. . . visual perceptual activities gradually extending time spent and
complexity of task . . . often begin with table top activities as these can easily be short and simple and made complex but they can stop when fatigued . . . move onto functional activities cooking, from making toast and sandwiches to cooking a stir fry etc. G(10).

Education was emphasized, including the education of clients on using other senses and their remaining vision:

Maximizing use of other senses (e.g. especially tactual alongside smell, hearing, proprioception, taste) glare reduction (e.g. use of blinds, sun glasses, hats, etc.) . . . use of eccentric vision mainly within functional tasks (as patients tend to only be able to use this for limited time) P(6-10).

The education of significant others is important because they are often utilized to provide ongoing support of treatment strategies outside the therapy sessions. For this a clear education of NVI and a rationale for treatment strategies are necessary as described by the following participant:

The education for family and support people is vital as visual impairment post-stroke is such a sudden loss. Patient and support people utilising strategies outside of therapy sessions and understanding rationale for same is crucial J(2).

The education of significant others to implement treatment strategies is important as therapists indicate they spend an average of 0-5 hours on
treatment. The utilization of family ensures consistency and repetition of strategies, and increases the likelihood of the strategies becoming habitual:

Incorporating verbal cues and explanation into functional tasks. Wherever practicable, early treatment in the patient’s own home environment with the focus on function. Individual remedial work using e.g. games and cards. Involving other staff and family in reinforcement of treatment principles and practices D(10).

Therapists were asked whether they felt that their treatment was successful and there was a somewhat ambiguous response from some:

Depends on definition of success with treatment. Often core function still remains, but functional ability increases I(10).

In general, there was agreement that though the problems don’t fully disappear yet things do change for the client, as illustrated by the following participant:

Often problems don’t fully resolve but often awareness improves and more willing to break task into components and use strategies to help with supermarket shopping etc. Relatives are often more understanding C(6-10).

The following participant gives a detailed and honest description of what improvements are made and why further improvement is often not achievable:
Moderate improvements noted if only in patient’s understanding and knowledge of their impairment alongside use of techniques they can use to manage this (for both patient, family and caregivers) . . .

There are a range of factors that can impact on the potential outcomes:

. . . it can be hampered due to age group I work with, multisensory loss (e.g. hearing, physical and cognitive impairment) P(6-10).

Therapists showed an understanding that treatment can vary greatly depending on the individual they are treating. They acknowledged that a successful outcome could be determined by the clients cognitive and physical functioning:

Sometimes, it depends on the problem and the person’s insight to recognize the problem, actively participate on the treatment and compensation approaches A(10).
4.6. Education of the therapist

In this final section therapists were asked about the adequacy of their education in terms of being able to work in the area of NVI. Most therapists felt that their training at the educational institutions was very basic (figure 4.8):

*Training at . . . did not address this area of practice J(2).*

![Q26: How do you feel your education has prepared you working with NVI?](image)

*Figure 4.10 Indication of how well education has prepared participants to work with NVI*  

Many therapists have been practising in the area of acquired brain injury for more than 10 years and have been graduates for considerably longer:
As a new grad 40+ years ago I don’t think I had too much awareness of the impact of NVI let alone able to assess D(10).

When asked about the evidence base for their practice, many participants indicated that they learn from the clinical expertise of other occupational therapists and their own experience (Figure 4.9). Textbooks and research literature is utilized the least to guide participants practice.

![Figure 4.11 Indication of what therapists use as evidence base for their practice](image)

Almost without exception, therapists indicated that they are keen to learn more about NVI and they used a variety of methods to support their own learning in this area. A majority of the participants indicated that they
would profit from physical or practical guidance when asked what type of learning they would benefit from:

*Practical demonstration of assessments and treatments with patients with NVI’s; opportunity to assess and treat with supervision D(10).*

The lack of postgraduate education in this area was a significant finding of this research:

*Always keen for extending my skills, but hard to find learning in NZ that would I(10).*

There is one training course available to therapists, but therapists can find it difficult to access even this one day training course

*I am aware there is a very good training course available however it is very difficult to obtain finance for training at present L(10).*

However, other therapists indicated a willingness and ability to fund the learning courses that they find necessary for their work.

*I self-funded myself to do a workshop M(2-5).*
4.7. Summary

This chapter has summarized the assessment and treatment of NVI. It has also addressed some key issues in the requirements for further education in this area.

Demographic details of the participants indicated that a large number of therapists working in this area have a significant amount of experience. Admittedly, this is a cross-section of therapists and we have no idea of the total number of therapists working in the area or whether the sample was biased towards those with most experience. Most of the therapists sampled worked in the area of community and rehabilitation wards.

Therapists indicated that they felt occupational therapy has a significant role in the assessment and treatment of NVI. Referrals are made to other specialists, but there seemed to be little confidence that these would be dealt with systematically. Therapists use a variety of both standardized and non-standardised assessments and they also appear to be skilled in assessing for and treating NVI within a functional context. The lack of education, both undergraduate and postgraduate, was felt to be a significant issue among this group of experienced therapists.

The next chapter will discuss the implications of the findings and make recommendations on future considerations and studies.
5. Chapter 5: Discussion

This final chapter discusses the implications from the study findings presented in Chapter Five. The main focus of the study was to answer the following question: What methods are occupational therapists in New Zealand using to treat NVI following an acquired brain injury including cerebral vascular accident/stroke? In answering this question it was necessary to also gather information about assessment processes and the educational preparedness of therapists in this area. This discussion chapter will offer implications of the findings and how these might be considered in future research. The chapter will also detail what implications these findings have for undergraduate and postgraduate programs. Reflections on the research methodology and study limitations will be discussed at the end.

5.1. Role of the occupational therapist

One of the most significant findings of the study was a greater understanding of how occupational therapists perceive their role in relation to NVI. A high number of the respondents have over 10 years experience working in the area of NVI. This means that the participants are a highly experienced group of therapists and are likely to represent best practice in New Zealand at this time. A response from twenty therapists would be considered high by New Zealand rates, though it is difficult to give any comparative details of similar surveys. This response suggests the level of importance occupational therapists attach to this area, and their willingness to participate in research that might facilitate development in it.
Almost half of the therapists surveyed take responsibility for assessing NVI in every patient, indicating that therapists see this as a significant part of their role (figure 4), and in the literature they are seen to be proactive in the provision of assessment and treatment of NVI (Suchoff & Gianutsos, 2000). Nearly half of all therapists also said that they assess every client for previous visual deficits. However, when it comes to treatment it appears that therapists have a lesser role. Therapists indicated that they spend only, on average, from 0-5 hours on treatment. This figure could be expanded where therapists had access to therapy assistants working under their direction, thus enabling them to increase therapy input hours, creating greater consistency and continuity (T(2)).

An important part of the role of occupational therapists is to involve, or refer on to, specialist agencies after an initial screening. Most therapists referred at some stage to ophthalmologists and optometrists. However, they also referred patients with NVI on to community occupational therapists, which again indicates a sustained belief in the notion that occupational therapists have an important role in this area.

Occupational therapists appear to take responsibility for setting up treatment protocols for patients with NVI (V(2-5)). The frustration expressed by therapists in this study about the difficulty of enabling these protocols suggests also that they have a sense that this is an area for which they are responsible (G(10)).

Having said this, there are also a significant number of therapists who indicate they do not see the assessment of NVI as part of their role. Their
preference is to have this responsibility diffused across the multidisciplinary team. However, even in these cases they feel it is appropriate to do an initial visual screen (O(2-5)) before referring on to the appropriate specialists. There is a distinct unease about whether patients missed by an occupational therapist would in fact be overlooked (V(2-5)). There is an expectation that the medical doctor should take the role of assessment, but the occupational therapist felt that this did not happen (M(2-5)).

5.2. Assessment

In this section of the findings the results were reported using tick boxes, or short responses. These were collated into tables for analysis.

5.2.1 Assessment of visual foundation skills

A theoretical framework was developed by Warren (1993) to describe the place of visual performance within a hierarchy of visual perceptual skills and has been the basis for the research. Such a hierarchical approach is recommended in occupational therapy assessment to establish the nature of impairment (Berryman, Rasavage, & Politzer, 2010; Mather, 2012).

This study suggests some degree of ambiguity about the assessment of visual foundation skills. Occupational therapists suggest that they do assessments at the level of ocular-motor control, visual field deficits and acuity (K(2-5)). However, the assessments they use do not correspond to back this up (K(2-5). Given the complexity of visual impairment it is unsurprising that therapists are often unaware where in the hierarchy the visual deficits lie. Warren (1993) argues that therapists often concentrate on the assessment and treatment of perceptual difficulties and not on lower level visual functional
skills. This survey bears out this suggestion and finds that most therapists use perceptual assessment tools, such as the LOTCA-G and Cognistat (Cooke, McKenna, & Fleming, 2005), as well as line bisection and cancellation tasks which are targeted to detect visual neglect (Molenberghs & Sale, 2011) rather than using standardized assessment for assessing the foundation visual skills. However, therapists acknowledge that they are not sure how successful their treatment is and this may be partly due to lack of clear assessment protocols.

There is little clarity about the best assessments to use at this point, which is hardly surprising given the lack of occupational therapy research in this area (Copolillo, Warren, & Teitelman, 2007). The variety of assessments used is wide ranging, suggesting a lack of consistency throughout New Zealand. In fact there is confusion among some therapists about which assessments are standardized, which suggests that they are working with findings that are neither reliable nor valid. For example, standardized assessments such as line bisection and letter cancellation tests were often put as non-standardized (G(10)) . This would have repercussions for their treatment approach.

5.2.2 Screening and ongoing referrals

Some therapists in this survey indicated that they take responsibility for full assessment, others only complete a screening. Other therapists complete a screening and then attempt to refer on to other MDT members, such as ophthalmologists and optometrists. Yet, therapists believe that optometrists and ophthalmologists do not take responsibility for assessing for NVI, suggesting that networks with these professions is weak. However, there is a growing trend for these professions to start playing a bigger role in this assessment and treatment area (Suchoff & Gianutsos, 2000). Interestingly, only
three therapists refer to a vision therapist, which suggests a gap in service provision. Therapists also indicate that they refer to the Royal New Zealand Foundation of the Blind (RNZFB), which is somewhat contradictory given that the RNZFB does not provide a service in the area of NVI.

Therapists acknowledge that they believe a lot of NVI could be overlooked and therefore not treated because of the afore-mentioned reasons. It is clearly important that a good link is established between occupational therapists and ophthalmologists or optometrists (Berryman et al., 2010; Copolillo et al., 2007; Suchoff & Gianutsos, 2000), but it is equally obvious from this survey that such a link is often not available.

5.2.3 **Functional assessment**

Findings from the survey indicated that the most important tools for assessment by occupational therapists are the observation of functional tasks and behavioral symptoms. Occupational therapists are well equipped to carry out observations of functional activities and make observations around functional visual problems (Scheiman, 2011). The survey findings support this notion, since the majority of the therapists use functional tasks as a fundamental part of the assessment of NVI. They report looking for difficulties with functional tasks such as overfilling glasses, using a finger to locate the next line of text, missing objects when searching among others.

There are a range of behavioural symptoms associated with NVI which may be picked up in such functional assessments. These behavioural symptoms include headaches, difficulty reading, fatigue, sleepiness, squinting, closing of one eye, avoidance of close distance work (Mather, 2012). Other
behavioural symptoms associated with NVI may be confused with perceptual or cognitive impairment. These include head movement/tilting or an increase in muscle tone of the neck, jaw and shoulders (Warren, 1993).

The reporting of therapists provides a rich source of detail about behavioural symptoms that they consider as part of an assessment for NVI. For example, they report a range of postural observations that they use as possible indicators including poor balance and weight distribution or cocking head to one side. These postural observations were matched in rich detail by the range of observations about mobility, which included banging into things, frequent falls, or staying at the edges of spaces.

As part of this process of function, therapists also rely on clients to indicate whether there is something wrong with their vision. Symptoms noted by clients include: headaches, eyestrain, light sensitivity, nausea, dizziness, double vision, fatigue, seeing ‘squiggly lines’, poor facial recognition and/or anxiety. Obviously, not every client demonstrates insight into their visual deficits and subtle deficits may be missed. Therefore such self-reporting is not a reliable method of assessment of NVI.
5.3. Treatment

In developing the survey a series of questions about treatment were developed from the available research literature. The results indicate that the most commonly used approaches include education and environmental set-up. This is important because literature indicates that vision impairment combined with a poorly set up environment for daily living activities can hinder the rehabilitation process (Foster, 2010). Approaches that were used relatively frequently include the use of scanning, lighting, contrast, size, glare reduction, tracking, fixation, maximizing other senses. The approaches that were used least frequently include the use of prisms, public identifiers, ‘other’ equipment and computer technology. Some occupational therapy literature (Warren, 1993) and considerably more research coming from outside the profession such as optometry (Ciuffreda & Ludlam, 2011; Suchoff & Gianutsos, 2000), suggest that remediation of the foundational visual skills is possible. Techniques proposed are the use of prisms or occlusion. However, this research has found that remediation techniques are not often used by therapists. Instead therapists focus on the use of functional tasks to teach compensatory strategies, as well as environmental adaptation and education of clients. They use functional everyday tasks and adapt the environment or teach strategies to compensate for the vision loss.

In the open-ended question therapists give a range of interesting details to describe their approaches to treatment. Some therapists indicate an approach that focuses on specific skills such as the use of positioning, tracking, fixation, or use of eccentric vision (P(6-10)). There is a significant emphasis on the integration of specific techniques into an overall functional approach. For example, using a cut-out image on the door for a woman who walked into the door and always listening closely to clients and working together to find a solution (N(6-10)).
Education includes the education of clients on using other senses and their remaining vision (P(6-10)). The education of significant others is important because they are often utilized to provide ongoing support of treatment strategies outside the therapy sessions. For this, a clear education about NVI and rationale for treatment strategies are necessary (J(2)). The education of significant others to implement treatment strategies is important as therapists indicate they spend an average of 0-5 hours on treatment. The utilization of family ensures consistency and repetition of strategies, which is important if the strategies are to become habitual. Some literature that indicates the most valuable treatment often comes from family (Tham & Kielhofner, 2003). Most studies show that regular systematic treatment was important to consolidate skills (Proto, Pella, Hill, & Gouvier, 2009). Studies (Tham & Kielhofner, 2003) show that some treatment methods should persist for five weeks, five days a week for 1-2 hours a day in order for the treatment to have some success. Therefore, therapists are clearly not spending enough time treating patients to be able to make significant changes in their capabilities.

Therapists were asked whether they felt that their treatment was successful and there was a mixed response (I(10)). In general, there was agreement that though the problems don't fully disappear yet things do change for the client, who learn to find strategies to compensate for their deficits C(6-10). However, other factors besides the NVI impact on the chances of treatment success, particularly multisensory losses P(6-10) or capacity for insight A(10). The aim of patient education, therefore, is often to increase patient awareness of their deficit (Gianutsos & Matheson, 1987).
5.4. Education of therapists

Some of the literature suggests there is concern that occupational therapy training is not detailed enough to ensure that graduates can correctly identify and treat some vision disorders (Lampert & Lapolice, 1995). This has been supported by the findings of this research in which occupational therapists indicate that their knowledge from undergraduate level is limited and that they would benefit from further education $J(2)$ $D(10)$. Most significantly, therapists indicate that they will benefit from practical guidance and demonstrations, rather than theoretical knowledge.

Almost without exception, therapists indicate they are keen to learn more about NVI and that they use a variety of methods to support their own learning in this area. The lack of postgraduate education in this area was a significant finding of this research $I(10)$.

5.5. Limitations of the research

In qualitative research rigour is affiliated with trustworthiness, and it is the trustworthiness of the research process that ensures the utility of the study. In the context of qualitative research, trustworthiness is constructed from four components: credibility, transferability, dependability, and confirmability (Finlay, 2006; Morse, Barrett, Mayan, Olson, & Spiers, 2008).

Credibility of this study was underpinned by recruiting through a range of special interest groups, which are likely to represent some of the more active occupational therapists in New Zealand. The survey provided both closed and open questions which enabled respondents to be cued into
responses that were relevant to the topic and also provided them with the opportunity to use their own words to describe their experience. These aspects of the survey ensured credibility because respondents had genuine freedom of speech and their perspectives were accurately represented in the findings (Milne & Oberle, 2005). The survey design ensured respondents were given the opportunity to give as much or as little information as they felt comfortable with. However, this could be considered a limitation of the study, since many answers respondents gave were listed rather than providing rich or thick qualitative descriptions. This meant that an understanding of the clinical reasoning of the therapists was necessarily limited. Alternative qualitative methods, such as focus groups and telephone interviews were considered for this study. Unfortunately, it was found to be difficult to identify expert clinicians in the local area to target for the study. A survey enabled an overview of therapists from around New Zealand, and this was considered to be a strength since focus on a particular area might be limited in terms of the skills available. However, it limited the depth that might have come from a more traditional qualitative approach.

Transferability in qualitative research refers to the degree to which the researcher provides a detailed description of the research context and process. This information should be enough for the reader to determine whether the findings are applicable in their practice area (Curtin & Fossey, 2007). This research is done in the New Zealand context, on therapists who are likely to represent some of the most experienced practitioners in the area of neurological vision impairment. However, the survey only included the opinions of twenty therapists, which is a small percentage of the overall number of therapists working in this area. It is up to the reader to determine the relevance of this context to their own area of practice.
Dependability in the context of qualitative research is determined by whether the findings are authentically based on the collected data, rather than whether findings can be reproduced by another (Pitney, 2004). In order to ensure dependability this research included verbatim quotes, regular supervision, rich descriptions of the methodology and journaling through the research process.

Confirmability provides assurance that the research findings reflect the experiences and views of participants, rather than those of the researcher (Curtin & Fossey, 2007). In this case the researcher was an occupational therapist working with people who are blind and vision impaired, through the Royal New Zealand Foundation of the Blind. My work did not include neurological vision impairment and I did not work in the areas covered by the respondents, i.e. rehabilitation and community occupational therapy. This means that, as a researcher, I brought a certain degree of expertise to the study, but was also open to what the findings would bring. I ensured that the analysis process was transparent through using a journal and by having regular supervision. Findings were cross-checked by my supervisor after each level of analysis.
6. Conclusion and recommendations

There is little current research that describes the role of the occupational therapist in the assessment and treatment of low vision including NVI (Copolillo et al., 2007). More particularly, there is no research available in this area done in New Zealand. This is a significant gap since recent research done within New Zealand has found that implications of ABI are far-reaching and much greater then first thought (Copolillo et al., 2007; Feigin & Barker-Collo, 2008). This is certainly an area that is of high relevance to occupational therapy (Mather, 2012) and occupational therapists are well-placed to play a crucial role in the rehabilitation of NVI, due to their prevalence in the rehabilitation setting and their general understanding of perceptual and cognitive processing. They are also in the position to make observations on functional visual problems during their assessments (Scheiman, 1997).

The number of participants who responded to this survey is an indication of the current feeling that occupational therapy has an important role to play in this area but the research has highlighted that many therapists are unsure of their practices. Much of this research was based on the work of Mary Warren’s hierarchy of visual perceptual functioning (1993). I therefore advocate education that includes much more of the basic sciences and a good understanding of ophthalmology to enable therapists to work effectively in this area. Without such knowledge, therapists are obviously going to be ineffective in their treatment approaches. This would also require therapists to create networks with ophthalmology and optometry services, so that they may work together in accurately diagnosing NVI (Mather, 2012; Warren, 1993).

The World Health Organization suggests that low vision services should be part of all educational curricula for those professionals likely to work with
vision impairment (Arditi, Corn, Goodrich, & Inde, 2005) and this would include NVI. Within New Zealand it is suggested that a model of visual screening and functioning is introduced in the rehabilitation setting and that standardized assessment of all ABI clients is introduced (Mather, 2012). This would allow assessment and treatment in New Zealand to be more consistent than it is presently. However, there is little agreement about the best clinical protocols for assessment and treatment of NVI and more research is needed in this area. This research project is a significant step towards developing such clinical protocols and beginning to establish future research needs in this area. This is because, in order to proceed, it is necessary to first know what our profession is doing in the area of NVI. This research therefore reflects the current state of occupational therapy in New Zealand when it comes to the assessment and treatment of NVI. It also reflects the way occupational therapists working in this area view their role and how they feel about their education and educational opportunities within New Zealand that enable them to specialize and thrive in the area of NVI.

This study has made the very positive finding that occupational therapists feel they have an important role in the assessment and treatment of NVI. Therapists take responsibility for screening and basic assessment of NVI; they take responsibility for referring to the MDT team; they feel frustrated when they cannot persuade the wider team to be interested; they provide education to both client and significant others about the NVI and they want more education to be made available to them. However, it should not be inferred from this that occupational therapists believe they have an exclusive role in the area, but that they recognise the lack of smooth communication and the possible dangers that this imposes on their patients.
The strengths of occupational therapists are principally expressed in terms of functional assessment and treatment that provides significant insights into the experience of NVI. However, this is accompanied by significant weaknesses in terms of the assessment and treatment of visual foundation skills. If occupational therapists are to continue to claim a role in this area then this weakness needs to be addressed through education and research.
References


Appendices

Appendix A Survey

Appendix B Ethics approval

Appendix C Communication Kaithohutohu office

Appendix D Consent form

Appendix E Color coding of data