# Meeting the need for post-stroke vision care in Australia: A scoping narrative review of current practice

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**Implications for Rehabilitation**

- Post-stroke vision care in Australia is unstandardised, which may cause inequities in vision care provision to Australian stroke survivors in different regions and/or care facilities.
- Education and training pertaining to stroke-related vision conditions for stroke healthcare professionals and the inclusion of eye-care professionals in stroke care teams is likely to improve gaps in care practice/pathways identified in the current evidence base.
- Management of stroke-related visual conditions should be inclusive of detailed information provision that is specific to the patient's condition(s) and circumstances, as well as ongoing, long-term management strategies/ support services to better aid stroke survivor's reintegration into the community.

# Meeting the need for post-stroke vision care in Australia: A scoping narrative review of current practice

*Purpose:* Determine current vision care pathways and practices for stroke survivors in Australia and internationally, focusing on identifying reoccurring gaps in these pathways and unmet care needs. *Method:* A scoping review was conducted to identify literature related to post-stroke vision care practices and perspectives of patients and health professionals. *Results:* A total of 16193 articles were retrieved and 28 deemed eligible for inclusion. Six were Australian, 14 from the UK, four from the USA, and four from within Europe. Post-stroke vision care is largely unstandardized, with substantial inconsistency in the use of vision care protocols, who executes them and at what point in post-stroke care they are utilised. Health professionals and stroke survivors expressed that unmet care needs were primarily a result of lack of education and awareness regarding post-stroke eye problems. Other gaps in care pathways related to the timing of vision assessment, provision of ongoing support, and the integration of eye-care specialists into the stroke team. *Conclusion:* Further research is needed into current Australian post-stroke vision care to accurately assess whether the needs of stroke survivors are being met. Available evidence indicates that in Australia, there is a requirement for well-defined protocols for vision screening, education, management, and referral of stroke survivors.

Keywords: stroke, vision rehabilitation, neuro-ophthalmology, Australian healthcare, care pathways

## Introduction

Stroke is the second leading cause of cardiovascular death in Australia.(1) Despite a proportional decrease in stroke events, the actual number of stroke events has increased due to an ageing population.(2) There are approximately 37,000 stroke events occurring in Australia each year.(1) Evidence indicates that 60% of these strokes will result in some form of visual impairment.(3) As stroke most commonly occurs in those aged 65 years and over,(1) there is also likely to be a high prevalence of pre-existing age-related eye conditions within this population of stroke survivors. This includes common age-related eye conditions such as cataracts, glaucoma, macular degeneration and presbyopia. For stroke survivors, these conditions will be compounded by the presence of stroke-related visual deficits, severely impacting rehabilitation and daily life activities.(3, 4) There is a strong correlation between visual impairment and increased depression,(4) falls risk(5-7) and overall morbidity.(8, 9) Reports from stroke survivors also indicate that their visual impairment resulted in a number of barriers to reintegration into the community.(10, 11) These included an inability to return to work, pursue hobbies such as reading, and driving. This indicates that visual impairment can be a hindrance to the successful rehabilitation of stroke survivors and resumption of independent living if not adequately addressed.

The most commonly reported post-stroke vision problems are visual field loss, eye movement abnormalities and visual processing disorders, including hemispatial neglect. There is some recovery expected post-stroke, however, the degree tends to vary depending on the type of vision problem and severity of the stroke. Only approximately 17% of visual field loss recovers completely over the first three months post stroke, while up to 34% of visual processing disorders have been found to recover in this time.(12) Eye movement abnormalities, such as most gaze defects only partially recover or do not recover at all in the six-month period after stroke.(13) For patients with ocular cranial nerve palsies, some recovery over a period of 6-12 months after onset is expected, although recovery is often partial, with only approximately 22% recovering completely.(14)

While there is no cure for some visual deficits caused by stroke, there are several management techniques and services available that have been proven to effectively reduce the burden of them. The primary complaint of eye movement abnormalities such as cranial nerve palsies, gaze palsies and vergence disorders is usually diplopia. Simple management techniques such as correctly occluding one eye, the use of prisms or the adoption of an adaptive head posture to relieve diplopia are commonly used for these conditions. (13, 15) If deviations of this kind persist beyond the expected point of recovery, surgical intervention or use of Botulinum toxin to alter eye muscle actions may be appropriate. While these methods have not been systematically investigated within stroke survivors specifically, the available literature indicates their wide use and efficacy of these treatment options in adult strabismic populations. (16, 17) Similar methods can be beneficial in some cases, to manage nystagmus, with the use of pharmacological agents such as Gabapentin and Baclofen being more common. (18)

For visual field loss, one of the common management techniques used is visual scanning training. (15, 19) Such training is often administered through electronic programs but can also be taught using non-computerised scanning techniques and environmental cues. It is a form of compensatory therapy that aims to improve the frequency, speed and accuracy of eye movements into the affected visual field. (20, 21) Peli prisms are also used for management of visual field loss as a means of shifting images from an area of field loss into the part of the visual field that is seeing. This promotes awareness of objects in the area of vision loss and prompts/cues eye movement in that direction. (22) Another technique, visual restoration therapy (VRT) uses light stimuli at the border of the visual field defect with the aim of slowly expanding the visual field. The available evidence on VRT suggests there is little to no change in size of visual fields from this treatment and as such it is not commonly used in practice. (23, 24)

Similarly, visual scanning training is often used to treat visual neglect with varying levels of success. (25) Other reported methods of treatment for this condition include perceptual retraining, typoscopes and hemifield eye patching.(15, 26) However, little evidence is available regarding their success in stroke patients. Better reported is the recommendation of daily living training and the provision of aids and modifications. Services such as Guide Dogs Australia and Vision Australia can facilitate this kind of training and offer support to those with vision impairments to obtain appropriate aids and advice. Conversely other vision specific treatment such as patching, prisms, visual adaptation and orthoptic training would typically be delivered by an orthoptist, ophthalmologist or at times an occupational therapist or specialised nurse. A range of health professionals can also provide the necessary information to stroke survivors about their vision problems, what to expect and what services might be available.

Despite the range of services and treatment options available to stroke survivors with vision impairment, post-stroke vision care is scarcely addressed in Australian national stroke guidelines. The Australian Clinical Guidelines for Stroke Management currently only contain limited information regarding vision, including recommendation for visual acuity and visual field testing and treatment options for visual inattention only.(27) Not all Australian states have stroke specific guidelines, and of those that do, most do not address vision at all.(28, 29) South Australia Health's Stroke Management Procedures and Protocols (2019) states that occupational therapists or physiotherapists should provide rehabilitation for functional vision loss, compensatory skills for visual field loss, visual acuity and eye movement disorders, most of which would be outside their scope of practice. The named therapies are visual training, visual scanning and use of prisms, as well as the requirement to facilitate early referral to neurological vision specialists. (30) The lack of guidance specific to post-stroke vision care makes it difficult to know if stroke survivors in Australia are getting the vision care they need to best facilitate their recovery and return to the community. As such, the aim of this review is to determine what the current post-stroke vision care pathways and practices are in Australia and identify reoccurring gaps and unmet care needs within them.

## Methods

A review was planned to collate evidence relating to vision care pathways and practices for stroke survivors in Australia and compare these to countries with similar healthcare structures. A care pathway was defined as a process through which stroke survivors were assessed, managed and/ or referred for their vision problems. Countries of a similar healthcare structure were defined as developed countries with stroke specific services available. This review was carried out according to the PRISMA-ScR(31) guidelines.

### *Inclusion and exclusion criteria for studies*

*Types of studies*

Studies were eligible for inclusion in the review if they provided information on post-stroke vision care practices or any stage of the post-stroke vision care pathway and were published in English. Studies included were: systematic reviews, cohort studies, observational studies, retrospective medical file reviews, randomised controlled trials and controlled trials. Case studies were not included, as they refer to isolated scenarios rather than widely utilised practices or pathways. Scoping of the literature revealed no evidence relevant to the topic published in Australia prior to 2008, hence studies conducted prior to this were excluded. For consistency, international studies published prior to 2008 were also excluded and it is noted that they may be an outdated representation of current healthcare practices. Studies were also excluded if they were conducted in developing countries under the assumption that results would vary greatly from Australian healthcare practices and hence would not be comparable.

*Types of participants*

We included studies of participants of all ages who were found to have visual complications following stroke. Studies relating to children (under 18 years) were analysed separately to those with adult (18 years and over) participants, as the care pathways are likely to differ based on the legal requirements for providing medical care to minors. Studies including participants of mixed health conditions were included if results for stroke survivors could be adequately differentiated. Studies with populations of health professionals who provide stroke care were also included.

***Search methods and databases***

A systematic search strategy was used to search the following key electronic databases:

- PubMed (2008- January 2022)
- Cochrane Library (2008- January 2022)
- MEDLINE (2008- January 2022)
- EMBASE (2008- January 2022)
- Australian Orthoptic Journal (2008- January 2022)

As the primary aim of this review is to identify literature relating to Australian post-stroke vision care pathways and practices, other international Orthoptic Journals were not included in the search. Search terms included a variety of MESH terms and alternatives relating to stroke, vision impairment and care provision. The complete search strategy for the PubMed database is provided as an example in Figure 1 manual search of reference lists from relevant Australian articles was also conducted. [Figure 1 near here]

***Study Selection***

Titles and abstracts returned from the search were independently reviewed by two authors (SS, SL) using the predetermined inclusion criteria. If a study could not be properly evaluated based on title and abstract alone, the full paper was obtained. Full papers were also obtained for the studies deemed eligible for inclusion. A second review of all full paper articles was then conducted to determine those studies eligible for inclusion.

### *Data collection*

Data extraction forms were designed to capture key study elements, and to inform quality assessment and categorisation. Further information collected included data pertaining to post-stroke vision care practices and pathways at each stage of care.

### *Data analysis*

Data analysis was inductive and largely descriptive due to the emerging nature of the review topic and variable study types included. This resulted in a narrative review. Care pathways are likely to differ between countries, healthcare models and time, making accurate synthesis of such data difficult. The variability of study types also produces different types of data (qualitative and quantitative) and so a thematic and descriptive approach was deemed the most appropriate. Data extracted was grouped according to the areas of post-stroke vision care. Descriptive statistics relevant to each stage of care were then collated and where possible, information on Australian post-stroke vision care was compared to that provided in other jurisdictions.

## Results

Figure 2 illustrates the results of the search. A total of 28 articles met the inclusion criteria for this review. Of the studies included, eight were cross-sectional studies, nine were cohort studies (both retrospective and prospective), five were qualitative studies, one was a mixed method study, three were multicentre prospective studies as well as one consensus study and one audit report. Studies varied in objectives, with most aiming to describe and appraise vision care provision for stroke survivors within specific regions or amongst specific professional groups. Other studies sought to explore the experience and perspectives of post-stroke vision care for stroke survivors, their carers and health professionals. [Figure 2 near here]

The countries from which data was collected included Australia (n=6), the UK (n=12), USA (n=4), Scotland (n=2), Finland (n=1), Denmark (n=1), Germany (n=1) and Norway (n=1). Of the studies included 15 provided information on vision screening and assessment of stroke survivors, 16 included information regarding management and referral, six included information relevant to education and information dissemination and 11 discussed perceptions of care and/or barriers to care.

***Care Provision***

*Screening & Assessment*

The available evidence indicates that the timing of vision screening and assessment of stroke survivors is of key importance to the quality of overall post-stroke vision care. The Vision in Stroke (VIS) study (2006-2016) surveying outpatients with stroke found that the median duration from stroke onset to initial eye examination was 22 days among stroke patients in 20 acute Trust hospitals in the UK. (32) More recently (2014-2015), further UK research in the Impact of Vision Impairment after Stroke (IVIS) study, interviewed 24 stroke health professionals working in integrated stroke/vision services. These interviews revealed that there was an aim to undertake initial vision assessment within one week of stroke onset/ admission.(33) However, in a slightly earlier study by the same group, a survey of 548 stroke health professionals indicated that only 41% reported assessing vision within one week of admission to the stroke unit.(3, 34) In a similar survey of orthoptists across 16 different countries, approximately half (55.6%) stated that first vision assessment was performed within four weeks of admission.(35) However, reports from stroke survivors indicated a delay in assessment, with many experiencing late or no referral to vision services.(3, 10)

There is a large amount of variability in reports of how vision screening is performed. Orthoptists report most frequently testing visual acuity, using standardised letter charts, visual fields, ocular alignment and ocular movements when assessing stroke survivors.(35) From reports of stroke health professionals in the UK, 22% use a screening tool to test vision, 39.5% tested visual acuity (method unspecified), 57.7% tested visual fields, 48.5% assessed ocular movements and 58.5% tested functional vision.(3, 34) When vision screening was performed by an occupational therapist, this consisted of visual attention and scanning testing, visual field assessment and visual tracking(36, 37)or use of an occupational therapist vision screening tool.(38) Another group of health professionals within a Danish stroke vision team, described by Norup et al.,(37) variously assessed cranial nerve function, neuro-ophthalmic reflexes, eye movements, visual fields and inattention (neurologist); balance, gait/ posture, eye movements, hand-eye coordination, ability to measure distance, vestibular-ocular reflex, hemianopia, diplopia and neglect (physiotherapist); visuo-perceptual and visuo-spatial difficulties (neuropsychologist).(37)

When determining which health professional typically performs vision screening and assessment, each study illustrated different protocols indicative of the structure of the respective hospital departments/ units. In the UK, orthoptists reported that first vision assessment for stroke survivors was usually performed by an orthoptist (87%) in the eye clinic (78.6%).(35) In all but one National Health Service (NHS) Trust surveyed by Rowe and colleagues (2013), stroke survivors had initial screening performed by a stroke team who had been trained by an orthoptist. Similar referral protocols were followed by other stroke services, whereby any need for secondary vision assessment was referred to an orthoptist (33) or other eye-care professional. (38)

Studies conducted in Australia found that vision assessment by non-orthoptic health professionals identified only 17% of the ocular conditions detected by an orthoptic assessment. (39, 40) This improved to detection of 62% of all ocular conditions (39) and a sensitivity of 67%(41) with the use of a vision screening tool. It was also found that the availability of hospital on-site outpatient eye care did not significantly increase the number of ocular problems detected in stroke survivors, when compared to those hospitals without any ophthalmology services.(40)

*Management & Referral*

Reports from both orthoptists(42) and occupational therapists(36) in Scotland indicated that only 14% and 9%, respectively, had a vision protocol or management plans specific to stroke patients in their stroke unit. In the UK, 13/14 NHS Trusts indicated that they use a standardised screening and referral form for post-stroke vision care.(3) There were also notable differences in referral patterns and the health professionals involved in post-stroke vision care between countries. Stroke services within the UK often had orthoptic led post-stroke vision care services(33, 42, 43) or capacity to refer directly to an orthoptist when visual problems are suspected.(3, 44) In the Danish service model described by Norup et al(37) stroke patients with visual deficits that affect daily living (e.g. visual field loss, loss of vision and eye movement abnormalities) were referred to an OT. Stroke patients with vision problems affecting balance and mobility were referred to a physiotherapist, and those with visuo-perceptual or visuo-spatial issues were referred to a neuropsychologist. (37)

An American study interviewed stroke survivors and their carers, who reported that they either saw an ophthalmologist, occupational therapist or ‘other’ unidentified care provider for their visual concerns. (45) Ophthalmologists were seen for the provision of magnifiers, glasses or patching/ occlusion. Occupational therapists addressed visual concerns with scanning, gaming and eye-hand coordination activities, while other health care professionals provided compensation techniques and therapy. (45, 46) These differences may in part be explained by the availability of orthoptists and orthoptic training programs between countries. Orthoptics degrees are offered at four universities within the UK, while the USA has a limited number of post-graduate fellowship training positions available, and Denmark does not have any orthoptic training. In Australia there are two universities offering either undergraduate or postgraduate orthoptic degrees. Australian studies were conducted across a select number of stroke facilities across Sydney, (39-41) and so could not provide generalisable information on referral patterns or which health professionals were typically involved in post-stroke vision care. However, when management of vision problems by orthoptists was compared to non-orthoptic inpatient staff in the participating stroke services, orthoptists more frequently provided referral and intervention to stroke patients. (40, 41)

Provision of treatment was also highly variable amongst all studies. Orthoptists (65.2%)(35) and other health professionals (46.5%)(34) would only occasionally treat stroke patients who had an eye condition but without visual symptoms. However, when asked about provision of treatment for stroke survivors with vision problems, most occupational therapists (75%) report providing treatment within six weeks of stroke. (36) It should be noted that the occupational therapists participating in this survey indicated similar frequency of use of the same treatment methods across all categories of visual conditions, suggesting that treatment did not vary according to the specific vision problem.

Interviews with stroke survivors in the UK suggest that the majority did not receive any treatment or ongoing community support for their vision problems.(3, 10, 11, 47) The most common types of treatment provided across studies were functional and vision advice(34, 35, 42, 48) and scanning and or reading strategies.(34, 37, 48) Other treatment options provided were prisms for diplopia,(35) monocular patching,(35, 45) prism adaptation,(37, 48) and magnifiers/low vision aids.(45) Studies that examined the provision of post-stroke vision care by orthoptists demonstrated more frequent use of management strategies such as feedback and advice, occlusion, lid taping, driver standard management, visual scanning, convergence training and recommendation for adaptive technologies/ low vision aids.(40, 49) Approximately half of the participating services in UK studies also keep a database of all referrals to ensure all patients receive appropriate assessment and follow up.(3, 33)

*Education & Information*

Delivery of quality vision care requires appropriately trained staff as well as appropriately targeted provision of information to patients and carers. The education of healthcare professionals and the provision of vision specific information to stroke survivors is a recurrent theme in the literature. Health professionals from integrated stroke and vision services in the UK highlighted accurate and ongoing vision training for multi-disciplinary members of the stroke team as important for quality of service.(33) Of 548 stroke health professionals surveyed in the UK, 20% rated their knowledge of visual problems as fairly poor or very poor(3) while 24% of Scottish occupational therapists report having no specific training on post-stroke vision problems.(36) This suggests that approximately one in five health professionals tasked with providing vision care to stroke survivors do not have the appropriate knowledge base and/or training to do so. This is reiterated in the experience of stroke survivors in Norway and the UK, where they reported a lack of awareness among healthcare professionals (11, 50) and inappropriate solutions suggested for their vision problems. (11)

Stroke survivors in the UK also report that the provision of information about their vision problems was related the knowledge and experience of their treating health professionals. Where these were non-eye care trained staff, little to no information was provided.(50) Similarly, stroke survivors in Norway report poor information provision, particularly relating to vision rehabilitation options and support services.(11) The majority of orthoptists (85.9%) do provide patients with visual information sheets,(35) while 33.5% of

UK stroke health professionals (mixed disciplines) did not provide visual information sheets.(34) In addition to providing vision information sheets, half of the participating services in the UK study by Rowe et al(33) provided lay summaries to the stroke team as well as to patients and carers. These summaries included information about the patient's vision problem, treatment needed and provided, as well as required follow up. (33)

***Reported barriers & unmet care needs***

Barriers to successful post-stroke vision care and existing unmet care needs must be identified to understand the nature of current pitfalls in post-stroke vison care services and enable improvement. Stroke survivors and health professionals alike report a number of barriers to accessing and providing appropriate post-stroke vision care. Stroke survivors in the UK and Norway identify visual impairment as a 'hidden disability', making it difficult to obtain adequate vision care in acute or rehabilitative stroke care setting.(10, 11) Stroke survivors in general, reported experiencing a general lack of awareness and support amongst health care professionals relating to their post-stroke vision problems, coupled with poor provision of information about vision in general and support services.(3, 10, 11, 44, 47)

Stroke health services often do not have access to vision care specialists in the stroke unit and deemed a lack of funding as one of the primary barriers to providing this service.(3, 33, 42) A lack of funding was also said to impact capacity for orthoptic cover when services relied on a single orthoptist or eye care professional.(33) Where services are only able to provide one session per week, there was a perceived risk of missing patients and not being able to screen all patients in a timely manner.(33) Other factors deemed important by health professionals to the success of stroke vision services were adequate training of multi-disciplinary team members,(3, 33) use of a standardised protocols or management plans(34, 36, 42) and support from stroke physicians.(33)

There is also evidence of a lack of awareness about stroke related vision problems amongst the general community and health professionals when investigating pre-hospital pathways for stroke sufferers. A study by Aroor et al (51) found that amongst the stroke sufferers that did not have any symptoms relating to the F.A.S.T. pneumonic, 40% had visual presenting symptoms. Of the 14.1% of patients with missed stroke diagnosis according to F.A.S.T., 9.7% could have been identified with the inclusion of balance and vision screening.(51) Raty et al (52) found that 11.4% of occipital stroke patients with isolated visual symptoms were frequently misdiagnosed and/or frequently arrived to ED through at least 2 points of care (27.3%). As such, these patients are more likely present to emergency services outside of the 4.5-hour eligibility window for IV thrombolysis. (52) Stroke survivors themselves also report being unaware of vision symptoms as part of the stroke syndrome (11) and attributing them to other causes.(10, 11, 53)

Other barriers identified by focus groups of stroke survivors and health professionals in addition to those related to funding and education included poor communication and poor transfer of patient information between teams, and limited access to vision care appointments.(44) Stroke survivors reported that the impact of post-stroke visual impairment could have been improved by early formal visual assessment, provision of management and advice on adaptive strategies and rehabilitation options.(10, 11)

## Discussion

The main themes identified in the available literature relating to post stroke vision care pathways and practices are: screening and assessment, management and referral, education and information, barriers and unmet care needs. Within these themes, more specific questions were explored in relation to the timing of each theme, which health care professionals are and should be involved, as well as the specificity of care provision. There is very limited evidence pertaining to Australian post-stroke vision care pathways and practices, with a large portion of the existing evidence base originating in the UK. Without formal investigation, it is difficult to know whether Australian stroke survivors with vision problems are receiving adequate care, if any at all. Based on the results of one NSW health district, it would appear that inequalities in vision care for stroke survivors do exist within the healthcare system, largely dependent on access to orthoptic services. (40)

While the evidence related to the structure and protocols of each service demonstrates large amounts of variability in current practice around the world, similar trends have emerged in relation to their successes and failures. The strongest message to emerge from this evidence is the need for implementation of a vision care pathway or framework specific to Australian stroke survivors that offers clear guidance on how care should be provided, by whom, and when. In addition to this, a greater focus on stroke related vision problems is needed within stroke care teams to improve knowledge through the provision of education in this area. (34, 36) Nationwide campaigns targeting awareness of stroke related vision problems among the general Australian population are also necessary moving forward, so that those suffering a stroke recognise the importance of stroke-related visual symptoms.

Studies concerning vision and ocular health assessment suggest that initial vision screening should be performed in the stroke unit on all stroke patients. (3, 39, 40) It is evident that this does not happen consistently across Australia and internationally, if at all. Reasons for this may relate to inadequate funding to facilitate appropriate staffing to carry out these assessments, (43) as well as a lack of expertise and/or training amongst stroke care teams. (33, 52) Differences in timing of vision assessment between studies may also relate to evolution in services over time and the type of stroke service from which participants were recruited. For example, the VIS study ran from 2006-2010 with recruitment mainly from outpatient services, while the IVIS study ran from 2014-2015 and recruited participants primarily from inpatient services.

Vision screening tools specific to stroke patients appear to be a viable option to address this gap in the initial stages of stroke vision care. Several studies have found that vision screening tools improve the identification of ocular conditions in stroke survivors, even when administered by non-eye care professionals.(39, 41, 54, 55) The efficacy of these tools is proven to be enhanced when appropriate training on use of the tool is provided.(39, 41, 54, 55) A number of different non-eye care professionals such as occupational therapists, nurses, and physiotherapists are assigned the role of carrying out vision assessment across stroke services. While it is important to acknowledge the value of such professionals being able to identify and manage certain eye conditions, orthoptists appear to be an underutilised resource within stroke care teams. Research has shown orthoptic led assessment to be the gold-standard in stroke vision care and their inclusion in stroke teams may help address gaps in provision of information and vision rehabilitation. (3, 39, 40, 56)

The literature reviewed suggests that limited management options for vision problems are provided to stroke patients. (10, 32, 45) This may be due to: the perceived potential for recovery of some stroke related vision problems within three to six months post stroke, the visual problems not being detected, or the absence of an available and appropriate care provider. However, when considering the negative impact vision problems can have on rehabilitation, (56-58) basic interventions should be provided as early as possible as a minimum. Of the services that reported providing management, the most common strategies used were advice, magnifiers, monocular patching and visual scanning training. (32, 37, 48) Simple interventions such as these may assist stroke survivors in participation of other rehabilitation activities and ease the burden of vision impairment in the acute stages of recovery, even though they do not cover the entirety of possible beneficial interventions.

The provision of clear and targeted information that is specific to the stroke survivor's visual impairment is also seen to be a valuable and empowering form of management. (10, 11, 45, 47) Stroke survivors and their carers should be directed to appropriate long-term care providers and vision support services prior to discharge from hospital in order to better assist the stroke survivor's reintegration into the community. Provision of such information is reportedly done to differing levels of success across the different services described.

There is limited evidence pertaining to the provision of vision care for stroke survivors in Australia and internationally. The pooling of data from different countries and, as such, different health services also makes it difficult to draw firm conclusions about current practice. In the UK, a stroke-vision care pathway has recently been developed in attempt to address the known gaps in this area of healthcare. (44) Such a pathway enables stroke sufferers and health professionals alike to be aware of the options and appropriate actions to take in response to stroke-related vision problems. Implementation of stroke clinical pathways has also been shown to improve coordination of multidisciplinary care, reduce length of hospital stays and overall healthcare costs. (59)

The lack of evidence and specified guidelines concerning post-stroke vision care within Australia may be an indication that Australian post-stroke vision care has similar pitfalls to those found internationally. While we can look to research such as that conducted in the UK as an example, the unique demographic and geographic characteristics of Australia needs specific and targeted requirements for a healthcare framework to be successful.(60-62) The development of a stroke-vision care pathway that is appropriate for implementation in Australia would address the unmet care needs across differing services and locations of the many Australians who suffer from stroke related vision problems. Future research should aim to describe and assess potential gaps in the current provision of stroke-vision care within Australia and work towards developing pathways that are appropriate, feasible and targeted to the needs of stroke survivors and those that care for them.

**Disclosure of interest**

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Figure 1. Example search strategy for PubMed database.

**Figure 1 Alt Text:** A graphic of the search strategy used for the PubMed database, provided as an example, where the mesh terms ‘stroke’ or ‘stroke rehabilitation were used in search #1 and mesh terms ‘vision disorders’, ‘vision impairment’ or ‘eye disease’ were used in search #2. The final search combined search #1 and search #2 with the conjunctive word ‘AND’ with specifications on the publication date being from 2008 to present.

Figure 2. Flowchart demonstrating the pathway for included articles.

**Figure 2 Alt Text:** A flowchart diagram outlining the process for article screening used in this review. The initial number of titles identified through database searching was 16,193. This was reduced to 12,078 through the removal of titles that did not meet the inclusion criteria or were duplicates. Following this, 11,994 articles were excluded through abstract screening as they were not relevant to the review, leaving 684 articles remaining. The full text of the remaining articles was then reviewed, with 656 excluded as they were not relevant to the review. The final step shows that 28 articles were included at the end of the screening process.

**Word count:** 4 897

Figure 1

Advanced search:

Search #1 – (stroke[MeSH Terms]) OR (stroke rehabilitation[MeSH Terms])

Search #2 – (vision disorders[MeSH Terms]) OR (visual impairment[MeSH Terms]) OR (eye disease[MeSH Terms])

**Search #3 - #1 AND #2 Filters: from 2008 – present**

Figure 2