Care provision for post stroke visual impairment

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Abstract

Background: We sought to explore the care provision for post stroke visual impairment and variations in this in the UK.

Methods: Survey questions were developed and piloted with clinicians, academics and users. Questions addressed types of visual problems, how these were identified, treated and followed up, care pathways in use, links with other professions and referral options. The survey was accessed via a web-link which was circulated through UK professional organisations to multi-professional members of ophthalmic and stroke teams.

Results: 548 completed electronic surveys were obtained. 49.5% of respondents represented stroke teams, 42.5% eye teams and 8% from other teams, e.g. emergency care. Many respondents (41%) saw patients within one week of stroke. 19% did not personally test vision: 11% had a visiting clinician to test vision. 22% used screening tools. Validated tests were used for assessment of visual acuity (39.5%), visual field (57.5%), eye movement (48.5%) and visual function (58.5%). Visual problems suspected by family or professionals were high (88.5%). Typical overall follow-up period of vision care was less than 3 months. 46% of respondents used designated care pathways for stroke survivors with visual problems. 33.5% of respondents did not provide visual information leaflets.

Conclusions: Significant inequality exists in care for stroke survivors who experience visual problems. There is great variability in how vision screening is undertaken, which vision tests are used, methods of referral to eye care services, how visual problems are managed and what vision information is provided to stroke survivors/ carers. Further work is required to ensure equality and effective care.

Keywords: Visual impairment; Stroke; Care provision; Survey; Professional; Screening; Assessment; Rehabilitation; Awareness; Information

Introduction

Stroke affects 150,000 individuals per annum in the UK and is estimated to cost the NHS almost £3bn a year (1,2). Visual impairment is a deficit of visual function and, following stroke, includes abnormalities of central and/or peripheral vision, eye movements and a variety of visual perception problems (how we interpret what we see) such as inattention and agnosia. The prevalence of visual impairment amongst stroke survivors is reported as approximately 60% (3). The visual problems (types of visual impairment) can be complex including ocular as well as cortical damage (4).

Visual symptoms are frequently poorly described by patients particularly where individuals have coexistent communication and cognitive impairments. Visual symptoms can be wide ranging including blurred vision, hallucinations, diplopia and reading impairment (5). It is unknown what symptoms are perceived to be most problematic to stroke survivors and which cause the greatest impact to everyday life such as navigation issues, reading difficulty, loss of confidence or loss of independence. It is important to ascertain this information as specific types of visual symptoms can be targeted by a range of therapy options such as prisms, occlusion, eye scanning training, medical and surgical interventions (4).

Recent studies carried out in the UK have highlighted that many stroke survivors report that their needs in relation to vision are not met. The Stroke Association (6) conducted a needs survey in 2010 which included the question “Since your stroke, have you had enough help with sight difficulties?” Most respondents (52.5%) had not had a problem, 37.5% had experienced a visual problem and 10.3% had experienced a problem but did not want help. Of those with a visual problem and wanting help, 26% reported that their need was unmet, 35% stated their need had been met to some extent and 39% reported their need had been fully met. Another

study, involving a structured needs assessment at 6 months post hospital discharge, also identified unmet needs in relation to vision, with 5.8% of participants reporting vision as an unmet need (7).

Given the reported variations in care in previously reported surveys, the purpose of this study was to survey professionals involved in stroke care to explore the systems in place for care provided for stroke survivors with visual impairment in the UK in relation to screening and assessment of visual problems, the treatment options offered, access to and use of care pathways and provision of information resources.

Methods

Institutional ethical approval was obtained for this study. Our survey of professionals included the following stages.

Methodology and feasibility

Development of survey questions involved consultation and pilot testing with clinicians, academics and users identified through professional organisation stroke specialist interest groups and stroke user forums. A range of questions addressed the types of visual problems seen, how these were identified, how these were treated, followed-up, what care pathways were used, links with other professions, referral options and provision of /access to resources.

Instruments

The online survey consisted of 30 questions (appendix 1) containing a mix of closed and open questions with additional sections for inserting comments. The survey took approximately 15 minutes to complete but could only be completed in one session, i.e. it was not possible to pause, save the survey and return to complete it at a later time.

Sample

Our sample included ophthalmic and stroke professionals contacted via their UK-wide professional bodies, the Stroke Association, the UK Stroke Forum, the Stroke Research Network regional contacts, Higher Education Institutes and NHS organisations (appendix 2).

Conduct

The survey was available for completion via a web-link which was circulated, along with a cover letter outlining the purpose of the survey. The survey was emailed to 31 professional groups and remained open for completion over a 6-week period (September-October 2013). Three polite reminder emails were subsequently circulated to boost survey completion rates.

The information provided on the returned surveys was input to a database (SPSS version 20: IBM, USA) and descriptive analysis undertaken to combine responses in relation to each of the questions.

Results

Respondent demographics

Completed surveys were obtained from 548 individuals. A further 348 individuals started the survey but dropped out before completion; although this figure will include some people who returned to the questionnaire and completed it as a new survey at a later date.

Figure 1 shows the professional categories completing the survey. Responses from members of stroke teams accounted for 49.5% of respondents and responses from members of eye teams were received from 42.5%. 'Other' responses received from 8% included accident and emergency (A&E) staff, assistant practitioners, charity

executives, clinical and neuro psychologists, dieticians, GPs, orthotists, paramedics, administrative and support workers and visual rehabilitation staff.

Respondents were primarily based in eye clinics (39.5%) and stroke units (26.5%) with the remainder from community stroke services (11.5%), rehabilitation units (10%), general medical or neurological wards (1.5%) or other services (11%: including charitable organisations, community services, social sensory support services, out-patient services, A&E, neurosurgical services and palliative care).

Visual screening and/or assessment

Patients were seen within variable time periods but many respondents (41%) saw patients within one week of admission (figure 2) and 73% saw patients within one month. When time of first visual screening/assessment versus profession was considered, there was a spread across many professional groups (table 1). Eye team professions (n=124 respondents, 22.5%) were as likely to see patients within one month as stroke team professions (n=105 respondents, 19%) with similar numbers of eye team professions (n=12 respondents, 2%) seeing patients after three months as stroke team professions (n=17 respondents, 3%).

Many patients (45%) were assessed on a stroke unit with 11.5% seen on neurological, general or elderly care wards. Many commonly saw patients in the eye clinic (30.5%), at home (15%), in rehabilitation units (14.5%) or in out-patient and community clinics (8.5%). Those seen in eye clinics were either referred by members of the stroke team or had follow-up assessments made by the orthoptists who had first seen them on the stroke unit.

Nineteen percent of respondents did not personally test vision in any way and 11% had a visiting clinician to test vision. Similar numbers of eye team professions (n=40

respondents, 7%) and stroke team professions (n=47 respondents, 8.5%) did not test the vision of stroke patients (table 2). However these members of the eye team would work in other areas of eye health and not specifically with stroke survivors. Similar numbers of eye team professions (n=30 respondents, 5.5%) as stroke team professions (n=26 respondents, 5%) reported that a different clinician took responsibility for undertaking this testing.

Screening tools were used by 22%. These included screening forms such as the Vision In Stroke (VIS) or locally modified VIS form, British and Irish Orthoptic Society (BIOS) or locally modified BIOS form. Locally designed screening forms were used most commonly (13% of total; 54.5% of those using screening forms).

A common range of validated vision tests (table 3) were used by respondents for assessment of visual acuity (39.5%), visual field (57.5%), eye movement (48.5%) and visual function (58.5%). Out of all professions, occupational therapists and orthoptists reported the greatest use of the full range of visual function test options (table 4).

When testing visual acuity, logMAR and Snellen charts were more frequently used (26% and 20% respectively). For assessment of ocular alignment, the cover test was most frequently used (35%) along with observations of corneal reflections (27%). Assessment of binocular function commonly included stereopsis (30%) and fusional ability (25%). Functional assessments of vision were undertaken by 58.5% of respondents. Six percent of respondents reported using questionnaires.

Visual symptoms and conditions

We asked respondents to report whether they encountered various symptoms frequently, sometimes, rarely, never or did not know about the symptoms.

Respondents reported recognising a variety of visual symptoms. Table 5 shows the frequency of recognition of these visual symptoms. Symptoms recognised frequently included reading difficulty (49%), visual field change (44.5%), changed or altered vision (42%), facial droop/weakness (37%) and clumsiness/increased collisions (37%).

Most visual symptoms were sometimes recognised by many respondents apart from photophobia/glare, wobbling/juddery vision and colour impairment. Other additional symptoms were noted rarely. Of all professions reporting their frequent recognition of symptoms, occupational therapists and orthoptists identified the largest range (table 6) with similar reporting for visual symptoms recognised sometimes or rarely. In addition, we asked whether visual problems were observed or suspected by family or other professionals. The response to this question was high at 88.5%.

A range of stroke-related visual conditions were recognised by professionals as underlying their patients' visual symptoms (table 7). Visual conditions recognised frequently included visual field loss (66%), visual inattention (54%) and reduced visual acuity (36.5%). Most visual conditions were sometimes recognised by many respondents apart from pupil and colour defects. Other ocular conditions reported as causing visual symptoms in stroke survivors included lack of glasses and refractive problems plus binocular vision problems. Of all professions reporting their frequent recognition of visual conditions, occupational therapists and orthoptists identified the largest range (table 8) with similar reporting for visual conditions recognised sometimes or rarely.

Visual rehabilitation and referrals

Visual rehabilitation options included treatment to improve visual acuity, to improve adaptation to visual field loss, to alleviate diplopia and improve eye movements, and to improve reading and functional vision (table 9). The most commonly provided treatment options included vision advice (87.5%), functional advice (70.5%), reading strategies (67%), prisms for diplopia (54.5%), monocular patch (53%) and eye scanning therapy for hemianopia (50%). Table 10 outlines how frequently specific treatment options were considered by individual professions. Certain types of treatment options were more likely to be considered by eye team professions than stroke team professions including prisms, typoscope, refraction, botulinum toxin and extra ocular muscle surgery.

Many respondents provided rehabilitation treatment options personally (figure 3). Respondents most commonly offered general vision advice (71% of respondents), functional advice (55%), reading strategies (52%), monocular patch (39%), eye scanning for hemianopia (39%), eye scanning for gaze (34%) and prisms for diplopia (34% of respondents). If patients had no visual symptoms but had an eye condition, 20.5% stated they would always treat, 46.5% would sometimes treat, 11% would not treat and 22% stated 'don't know'. Those stating ‘don’t know’ included both eye team and stroke team professions.

The typical overall follow-up period was less than 3 months. This varied depending on whether the visual condition related to visual field loss, eye movement disorders, reduced visual acuity or visual perception impairment (figure 4). Follow-up options were similar between eye team and stroke team professions for visual field loss and visual perception impairment. Longer follow-up options were offered by orthoptists and ophthalmologists for eye movement disorders and reduced visual acuity.

Care pathways, resources and knowledge base

A designated care pathway for stroke survivors with visual problems was used by 46% of respondents. Locally designed pathways were most frequently used (37.5%) by both stroke team and eye tea professions. Where the (national) British and Irish Orthoptic Society care pathway (8) was used, this was only by orthoptists and ophthalmologists.

Visual information sheets related to patient's visual problems were not given to patients by 33.5% of respondents. Of the vision information sheets provided, many were obtained from charitable organisations such as the Stroke Association and RNIB (47%) followed by professional body resources (24.5%) and Trust in-house information leaflets (19%).

Twenty percent of respondents rated their knowledge of visual problems as fairly or very poor whereas 80% rated their vision knowledge as very or fairly good. More responses reporting fairly poor or poor knowledge were from stroke team professions (table 11). Nearly 40% of respondents would request more information to enhance their knowledge and skills: specifically on types of visual problems (39%), assessment options (47%), management options (60%), who to refer to (37%) and information resources for patients (59%). These requests for further information were spread across both eye team and stroke team professions but with a high number of requests from occupational therapists (figure 5). When asked about the existing evidence base, 40.5% felt this did not influence, or only slightly influenced, their assessment of visual problems, and 36.5% felt the evidence base did not influence, or only slightly influenced, their management. Of all professions, orthoptists reported being more influenced by the evidence base in how they assess and manage visual problems.

Discussion

We received 548 responses to our survey from a circulation of the online survey through 31 organisations. A roughly equal number of responses were received from members of the stroke team and members of the eye team. The highest number of responses was received from orthoptists and occupational therapists indicating their particular involvement with post-stroke care provision for visual impairment. Our results are limited by a lower than anticipated response rate and a high non-completion rate (discussed later).

Patients with vision problems were reported by 27% of respondents as being seen at greater than 4 weeks post stroke. These respondents included both eye team and stroke team respondents. For those from eye teams, this delay between stroke and visual assessment potentially has an impact as early treatment of eye problems is not provided. Early treatment is important as this can alleviate troublesome visual symptoms and/or advise on compensatory strategies to make best use of residual visual function. For example, correcting diplopia with prisms enables safer mobilisation of patients and such patients specifically report considerable symptoms of disorientation when diplopia is not corrected. Furthermore, delay in visual assessment leads to a delay in providing accurate information about the visual condition to the patient, carers and therapy staff.

One fifth of respondents used screening tools but these were mostly screening forms based on identifying observed signs of visual problems or patient-reported visual syndromes. They were not formal tests of visual function and such screening forms have known reliability issues (9). Specifically sensitivity and specificity is low where

detection of visual impairment is based on observed visual signs alone. Where visual assessment was undertaken, a common array of tests was used for visual acuity, visual field, eye movements and visual perception. Many tests were validated assessments, particularly when testing visual acuity and visual inattention. Orthoptists used the widest range of tests which likely reflects their eye care training and adaptation of this for stroke services. Confrontation was commonly used for visual field assessment and this is an appropriate bed-side assessment (10,11). However, where visual field loss is identified, it is advisable to obtain follow-up with formal perimetry methods as this plots visual field loss more accurately and reliably than confrontation, particularly for smaller/less dense visual field defects and, with respect to follow-up, for confirming change in visual fields (10,11). Assessment of nine positions of gaze for eye movements was undertaken by a third of respondents but with others testing only horizontal or vertical eye movements. It is important that suitable assessment of eye movements is sought (i.e. minimum of horizontal and vertical eye movements) so that abnormalities, which may only be present in one specific gaze position, are not missed. From our overall results, it was clear that no standardised assessment of visual function was made for post-stroke visual impairment. It was unclear whether assessments for visual function were provided for all stroke survivors or just for those with suspected visual problems. Thus our data demonstrate that there are substantial variations in the assessment visual problems after stroke, and a need for core standardised assessment tools. We argue that there is a need to develop a set of agreed core outcome measures which measure relevant outcomes and reflect what is important to patients. Standardised core measures should specify the minimum assessments that should be attempted

(considering patient ability) which are not time consuming or too onerous for the patient to complete.

We asked respondents how frequently they recognised visual symptoms. Of note, this is not indicative of how frequently these visual symptoms are reported by patients but merely how frequently they were recognised by respondents. The most commonly recognised visual symptoms by respondents included blurred vision, changed or altered vision, field loss, facial weakness, reading difficulties and clumsiness. Notably these symptoms could be attributed to a number of different visual problems and could not be used to infer a diagnosis of a specific type of visual problem which has been reported previously (5).

The survey asked how commonly visual problems were suspected in patients who could not report their visual symptoms. In such circumstances, respondents highlighted that visual problems were frequently suspected and subsequently reported by family or members of the stroke team (88%). This suspicion of visual problems by professionals, family and carers is important in detecting problems for patients who are not able to communicate their visual symptoms for whatever reason.

The most common treatment options that were provided personally by professions in either the stroke or eye teams included functional activity training, scanning training for hemianopia or for eye movement problems plus reading strategies and general advice on adaptations. Scanning training for eye movement problems was reported as a widely used treatment option by a previous survey (12). In our survey its use was reported by members of the stroke team but less by members of the eye team

who targeted treatment specifically to the type of eye movement problem. Referrals made to the eye team were typically to ophthalmologists, orthoptists, optometrists and low vision services. These referrals are important so that access to specialist treatments such as prisms, refraction, botulinum toxin and extra-ocular muscle surgery is facilitated. However there remains a lack of high quality evidence in relation to the effectiveness of interventions for visual problems after stroke, and there is clearly an urgent need to establish the evidence-base for the interventions that are in current use.

Care pathways for visual problems were not utilised by 44% of respondents. Two previous surveys of occupational therapists and orthoptists in Scotland reported access to protocols for post stroke visual impairment by 9% and 12% respectively (12,13). Our figure of 44% is considerably improved but may relate to our survey being UK wide and across multiple professional groups whereas the previous surveys were reported in 2011 and in two professional groups only (occupational therapists and orthoptists). Despite this evidence that care pathways may now be more widely used, our survey does clearly demonstrate that there remain substantial variations in the delivery of care to people with visual problems after stroke. We believe that improving access to and use of nationally agreed care pathways is essential to facilitate improved, equitable care provision for post-stroke visual impairment across the UK.

When asked about provision of resources 31% of our respondents did not provide any visual information leaflets. Given the free availability and easy access to nationally approved visual information leaflets, this is an aspect that can be readily acted upon to improve care for stroke survivors with visual impairment. Within the

UK, vision information can be accessed through the Stroke Association (14), RNIB (15) and other charities or professional organisations in a variety of formats (e.g. standard print, large print, auditory). Our survey data suggests that a significant number of people with post stroke visual impairment may not be receiving information about their impairment, despite the wide-spread and free availability of information leaflets specifically for this group of patients. We urge all health professionals to ensure that their patients have access to appropriate information about their condition.

One fifth of respondents reported their visual knowledge as fairly or very poor and specifically requested information on types of visual problems, assessment of visual problems, management options, referral and information resources. Twice as many stroke team professions requested such information versus eye team professions, and in particular occupational therapists. Furthermore one third of respondents across all professions felt the existing evidence base did not influence their practice. This raises education issues which have also been previously advocated (8,9). Professionals can access a wide range of published papers in medical journals through their organisation libraries. However there is a wealth of information also available through free internet resources along with approved training courses (1,17). The challenge of ensuring that health professionals have adequate knowledge and skills relating to visual impairment after stroke should be addressed by under-graduate and post-graduate training programmes throughout the UK.

Limitations

We received 548 responses to our professional survey. We had hoped to receive over 1000 responses on the basis of returns of previous vision/stroke surveys. We

identified professions involved in eye and stroke care through Vision 2020 UK and the UK Stroke Forum and circulated the online survey as a web-link via professional organisations to all professions involved in stroke and eye care. Despite this we are unsure whether the survey was sufficiently disseminated to clinicians. However we received almost equal numbers of responses from eye teams and stroke teams with useful information provided.

We received three criticisms about completion of the survey in which respondents found it difficult to complete the survey because many questions were asked about visual assessments and treatments and staff did not necessarily have sufficient knowledge of these. This criticism had been raised in our pilot survey before the main survey was released and a ‘don’t know’ or ‘not applicable’ option was added to most questions. Future, similar, surveys should add these options to all questions where relevant. It is possible that our results may be biased towards professionals who had a greater understanding of visual problems. If the results are biased in this way then it is likely that there is greater variation in care, outcome assessment, poorer knowledge base and less provision of visual information resources. It is likely that this will have served to under, rather than over, estimate the variations and limitations in care provision.

A further limitation of the survey was that it required completion in one stage which took approximately 15 minutes for full completion. Therefore if individuals had not allowed sufficient time to complete the survey or for those who found it difficult to complete (as raised above) and dropped out of it, there was no option to return to where they had stopped and complete it later. For those returning to the survey, they would have to start the survey from the beginning and the survey script would count them as a new respondent. Table 12 outlines the professional groups for non-

completed surveys versus completed surveys. It is likely that some of the 348 who failed to complete the survey did return to the survey at a different time and complete it. Thus the 348 figure may overestimate the true number of non-completions.

Conclusions

Visual problems are common after stroke, and a large number of different eye and stroke professionals are involved in the care of people with these problems. To ensure the delivery of equitable, high quality, effective care to this group of people it is clear that a number of service improvements are required. Central to these are the need for strategies to detect visual problems in people with communication problems, nationally agreed care pathways and provision of adequate information to all people with post stroke visual impairment. In addition there is a need for agreement over core outcome measures, high quality research to establish the evidence based for interventions and education and training programmes to ensure adequate knowledge and skills amongst all relevant health professionals. People with stroke have previously identified that their needs in relation to visual problems have not been met, and that visual problems after stroke is a top research priority (18,19); we therefore urge service providers and researchers to address the important issues raised from this survey.

Acknowledgements

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Figure 1 Professional categories

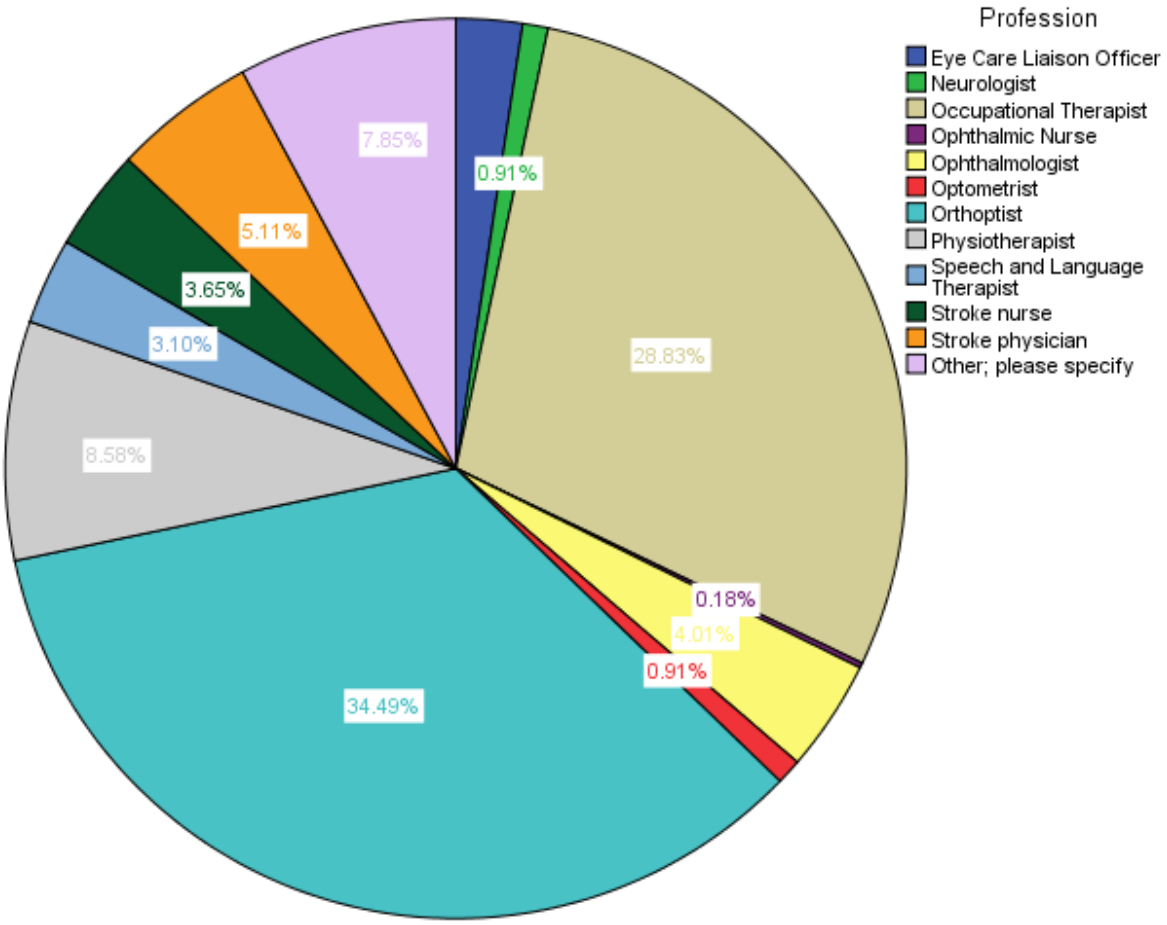

Figure 2 Time period for visual screening

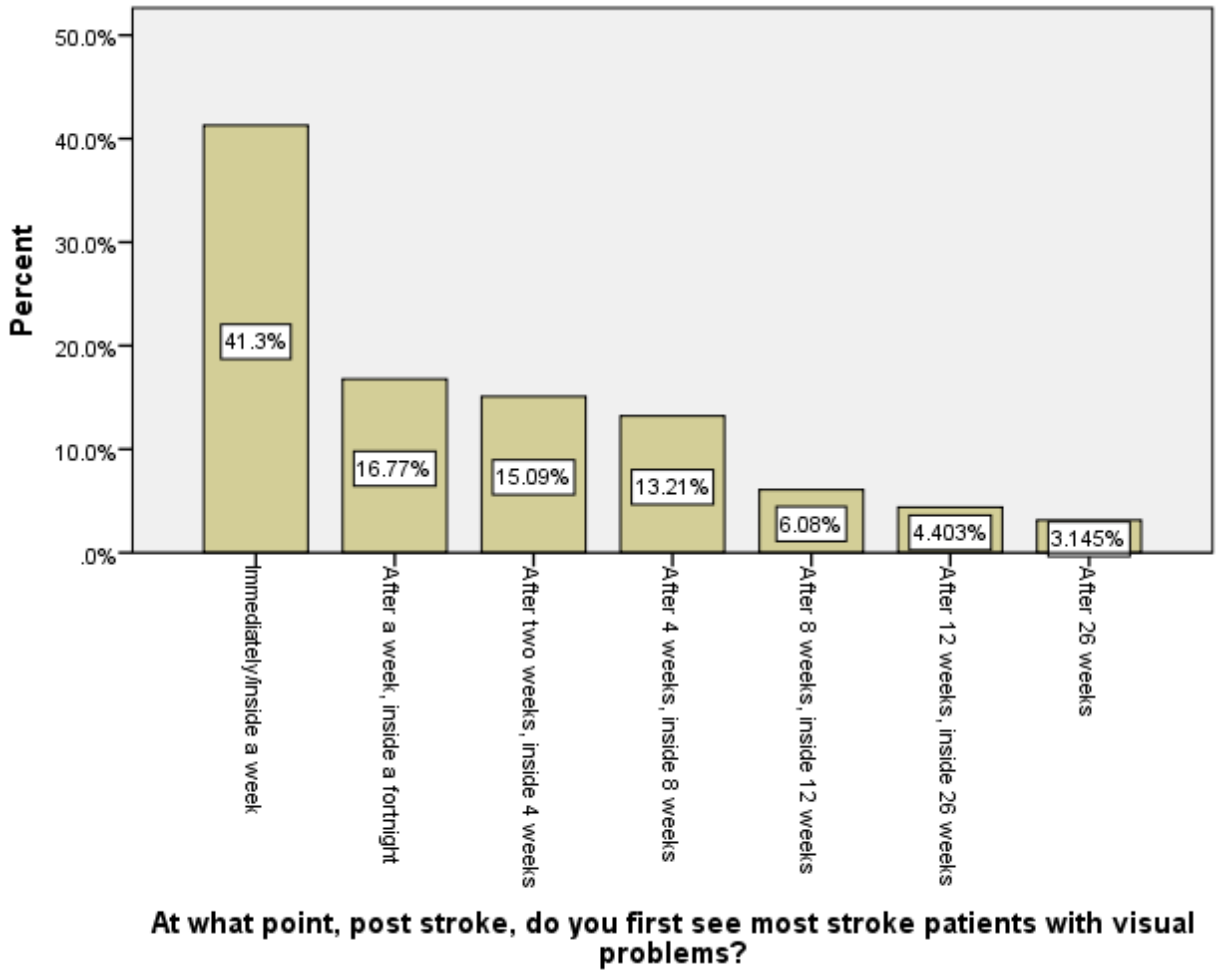

Figure 3 Percent frequency of personally provided visual rehabilitation options

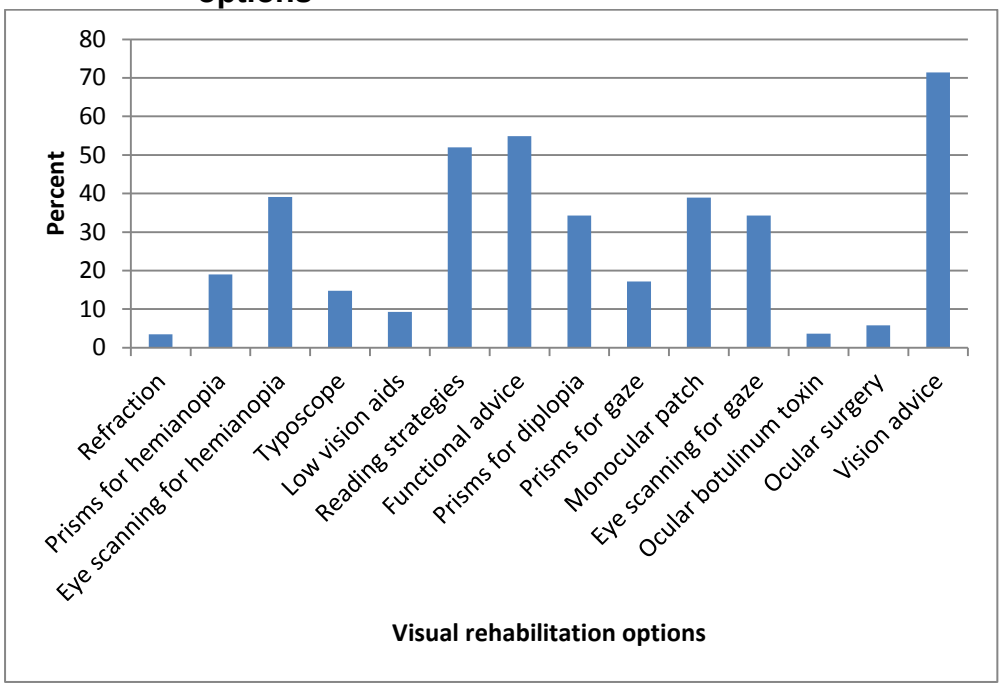

Figure 4 Follow-up options for visual conditions

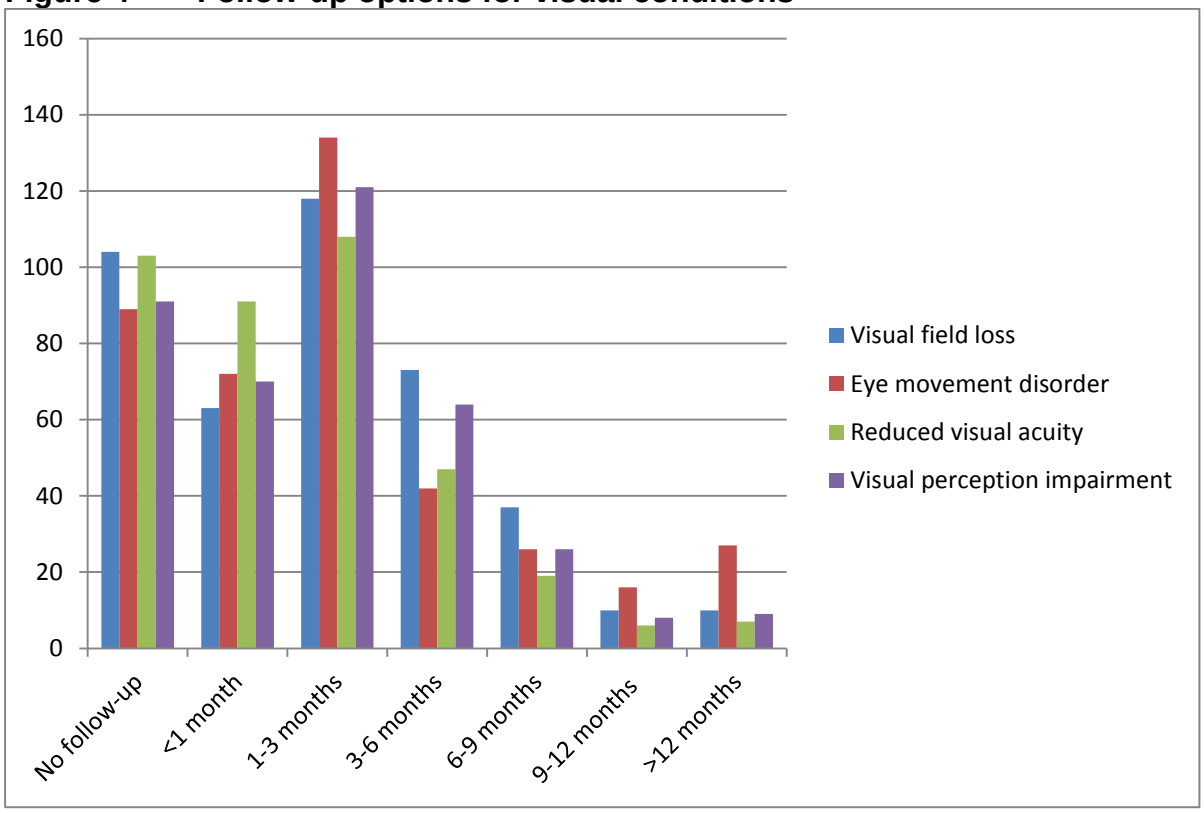

Figure 5 Requests by profession for additional information

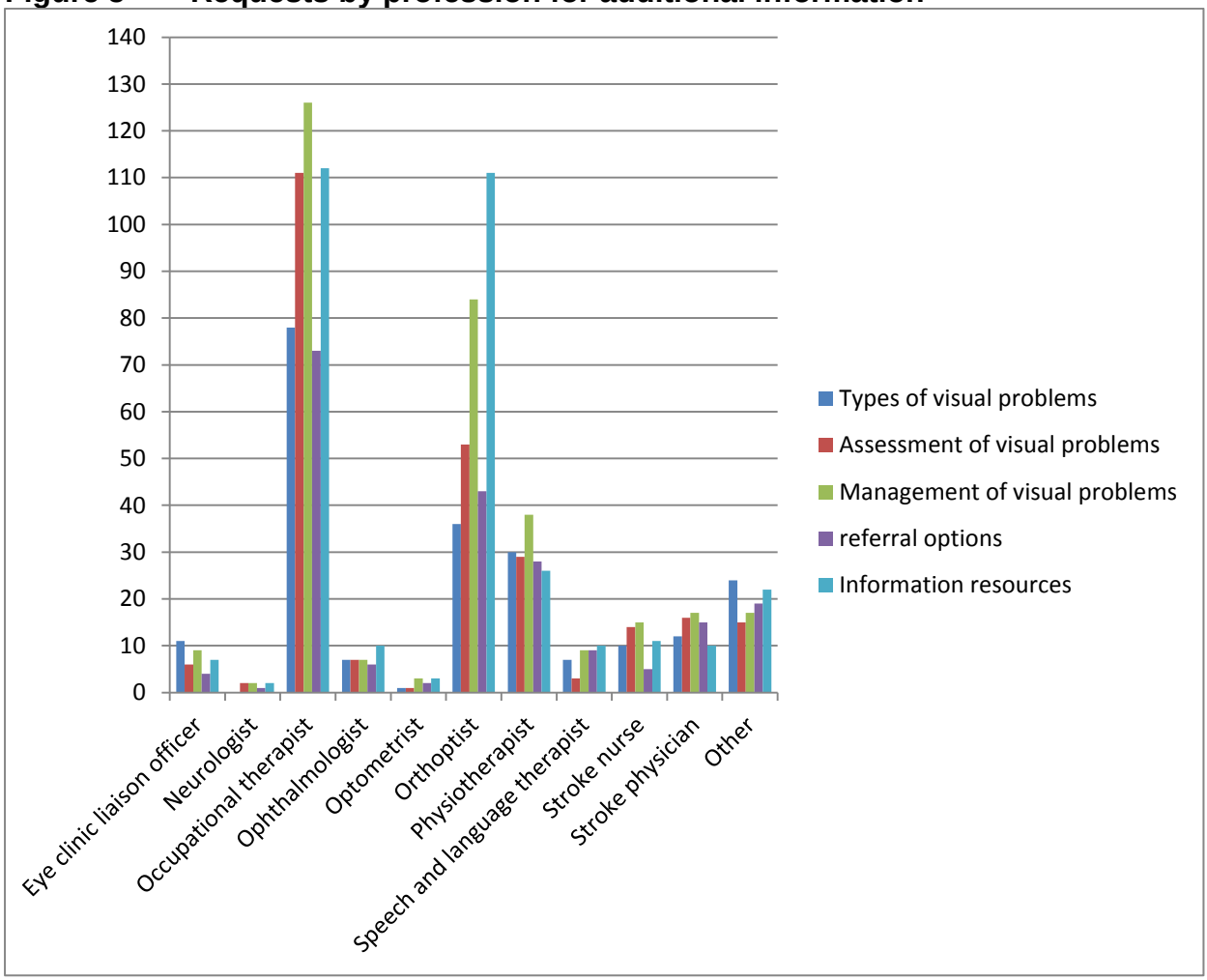

Table 1 Timing of first vision assessment by professional group

N (%)	Immediately /inside a week	After a week, inside a fortnight	After two weeks, inside 4 weeks	After 4 weeks, inside 8 weeks	After 8 weeks, inside 12 weeks	After 12 weeks, inside 26 weeks	After 26 weeks	Total
Eye Care Liaison Officer	0	1 (0.2%)	2 (0.4%)	2 (0.4%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	8 (1.7%)
Neurologist	3 (0.6%)	0	0	1 (0.2%)	0	0	0	4 (0.8%)
Occupational Therapist	84 (17.6%)	13 (2.7%)	16 (3.3%)	11 (2.3%)	10 (2.1%)	5 (1%)	6 (1.3%)	145 (30.4%)
Ophthalmic Nurse	0	0	0	0	1 (0.2%)	0	0	1 (0.2%)
Ophthalmologist	1 (0.2%)	0	5 (1%)	6 (1.3%)	2 (0.4%)	3 (0.6%)	0	17 (3.6%)
Optometrist	0	2 (0.4%)	0	1 (0.2%)	0	1 (0.2%)	0	4 (0.8%)
Orthoptist	26 (5.5%)	52 (10.9%)	35 (7.3%)	35 (7.3%)	9 (1.9%)	3 (0.6%)	3 (0.6%)	163 (34.1%)
Physiotherapist	29 (6%)	1 (0.2%)	6 (1.3%)	2 (0.4%)	1 (0.2%)	1 (0.2%)	2 (0.4%)	42 (8.8%)
Speech and Language Therapist	8 (1.7%)	1 (0.2%)	2 (0.4%)	0	2 (0.4%)	2 (0.4%)	1 (0.2%)	16 (3.4%)
Stroke nurse	11 (2.3%)	2 (0.4%)	2 (0.4%)	1 (0.2%)	0	0	0	16 (3.4%)
Stroke physician	26 (5.5%)	1 (0.2%)	0	0	0	0	0	27 (5.6%)
Other	9 (1.9%)	7 (1.5%)	4 (0.8%)	4 (0.8%)	3 (0.6%)	5 (1%)	2 (0.4%)	34 (7.1%)

Table 2 Professional group numbers not undertaking vision assessments specifically for stroke survivors

Profession	Do not personally test vision N (%)	Has a visiting clinician to test vision N (%)
Eye Care Liaison Officer	10 (1.8%)	1 (0.2%)
Neurologist	0	0
Occupational Therapist	11 (2%)	13 (2.4%)
Ophthalmic Nurse	0	0
Ophthalmologist	5 (0.9%)	2 (0.4%)
Optometrist	0	2 (0.4%)
Orthoptist	25 (4.6%)	25 (4.6%)
Physiotherapist	14 (2.6%)	4 (0.7%)
Speech and Language Therapist	14 (2.6%)	1 (0.2%)
Stroke Nurse	6 (1.1%)	6 (1.1%)
Stroke Physician	2 (0.4%)	2 (0.4%)

Table 3 Type of visual assessments

Visual assessment type	Percentage use by respondents	Test type
Letter charts or tests	39.5%	logMAR charts (26%) Snellen's chart (20%) Fixation and following (18%) Vanishing optotypes (6.5%) Gratings (6%) Near acuity charts (6%) Others: inattention tests, Kay's pictures and Sheridan Gardiner optotypes.
Visual field assessment	57.5%	Confrontation (46.5%) Static perimetry (23%) Kinetic perimetry (17.5%)
Ocular alignment assessment	38%	Cover test (35%) Observations of corneal reflections (27%)
Ocular movement assessment	48.5%	Nine position testing (35%) Horizontal and vertical gaze only (14%) Horizontal gaze only (5%) Vertical gaze only (3.5%) Others: vergence, saccades, Hess/Lees charts, optokinetic nystagmus and vestibulo-ocular reflex
Binocular vision assessment	36%	Stereopsis (30%) Fusional ability (25%)

		Retinal correspondence (15%)
Functional vision assessment	58.5%	Observations of navigation, reading, eye scanning, walking, activities of daily living, self-care, body placement, spatial awareness, mobility, writing, hand-eye coordination Carer observations
Questionnaire	6%	Locally designed questionnaires Validated questionnaires for activities of daily living Visual Function Questionnaire (NVQ25)
Other: case history, inattention assessment, low vision assessment, NIHSS scale, other screening scales	10.5%	

Table 4 Type of visual assessments across professional groups

Profession N (%)	Screening tool	Vision/letter test	Visual field test	Ocular alignment test	Ocular movements test	Binocular vision test	Functional assessment	Questionnaire
Eye Care Liaison Officer	0	0	0	0	0	0	2 (0.4%)	1 (0.2%)
Neurologist	0	4 (0.7%)	5 (0.9%)	4 (0.7%)	5 (0.9%)	4 (0.7%)	4 (0.7%)	0
Occupational Therapist	81 (14.8%)	42 (7.7%)	99 (18.1%)	23 (4.2%)	50 (9.1%)	25 (4.6%)	129 (23.5%)	11 (2%)
Ophthalmic Nurse	0	0	1 (0.2%)	0	0	0	0	0
Ophthalmologist	0	13 (2.4%)	14 (2.6%)	14 (2.6%)	13 (2.4%)	8 (1.5%)	5 (0.9%)	0
Optometrist	1 (0.2%)	4 (0.7%)	3 (0.5%)	3 (0.5%)	3 (0.5%)	2 (0.4%)	3 (0.5%)	1 (0.2%)
Orthoptist	23 (4.2%)	140 (25.5%)	128 (23.4%)	143 (26.1%)	146 (26.6%)	141 (25.7%)	109 (19.9%)	15 (2.7%)
Physiotherapist	3 (0.5%)	3 (0.5%)	20 (3.6%)	5 (0.9%)	17 (3.1%)	5 (0.9%)	29 (5.3%)	1 (0.2%)
Speech and Language Therapist	1 (0.2%)	0	0	0	0	0	4 (0.7%)	0

Stroke Nurse	3 (0.5%)	1 (0.2%)	8 (1.5%)	2 (0.4%)	4 (0.7%)	1 (0.2%)	7 (1.3%)	0
Stroke Physician	2 (0.4%)	8 (1.5%)	23 (4.2%)	10 (1.8%)	20 (3.6%)	10 (1.8%)	15 (2.7%)	0
Other	7 (1.3%)	2 (0.4%)	15 (2.7%)	3 (0.5%)	8 (1.5%)	2 (0.4%)	14 (2.6%)	2 (0.4%)

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Table 5 Percent frequency of recognised symptoms

Symptom	Recognised frequently	Recognised sometimes	Recognised rarely	Not recognised / did not know
Reading difficulty	49%	44.5%	3%	3.5%
Visual field change	44.5%	45.5%	7%	3%
Changed or altered vision	42%	47%	6%	5%
Facial droop/ weakness	37%	38.5%	15%	10%
Clumsy / collisions	37%	51%	6%	6%
Blurred vision	32%	52%	10%	6%
Writing difficulty	24%	52%	16%	8%
Depth impairment	20%	53%	17.5%	9.5%
Diplopia	16%	66%	13%	5%
Recognition impairment	13%	49%	28.5%	9.5%
Compensatory head posture	9.5%	40.5%	36%	14%
Lid droop	8%	44%	38%	10%
Visual hallucinations	3.5%	34.5%	47%	15%
Photophobia / glare	3.5%	26.5%	52%	18%
Wobbling / juddery vision	3%	29%	50%	18%
Colour impairment	0.5%	13%	53.5%	33%

Table 6 Recognition of visual symptoms by professional groups

N (%)	Blurred vision	Writing difficulty	Altered vision	Photophobia	Diplopia	Colour impairment	Visual field change	Wobbling vision
Eye Care Liaison Officer	2 (0.4%)	3 (0.5%)	10 (1.8%)	2 (0.4%)	1 (0.2%)	1 (0.2%)	9 (1.6%)	0
Neurologist	2 (0.4%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	2 (0.4%)	0	2 (0.4%)	0
Occupational Therapist	38 (6.9%)	43 (7.8%)	66 (12%)	5 (0.9%)	29 (5.3%)	0	73 (13.3%)	2 (0.4%)
Ophthalmic Nurse	0	0	0	0	0	0	0	0
Ophthalmologist	6 (1.1%)	2 (0.4%)	5 (0.9%)	0	3 (0.5%)	0	11 (2%)	0
Optometrist	3 (0.5%)	1 (0.2%)	4 (0.7%)	0	1 (0.2%)	0	3 (0.5%)	0
Orthoptist	91 (16.6%)	21 (3.8%)	87 (15.9%)	8 (1.5%)	35 (6.4%)	0	83 (15.1%)	12 (2.2%)
Physiotherapist	8 (1.5%)	16 (2.9%)	16 (2.9%)	0	6 (1.1%)	0	16 (2.9%)	0
Speech and Language Therapist	4 (0.7%)	14 (2.6%)	10 (1.8%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	13 (2.4%)	1 (0.2%)
Stroke Nurse	4 (0.7%)	8 (1.5%)	8 (1.5%)	0	3 (0.5%)	0	9 (1.6%)	0
Stroke Physician	12 (2.2%)	6 (1.1%)	9 (1.6%)	1 (0.2%)	4 (0.7%)	0	10 (1.8%)	0
Other	6 (1.1%)	16 (2.9%)	15 (2.7%)	1 (0.2%)	4 (0.7%)	0	15 (2.7%)	0

	Facial droop	Lid droop	Compensatory head posture	Visual hallucinations	Recognition impairment	Depth impairment	Reading difficulty	Clumsy / collisions
Eye Care Liaison Officer	0	1 (0.2%)	0	2 (0.4%)	5 (0.9%)	8 (1.5%)	10 (1.8%)	7 (1.3%)
Neurologist	4 (0.7%)	0	0	0	0	0	2 (0.4%)	2 (0.4%)
Occupational Therapist	91 (16.6%)	14 (2.6%)	24 (4.4%)	6 (1.1%)	21 (3.8%)	35 (6.4%)	72 (13.1%)	63 (11.5%)
Ophthalmic Nurse	0	0	0	0	0	0	0	0
Ophthalmologist	0	1 (0.2%)	0	1 (0.2%)	0	2 (0.4%)	9 (1.6%)	4 (0.7%)
Optometrist	0	0	0	0	1 (0.2%)	1 (0.2%)	3 (0.5%)	2 (0.4%)
Orthoptist	10 (1.8%)	4 (0.7%)	4 (0.7%)	9 (1.6%)	26 (4.7%)	36 (6.6%)	104 (19%)	62 (11.3%)
Physiotherapist	25 (4.6%)	7 (1.3%)	12 (2.2%)	0	5 (0.9%)	11 (2%)	17 (3.1%)	20 (3.6%)
Speech and Language Therapist	12 (2.2%)	4 (0.7%)	3 (0.5%)	0	3 (0.5%)	3 (0.5%)	13 (2.4%)	7 (1.3%)
Stroke Nurse	12 (2.2%)	2 (0.4%)	3 (0.5%)	1 (0.2%)	7 (1.3%)	4 (0.7%)	8 (1.5%)	10 (1.8%)
Stroke Physician	26 (4.7%)	4 (0.7%)	1 (0.2%)	0	0	3 (0.5%)	10 (1.8%)	9 (1.6%)
Other	22 (4%)	6 (1.1%)	5 (0.9%)	1 (0.2%)	3 (0.5%)	6 (1.1%)	22 (4%)	17 (1.3%)

Table 7 Percent frequency of recognised visual conditions

Condition %	Recognised frequently	Recognised sometimes	Recognised rarely	Not recognised / did not know
Visual field loss	66%	26.5%	2.5%	5%
Visual inattention	54%	34%	6%	6%
Reduced visual acuity	36.5%	50%	5.5%	8%
Ophthalmic condition	24%	50%	16%	10%
Eye tracking defect	17%	53.5%	16%	13%
Depth defect	16%	52%	18%	12%
Perceptual defect	16%	49%	22%	13%
Ocular cranial nerve palsy	14%	43.5%	22%	20.5%
Ocular gaze palsy	11.5%	43%	26%	19.5%
Strabismus	10.5%	41.5%	30%	18%
Visual agnosia	9.5%	45%	32%	13.5%
Nystagmus	9.5%	43.5%	34.5%	12.5%
Visual hallucinations	6%	36%	40%	18%
Lid defect	6%	45%	35.5%	13.5%
Reduced contrast	5%	35%	28%	32%
Pupil defect	2%	28%	45.5%	24.5%
Colour defect	1%	18.5%	47.5%	33%

Table 8 Recognition of visual conditions by professional groups

N (%)	Visual field loss	Reduced visual acuity	Reduced contrast	Visual inattention	Colour defect	Depth defect	Visual hallucinations	Visual agnosia
Eye Care Liaison Officer	12 (2.2%)	7 (1.3%)	4 (0.7%)	8 (1.5%)	1 (0.2%)	6 (1.1%)	2 (0.4%)	2 (0.4%)
Neurologist	4 (0.7%)	1 (0.2%)	0	4 (0.7%)	0	0	0	1 (0.2%)
Occupational Therapist	109 (19.9%)	62 (11.3%)	5 (0.9%)	118 (21.5%)	3 (0.5%)	37 (6.6%)	6 (1.1%)	21 (3.8%)
Ophthalmic Nurse	0	0	0	0	0	0	0	0
Ophthalmologist	16 (2.9%)	7 (1.3%)	0	2 (0.4%)	0	1 (0.2%)	1 (0.2%)	0
Optometrist	4 (0.7%)	2 (0.4%)	0	1 (0.2%)	0	0	1 (0.2%)	0
Orthoptist	124 (22.6%)	85 (15.5%)	11 (2%)	69 (12.6%)	0	27 (4.9%)	19 (3.5%)	19 (3.5%)
Physiotherapist	25 (4.6%)	9 (1.6%)	0	30 (5.5%)	0	4 (0.7%)	1 (0.2%)	3 (0.5%)
Speech and Language Therapist	12 (2.2%)	5 (0.9%)	2 (0.4%)	13 (2.4%)	0	2 (0.4%)	0	3 (0.5%)
Stroke Nurse	13 (2.2%)	4 (0.7%)	1 (0.2%)	11 (2%)	0	1 (0.2%)	0	0
Stroke Physician	23 (4.2%)	10 (1.8%)	1 (0.2%)	20 (3.6%)	0	2 (0.4%)	1 (0.2%)	3 (0.5%)
Other	21 (3.8%)	8 (1.5%)	3 (0.5%)	27 (4.9%)	0	6 (1.1%)	1 (0.2%)	0

	Perceptual defect	Strabismus	Nystagmus	Cranial nerve palsy	Gaze palsy	Eye tracking defect	Lid defect	Pupil defect
Eye Care Liaison Officer	2 (0.4%)	0	0	0	0	2 (0.4%)	1 (0.2%)	0
Neurologist	1 (0.2%)	1 (0.2%)	1 (0.2%)	2 (0.4%)	3 (0.5%)	0	0	0
Occupational Therapist	42 (7.7%)	0	11 (2%)	1 (0.2%)	5 (0.9%)	23 (4.2%)	7 (1.3%)	3 (0.5%)
Ophthalmic Nurse	0	0	0	0	0	0	0	0
Ophthalmologist	1 (0.2%)	4 (0.7%)	1 (0.2%)	4 (0.7%)	3 (0.5%)	2 (0.4%)	2 (0.4%)	1 (0.2%)
Optometrist	0	0	1 (0.2%)	0	0	0	0	0
Orthoptist	23 (4.2%)	47 (8.6%)	30 (5.5%)	62 (11.3%)	37 (6.8%)	51 (9.3%)	10 (1.8%)	4 (0.7%)
Physiotherapist	4 (0.7%)	1 (0.2%)	3 (0.5%)	1 (0.2%)	2 (0.4%)	6 (1.1%)	3 (0.5%)	1 (0.2%)
Speech and Language Therapist	6 (1.1%)	0	0	1 (0.2%)	0	2 (0.4%)	3 (0.5%)	1 (0.2%)
Stroke Nurse	0	1 (0.2%)	2 (0.4%)	0	3 (0.5%)	1 (0.2%)	1 (0.2%)	0
Stroke Physician	4 (0.7%)	3 (0.5%)	3 (0.5%)	5 (0.9%)	8 (1.5%)	3 (0.5%)	3 (0.5%)	2 (0.4%)
Other	5 (0.9%)	0	0	0	2 (0.4%)	4 (0.7%)	2 (0.4%)	0

Table 9 Percent frequency of provided visual rehabilitation options

Rehabilitation	Provided	Frequently	Sometimes	Rarely
Vision advice	87.5%	66.4%	19.5%	1.5%
Functional advice	70.5%	48.7%	17.4%	4.2%
Reading strategies	67%	31.6%	29.9%	5.3%
Prisms for diplopia	54.5%	26.8%	23%	4.7%
Monocular patch	53%	21.4%	25.8%	5.8%
Eye scanning for hemianopia	50%	29.4%	16.4%	4.2%
Refraction / glasses	45%	18.4%	22.4%	4%
Low vision aids	45%	9.7%	27%	8.2%
Eye scanning for gaze	45%	21.5%	19%	4.7%
Prisms for hemianopia	39.5%	9.9%	19.7%	10%
Prisms for gaze	28%	9.3%	13%	6%
Ocular muscle surgery	24%	2.6%	13.5%	8%
Typoscope	17%	4.6%	9.3%	3.3%
Ocular muscle botulinum toxin	17%	1.8%	10.2%	5.3%

Table 10 Provision or referral for treatment options by professional groups

N (%)	Refraction	Prisms: hemianopia	Scanning: hemianopia	Typoscope	Low vision aids	Reading strategies	Functional activity advice	General advice
Eye Care Liaison Officer	4 (0.7%)	3 (0.5%)	3 (0.5%)	2 (0.4%)	9 (1.6%)	7 (1.3%)	7 (1.3%)	12 (2.2%)
Neurologist	3 (0.5%)	2 (0.4%)	3 (0.5%)	0	4 (0.7%)	5 (0.9%)	5 (0.9%)	4 (0.7%)
Occupational Therapist	47 (8.6%)	48 (8.8%)	115 (21%)	3 (0.5%)	55 (10%)	131 (23.9%)	151 (27.6%)	142 (25.9%)
Ophthalmic Nurse	1 (0.2%)	1 (0.2%)	0	0	1 (0.2%)	0	0	0
Ophthalmologist	18 (3.3%)	6 (1.1%)	5 (0.9%)	0	18 (3.3%)	10 (1.8%)	8 (1.5%)	19 (2.5%)
Optometrist	5 (0.9%)	3 (0.5%)	3 (0.5%)	3 (0.5%)	5 (0.9%)	3 (0.5%)	2 (0.4%)	5 (0.9%)
Orthoptist	124 (22.6%)	102 (18.6%)	88 (16.1%)	81 (14.8%)	117 (21.4)	135 (24.6%)	108 (19.7%)	177 (32.3%)
Physiotherapist	9 (1.6%)	13 (2.4%)	20 (3.6%)	0	8 (1.5%)	17 (3.1%)	33 (6%)	39 (7.1%)
Speech and Language Therapist	5 (0.9%)	4 (0.7%)	4 (0.7%)	0	3 (0.5%)	11 (2%)	10 (1.8%)	10 (1.8%)
Stroke Nurse	10 (1.8%)	10 (1.8%)	10 (1.8%)	1 (0.2%)	6 (1.1%)	9 (1.6%)	13 (2.4%)	16 (2.9%)
Stroke Physician	14 (2.6%)	17 (3.1%)	10 (1.8%)	1 (0.2%)	13 (2.4%)	19 (3.5%)	23 (4.2%)	25 (4.6%)
Other	7 (1.3%)	7 (1.3%)	13 (2.4%)	3 (0.5%)	6 (1.1%)	18 (3.3%)	22 (4%)	21 (3.8%)

	Prisms: diplopia	Prisms: gaze	Occlusion	Scanning: gaze	Ocular muscle botulinum toxin	Ocular muscle surgery	Don't know	Not applicable
Eye Care Liaison Officer	4 (0.7%)	2 (0.4%)	1 (0.2%)	3 (0.5%)	1 (0.2%)	1 (0.2%)	0	0
Neurologist	5 (0.9%)	3 (0.5%)	5 (0.9%)	3 (0.5%)	1 (0.2%)	1 (0.2%)	0	0
Occupational Therapist	36 (6.6%)	20 (3.6%)	38 (6.9%)	104 (19%)	0	1 (0.2%)	0	2 (0.4%)
Ophthalmic Nurse	1 (0.2%)	0	0	0	1 (0.2%)	0	0	0
Ophthalmologist	20 (3.6%)	9 (1.6%)	18 (3.3%)	5 (0.9%)	16 (2.9%)	17 (3.1%)	1 (0.2%)	0
Optometrist	3 (0.5%)	2 (0.4%)	4 (0.7%)	1 (0.2%)	1 (0.2%)	1 (0.2%)	0	0
Orthoptist	183 (33.4%)	93 (17%)	176 (32.1%)	79 (14.4%)	71 (13%)	110 (20.1%)	2 (0.4%)	2 (0.4%)
Physiotherapist	10 (1.8%)	6 (1.1%)	14 (2.6%)	28 (5.1%)	0	0	1 (0.2%)	1 (0.2%)
Speech and Language Therapist	2 (0.4%)	1 (0.2%)	2 (0.4%)	4 (0.7%)	0	0	0	3 (0.5%)
Stroke Nurse	6 (1.1%)	4 (0.7%)	8 (1.5%)	8 (1.5%)	0	0	0	3 (0.5%)
Stroke Physician	23 (4.2%)	12 (2.2%)	17 (3.1%)	10 (1.8%)	3 (0.5%)	1 (0.2%)	0	0
Other	6	3	4	13	1	0	1	13

	(1.1%)	(0.5%)	(0.7%)	(2.4%)	(0.2%)	(0.2%)	(2.4%)

Table 11 Reporting of knowledge base by professional group

N (%)	Very good	Fairly good	Fairly poor	Very poor	Total
Eye Care Liaison Officer	1 (0.2%)	11 (2%)	1 (0.2%)	0	13 (2.4%)
Neurologist	1 (0.2%)	4 (0.7%)	0	0	5 (0.9%)
Occupational Therapist	13 (2.4%)	113 (20.6%)	32 (5.8%)	0	158 (28.8%)
Ophthalmic Nurse	0	1 (0.2%)	0	0	1 (0.2%)
Ophthalmologist	5 (0.9%)	14 (2.6%)	3 (0.5%)	0	22 (4%)
Optometrist	1 (0.2%)	4 (0.7%)	0	0	5 (0.9%)
Orthoptist	59 (10.8%)	114 (20.8%)	16 (2.9%)	0	189 (34.5%)
Physiotherapist	1 (0.2%)	22 (4%)	23 (4.2%)	1 (0.2%)	47 (8.6%)
Speech and Language Therapist	0	10 (1.8%)	6 (1.1%)	1 (0.2%)	17 (3.1%)
Stroke nurse	0	13 (2.4%)	7 (1.3%)	0	20 (3.6%)
Stroke physician	5 (0.9%)	20 (3.6%)	3 (0.5%)	0	28 (5.1%)
Other	6 (1.1%)	20 (3.6%)	12 (2.2%)	5 (0.9%)	43 (7.8%)
Total	92 (16.8%)	346 (63.1%)	103 (18.8%)	7 (1.3%)	548 (100%)

Table 12 Numbers of professionals with non-completed and completed surveys

Professional group	Non-completed surveys (n)	Completed surveys (n)
Eye Care Liaison Officer	3	13
Neurologist	3	5
Occupational Therapist	78	158
Ophthalmic nurse	3	1
Ophthalmologist	17	22
Optometrist	5	5
Orthoptist	134	189
Physiotherapist	24	47
Speech and language therapist	5	17
Stroke nurse	24	20
Stroke physician	11	28
Others	25	43
TOTAL	**332**	**548**