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The British and Irish Orthoptic Society (BIOS) Position Statement for Vision Services in Stroke Practice

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1. Introduction

This document is the fourth edition of the BIOS position statement for vision services in stroke practice. It provides a brief overview of Orthoptic practice for individuals who have had a stroke, their carers and health care practitioners. It also includes recommendations for the staffing input required from Orthoptists for acute stroke units. It has been updated using a combination of current research evidence from the medical literature and Cochrane systematic reviews, expert consensus from the Orthoptic Clinical Advisory Group (CAG) in Stroke and neuro-rehabilitation and models of best practice

Visual problems following stroke are multifaceted, cause significant impairment and can be a barrier to rehabilitation. Since the launch of the National Stroke Strategy in 2007, there have been considerable advances in the education of healthcare professionals involved in the care of stroke survivors in addition to advances in the assessment and treatment of visual impairment due to stroke [1]. National stroke guidelines [1, 2] state that stroke survivors with visual problems must be referred for specialist assessment and management. This has been further endorsed in the current edition of the Royal College of Physicians (RCP) Guidelines, 2016, that states that each stroke acute unit and service should have an Orthoptist as part of the core multi-disciplinary team [3]. The British and Irish Orthoptic Society (BIOS) provide guidance through the Professional Practice Guidelines for Orthoptists working with patients who have had a stroke [4]. These detail the specific assessment procedures and strategies for Orthoptists, to facilitate high quality and uniform care to stroke survivors who benefit from Orthoptic input.

Orthoptists have clinical expertise in the diagnosis and management of eye movement abnormality disorders affecting binocular vision and stereovision, in visual neglect and perception and in visual field assessment. They are experienced in providing a diagnosis and management in both the early post-acute phase and long-term care for these patients. As the incidence of visual problems following stroke is 60% or more [5], Orthoptists are therefore essential in the care and management of stroke patients by contributing their specialist knowledge and skills as part of the multi-disciplinary team (MDT). The Orthoptist has an important role to play in stroke rehabilitation and it is recommended that links between the stroke and Orthoptic departments should be established in all units [6-9].

2. Role of the Orthoptist

Orthoptists undertake specialised ocular testing procedures with provision of treatment options in the area of visual impairment following stroke. An Orthoptic assessment can provide the patient, the multi-disciplinary team and carers with a clear explanation of the visual defects that have arisen following stroke and how they can affect the patient and the ability to undertake activities of daily living, this often aids rehabilitation [10, 11]. Communication is

often difficult after stroke but Orthoptists can use techniques and tests that are non-verbal, making a reliable assessment possible. About 40% of stroke survivors, in the acute stage, do not or cannot report visual symptoms despite presence of visual impairment [12].

Diplopia (double vision), blurred/altered vision, ocular muscle imbalance, visual field deficits and visual inattention are common visual deficits that occur following a stroke. Orthoptists can assist with these problems to aid rehabilitation. They can provide information, compensatory and adaptive strategies, reading aids and advising on visual search techniques for visual field loss and inattention. They can also offer advice on the utilisation of a compensatory head posture, or utilising prisms and occlusion for diplopia or visual disturbances such as nystagmus. This can have a positive impact on general rehabilitation as enhancing ocular abilities and making best use of residual vision can aid general balance, mobility and the ability to carry out many activities of daily level, which can help the patient maintain a level of independence:

- Orthoptists use their specialist knowledge of the visual system, the brain and its associated pathologies to formulate strategies to assess the patient.
- By using quantitative and qualitative tests to investigate further the visual status of the patient, the Orthoptist can determine:
    - Presence of an ocular condition
    - Diagnosis of the type of ocular condition
    - Whether the ocular defects are due to the recent stroke or pre-existing pathology
    - The possible prognosis for ocular improvement and recovery
- Orthoptists advise, in the presence of ocular motility disorders and in particular gaze palsies, on how to utilise residual visual functions including compensatory head postures/movements, prisms and positioning of objects.
- They help to alleviate symptoms of diplopia using prisms, occlusion or advice on the use of a compensatory head posture and positioning as appropriate and monitor accordingly.
- An explanation, advice and treatment options regarding the presence of nystagmus as appropriate can be given regarding the use of a compensatory head posture or positioning, and / or the use of other strategies such as occlusion to lessen symptoms of oscillopsia, vertigo or blurring.
- Advise on the strategies available to cope with visual field loss such as positioning, scanning, prisms and exaggerated head movements will be given if appropriate.
- Orthoptists will arrange formal visual field assessment (if not already performed) where visual field loss is detected by confrontation testing and recovery is not evident by the time of discharge [13]. Zhang, Kedar [14] recommends visual field testing should be systematically performed in all stroke patients. This is also particularly important for driving standards and is discussed in the current RCP guidelines 2016 [3].

- Identify visual inattention, because it has implications for the patient's safety and mobility, and it impacts on activities of daily living and provide advice and strategies for rehabilitation.
- Orthoptists can provide patients with the option of a referral to Ophthalmology for consideration of certification for vision impairment where applicable
- The Orthoptist can also arrange other additional help and support from ECLO, support workers that work within their own trust.
- As part of the stroke MDT, the Orthoptist designs and implements treatment plans with the patient's involvement and consent:
- Orthoptists consider all treatment options in liaison with the stroke team and the patient, taking into account prognostic indicators, available resources, any adverse side effects and level of patient involvement that will be required.
- In conjunction with the stroke team, the Orthoptist advises and structures the specific treatment with respect to the general condition of the patient.
- Details of verbal or written instructions/information regarding Orthoptic, optical and, if required, ophthalmic procedures and care given to the patient and/or carer are provided.
- Written/verbal information is given to the MDT on the ocular status of the patient such as:
    - Identifying the patient's glasses that are required for reading and distance tasks
    - Identifying if the patient has vision within expected norms or if this is reduced
    - Identifying if the patient has diplopia, visual field loss or inattention
    - Identifying if the patient has any difficulty with their vision that may affect balance, judging distances and mobility
- The Orthoptist informs the patient and the stroke team at an appropriate time when the presence of a visual defect such as double vision, visual field loss, visual inattention or reduced vision will affect the patient's driving eligibility and when it is necessary to inform the DVLA
- A cost-effective service is provided by Orthoptists by screening for stroke-associated visual defects and thus save on unnecessary referrals to Ophthalmology

The positive effect that reassurance and explanation to the patient can have when their visual problems after stroke are fully defined to them by knowledgeable professionals should not be underestimated.

3. Evidence

The impact of visual impairment can be wide ranging. Impact on functional performance can include general mobility, self-care, ability to judge distances

due to diplopia or impaired stereo vision, reading impairment due to cortical or ocular dysfunction, impaired colour perception and visual hallucinations. Impact to quality of life is also an issue with changes to independent living, ability to drive, social functioning, dependency, loss of confidence and links to anxiety and depression [8, 10, 15-20]. Eye movement disorders impact on the effectiveness of rehabilitation therapy in regaining mobility and activities of daily living [2].

3.1. Incidence

There has been one epidemiology study of the presence and extent of visual deficits following stroke [5]. Visual deficits arising after stroke are multi-faceted and frequent with a prevalence reported as up to 73% and incidence of new onset vision problems in up to 60% [5]. The visual sequelae of stroke are many but broadly relate to low vision, visual field loss, ocular motility deficits and visual perception difficulties [7, 8, 21, 22].

Low vision has been reported in up to 56% of stroke survivors and can relate to associated vascular pathology or to other co-existent ocular abnormalities such as glaucoma, cataract and refractive error [5, 23].

Ocular motility disorders can be divided into cortical deficits of strabismus, saccadic or smooth pursuit eye movements and brain stem defects including cranial nerve palsies, nystagmus, gaze palsies and skew deviations. The prevalence of ocular alignment and/or ocular motility deficits is estimated at up to 64% [5, 24-31].

Perceptual problems encompass agnosia, simultanagnosia, prosopagnosia, alexia and achromatopsia amongst others [32]. Visual inattention (VI) is a frequent perceptual sequelae of right-hemisphere damage [33] although it has also been reported in left hemisphere damage [34, 35]. The reported prevalence varies but has been documented to be as high as 85% with some degree of neglect [35-37]. Recovery of VI frequently occurs in the early post-acute stage, however persistent neglect has been documented to be as high as 31.5% [38].

Homonymous visual field defects are among the most common disorders that occur after stroke but are not the only type of visual field loss that can occur. The prevalence of post-stroke homonymous visual field loss is relatively high and frequently underestimated by confrontational testing with stroke patients often unaware of their field loss [39].

Estimates of incidence of stroke-associated visual field loss vary considerably, depending on the method of testing used or what stage post stroke testing was performed with ranges from 20% [40] to 63% [41]. They lead to considerable disabilities, particularly with reading, visual exploration, mobility and are associated with a higher risk of falls and also associated with reduced prognosis for successful rehabilitation [42] and frequently preclude driving [43]. Visual field loss, like low vision, is associated with a higher risk of falls and thus it is important to obtain the diagnosis of visual field impairment for this group of already compromised patients [8, 44].

3.2. Early intervention

National guidelines [2, 3, 45] recommend that best care starts with a specialist assessment and continues in a specific stroke unit with active management. An assessment of visual deficits in the immediate acute phase is the optimum time for Orthoptic input. Core outcome sets exist for vision screening and assessment of stroke survivors [46]. Core outcome sets represent the minimum that should be measured and reported for a specific condition, and aids standardisation. Screening assessment should comprise: Case history – previous ocular history and use of glasses, open questions; Observations; Visual acuity; Eye alignment position; Eye movement – ocular motility assessment; Visual field assessment; Visual neglect assessment; Functional vision assessment; and Reading assessment. Full orthoptic assessment should include, as a minimum; Case history – previous ocular history and use of glasses, open questions, visual fatigue and visual perception questions; Observations – including lids and pupils; Visual acuity; Eye alignment position; Eye movement – ocular motility assessment; Binocular vision assessment; Eye position measurement; Visual field assessment; Visual neglect assessment; Functional vision assessment; Reading assessment; and Quality of life questionnaires.

At the immediate acute stage, the Orthoptist can provide essential information to the MDT on the ocular status of the patient so that other professionals can consider and use this knowledge when planning and carrying out their own rehabilitation plans. RCP guidelines specifically call for Orthoptists as a member of the core multi-disciplinary team in acute stroke units.

Early assessment of stroke survivors is advised within the first three days of stroke admission or before discharge, whichever is the soonest. Over half of stroke survivors can be reliably assessed for visual status during that time, whilst the majority will be assessed within one week [5].

The neglect syndrome rather than overall stroke severity is an important predictor of poor functional recovery [47, 48] and therefore, therapy treatment for neglect remains a high priority. Treatment targeted at visual neglect has been shown to improve outcome and reduce pressure on resources [49]. However it is generally recognised that more research is needed to better define which treatment techniques are the most beneficial [50]. Treatment options have included prism adaptation [51], visual imagery techniques [52, 53], and visual scanning training [54]. A Cochrane systematic review considers the many interventions for visual inattention [55].

There is evidence to support visuospatial rehabilitation for deficits associated with visual neglect after right hemisphere stroke [56, 57]. Spacio-motor cueing and early emphasis on function can improve outcome and reduce resource use in patients with visual neglect [49]. Motor and functional recovery of stroke patients with neglect seems to be significantly improved by the simultaneous presence of a treatment specifically focussed on neglect [58-60]. Results from systematic reviews for interventions for visuo-spatial neglect have not found sufficient evidence to reach conclusions relating to the effectiveness of interventions. However, of the potentially promising interventions visual scanning training appears to be the intervention with the most supporting evidence [2].

There is a limited literature addressing possible rehabilitation options for patients with homonymous hemianopias and this has been reported clearly by a Cochrane systematic review [61]. Visual search training is most frequently implemented for those with visual field loss and is shown to have benefit for stroke survivors with hemianopia [62, 63]. It has been reported that up to 70% of patients with homonymous field defects show disorganised visual search strategy, which can be markedly improved with systematic training of saccadic eye movements, and visual search strategies [64]. Visual field rehabilitation strategies should be initiated early after injury [14]. Despite uncertainty as to the long-term efficacy of this treatment due to lack of large-scale systematic trials, advocates promote the increased speed of adaptation to visual field loss and the benefit of this to rehabilitation. Most importantly, it is a low-cost treatment that generalises across a wide range of tasks for many weeks afterwards.

Treatment may also involve expanding the visual field in lateral gaze using sector prisms. Patients, particularly those who are younger or motivated, report improvement in functioning and obstacle avoidance [58]. However, it appears that although patients may show adaptation to the field defect there is little objective alteration of the visual field boundaries [65] and there may be increased adverse events relating to headaches and visual confusion [62].

It is important that low vision is identified in older patients [30]. In many cases it is treatable, e.g. spectacles for uncorrected refractive errors or surgical extraction of cataract. However undiagnosed low vision or untreated low vision is a risk factor for falls and is also linked with depression and reduced activity of daily living performance [8]. Importantly low vision can also impact on the rehabilitation of stroke [66].

Patients with disorders of eye movement should receive appropriate advice or interventions from appropriately trained specialists [2]. It is important to recognise that improvement can be noted with ocular motility treatment [67, 68]. Patients may be treated in a variety of ways dependent on their symptoms [27]. Those with diplopia can be given Fresnel prisms to join the double images and where it is not possible to achieve this with prisms, occlusion – either total or sector – can be utilised. Exercises are advocated in many cases of convergence weakness and compensatory head postures are advised to aid gaze disorders. In addition, advice may be given in relation to scanning and tracking strategies and use of a typoscope to aid reading [28, 69].

3.3. Long-term follow up

In cases of visual field loss, most improvement occurs by 3-6 months [43, 44]. In cases of diplopia, most recovery is expected by 6 months. By 6 months post-stroke, the Orthoptist will have either determined the next stage of intervention such as prism incorporation, referral to Ophthalmology for sight-impaired registration, botulinum toxin or surgery as appropriate OR assessed the patient as fit for discharge. It seems reasonable therefore to anticipate an average follow-up time of 6 months in most cases, based on current evidence.

However, as '*the impact of stroke varies hugely, support in the long-term needs to be tailored to meet the individual's needs'* [1]. Follow-up can be arranged in an out-patient setting as long as is required to support long-term rehabilitation as appropriate and reflects the stated required staffing levels to support such long-term care.

Throughout the process of initial and follow-up assessments, it is important that patients and carers are provided with appropriate information that explains the potential visual problems in an appropriate manner [27]. Early provision of visual information is reported as beneficial by stroke survivors as is post-discharge information about local support services.

Whilst many stroke survivors have the opportunity to obtain visual assessment in their early post-stroke period, it is recognised that other stroke survivors may present requiring visual assessment at many varied time points and through many different services. Regardless of time or mode of presentation, orthoptic assessment should be organised [70].

4. Staffing recommendations

Orthoptists accept direct referrals from in-patient stroke units, TIA clinics, ophthalmology outpatient clinics and community follow-up referrals. It is recommended to allow for multidisciplinary working and provision of education sessions for other professionals working with stroke patients. The National Stroke Strategy stated that staffing levels are currently inadequate [1]. A survey in 2010 stated that staffing levels had not changed significantly and that 78% of stroke units had access to Orthoptists [71]. A 10-year update of this survey reported an approximate doubling of orthoptic stroke services across the UK, but with a number of stroke units remaining without any vision service and some existent orthoptic services being ad-hoc provision rather than mainstream [72]. To comply with current national stroke guidelines and to mitigate against health inequality this needs to be addressed.

Key elements for high quality stroke/vision services have been published [73] and include;

- Minimum designated orthoptic sessions per week (per BIOS 2014 recommendations)
- Flexible appointments
- Formal stroke team training
- Formal support from stroke physicians
- Lay summaries
- Open communication
- Orthoptic assessment within one week of stroke onset

- Orthoptist named on core stroke team
- Provision of visual information leaflets
- Rota of orthoptic staff
- Standardised referral form
- Vision care pathway.

In previous recommendations, regarding staffing input from Orthoptists providing stroke care was 0.1fte Orthoptists per 10 bedded stroke unit. In 2014 the mean length of stay for stroke survivors was 17 days, which is longer than more recent durations [74].
Currently (part based on SSNAP data) the average length of stay is 3 days for hyper-acute stroke units, 7 days for acute stroke units and 14-20 days for rehabilitation units. Thus, there is now a greater turnover and patient throughput in hyper-acute and acute stroke units. This warrants a greater investment in orthoptic sessions.

The recommended staffing input from Orthoptists providing stroke care is 0.4 full-time equivalent Orthoptists per 10 bedded hyper-acute stroke unit, taking into account the rapid turn-over and numbers of stroke admissions in this care setting. The recommendation is 0.2 full-time equivalent Orthoptists per 10 bedded acute stroke unit, acknowledging the slightly longer length of stay in this setting and 0.1 full-time equivalent Orthoptists per 10 bedded neuro-rehabilitation unit. One out-patient orthoptic clinic per week is recommended for follow-up appointments per 30 bedded stroke provision.
This is the **minimum** recommendation to provide adequate services for stroke patients. Allowance should also be made for the administrative workload that accompanies provision of a stroke-vision service.

5. Summary

It is recommended that orthoptists are part of the core stroke MDT and. the high prevalence of visual impairment post-stroke (73%) is now established. An assessment for visual impairment in the immediate post-acute phase is the optimum time for Orthoptic input, to enable provision of information the MDT so rehabilitation can be optimised. A minimum of 0.2 full time equivalent Orthoptists per 10 bedded stroke unit is the recommended staffing input.

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