Institution: University of Bradford

Unit of Assessment: A3

Title of case study: Changes to ophthalmic clinical practice to help reduce trips and falls.

1. Summary of the impact

Falls are a common and serious health risk for older people and reducing falls is a priority for the NHS. Research at the University of Bradford on the link between vision and falls has led to new healthcare guidelines, specifically those from the College of Optometrists and the British Geriatrics Society and endorsed by Age UK and the Royal College of General Practitioners. Continuing professional development practices have changed and public awareness of this health risk has been raised by *Which?* reports and subsequent media coverage. These developments have impacted on the health and welfare of older people, particularly those at risk of falls.

2. Underpinning research

Falls and fall-related injuries are a common and very serious problem for older people. Approximately 33% of people aged over 65 and 50% of those over 80 fall at least once a year. Falls cause bruising, fractures, loss of confidence and independence and are the leading cause of accidental death in older people. They are estimated to cost the NHS more than £2.3 billion per year.

Research conducted in the vision and mobility laboratory at the University of Bradford assessed how safely older people can negotiate step and stair ascent and descent (adaptive gait), which is highly dependent on good visual information. We investigated adaptive gait in well-adapted, long-term wearers of bifocal or varifocal spectacles (1,2,5) and showed that they: i) did not show the safety precautions we had reported previously in subjects with blurred vision in the lower visual field; ii) did not follow professional advice to “tuck their chin in” so that the lower visual field would be seen clearly through the distance part of their spectacles; iii) had more variable adaptive gait; iv) were more likely to hit a step edge when stepping up; v) were more likely to ‘drop’ onto the step during step descent. Importantly, despite being adapted to bifocal or varifocal spectacles for many years, these subjects showed safer adaptive gait when switched to single vision distance lenses (1,2,5), did not hit the step when stepping up and showed more controlled step descent. Our laboratory-based studies supported other epidemiological, clinical and randomized controlled trial evidence from other laboratories.

In addition, research has indicated that visual impairment is a significant risk factor for falls suggesting that updated spectacles and cataract surgery would reduce the falls rate. However, randomized controlled trials have not shown the expected benefits and indeed, one study by an Australian group found that updated spectacles **increased** falls. Given the known effects of a visual illusion on adaptive gait (3), this unexpected finding led us to investigate whether spectacle magnification could be the cause of the problem with updated spectacles (4). We found that adaptive gait was driven by changes in lens magnification, with the highest magnifications causing potentially unsafe adaptive gait changes. Other studies from our team with Canadian collaborators have shown that partial prescribing of refractive change is less likely to lead to problems, particularly in older patients (e.g. 6) and this is what is now recommended to clinicians. Dave Elliott (Senior Lecturer 1995-1998, Reader 1998-2003, Professor 2003-present) began gait and vision studies with Patla in Kinesiology, Waterloo, Canada in 1993 and set up a vision and mobility laboratory in Bradford in 2001. The team includes Dr John Buckley (PDRA 2002-2005, Research Fellow 2005-2007, Reader 2007-present), Andrew Scally (Lecturer 1996-2005, Senior Lecturer 2005-present) and Dr Sarah Louise Johnson (University Teacher 2000-2002, Lecturer 2005-present). The papers listed included contributions from David Whitaker (Senior Lecturer 1995-1996, Reader 1996-2000, Professor 2000-present), and research assistants Harley (2006-2007) and Chapman (2007-2009).

3. References to the research

1. Johnson L, Buckley JG, Scally AJ, Elliott DB. (2007) Multifocal spectacles increase variability in toe clearance and risk of tripping in the elderly. *Investigative Ophthalmology and Visual Science* 48: 1466-1471.

2. Johnson L, Buckley JG, Harley C, Elliott DB. (2008) Use of single-vision eyeglasses improves stepping precision and safety when elderly habitual multifocal wearers negotiate a raised surface. *Journal of the American Geriatrics Society* 56: 178-180.

3. Elliott DB, Vale A, Whitaker D, Buckley JG. (2009) Does my step look big in this? A visual illusion leads to safer stepping behavior. *PLoS One* 4(2): e4577. doi:10.1371/journal.pone.0004577

4. Elliott DB, Chapman GJ. (2010) Adaptive gait changes due to spectacle magnification and dioptric blur in older people. *Investigative Ophthalmology and Visual Science* 51: 718–722.

5. Timmis MA, Johnson L, Elliott DB, Buckley JG. (2010) Use of single-vision distance spectacles improves landing control during step descent in well-adapted multifocal lens-wearers. *Investigative Ophthalmology and Visual Science* 51: 3903-3908.

6. Howell-Duffy C, Hrynchak PK, Irving EL, Mouat GSV, Elliott DB. (2012) Evaluation of the clinical maxim: "If it ain't broke, don't fix it". *Optometry and Vision Science* 89(1): 105-111.

Evidence of quality:
The papers are either published in multidisciplinary journals (*Plos One*, 2012 impact factor 3.73, ranked 7th of 56 in Multidisciplinary Sciences; *Journal of the American Geriatrics Society,* 2012 impact factor 3.98, ranked 9th of 46 in Geriatrics & Gerontology) or one of the leading international ophthalmology journals *Investigative Ophthalmology & Visual Science* (2012 impact factor 3.44, ranked 5th of 58 in ophthalmology). Individual paper citations are good and typically in the top 10-25% for the discipline.

Evidence of the quality of the research is also demonstrated by the award of the following research grants:

The PPP Foundation, 2001-2004, £150K. *Falls in the elderly: the link with visual impairment and ophthalmic intervention*. PI: Elliott, CI: Scally**.**

The Health Foundation, 2004-2008, £150K. *Impact of correctable visual impairment upon balance control and stepping strategies*. Training Fellowship for Buckley, sponsor: Elliott.

Nursing & Allied Health Professions Award Scheme, Research Capacity Development, (a predecessor of the NIHR Doctoral Research Fellowship award), 2005-2008, £211 K. *Effects of common forms of visual impairment upon gait biomechanics during stair/step negotiation in the elderly*. Research Fellowship for Johnson; sponsors: Elliott and Buckley.

National Institute for Health Research, Public Health Research Programme, 2012-2014, £200K. *Manipulating the appearance of steps and stairs to make them safer for older people to negotiate*. PI: Elliott. CIs: Buckley, Scally, Whitaker.

4. Details of the impact

Research at Bradford has led to changes in healthcare guidelines and healthcare training guidelines particularly regarding the prescribing of bifocals and varifocals and the need to prescribe refractive correction changes conservatively to older people at risk of falling.

The Importance of Vision in Preventing Falls guidelines (a) were produced by the College of Optometrists and the British Geriatrics Society and endorsed by Age UK and the Royal College of General Practitioners in 2011. They are provided on each of these organisation's websites plus those for Vision2020, the Macular Disease Society, Visibility, the Glaucoma Association, local NHS falls prevention teams, local optometric committees and a variety of health-related consumer websites. Elliott was co-author and lead expert and the guidelines include reference to several publications from the group (1,4,5). The guidelines have been provided to ~10,000 optometrists practicing in the UK. (b). The significance of the research was also highlighted in a 2013 review of the literature by the Thomas Pocklington Trust (c) which explains the scale of the problem of falls in the elderly and the importance of the research at Bradford (1,4,5) in the understanding of the role of vision in relation to falls. Outcomes for older patients at risk of falls due to poor vision have improved via input into the development of NICE guidelines for falls by Elliott on behalf of the College of Optometrists (b). In particular, the new addition of "visual impairment" as a key part of multifactorial assessments to the June 2013 NICE guidelines for the assessment and prevention of falls for older people is a significant step forward (d). In May 2013 the College of Optometrists developed a "Watch your Step" campaign, which created significant media interest and included College members sending out 16,000 patient leaflets highlighting the link between vision and falls (b). A College of Optometrists "Falls Pathway Policy" steering group (July 2013-present), of which Elliott is a member, is currently contacting falls teams across the UK to develop links and determine whether vision measurements, determination of multifocal wear and optometric referral are part of their assessments (b).

Dissemination of the recommendations in the fall prevention guidelines (a) to clinicians has occurred via continuing professional development (CPD) articles in professional journals (e, f), a best-selling clinical textbook (g) and in CPD lectures. Feedback regarding the usefulness of these articles was received from a large number of clinicians, who reported that they were highly relevant to their daily work (e, f). Invited CPD presentations about "how to help prevent falls in your older patients" have been given in Hull & East Riding (2008), North Midlands (2009), Aintree (2010), Royal Society of Medicine, London (2010), Manchester (2010), Sheffield (2011) and Phoenix USA (2012). Attendance levels were between 60-150, with very positive feedback regarding relevance to clinical practice (76-86% either 'good' or 'excellent'). It would be fair to say that the understanding of the link between vision and falls by optometrists, dispensing opticians and orthoptists 10 and even 5 years ago was negligible (b). The efforts described above have made a big improvement in a short period of time. Hospital optometrists and clinicians helping visually impaired patients are using the recommendations provided in the guidelines widely (h) and a recent independent survey of high street optometrists has indicated a growing number of optometrists in high street practice feeling able to appropriately manage older people at risk of falls (i).

We have made considerable efforts to improve public understanding of the risks of wearing bifocal and varifocal spectacles and the publicity our work has received has stimulated public debate. Magazine and online articles in the Consumer Association *Which?* in 2010 and 2012 highlighted the unsafe practice of buying varifocals and bifocals online and the problems associated with higher-powered ready readers (j). The *Which?* reports led to 18 pieces of media coverage, including a Pugh cartoon in the *Daily Mail* and articles discussing the issues in *The Daily Mirror*, *The Telegraph*, the *Express* and a wide range of websites (j). The *Which?* reports also led to two online companies (Select Specs, Spec Superstore) changing the way that varifocals and bifocals were ordered online to make provision safer and several stores, including Poundland, launched their own audits of their ready readers stock, while *Which?* also reported some companies to trading standards, who investigated (j).

5. Sources to corroborate the impact

a. *The Importance of Vision in Preventing Falls (2011)*. Guidelines produced by the College of Optometrists and the British Geriatrics Society and endorsed by Age UK and the Royal College of General Practitioners. http://www.bgs.org.uk/index.php/nursepublications/nursefalls/1455-

visionfalls

b. Clinical Advisor to The College of Optometrists – impact of 'Vision in Preventing Falls' guidelines, 'Watch Your Step' campaign and 'Fall Pathways Policy' steering group.

c. *Falls in older people with sight loss: a review of emerging research and key action points (2013)*. Thomas Pocklington Trust, Research Discussion paper 12; June 2013. http://www.pocklington-trust.org.uk/

d. *Falls: assessment and prevention of falls in older people (2013)*. NICE clinical guideline 161, June 2013. http://www.nice.org.uk/nicemedia/live/14181/64088/64088.pdf

e. Elliott DB (2012). Falls and vision impairment: guidance for the optometrist. *Optometry in Practice* 13(2)**:** 65-76. This article was received by ~ 10,000 optometrists who are members of the College of Optometrists. 671 gave feedback on the article and 67% indicated that it had 'good' relevance (97% good or average relevance) to their work. www.college-optometrists.org

f. Elliott DB (2012). Ophthalmic interventions and advice to help prevent falls in older patients. *Dispensing Optics* (December 2012: 4-10). This was an invited CPD article for the Association of British Dispensing Opticians and was received by 8,537 dispensing opticians. The article received feedback from 1,353 of them, of whom 88% indicated that it had "good" or "excellent" relevance to their work. For readership and feedback figures contact the CET Co-ordinator at the Association of British Dispensing Opticians.

g. Elliott DB. *Clinical procedures in primary eye care.* 3rd edition, Elsevier, 2007; 4th edition, Elsevier, 2013 (ISBN: 9780702051944). This is a bestselling textbook used widely by optometrists and ophthalmologists in the UK and internationally: over 6,000 copies have been sold since 2008, with average yearly sales of ~ 1,200 and sales by region of UK & Ireland 49%, USA 22%, Western Europe 14%, Australasia 8%, rest of the world 7%. www.Elsevier.com

h. Chief Optometric Advisor to the Welsh Government, Clinical lead for the Welsh Low Vision Service.

i. School of Life and Health Sciences, Aston University. This recent survey of high street optometrists indicated that 36% (75 of 209) felt confident to assess their patient's risk of falls and of these, 82% stated that separate single vision distance and near lenses were their lens design of choice for those aged 65 or over, who were at risk of falls.

j. *Which?* Consumer Association (http://www.which.co.uk/). Senior Health Researcher, *Which?* can confirm the details of the impact discussed above and the following:
The magazine is sent to 625,000 members whose average age is 60 years and Which? online has 235,000 members. A subsequent Which? survey indicated that 45% of members read the article about selling multifocals and other glasses online.