Institution: City University London

Unit of Assessment: 3 Allied Health Professions, Dentistry, Nursing and Pharmacy

Title of case study: Improvements in the Detection and Management of Glaucoma

1. Summary of the impact

Glaucoma affects around 2% of people over 40 years of age and almost 10% of those over 75. There are more than one million glaucoma-related outpatient visits to hospital eye services annually. Once lost through glaucoma, sight cannot be restored. Therefore early detection (mainly by optometrists) and appropriate management of the condition are crucial to maintaining a sighted lifetime. Uncertainty and variation exist in clinical practice and service delivery. Research undertaken by academic staff at City University London has led to:

- contributions to the development of computer software used in hospital clinics globally to assess glaucoma;
- changes in the management by the National Health Service of one group of patients (ocular hypertensives) at risk of glaucoma;
- unique films, developed at City, of patients 'driving' with vision loss resulting from glaucoma being used by the BBC and the International Glaucoma Association to increase disease awareness;
- curricula for professional qualifications in glaucoma (based on a competency framework developed by City) becoming the national standard for optometrists.

In addition, City research on the scope of therapeutic practice by optometrists and the development of clinical management guidelines (CMGs) strongly influenced the decision to extend independent prescribing to optometrists. CMGs developed at City were incorporated into the Map of Medicine and other national ophthalmology primary care pathways. Research on a repeat-measurement-enhanced glaucoma scheme generated a National Institute for Health and Care Excellence (NICE) Quality, Innovation, Productivity and Prevention (QIPP) Case Study and informed Joint College Commissioning Guidance on Glaucoma and Local Optical Committee Support Unit (LOCSU) schemes. City's Standardised Patient research, where actors play the role of patients to collect evidence on actual clinical practice, is unique in optometric research and has been referred to by experts and relied upon in the defence of optometrists' actions in several clinico-legal cases before the General Optical Council.

2. Underpinning research

Glaucoma detection: Glaucoma detection is often achieved by testing the patient's field of vision (visual field). Work related to visual field testing led by Professor David Crabb (dating back to 1996 but at City since 2005) demonstrated the limitations of standard techniques and led to new computer-based methods of testing. The research progressed to link such measurements taken in the clinic with the patient's actual function when performing everyday tasks. The study described in [1] investigated eye movements in glaucomatous patients when viewing driving scenes in a hazard perception test (HPT). The work showed that characteristics of eye movement patterns in patients with bilateral glaucoma can differ significantly from age-matched controls when viewing a traffic scene.

Glaucoma: monitoring and treatment. Crabb's work with the University of Aberdeen [7] to determine optimal surveillance regimes for monitoring ocular hypertensives (patients at risk of glaucoma) identified and validated glaucoma risk prediction models and developed models to determine optimal surveillance pathways. The research demonstrated that for confirmed ocular hypertension there is no clear benefit from intensive monitoring for development of glaucoma and that biennial monitoring may be the best option.

Glaucoma: service delivery. Glaucoma-related activity within the Hospital Eye Service is a major and increasing NHS burden. Over 90% of referrals for suspect glaucoma originate from High Street (community) optometrists following routine sight tests. Edgar (at City since 1977, now Professor) and Parkins (Bexley Care Trust) collaborated on a project which assessed the effectiveness of a new referral scheme involving community optometrists [2]. It provides incentives for optometrists to improve the quality of referrals for suspect glaucoma by repeat testing with standard screening tests before taking the final decision whether to refer. Repeat testing resulted in 76% of patients in

the scheme not being referred from community optometrists to the hospital glaucoma clinics, leading to significant cost savings to the NHS.

Standardised Patients (SPs): SPs are actors who, unknown to the clinician examining them, play the role of patients and report on the clinicians' practice. SPs are widely used in medicine where they are considered the reference standard for measuring quality of clinical practice, but had not previously been used in optometry research. Since 2006, Edgar (with Shah and Evans of the Institute of Optometry) and Lawrenson (at City since 1994, now Professor) have co-led on SP-based studies which provided a unique picture of actual optometric practice [3, 4]. They showed that SP encounters are an effective way of measuring clinical care within optometry and should be considered for further comparative measurements of quality of care; and that there are differences between the "real-world" picture of optometric clinical practice and the College of Optometrists published guidelines for professional conduct. The research also identified notable cases of under-recording of results. They made recommendations on the focus of future optometric continuing education.

Competency Frameworks: Lawrenson has significant research expertise in developing competency frameworks in healthcare. Following publication of the NICE clinical guidelines on glaucoma in 2009, Lawrenson and Edgar, using a consensus methodology consisting of a modified Delphi technique, convened a multidisciplinary team to develop a competency framework for optometrists with a specialist interest in glaucoma to provide a basis for training and accreditation. This will help to shape the development of a specialty curriculum and could be adapted for other healthcare professionals. [5]

Therapeutic Practice: Noting that changes in medicines legislation in the UK have broadened the opportunities for optometrists to use and supply therapeutic drugs, research led by Lawrenson defined, for the first time, the scope of therapeutic practice by community optometrists and elicited their views on an extended prescribing role [6]. The survey of the College of Optometrists covered four areas: mode of practice, proximity and relationship to other providers of eye care, scope of current therapeutic practice and future plans regarding prescriber training. The research showed that significant numbers of community optometrists are managing a range of common ocular conditions using a limited formulary. Enabling optometrists to train as independent prescribers will further develop this role, allow greater use of their skills and provide patients with quicker access to medicines.

3. References to the research

Key Publications

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3. Shah, R, Edgar, DF, Spry, PG, Harper, RA, Kotecha, A, Rughani, S, Evans, BJ. (2009). Glaucoma detection: the content of optometric eye examinations for a presbyopic patient of African racial descent. *Br. J. Ophthalmol.*, 93(4), 492-496. doi:10.1136/bjo.2008.145623
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5. Myint J., Edgar D.F., Kotecha A., Crabb D.P. & Lawrenson J.G. (2010). Development of a competency framework for optometrists with a specialist interest in glaucoma, *Eye* 2010(24), 1509-1514 10.1038/eye.2010.62
6. Needle J.J., Petchey R. & Lawrenson J.G. (2008). A survey of the scope of therapeutic practice by UK optometrists and their attitudes to an extended prescribing role. *Ophthal. Physiol. Opt.* 28(3), 193-203 10.1111/j.1475-1313.2008.00551.x

Key Research Grant

NIHR Health Technology Assessment (HTA) Programme Project www.hta.ac.uk/project/1757.asp. Crabb Co-Investigator with Dr J Burr (University of Aberdeen) Title: Optimal Surveillance Regimes for Individuals with Ocular Hypertension (OHT): Modelling and economic evaluation.

The work is all published in double-blind peer-reviewed journals and we believe that appropriate scientific rigour is demonstrated concerning design, method, execution and analysis.

4. Details of the impact

Glaucoma detection: Research on visual fields has led to the jointly-developed Moorfields Motion Displacement Test (MDT) (www.moorfieldsmdt.co.uk), a novel form of visual fields test. The MDT was winner of the Medical Research Council translational research innovation award (2008) and published as one of the *Big Ideas for the Future* by Research Councils UK in 2011 [1]. The recent NICE guidelines for glaucoma made an important recommendation for research to improve patient care in the future, including a call to establish the clinical-effectiveness and cost-effectiveness of using different monitoring intervals to detect disease worsening or stability in patients diagnosed with the condition. Crabb is the principal investigator on a research project tasked with answering this research question and funded by the NHS National Institute for Health Research (NIHR) Health Services and Delivery Research (2011 to 3).

Glaucoma: monitoring and treatment. People with glaucoma need lifelong monitoring to detect any deterioration of vision. Computer software for improving assessment of visual field loss (PROGRESSOR visual field software [Medisoft Ltd.]) and monitoring optic nerve head changes (Moorfields Regression Analysis for the Heidelberg Retina Tomograph [Heidelberg Engineering Ltd.]) has been adopted in glaucoma clinics globally. Use of this software improves the ability to identify correctly changes in the disease that may require changes in treatment regimes. Crabb's work with Burr (Aberdeen) has resulted in changes in the way patients at risk of glaucoma can be managed by the NHS [2]. The videos of eye movements during driving with visual field loss have been used by the BBC and the International Glaucoma Association [3] for patient awareness.

Glaucoma: service delivery. Glaucoma is a high-volume and resource-demanding disease where significant efficiencies can be made by decentralising care and making greater use of the skills of community eye care providers. In repeat measurement schemes, community optometrists repeat key tests on a second visit before deciding whether to refer patients as glaucoma suspects. Research by Edgar and Parkins on a repeat-measurement-enhanced glaucoma scheme in Bexley formed the basis for a Case Study published in late 2011 as a NICE QIPP in NHS Evidence [4]. The case study reported a 62% saving against HES (Hospital Episode Statistics) tariff (equating to £15k per million people). As a result of this research, NHS London awarded a grant to NHS South East London as part of its Continuing Professional and Personal Development funding stream. This funding has led to the extension and integration of repeat measurement schemes across every Clinical Commissioning Group area in SE London. The research also informed the 2013 Joint College Commissioning Guidance on Glaucoma [5]. The Parkins and Edgar research paper is the only peer-reviewed publication quoted in the LOCSU repeat-measurement-enhanced service pathway for glaucoma and ocular hypertension [6]. This pathway has been adopted in enhanced schemes across England. Repeat measures schemes lead to more care provided in the community and save NHS resources.

Standardised Patients (SPs): In clinico-legal cases, an optometrist's actions can be successfully defended if it can be shown that the care provided is supported by the actions of a significant body of reasonably competent optometrists. The City evidence-based investigations into the content of an optometric eye examination have been central to the defence of optometrists' actions in a several recent clinico-legal cases. The SP research papers have been identified by expert witnesses and legal teams as providing unique evidence supporting what "reasonably competent optometrists" are likely to do in some real-life optometric practice situations [7]. Published clinical guidelines, which are also often used as evidence in clinico-legal cases, do not always fully reflect actual clinical practice. Our research papers have also been quoted in the record audit guidance section for Quality in Optometry, Level 1, an NHS England approved toolkit [8].

Competency frameworks: Lawrenson has significant expertise in developing competency frameworks in healthcare and has worked with NICE to produce frameworks for medical and non-medical prescribers [9]. The guideline recommends that any healthcare professionals involved in the diagnosis and monitoring of glaucoma have a specialist qualification. Following its publication, a team led by Lawrenson was commissioned by the College of Optometrists to develop curricula for professional qualifications in glaucoma based on the competency framework developed by City [10]. These qualifications have become the national standard for optometrists working in this specialty [10] and ensure optometrists have the appropriate level of diagnostic and management skills.

Therapeutic practice: Lawrenson, as a member of the Cochrane Eyes and Vision Group, has used evidence synthesis and critical appraisal techniques to develop Clinical Management Guidelines for primary eye care [11]. They were adopted in 2008 by the College of Optometrists to support therapeutic prescribers and form the basis of national pathways for referral and management of eye disease. Research on the scope of therapeutic practice by Lawrenson and the development of evidence-based clinical management guidelines at City strongly influenced the decision by the Commission for Human Medicines to extend independent prescribing responsibilities to optometrists [12]. This policy change has substantially increased the benefits that optometrists offer to patients in terms of their quality of care and patient experience. Independent prescribing has had particular impact on the management of glaucoma [13]. Although originally written for optometrist prescribers, the Clinical Management Guidelines developed at City have been incorporated into the Map of Medicine and other national ophthalmology primary care pathways [14]. The Guidelines ensure that management and referral of eye disease by optometrists and general practitioners is appropriate and informed by best research evidence.

5. Sources to corroborate the impact

1. RCUK Big Ideas for the Future Report 2011 [Internet]. [cited 2012 Mar 16]. Available from: www.rcuk.ac.uk/documents/publications/BigIdeasfortheFuturereport.pdf.
2. NIHR Health Technology Assessment (HTA) Programme Project www.hta.ac.uk/project/1757.asp Co-Investigator with Dr J. Burr (University of Aberdeen) Title: Optimal Surveillance Regimes for Individuals with Ocular Hypertension (OHT): Modelling and economic evaluation.
3. International Glaucoma Association 2011 [Internet] Available from: www.glaucoma-association.com/can-u-c-2-drive-campaign/impact-of-glaucoma-on-driving.html.
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5. Commissioning better eye care: clinical commissioning guidance from The College of Optometrists and The Royal College of Ophthalmologists. Glaucoma. Version 1. Published 14th February 2013. www.locsu.co.uk/uploads/enhanced_pathways_2013/joint_colleges_glaucoma_guidance.pdf.
6. Glaucoma repeat readings & OHT monitoring enhanced service pathway. Issued by Local Optical Committee Support Unit. May 2009 [Revised June 2012] www.locsu.co.uk/uploads/enhanced_pathways_2012/locsu_glaucoma_rr_oht_monitoring_pathway_rev_june_2012.pdf.
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8. Corroborative statement can be provided by the Clinical Adviser to the Legal Services Team, Board Member, Association of Optometrists.
9. NICE 2012. A single competency framework for all prescribers. www.npc.co.uk/improving_safety/improving_quality/resources/single_comp_framework.pdf.
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13. National Prescribing Centre. Optometrist independent prescribing in a one-stop optometry glaucoma assessment clinic. www.npc.nhs.uk/shared_practice/nmp/example_optometry_one_stop.php.
14. NICE Clinical Knowledge Summaries. http://cks.nice.org.uk/glaucoma#!scenariobasis.