New methods for measuring vision loss in patients with glaucoma – Translating research papers into clinical tools.

Glaucoma is an eye disease affecting a significant number of the elderly population and it can lead to blindness if left untreated; it is a progressive chronic disease and often asymptomatic, so it is vital that affected individuals are monitored routinely over time in order to detect any signs of worsening vision loss on treatment. Glaucoma represents a major workload for UK eye hospitals accounting for a staggering one million NHS hospital visits per year. Any vision loss that occurs is irreversible, and so clinical care must aim to halt or ameliorate progression to a rate which is compatible with a sighted lifetime. We have recently reported in the Lancet about the effectiveness of some treatments but only if a patient is adequately managed (1). Clinicians can escalate treatment (to surgery for example) to prevent progression. Vision affected by glaucoma is tested on a machine called an automated perimeter and this is performed 2 or 3 times per year in most patients. The measurements yielded are complex maps of preserved vision and are subject to measurement error. As a result of prestigious National Institute of Health Research (NIHR) funded work (2) we have recently produced a series of papers presenting new statistical and computational methods for better monitoring and analysing these measurements (3) (4) (5). These articles have been well received by the glaucoma research community but the techniques described in them are not available to clinics in day-to-day practice. Unfortunately the papers describing these methods will simply gather dust in scientific journals unless we facilitate their use by ophthalmologists in clinics.

Few NHS eye units can identify how frequently patients are seen or how the disease is responding to treatment. Most are unable to identify low-risk patients or predict the risk of future visually significant sight loss. Consequently it can be very difficult to stratify patients’ glaucoma care needs. We will establish a key partnership with Medisoft Ophthalmology Ltd. (www.medisoft.co.uk), an SME that has, over the last 20 years, established an award winning electronic medical record (EMR) system that is used in more than 60 NHS ophthalmology clinics. Our proposed solution is an automated patient risk analysis module that will simply incorporate the methods developed in our research laboratory in the last few years. This module will be incorporated within Medisoft’s EMR system. As well as highlighting the total burden of glaucoma in clinics, the data can identify patients lost to follow up and triage them into appropriate care pathways, saving valuable clinician time and reducing unnecessary intervention.

The researcher funded by this prize will adapt our published methods into software code to be used by Medisoft and will author a module for managing patients. For example, we plan to translate a visualisation tool that a clinician can use to instantaneously visualise the disease progression of everyone in their clinic. These motion graphs will allow the clinician to risk stratify patients according to speed of vision loss and to manage their patients more effectively. A snapshot of this visualisation tool is shown in the adjacent figure with traffic light colours indicating those patients within a cohort that are at greatest risk of vision loss that will affect them in their lifetime. By modelling the trajectory of vision in both eyes, the risk of future significant visual impairment for the patient can be predicted. The researcher to be funded is Dr Susan Bryan who is already working in this research area in the prestigious Rotterdam Ophthalmic Institute (www.roi.eyehospital.nl). Dr Bryan will join my lab in October and brings with her a track record (6) of statistical and computational skills allowing her to turn these methods into a module that will be directly implemented by Medisoft.
Outcomes of Project

- We will deliver a software module in 2016 that will be incorporated directly into the Medisoft EMR; we expect this to be in use in NHS clinics 2016.

- This project will develop REF type impact from recently completed research because it will translate methodology developed in the research lab into tools that will be adopted by clinicians almost immediately, resulting in impact on patient care.

- This project may also help to develop a future innovation application in the form of a Knowledge Transfer Partnership (KTP) with Medisoft. Amy Bilton (KTP Manager) has already had a positive preliminary meeting with Medisoft (01.04.2015) and the company are very keen to work collaboratively with us. The prize is likely to help us in focussing on a relevant opportunity, as well as helping to convince them of our commitment to a working relationship. Indeed, KTPs are most commonly drawn from existing partnerships between a university and company partner.

- We will also work with Medisoft on methods being developed for analysing measurements taken in other ophthalmology clinics including the assessment of changes in optical coherence tomography measures in retinal disease clinics. These will be the subject of a major research grant application to the NIHR.

References


- Amount requested: £11,301

Six months’ salary 0.5FT G6.34 Dr Susan Bryan

- Start date anticipated (the project must be completed by the end of June 2016):

01.10.15 to 31.03.16

- I agree to present this at the Competition on 4 June 2015:

David P Crabb

Approved on behalf of School by Associate Dean for Research (signature):