The role and benefits of collaborative care through task sharing in eye health service delivery

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Abstract

With an increasing proportion of the population ageing, chronic eye diseases are expected to increase in numbers, consequently, more Australians will require long term management of eye conditions and access to tertiary services. Based on current trends of the eye care workforce and the current state of eye health delivery service models, it is expected the workforce might not be able to meet the increase in demand. The current service model of eye health delivery does not demonstrate integrated and collaborative relationships between primary and tertiary service delivery. This study evaluated two possibilities of task sharing, the first in primary care and the second, in tertiary care. In primary care, a model of collaborative care between optometry and ophthalmology, the Optometry-Ophthalmology Workforce Collaboration (OOWC) project was tested. In tertiary care, an exploratory, retrospective study was conducted to understand the number of occasions of service required by an individual, with any of the three main chronic eye conditions: age-related macular degeneration, diabetic retinopathy and glaucoma, to determine the future demand on tertiary services and to identify potential areas for task sharing. Collaborative care and task sharing is an opportunity to utilise the existing skills of the current workforce to meet the expected future demands.

The OOWC successfully identified patients who required tertiary eye services versus those who could be managed in the primary eye care setting. A significant number of patients (72%) initially referred to The Royal Victorian Eye and Ear Hospital and who were suitable to attend the trial clinic at the Australian College of Optometry were discharged after initial assessment. Introduction of the trial clinic had a positive impact on reducing the median wait time for a first outpatient appointment at The Royal Victorian Eye and Ear Hospital. The wait time for a first appointment was the shortest it had ever been over the previous 12 month period preceding the trial clinic. The number of new patients receiving appointments was also higher. The study of occasions of service over a five year period demonstrated opportunities for task sharing existing in the outpatient setting, and that the existing skilled workforce, such as orthoptists and nurses, could be utilised to potentially improve the number of
patients seen in clinics by providing some aspects of care to address the increased demand on services and workforce shortages.

This research demonstrated integrated care between optometry and ophthalmology is a safe and effective approach to deliver primary eye care and not all GP referrals need to be seen by an ophthalmologist. This research also demonstrated that there are numerous opportunities for task sharing to meet the future demands on the tertiary eye care setting to manage patients who require long-term monitoring. This research can be utilised to further develop clinical and referral guidelines and trial models of task sharing for future eye health service provision.
Declaration

This is to certify that

- the thesis comprises only my original work towards the MPhil except where indicated in the Preface,
- due acknowledgement has been made in the text to all other material used,
- the thesis is less than 50,000 words in length, exclusive of tables, maps, bibliographies and appendices

Stephanie Tsonis

15th July 2015
Preface

Prior to beginning this thesis I was the appointed project manager (and principal investigator) for the Optometry-Ophthalmology Workforce Collaboration Project between The Royal Victorian Eye and Ear Hospital and the Australian College of Optometry. My responsibilities included oversight of the entire project design and implementation. I completed all the triage, developed the assessment form, clinical guidelines, collated the clinical outcomes data, authored the mid-term evaluation report and facilitated ongoing monitoring throughout the pilot phase. As part of the project the Centre for Eye Research Australia was commissioned to undertake the development of the database, Patient Experiences Survey and the final evaluation report.
Acknowledgements

This research has been made possible by the advice, support and co-operation of many people. I would like to begin by acknowledging my supervisor, Professor Jill Keeffe for her ongoing professional support and advice, intellectual guidance and enthusiasm that was always so infectious after our meetings. I am grateful for her always being available despite a demanding travel schedule.

I would like to acknowledge the funding provided by the Department of Health Workforce Grant Program 2010-2011 to The Royal Victorian Eye and Ear Hospital (RVEEH) and the Australian College of Optometry (ACO) for the Optometry-Ophthalmology Workforce Collaboration project.

This research would not have been possible without the many who were involved in the Optometry-Ophthalmology Workforce Collaboration project. This includes all the members of the project steering committee, the participating optometrists, the RVEEH Outpatient Booking Unit team, the ACO administration team, RVEEH Health Information Services and Interpreter Services. Sincere thanks to both Dr Jacqueline Beltz and Dr Mark McCombe for their ongoing support and encouragement throughout the project. I would also like to thank Jennifer Hassell from CERA, I thoroughly enjoyed working together to deliver a successful project.

I would like to acknowledge my employer the RVEEH and the Orthoptic Department for the opportunity to be involved in such research and my fellow colleagues for ongoing inspiration and reassurance.

Finally, to my husband Mickael, for all his love and encouragement during those challenging times and my daughter Sophie, who has the priceless ability to always put a smile on my face. To my wonderful parents, who always have faith in my abilities and lastly, to my unborn child who was the true motivation for this achievement.
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# Abbreviations

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<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>A &amp; E</td>
<td>Accident and Emergency</td>
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<tr>
<td>AAO</td>
<td>American Academy of Ophthalmology</td>
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<td>ABS</td>
<td>Australian Bureau of Statistics</td>
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<td>ACG</td>
<td>Angle Closure Glaucoma</td>
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<td>ACO</td>
<td>Australian College of Optometry</td>
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<td>AHPRA</td>
<td>Australian Health Practitioner Regulation Agency</td>
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<td>AIHW</td>
<td>Australian Institute of Health and Welfare</td>
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<td>AMD</td>
<td>Age-related macular degeneration</td>
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<td>APPT</td>
<td>Appointment</td>
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<tr>
<td>ATSI</td>
<td>Aboriginal or Torres Strait Islander</td>
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<tr>
<td>Aus</td>
<td>Australia</td>
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<tr>
<td>AusDiab</td>
<td>Australian Diabetes, Obesity and Lifestyle study</td>
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<td>BMES</td>
<td>Blue Mountains Eye Study</td>
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<tr>
<td>BP</td>
<td>Blood pressure</td>
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<tr>
<td>BSCGS</td>
<td>Bristol Shared Care Glaucoma Study</td>
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<td>CACG</td>
<td>Chronic Angle Closure Glaucoma</td>
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<tr>
<td>CALD</td>
<td>Culturally and linguistically diverse</td>
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<tr>
<td>CCT</td>
<td>Central corneal thickness</td>
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<tr>
<td>C/D</td>
<td>Cup to disc ratio</td>
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<tr>
<td>CECP</td>
<td>Community Eye Care Partnership</td>
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<tr>
<td>CERA</td>
<td>Centre for Eye Research Australia</td>
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<tr>
<td>CMO</td>
<td>Cystoid macula oedema</td>
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<td>CSR</td>
<td>Cataract surgical rate</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>D/C</td>
<td>Discharge</td>
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<tr>
<td>DEC</td>
<td>Diabetic eye check</td>
</tr>
<tr>
<td>DH</td>
<td>Department of Health</td>
</tr>
<tr>
<td>DNA</td>
<td>Did not attend</td>
</tr>
<tr>
<td>DoHA</td>
<td>Department of Health and Ageing</td>
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<td>DR</td>
<td>Diabetic retinopathy</td>
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<tr>
<td>EACO</td>
<td>Australian College of Optometry appointment booking code</td>
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<tr>
<td>ED</td>
<td>Emergency Department</td>
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<tr>
<td>ERM</td>
<td>Epi-retinal membrane</td>
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<tr>
<td>FTE</td>
<td>Full-time equivalent</td>
</tr>
<tr>
<td>GAT</td>
<td>Goldmann Applanation Tonometry</td>
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<tr>
<td>GBD</td>
<td>Global Burden of Disease study</td>
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<td>GDx</td>
<td>Glaucoma diagnosis</td>
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<td>GEC</td>
<td>General eye clinic</td>
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<tr>
<td>GP</td>
<td>General Practitioner</td>
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<td>GPV</td>
<td>General Practice Victoria</td>
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<td>HRT</td>
<td>Heidelberg Retinal Tomograph</td>
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<td>HVF</td>
<td>Humphrey visual field</td>
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<td>HWA</td>
<td>Health Workforce Australia</td>
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<td>IOP</td>
<td>Intra-ocular pressure</td>
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<td>MBS</td>
<td>Medicare Benefits Schedule</td>
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<td>MGPN</td>
<td>Melbourne General Practice Network</td>
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<td>MLFS</td>
<td>Medical Labour Force Survey</td>
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<td>MVIP</td>
<td>Melbourne Visual Impairment Project</td>
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<tr>
<td>NHMRC</td>
<td>National Health and Medical Research Council</td>
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<tr>
<td>NMLFS</td>
<td>Nursing and Midwifery Labour Force Survey</td>
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<tr>
<td>Acronym</td>
<td>Description</td>
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<tr>
<td>NPDR</td>
<td>Non-proliferative diabetic retinopathy</td>
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<tr>
<td>NSW</td>
<td>New South Wales</td>
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<tr>
<td>NZ</td>
<td>New Zealand</td>
</tr>
<tr>
<td>OA</td>
<td>Orthoptics Australia</td>
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<tr>
<td>OCO</td>
<td>Ophthalmic clinical officers</td>
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<tr>
<td>OCT</td>
<td>Optical Coherence Tomography</td>
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<tr>
<td>OOWC</td>
<td>Optometry- Ophthalmology Workforce Collaboration</td>
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<tr>
<td>PDR</td>
<td>Proliferative diabetic retinopathy</td>
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<tr>
<td>PES</td>
<td>Patient Experience Survey</td>
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<tr>
<td>PiMs</td>
<td>Patient Information Management System</td>
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<td>POAG</td>
<td>Primary Open Angle Glaucoma</td>
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<td>PVD</td>
<td>Posterior vitreous detachment</td>
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<tr>
<td>QLD</td>
<td>Queensland</td>
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<tr>
<td>QPDR</td>
<td>Quiescent proliferative diabetic retinopathy</td>
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<tr>
<td>RANZCO</td>
<td>Royal Australian and New Zealand College of Ophthalmologists</td>
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<tr>
<td>REH</td>
<td>Rotterdam Eye Hospital</td>
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<tr>
<td>RNFL</td>
<td>Retinal nerve fibre layer</td>
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<tr>
<td>RPE</td>
<td>Retinal pigment epithelium</td>
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<tr>
<td>RVEEH</td>
<td>Royal Victorian Eye and Ear Hospital</td>
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<tr>
<td>SA</td>
<td>South Australia</td>
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<tr>
<td>SEC</td>
<td>Special eye clinic</td>
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<tr>
<td>TAS</td>
<td>Tasmania</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>USA</td>
<td>United States of America</td>
</tr>
<tr>
<td>VA</td>
<td>Visual Acuity</td>
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<tr>
<td>VACS</td>
<td>Victorian Ambulatory Classification System</td>
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</table>
VEGF: Vascular Endothelial Growth Factor
VIC: Victoria
VIRIAF: Victorian Innovation and Reform Impact Assessment Framework
VF: Visual Field
VOSPF: Victorian Ophthalmology Service Planning Framework
WA: Western Australia
WHO: World Health Organization
W/L: Waiting list
YAG: Yttrium aluminum garnet
Chapter 1 INTRODUCTION

Demand for ophthalmology services in Australia will be profoundly affected by the changing demographics of the Australian population over the next twenty years. Population growth and increasing longevity means more people will need eye care services and for longer. In Australia, life expectancy has increased from 77 years in 1990 to 82 years in 2010. Nearly half a million Australians have impaired vision and it is expected that the ageing population could lead to a doubling of the number of people with eye disease by the year 2020 (2). Changing patterns of vision loss as a result of age-related eye diseases will dictate the course of change in eye health service delivery (3). Chronic eye diseases are expected to become more prevalent and more Australians will require ongoing management of eye conditions and access to tertiary services. Based on current trends of the eye care workforce and the current service model of eye health delivery it is expected the existing workforce might not be able to meet the increase in demand. The current service model of eye health delivery does not demonstrate integrated and collaborative relationships between primary and tertiary healthcare service delivery. Collaborative care and task sharing present an opportunity to utilise the existing skills of the current workforce to meet future demands. In Australia, it is time to put aside the history of difficult professional relationships and territorial boundaries as the need to focus on the future demand is not only greater, but a necessity.

There are a number of initiatives undertaken nationally and internationally to prevent avoidable blindness through strategies to increase awareness and early detection and access to services (4). These include the Vision 2020 Australia Action Plan and the National Framework for Action to Promote Eye Health and Prevent Avoidable Blindness and Vision Loss (5). Such initiatives are critical for future changes in eye health delivery and all identify the need to develop and expand models of care to better utilise the existing skilled workforce in hospitals and in community settings. This is supported by the World Health Organization’s (WHO) health system framework where there are six building blocks that are critical in informing and supporting key components of a well-functioning health system (6). These building blocks should not be addressed in isolation, as the inter-relationships are critical. Although one may be
inspired to focus on workforce, this is not possible without addressing service delivery and how technologies can influence service delivery.

While there are initiatives that are preparing and planning for the future anticipated increase in the number of people with chronic eye disease, the question needs to be raised, are we actually aware of the true demand on our tertiary services? Chronic disease needs to be considered in terms of ‘occasions of service’. How much contact with health professionals is required for an individual, what tasks need to be performed at these encounters, and who is capable of delivering these tasks? These questions need to be considered and are critical for future planning of eye health service delivery.

This thesis will investigate two possibilities of task sharing, in primary and tertiary care, propose a role for integrated and collaborative care in a primary care setting, and explore the anticipated benefits of task sharing to utilise the existing skilled workforce in a tertiary setting to meet present and future demands. To achieve these aims the research will evaluate a model of collaborative care between optometry and ophthalmology using two organisations central to public eye health service delivery in Victoria as a test platform, The Royal Victorian Eye and Ear Hospital (RVEEH) and the Australian College of Optometry (ACO). The success of this model of care will be demonstrated by clinical outcomes, effective use of clinical guidelines, a positive impact on waiting times and positive relationship-building between the two professions. In addition to evaluating the demonstration of collaborative care, this thesis will also quantify the occasions of service necessary for RVEEH patients with any of the three main chronic eye diseases; age-related macular degeneration (AMD), diabetic retinopathy (DR) and glaucoma. The aim of these data is to understand future demand on the eye care workforce and to use the data to inform future models of care in eye health service delivery. Evaluation of the two possibilities of task sharing will be based on the three building blocks of service delivery, health workforce and technologies, and consider the roles of the other three building blocks, well-functioning health information, financing systems and policy leadership (6). It is anticipated that the findings and conclusions of this research will have the potential to inform future models of care in Australia, and influence future management guidelines.

This research comes at a time when traditional roles and practices are being questioned and the need for change has been acknowledged (7). This aligns with the Victorian
Ophthalmology Service Planning Framework (VOSPF) (2) and the strategic goals and priorities of the RVEEH. The evolving concept of task shifting introduced by the WHO involves the rational distribution of tasks as a method of strengthening and expanding the health workforce to improve access to health services. It is defined as the process where specific tasks are moved to appropriate health workers with shorter training duration and fewer qualifications (8). This research will be informed by currently available workforce data and will not attempt to undertake a workforce investigation or projection of workforce numbers that may be required in the future.

Eye health service delivery in Australia as reported in the literature will be the focus of the second chapter. This will include the epidemiology of the main causes of vision loss, and the future demands for health services and the eye health workforce. Current data and trends of workforce supply will also be evaluated as will historical and current relationships between eye health professionals. The literature will be further reviewed to evaluate models of care tried and tested in both Australia and internationally, what lessons were learnt from these models, and how they can potentially inform future practice. Current referral practices within eye care service delivery will also be considered to identify barriers and the direct impact on tertiary service provision. Chapter 3 will present the research design and the tools developed to deliver this research to demonstrate an example of collaborative care. The methodology and rationale of data collection relative to occasions of service over a 5-year period for the three main chronic eye diseases will also be presented. Chapter 4 will present the results of the trial clinics at ACO. This will include both qualitative and quantitative data, including a review of patients’ perspectives and experiences. In relation to the occasions of service, the number of outpatient visits over a 5-year period and the number of tests and who delivered these tests will also be analysed. Chapter 5 will discuss the methods and results presented in the thesis. The discussion will focus on the findings of the study and the implications and benefits for service delivery through the use of task sharing, in terms of accessibility of health services, demand, workforce and referral practices. The feasibility and sustainability of the trial clinic will also be considered and future research that could arise from this study will be identified. Chapter 6 will conclude the thesis with final conclusions to inform future practice and how such a model of care and task sharing is a necessity to the future of eye care service delivery in Victoria and Australia.
Chapter 2 LITERATURE REVIEW

The aim of this chapter is to present the epidemiology of vision loss in the Australian population, current understanding of the required access to services and the future demand on the current workforce in eye care service delivery. Workforce supply data will be considered and the historical relationships between the eye health professions will be reviewed. Current models of eye care in Australia will also be evaluated in comparison to international eye health service delivery to inform the timeliness and necessity of this study.

A comprehensive search of the literature was performed using key sources in ophthalmology and optometry. International journal indexes searched were the ISI Web of Science, PubMed and Expanded Academic and Discovery. Keywords entered included ‘eye workforce’, ‘eye services model of care’, ‘vision impairment’, ‘ophthalmology referrals’, ‘community care’, ‘task sharing’, ‘task shifting’, ‘ophthalmology and technology’, and ‘access to eye services’.

The literature was reviewed in relation to topics associated with models of eye care; demand, access, workforce, models of care, technology, referral practices and the WHO Health System Framework.

2.1 Demand

According to the Global Burden of Disease (GBD) study data there are currently an estimated 32.4 million people blind and 191 million with moderate to severe vision impairment worldwide (1). The GBD study also identified a 30% change in population growth, and the number of people aged over 100 years increased by 185% (1).

For the purpose of this study, the definitions of vision impairment and blindness are in accordance with the WHO (9). Moderate to severe vision impairment is defined as visual acuity worse than 6/18 in the better eye but at least 3/60, and blindness as visual acuity of worse than 3/60 in the better eye. Several population-based studies worldwide
have identified that the top six causes of vision impairment and blindness are cataract, glaucoma, macular degeneration, DR, trachoma and uncorrected refractive error (10) (11) (12) (13). While there have been several studies of Australian population health, there are two major cross-sectional population-based prevalence studies of eye disease that have been undertaken in the last 20 years, the Melbourne Visual Impairment Study (MVIP; 1995-1996), conducted by the Centre for Eye Research Australia (CERA) and reported in 1997, and the Blue Mountains Eye Study (BMES) conducted in three phases over a 5 year period (1994-2010) (10) (14) (15). The MVIP was a population based study of urban, rural and institutionalized residents of Victoria aged 40 years or older (10) (16). The BMES was first conducted in 1992-1994 with the second study 5 years later (1997-1999), and a third follow-up study in 2002-2004, 10 years after the original collection (14) (15) (17). The BMES provided the first Australian estimates of the prevalence of eye disease and vision loss in residents of a 2-postcode area of the Blue Mountains region, west of Sydney. This area had a demographic distribution very similar to that of the Australian population, and could be considered representative of Australia as a whole. Detailed methods of both BMES and MVIP have been reported (14) (15) (18). A synthesis of the data from the two studies incorporating 8,909 participants identified the most common cause of blindness was AMD (48%) (19). The data also indicated a strong association of prevalence of vision impairment and blindness with age, showing a threefold increase with each decade of life after 40 years (10). Most recently, published results of the GBD, Risk Factors and Injury Study 2010, identified a reduction in the prevalence of cataract and uncorrected refractive error, previously the leading causes of blindness between 1990 and 2010, and a corresponding increase in the proportion of vision impairment caused by chronic conditions such as macular degeneration (1). In the Australasia region specifically, the rates of vision impairment caused by macular degeneration, DR and glaucoma have all increased. The proportion of people with vision impairment from macular degeneration went from 16.8% in 1990 to 17.7% in 2010, DR from 4.5% to 4.3%, and glaucoma from 9.6% to 11.3% (1). This trend in chronic diseases will have a significant impact on eye health service delivery and demand. Not only will there be more people with these conditions, but they will also be living longer. From 2002 to 2032, the total Australian population is estimated to increase by 27% to almost 25 million. At the same time it is predicted that the number of people aged 55 years will double from 4.4 million to 8.9 million, this corresponds to an increase from one in five in 2003 to one in three in 2032 (20).
According to the background paper to the National Framework for Action to Promote Eye Health and Prevent Avoidable Blindness and Vision Loss, Eye Health in Australia (Nov 2005), the most prevalent causes of blindness in Australia are age-related degenerative diseases (20). This was also consistent with the Clear Focus report, The Economic Impact of Vision Loss in Australia in 2009 that was based on VIP data (10) (20). The top five eye conditions causing vision loss among Australians aged 40 years or older are AMD (10%), cataract (15%), DR (2%), glaucoma (5%) and uncorrected refractive error (59%) (21). Of the five, three conditions are chronic and all can now have vision loss prevented but they do require ongoing management and treatment.

In the last 10 years, the treatment and management of neovascular AMD has significantly changed and advanced. What was once a chronic disease with no treatment available is now one of the most commonly managed chronic conditions in the clinical setting as a result of advancements in research and the ongoing evolution of technology, additionally, the introduction of new pharmacological agents such as Avastin, Lucentis and Eyelea has revolutionised traditional methods of treatment for neovascular AMD. Treatment with anti-vascular endothelial growth factor (anti-VEGF) is required frequently over a long period of time. This results in the patient requiring frequent contact with ophthalmologists to administer the treatment and monitor change and has an obvious economic burden on the patient and the health system. It is projected that the number of Australians with early AMD in at least one eye will increase by almost 70%, from around 855,000 in 2010 to around 1.44 million in 2030 (19). The number of Australians with early AMD in both eyes is projected to increase from around 340,000 in 2010 to over 600,000 in 2030, as a result of demographic ageing (19).

DR, a condition affecting the blood vessels of the retina, is a common complication of diabetes and with the prevalence of diabetes increasing in Australia, associated vision loss could also rise. Diabetes Australia estimates that currently 1.8 million Australians are living with diabetes and an estimated 3.3 million Australians will have Type 2 diabetes by 2031 (22). Currently, for every person diagnosed with diabetes each day there is another who is undiagnosed. The Australian Diabetes, Obesity and Lifestyle (AusDiab) study, the largest Australian longitudinal population-based study assessing the course of diabetes, identified that 15.3% of people with diabetes had retinopathy (23), however the National Health and Medical Research Council Diabetic Retinopathy Management Guidelines state that 25-44% of people with diabetes have some form of DR at any one time (24) . Results of the AusDiab study were first reported in 2000 and
the study was one of the first national studies of diabetes that included DR. It included 11,247 adults aged ≥ 25 years in 42 randomly selected areas in Australia and assessed people with both newly and previously diagnosed diabetes; follow-up surveys were conducted in 2005 and 2012. Although diabetes is not age-related, the increasing prevalence will have a marked impact on eye care service delivery, as once diagnosed, patients need regular screening to reduce the number with vision threatening retinopathy. The age of onset of diabetes is decreasing, increasing the length of time an individual has the condition, thus increasing the risk of DR and long-term dependency on all levels of eye care services.

As stated above, glaucoma, an optic neuropathy which can cause permanent vision loss, accounts for 16% of blindness in Australia and 5% of vision loss (21). One in 10 Australians over 80 years will develop glaucoma. At present, as identified in the BMES 50% of people with glaucoma in Australia are undiagnosed (14). The workload of glaucoma clinics is likely to increase substantially in the coming years as a result of the ageing population, increasing optometric case findings, raised public awareness and more aggressive management of the condition. Vision loss associated with glaucoma is irreversible and once diagnosed lifetime management is required and like AMD, patients require frequent contact with ophthalmologists. There have been several studies internationally including in the United States (25) and the Netherlands (26), that have identified that direct ophthalmology-related resources, including ophthalmology visits, glaucoma surgery and medication use, increased as disease severity worsened.

According to the Australian Institute of Health and Welfare (AIHW), almost 1.5 million Australians aged over 55 years had untreated cataract in 2004 (3). This may be considered as an overestimation as the GBD study reported a reduction of moderate to severe vision impairment caused by cataract in the Australasia region from 21.9% in 1990 to 13.7% in 2010 (1). Cataracts become more prevalent with age and 70% of those aged 80 years and over have the condition or have had surgery (3). The only intervention for cataracts is surgical correction and this is only performed by an ophthalmologist. Cataract surgery is one of the most frequently performed surgical procedures in the developed world. Currently, Australia has the highest worldwide cataract surgical rate (CSR) at 6,500/million/year or 150 cataract operations per week (27). In comparison, the United Kingdom’s CSR is 4,000-4,500/million/year, about 100 operations per week (27). It is critical that this trend is maintained or increased with the ageing population and this may be possible with task shifting of some procedures.
Consistent with the VIP and the Victorian Planning Framework, the inpatient forecast (2003-04) indicated that public and private ophthalmology separations will grow by 3.4% per annum, and inpatient stays will increase by 2.9% per annum to 2016-17. This growth is led by cataract procedures with a forecast growth in separations of 4.2% per annum or a doubling by 2016-17 (27). Separations are defined in accordance to the AIHW as the process by which an episode of care for an admitted patient ceases (28).

Based on these data for the three main chronic eye conditions and the prevalence of cataract, it is evident that the demand on eye health services will only grow, raising the question, how can we manage this demand? Task sharing is not a new concept to meet demand on public health services, however it is lacking in eye care service.

### 2.2 Accessibility of health services

Consideration of accessibility of health services is an essential part of strengthening a health system. Access is defined in accordance with the WHO Health Systems Strengthening Glossary, “aspects of the structure of health services or health facilities that enhance the ability of people to reach a health care practitioner, in terms of location, time and ease of approach” (29). Tertiary eye services are facing a challenging future to ensure equitable and appropriate access in response to the increased numbers of people with chronic eye disease. With increasing life expectancy, it is important to ensure adequate access to ophthalmological care in a timely manner when required. In Australia, models of care for ophthalmology service have undergone significant changes with an increasing trend towards ambulatory care. Chronic diseases will play a significant role in eye care service delivery.

The prevalence of eye disease not only has an impact on resources and service delivery but also has a significant impact on the economic cost. The total economic cost of vision loss in Australia in 2004 was estimated at $9.8 billion, and in a 5-year period this almost doubled to an estimated $16.6 billion in 2009 (21). This clearly reflects the ageing population and inflation over time. In terms of direct health costs in 2009, the total health expenditure was estimated to be $2.98 billion and this is projected to reach $4.8 billion by 2020 (21). Health expenditure on eye conditions is growing at approximately 4.8% per annum with a corresponding large increase in spending on pharmaceuticals due to effective new treatments (21). Cataract remains the largest single direct health...
cost at $459 million (21). The AMD share of total allocated expenditure rose substantially from 2004-2009 from 1% to 7%, largely due to the inclusion of government expenditure on Lucentis (21). Vision loss has significant social and economic costs; the indirect cost to the community of vision loss is $4.2 billion, (21) and this can only be expected to rise with the ageing population and longer life expectancy.

Models of care developed on task sharing have the potential to significantly reduce the direct costs of providing care in eye health service delivery. While there are abundant data on the epidemiology of chronic eye conditions in the literature and the future demand for eye health services, there is an absence of information in relation to what the actual demand will be. The number of outpatient visits over a lifetime, the interventions required and who will deliver these services is critical evidence required for future planning of service delivery and will be addressed in this research. The literature has also not addressed what is the scope of service delivery when patients enter the eye health service, particularly in the public sector, and what occasions of services are involved in the service delivery. Are individuals receiving timely access to eye services and are they being retained long term and monitored accordingly? How much access is truly required and who is capable to meet this demand?

2.3 Eye health service workforce

There is a general recognition that in Australia there is an adequate supply of eye health care professionals with specific ophthalmic training and skills. In 2006 there was an estimated 9,200 people in the ophthalmic labour force (30). The delivery of eye health care in Australia is delivered by the following professions:

- Ophthalmologists
- Optometrists
- Orthoptists
- Ophthalmic nurses

The eye health workforce also includes the following occupations:

- Optical dispensers
- Optical mechanics
As part of the National Framework for Action to Promote Eye Health and Avoidable Blindness and Vision Loss (2005) the Australian Government Department of Health and Ageing commissioned the AIHW through the National Eye Health Initiative to report on the current status on the eye health labour force in 2006. The report, Eye Health Labour Force in Australia was published in 2009. Data were collated from four different sources, the AIHW Medical Labour Force Survey (MLFS), the AIHW Nursing and Midwifery Labour Force Survey (NMLFS), the Australian Bureau of Statistics (ABS) Census of Population and Health and the Australian Government Department of Health Medicare data (30).

In addition to the AIHW report, professional bodies have independently conducted workforce studies, however each profession does this at different intervals and some not at all. Optometry Australia undertakes frequent studies of the workforce and assessment of future demands. Data suggest a study has been completed every three years with the latest completed in 2009 (31). In comparison, Orthoptics Australia (OA) has not conducted studies as frequently and the latest recorded workforce study was completed in 2006 in parallel with the ABS Census (30). At the time of writing this thesis, OA was conducting surveys of its members to obtain current workforce trends. The ophthalmology profession has not been as proactive and the only workforce study documented is that commissioned by the AIHW or data provided by the Royal Australian and New Zealand College of Ophthalmology (RANZCO) in their annual reports (30). Data on memberships provided in the annual reports are minimal, and the only available data is in relation to membership numbers per annum per state. There are no data available regarding the characteristics of employed ophthalmologists as in the AIHW eye health labour force report in 2009.

2.3.1 Ophthalmologists

An ophthalmologist is a medically trained doctor who acts as both physician and surgeon. They examine, diagnose and treat diseases and injuries in and around the eye and deliver medical and surgical interventions (30). Ophthalmologists provide primary and secondary care as well as highly specialized treatment. Training requires a minimum of 5 years to complete following completion of a medical degree. This comprises two years of basic training, two years advanced training and a final year of specialist training, usually overseas (32).
RANZCO is the body responsible for ophthalmology training and examination in Australia. The majority of ophthalmologists practising in Australia are Fellows of the College. The figures depict an increase of 17.8% in the number of Australian RANZCO Fellows. Of these, 40.1% belonged to the New South Wales branch and 24.8% to the Victoria branch (Table 1). The average growth rate over the 6 years was 3%. There are no RANZCO branches in the Australian Capital Territory and the Northern Territory.

Table 1: Number of Fellows of the RANZCO, by branch 2001-2007

<table>
<thead>
<tr>
<th>RANZCO Branch</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSW</td>
<td>308</td>
<td>304</td>
<td>320</td>
<td>311</td>
<td>341</td>
<td>339</td>
<td>356</td>
</tr>
<tr>
<td>Vic</td>
<td>191</td>
<td>186</td>
<td>194</td>
<td>199</td>
<td>202</td>
<td>202</td>
<td>220</td>
</tr>
<tr>
<td>Qld</td>
<td>110</td>
<td>120</td>
<td>125</td>
<td>130</td>
<td>136</td>
<td>141</td>
<td>150</td>
</tr>
<tr>
<td>WA</td>
<td>62</td>
<td>65</td>
<td>66</td>
<td>67</td>
<td>65</td>
<td>70</td>
<td>73</td>
</tr>
<tr>
<td>SA</td>
<td>70</td>
<td>68</td>
<td>69</td>
<td>68</td>
<td>70</td>
<td>74</td>
<td>72</td>
</tr>
<tr>
<td>Tas</td>
<td>12</td>
<td>15</td>
<td>16</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Australia</td>
<td>753</td>
<td>758</td>
<td>790</td>
<td>790</td>
<td>829</td>
<td>841</td>
<td>887</td>
</tr>
</tbody>
</table>


Nationally in 2007 there were 887 ophthalmologists; this equates to an average of 3 full-time equivalent (FTE) per 100,000 population in each state. This is well within the WHO recommendation of ≥1 ophthalmologist per 100,000 persons (33). In comparison, in developing countries such as Thailand the ratio is 1.52 ophthalmologists per 100,000 (33). In Australia, the average number of hours worked in the week declined from 44.0 hours in 2001 to 43.0 hours in 2006 (Table 2). Data also indicate the number of female ophthalmologists increased from 12.1% to 15.7%. This is expected to continue to rise which potentially will impact the FTE rate as it is hard to predict how much time women will take off in the course of their careers.

The data collated in the survey indicated that the average age of ophthalmologists declined slightly from 52.2 years in 2001 to 51.6 years in 2006. During this period the percentage of ophthalmologists aged 55 years and over declined from 38.5% to 36.0%. The age profile of ophthalmologists during this time has also altered, between 2001 and
Chapter 2: Literature Review

2006 the percentage of ophthalmologists aged 35-44 years decreased from 31.5% to 28.2%. The number of ophthalmologists aged 45-54 years increased from 25.6% to 33.1% (30).

Table 2: Characteristics of employed ophthalmologists, states and territories, 2001 and 2006

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>2001</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>653</td>
<td>769</td>
</tr>
<tr>
<td>% female</td>
<td>12.1</td>
<td>15.7</td>
</tr>
<tr>
<td>Average age, years</td>
<td>52.2</td>
<td>51.6</td>
</tr>
<tr>
<td>% aged 55 years and over</td>
<td>38.5</td>
<td>36.0</td>
</tr>
<tr>
<td>Average hours worked per week</td>
<td>44.0</td>
<td>43.0</td>
</tr>
<tr>
<td>FTE****</td>
<td>639</td>
<td>735</td>
</tr>
<tr>
<td>FTE rate^</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>

Source: AIHW Medical Labour Force Surveys, 2001 and 2006. * nil ** n.a=not applicable *** n.p= not publishable (numbers are too low to publish) ****FTE= full-time equivalent based on a 45 hour week. ^FTE rate= per 100,000 population (30)
In November 2010, Australia’s Health Ministers commissioned Health Workforce Australia (HWA) to develop the Health Workforce 2025 report with a focus on national workforce projections for doctors, nurses and midwives (34). This was followed by a second report in November 2012 with a focus on medical specialists including ophthalmologists (32). The existing ophthalmology workforce position was assessed as “some perceived difficulty in filling positions, either through maldistribution or insufficient workforce” (34). This was supported by the second report that identified a reduction in working hours as a result of increasing female participation, and limited training in the private sector impacting the future supply. Changing service delivery models and advancements in technology will also impact the demand for ophthalmologists (32). Both reports used the ophthalmology workforce data of the 2009 AIWH Medical Labour Force Survey. The average age and replacement rate indicators were the main concern, which were driven by an increasing exit rate as a result of an ageing workforce. By 2025, there is a predicted shortfall of 13% in the number of employed ophthalmologists than the expected demand requires, and between 2012 and 2025 the number of new Fellows is expected to be static (Table 3).

Table 3: Ophthalmology projections 2009 to 2025

<table>
<thead>
<tr>
<th>Headcount</th>
<th>2009</th>
<th>2012</th>
<th>2018</th>
<th>2025</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply</td>
<td>843</td>
<td>870</td>
<td>960</td>
<td>1,034</td>
</tr>
<tr>
<td>New Fellows</td>
<td>11</td>
<td>20</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>Exits</td>
<td>1.83%</td>
<td>1.53%</td>
<td>2.02%</td>
<td>2.16%</td>
</tr>
<tr>
<td>Expressed demand</td>
<td>843</td>
<td>905</td>
<td>1,033</td>
<td>1,196</td>
</tr>
<tr>
<td>Positive/Negative demand</td>
<td>-</td>
<td>-35</td>
<td>-73</td>
<td>-162</td>
</tr>
</tbody>
</table>

Source: AIHW Health Workforce 2025 Volume 3 (32)

The 2009 AIHW report also included data on ophthalmologists’ work setting and sector (30). Work setting refers to the type of service or facility where ophthalmologists work and sector refers to whether the care is provided in a public or private organisation. In 2006 data indicated that 69% of ophthalmologists worked in one or more private sector work settings, a rise of 14.6% since 2001 (Table 4). Ophthalmologists worked more than three times as many weekly hours in the private sector than in the public sector, with an average of 37.5 hours per week in the private sector and 11.3 hours in the public sector. In Australia, approximately 97% of ophthalmologists work primarily in private
practices (30). Average weekly hours worked by an ophthalmologist in the public sector decreased by 8% in 2006 and 6% in the private sector.

Table 4: Employed ophthalmologists: work setting and sector, 2001 and 2006

<table>
<thead>
<tr>
<th>Work setting</th>
<th>Public sector</th>
<th>Private sector</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Average weekly total hours</td>
</tr>
<tr>
<td>Private medical practitioners’ rooms</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Hospital</td>
<td>260</td>
<td>10.3</td>
</tr>
<tr>
<td>Ambulatory care, day procedure centre, outpatient clinic</td>
<td>59</td>
<td>9.4</td>
</tr>
<tr>
<td>Educational Institution</td>
<td>23</td>
<td>6.6</td>
</tr>
<tr>
<td>Other</td>
<td>21</td>
<td>9.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>318</td>
<td>11.3</td>
</tr>
</tbody>
</table>

2001

| Total                                            | 323    | 12.2            | 617    | 39.5                       |

Source: AIHW Medical Labour Force Surveys, 2001 and 2006 (30)

The majority of employed ophthalmologists worked in major cities (82.5%), and only 12% of ophthalmologists worked in inner regional areas; this misdistribution will be an obstacle for future demand and supply (32).

2.3.2 Optometrists

An optometrist is a non-medical practitioner trained to assess the eye and the visual system, and diagnose refractive errors and disease. An optometrist prescribes and dispenses corrective lenses and works with other eye care professionals to ensure that patients are referred appropriately for diagnostic and therapeutic needs (30). All Australian optometrists must be registered with the Optometry Board of Australia.
In Australia, some optometrists can use ophthalmic drugs to facilitate diagnostic procedures. In recent times, legislation in New South Wales, Victoria and Queensland has changed to permit optometrists to prescribe a limited range of drugs for uncomplicated eye conditions. Optometrists in these states are required to undergo therapeutic training to allow them to extend their scope of practice. Although all new graduates are now therapeutically endorsed (30), in 2009 only 14.8% of practising optometrists were therapeutically endorsed and there is a strong consensus amongst practising optometrists not to mandate additional therapeutic training. Most optometrists in Australia are employed in private practice or large optical chains. Unlike the UK, optometrists in Australia do not work in hospitals and only a small number work alongside an ophthalmologist. In 1975, the Australian Government acknowledged the role of optometry by including it in the Medicare program. In 1996-97 Australian optometrists provided nearly 3.2 million initial consultations. It is estimated that optometrists provide over 75% of all vision care services in Australia (30).

According to the AIHW in 2006 there were 4,414 optometrists (3,329 FTE) registered in the states and territories, the most being in New South Wales and Victoria (30). It should be noted this total could include optometrists registered in more than one state. Data based on the ABS 2006 Census of Population and Housing and as reported in the AIHW Eye Health Labour Force in Australia, 44.2% of employed optometrists were female and the average age was 40.0 years, up from 38.0 years in 2001. New South Wales had the most optometrists per capita, 18 per 100,000 population, in comparison with the national average of 16 per 100,000 in 2006 (Table 5).
Table 5: Characteristics of employed optometrists, states and territories, 2001 and 2006

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>WA</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>NT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>987</td>
<td>658</td>
<td>526</td>
<td>244</td>
<td>163</td>
<td>62</td>
<td>36</td>
<td>21</td>
<td>2,697</td>
</tr>
<tr>
<td>% female</td>
<td>41.6</td>
<td>45.1</td>
<td>37.8</td>
<td>36.5</td>
<td>35.6</td>
<td>37.1</td>
<td>55.6</td>
<td>42.9</td>
<td>41.0</td>
</tr>
<tr>
<td>Average age, years</td>
<td>39.0</td>
<td>37.0</td>
<td>36.0</td>
<td>38.0</td>
<td>39.0</td>
<td>38.0</td>
<td>35.0</td>
<td>36.0</td>
<td>38.0</td>
</tr>
<tr>
<td>% 55 years and over</td>
<td>7.0</td>
<td>6.0</td>
<td>5.4</td>
<td>14.3</td>
<td>15.3</td>
<td>13.1</td>
<td>-</td>
<td>-</td>
<td>7.6</td>
</tr>
<tr>
<td>% Australian born</td>
<td>60.4</td>
<td>73.3</td>
<td>83.4</td>
<td>59.3</td>
<td>76.7</td>
<td>71.7</td>
<td>62.2</td>
<td>75.0</td>
<td>69.3</td>
</tr>
<tr>
<td>Average hours worked per week</td>
<td>39.0</td>
<td>38.0</td>
<td>40.0</td>
<td>38.0</td>
<td>41.0</td>
<td>41.0</td>
<td>34.0</td>
<td>43.0</td>
<td>39.0</td>
</tr>
<tr>
<td>FTE**</td>
<td>1,100</td>
<td>714</td>
<td>601</td>
<td>265</td>
<td>191</td>
<td>73</td>
<td>35</td>
<td>26</td>
<td>3,005</td>
</tr>
<tr>
<td>FTE rate***</td>
<td>17</td>
<td>15</td>
<td>17</td>
<td>14</td>
<td>13</td>
<td>15</td>
<td>11</td>
<td>13</td>
<td>15</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>WA</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>NT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>1,118</td>
<td>730</td>
<td>650</td>
<td>258</td>
<td>173</td>
<td>67</td>
<td>48</td>
<td>22</td>
<td>3,066</td>
</tr>
<tr>
<td>% female</td>
<td>48.2</td>
<td>45.5</td>
<td>41.8</td>
<td>34.5</td>
<td>35.3</td>
<td>34.3</td>
<td>58.3</td>
<td>54.5</td>
<td>44.2</td>
</tr>
<tr>
<td>Average age, years</td>
<td>40.0</td>
<td>40.0</td>
<td>38.0</td>
<td>42.0</td>
<td>42.0</td>
<td>40.0</td>
<td>35.0</td>
<td>39.0</td>
<td>40.0</td>
</tr>
<tr>
<td>% 55 years and over</td>
<td>7.3</td>
<td>9.5</td>
<td>8.5</td>
<td>13.6</td>
<td>11.6</td>
<td>16.4</td>
<td>-</td>
<td>-</td>
<td>8.9</td>
</tr>
<tr>
<td>% Australian born</td>
<td>56.0</td>
<td>69.1</td>
<td>75.8</td>
<td>54.7</td>
<td>65.3</td>
<td>63.2</td>
<td>60.9</td>
<td>65.0</td>
<td>64.0</td>
</tr>
<tr>
<td>Average hours worked per week</td>
<td>38.0</td>
<td>38.0</td>
<td>38.0</td>
<td>38.0</td>
<td>38.0</td>
<td>38.0</td>
<td>33.0</td>
<td>47.0</td>
<td>38.0</td>
</tr>
<tr>
<td>FTE**</td>
<td>1,214</td>
<td>793</td>
<td>706</td>
<td>280</td>
<td>178</td>
<td>73</td>
<td>45</td>
<td>30</td>
<td>3,329</td>
</tr>
<tr>
<td>FTE rate***</td>
<td>18</td>
<td>15</td>
<td>17</td>
<td>14</td>
<td>11</td>
<td>15</td>
<td>14</td>
<td>14</td>
<td>16</td>
</tr>
</tbody>
</table>

Source: AIHW Medical Labour Force Surveys, 2001 and 2006 (ABS 2006 Census of Population and Housing data) *nil **FTE= full-time equivalent *** FTE rate= per 100,000 population (30)

In 2009, a study was conducted by the Optometrists Association Australia (now known as Optometry Australia) on the Australian optometric workforce (31). Data from the association’s database, the ABS, Medicare Australia and the Department of Veterans Affairs were consolidated to develop a profile of the Australian optometric workforce. The findings were consistent with data of the AIHW released in 2009, with a steady increase in supply to 3,664 FTE and a population per optometrist ratio of 5,944:1 (Table 6) (31). The Optometry Australia study concluded that the existing optometric workforce could adequately provide optometric care for the Australian population if individuals attend for general optometric care every three years (31).
Table 6: Number of optometrists in clinical practice, population per optometrist in clinical practice, number of FTEs and population per FTE for countries where the scope of practice is similar to that in Australia

<table>
<thead>
<tr>
<th>Country</th>
<th>No. of practising clinical optometrists</th>
<th>Population per practising clinical optometrist</th>
<th>FTE**</th>
<th>Population per FTE</th>
<th>Av. Age</th>
<th>% female</th>
<th>Average hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optometry Australia</td>
<td>3,719</td>
<td>5,882</td>
<td>3,664</td>
<td>5,970</td>
<td>41.4</td>
<td>45.3</td>
<td>37.2</td>
</tr>
<tr>
<td>Australia Workforce Study (2009)</td>
<td>3,066</td>
<td>6,801</td>
<td>3,329</td>
<td>6,264</td>
<td>40</td>
<td>44.2</td>
<td>38</td>
</tr>
<tr>
<td>Australia (AIHW 2009)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Canada (2006)</td>
<td>3,941</td>
<td>8,106</td>
<td>-*</td>
<td>-*</td>
<td>41</td>
<td>44</td>
<td>-*</td>
</tr>
<tr>
<td>NZ (2006)</td>
<td>618</td>
<td>6,606</td>
<td>544</td>
<td>7,517</td>
<td>39</td>
<td>46</td>
<td>37.1</td>
</tr>
<tr>
<td>UK (England and Wales) (2007)</td>
<td>9,918</td>
<td>5,477</td>
<td>-*</td>
<td>-*</td>
<td>45.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


2.3.3 Orthoptists

An orthoptist is an allied health professional that specialises in diagnosis and management of disorders of eye movements and associated vision problems. They perform investigative procedures appropriate to disorders of the eye and visual system and assist with rehabilitating patients with vision loss (30). Orthoptists also diagnose refractive disorders and prescribe glasses in accordance to the Schedule Health Practitioner Regulation National Law Act 2009. This includes undertaking duties in a public facility, on referral from an ophthalmologist or optometrist and it is a requirement that orthoptists are registered with the Australian Orthoptic Board (35). Orthoptists’ scope of practice has expanded over the years to include a wider range of clinical skills than only strabismus assessment as is the case in many other countries. Orthoptists in Australia complete a university course and the duration is dependent on the state where university is attended. In Victoria, orthoptists will be educated through a four year course and graduate with a Bachelor of Health Science/ Master of Orthoptics (36). In NSW, orthoptists will be educated through a two year course and graduate with Master of Orthoptics. Areas of study have expanded and include ophthalmic pathology and microbiology, pharmacology and therapeutics in addition to strabismus and low vision training (36). Orthoptists have a medical model of training and have the ability
to identify medical conditions that require medical attention. In comparison, orthoptists in the United States obtain a baccalaureate degree prior to a two year fellowship in an orthoptic program. The training program is entirely focused on strabismus diagnosis and management and does not include broader subjects of ophthalmic pathology and management (37).

Orthoptists do not need to be registered to practice, meaning there are more orthoptists in Australia than the number registered. In 2006, according to the ABS Census, there were 515 orthoptists employed at the time, an increase of 19.2% since 2001 (Table 7) (30).

Table 7: Characteristics of employed orthoptists, by states and territories, 2001 and 2006

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>NSW</th>
<th>Vic</th>
<th>Qld</th>
<th>WA</th>
<th>SA</th>
<th>Tas</th>
<th>ACT</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2001</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>197</td>
<td>171</td>
<td>36</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>7</td>
<td>432</td>
</tr>
<tr>
<td>% female</td>
<td>89.3</td>
<td>84.8</td>
<td>75.0</td>
<td>75.0</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>86.3</td>
</tr>
<tr>
<td>Average age, years</td>
<td>35.0</td>
<td>33.0</td>
<td>34.0</td>
<td>25.0</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>34.0</td>
</tr>
<tr>
<td>% 55 years and over</td>
<td>6.4</td>
<td>1.8</td>
<td>-*</td>
<td>-*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>4.4</td>
</tr>
<tr>
<td>% Australian born</td>
<td>77.2</td>
<td>89.5</td>
<td>83.9</td>
<td>58.3</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>82.9</td>
</tr>
<tr>
<td>Average hours worked per week</td>
<td>33.0</td>
<td>31.0</td>
<td>36.0</td>
<td>37.0</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>33.0</td>
</tr>
<tr>
<td>FTE***</td>
<td>186</td>
<td>151</td>
<td>37</td>
<td>13</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>407</td>
</tr>
<tr>
<td>FTE rate****</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>2</td>
</tr>
<tr>
<td><strong>2006</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>240</td>
<td>202</td>
<td>39</td>
<td>17</td>
<td>5</td>
<td>8</td>
<td>4</td>
<td>515</td>
</tr>
<tr>
<td>% female</td>
<td>91.7</td>
<td>89.6</td>
<td>82.1</td>
<td>82.4</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>90.1</td>
</tr>
<tr>
<td>Average age, years</td>
<td>34.0</td>
<td>35.0</td>
<td>42.0</td>
<td>41.0</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>36.0</td>
</tr>
<tr>
<td>% 55 years and over</td>
<td>4.2</td>
<td>3.0</td>
<td>23.1</td>
<td>-*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>6.6</td>
</tr>
<tr>
<td>% Australian born</td>
<td>77.3</td>
<td>85.0</td>
<td>71.1</td>
<td>77.8</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>79.2</td>
</tr>
<tr>
<td>Average hours worked per week</td>
<td>32.0</td>
<td>30.0</td>
<td>41.0</td>
<td>39.0</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>32.0</td>
</tr>
<tr>
<td>FTE***</td>
<td>219</td>
<td>173</td>
<td>46</td>
<td>19</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>471</td>
</tr>
<tr>
<td>FTE rate****</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>n.p*</td>
<td>n.p*</td>
<td>n.p*</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: AIHW Medical Labour Force Surveys, 2001–2006 (ABS 2006 Census of Population and Housing data) * nil, **n.p= not publishable (numbers are too low to publish), ***FTE= full-time equivalent, ****FTE rate= per 100,000 population (30)
The majority of orthoptists are female, 90.1% in 2006 which was up from 86.3% in 2001. The average age was 36.0 years and the majority (86.8%) lived in major cities and none in remote or very remote areas. There were no orthoptists reported in the Northern Territory.

2.3.4 Ophthalmic nurses

Ophthalmic nurses care for patients with disorders and diseases of the eye testing vision and performing other tests under medical direction. Ophthalmic nurses work in specialist eye hospitals, day surgery centers and general hospitals where beds are allocated for patients with ophthalmic conditions (30). Ophthalmic nurses complete general nurse training for a graduate diploma and then an additional 12 months training to obtain a postgraduate certificate in clinical nursing (38). In 2004, the AIHW Nursing and Midwifery Survey identified that there were 475 (421 FTE) ophthalmic nurses in Australia, the most being employed in New South Wales (34.5%) and Queensland (21.1%) and on average there are 2 per 100,000 population nationally. The average age of ophthalmic nurses was 45.6 years, with 20.2% aged 55 years and over. In 2004, 76.8% of ophthalmic nurses worked in major cities (30).

2.3.5 Characteristics of the workforce

When comparing the characteristics of the three main professions, (ophthalmologist, optometrist and orthoptist) involved in eye health service delivery based on the data of the 2009 AIHW report, the strength and weaknesses of the workforce are apparent (30) (Table 8). Ophthalmologists are on average older than the other eye health professionals, optometrists have the highest FTE rate per 100,000 population and there is evidence of growth for all professions, the most demonstrated by orthoptists (Table 9).
Table 8: Characteristics of the three main eye health professionals in 2006

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Average age, years</th>
<th>% aged 55 years and over</th>
<th>% female</th>
<th>Average hours worked per week</th>
<th>FTE*</th>
<th>FTE rate**</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ophthalmologist</strong></td>
<td>769</td>
<td>51.6</td>
<td>36.0</td>
<td>15.7</td>
<td>43.0</td>
<td>735</td>
<td>4</td>
</tr>
<tr>
<td><strong>Optometrist</strong></td>
<td>3,066</td>
<td>40.0</td>
<td>8.9</td>
<td>44.2</td>
<td>38.0</td>
<td>3,329</td>
<td>16</td>
</tr>
<tr>
<td><strong>Orthoptist</strong></td>
<td>515</td>
<td>36.0</td>
<td>6.6</td>
<td>90.1</td>
<td>32.0</td>
<td>471</td>
<td>2</td>
</tr>
</tbody>
</table>

Source: AIHW Medical Labour Force Surveys, 2001-2006 *FTE= full-time equivalent, **FTE rate=full-time equivalent per 100,000 population (30)

Table 9: The growth rate of the three main eye health professions between 2001 and 2006

<table>
<thead>
<tr>
<th></th>
<th>2001</th>
<th>2006</th>
<th>Difference</th>
<th>% Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ophthalmologist</strong></td>
<td>653</td>
<td>769</td>
<td>116</td>
<td>17.8</td>
</tr>
<tr>
<td><strong>Optometrist</strong></td>
<td>2,697</td>
<td>3,066</td>
<td>369</td>
<td>13.6</td>
</tr>
<tr>
<td><strong>Orthoptist</strong></td>
<td>432</td>
<td>515</td>
<td>83</td>
<td>19.2</td>
</tr>
</tbody>
</table>

Source: AIHW Medical Labour Force Surveys, 2001-2006 (30)

One of the major challenges in eye health service delivery is the distribution of the workforce. All three eye health professionals are over-represented in major cities, and in general ophthalmologist and orthoptist numbers are often mirrored as these two professions work in parallel which is reflected in the fact that there are no ophthalmologists or orthoptists recorded in remote or very remote areas. Some ophthalmologists now undertake outreach work in rural and remote areas but none are permanently based there. In 2006, 82.5% of ophthalmologists worked in major cities yet only 68.5% of the Australian population and 67% of Australians with eye disorders lived in major cities (Table 10). Although the majority of optometrists work in major cities, there was a higher percentage distributed in outer regional (5.5%) and remote/very remote (0.5%) areas compared to ophthalmologists and orthoptists, where the numbers are nil or too low to publish.
Table 10: Employment by Remoteness Area, 2006

<table>
<thead>
<tr>
<th></th>
<th>Major cities n (%)</th>
<th>Inner regional n (%)</th>
<th>Outer regional n (%)</th>
<th>Remote/Very remote n (%)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ophthalmologist</td>
<td>634 (82.0)</td>
<td>92 (12.0)</td>
<td>25 (3.0)</td>
<td>n.p*</td>
<td>769</td>
</tr>
<tr>
<td>Optometrist</td>
<td>2,410 (79.0)</td>
<td>466 (16.0)</td>
<td>168 (5.0)</td>
<td>15 (0.5)</td>
<td>3,066</td>
</tr>
<tr>
<td>Orthoptist</td>
<td>450 (87.0)</td>
<td>59 (11.0)</td>
<td>9 (2.0)</td>
<td>** nil **</td>
<td>518</td>
</tr>
</tbody>
</table>

Source: AIHW Medical Labour Force Surveys, 2001-2006 *n.p= not publishable (numbers are too low to publish) ** nil (30)

2.4 Models of care

As the elderly population grows in size and more demands are placed on hospitals there will be greater focus on multi-disciplinary care and a holistic approach to chronic conditions. The Victorian Ophthalmology Service Planning Framework 2005 supports further opportunities to better utilise the skills of the current workforce through a reconfiguration of workforce models. This was identified as a recommendation, “establishment and/or expansion of workforce models that make best use of the existing workforce in public hospitals and in community settings (optometrists, orthoptists and nurses undertaking greater roles in the provision of eye care” (2). Recent studies, such as the Bristol Shared Care Glaucoma Study in the United Kingdom and the Community Eye Care Partnership in Melbourne, (39) (40), have been based on the concepts of “integrated”, “collaborative” or “shared” care and task shifting as a result of the global burden of disease changes from acute to chronic diseases. Integrated care has received much attention as a way of improving access to health care delivery and utilising existing skilled workforces to relieve the burden on hospital services. Integrated care which is defined by the WHO as: “a concept bringing together inputs, delivery, management and organisation of services related to diagnosis, treatment, care, rehabilitation and health promotion. Integration is a means to improve services in relation to access, quality, user satisfaction and efficiency” (41)

In Australia, for the first time, a shared care model for the management of a chronic eye condition, glaucoma, was launched under the Pharmaceutical Benefits Scheme (PBS) in January 2008 (42). Authorised optometrists can co-manage patients with glaucoma in a
shared care arrangement with an ophthalmologist according to specific management guidelines agreed by RANZCO and the Optometry Australia. As stated above, currently 14.8% of optometrists are therapeutically endorsed (30). The range of medications that authorised optometrists may prescribe under the PBS includes lubricants and therapeutic agents for treating allergies, infection, inflammation and glaucoma. Under the shared care model a patient’s ophthalmologist and optometrist together develop a written management plan that specifies the treatment goals and the roles and responsibilities of the two practitioners, create a review schedule, and communicate clinical information to the patient’s GP thus promoting an integrated and collaborative approach. This model of care has the potential to increase patient access to eye health services, particularly in rural areas and to also ensure adequate supervision of the condition that can cause irreversible vision loss. This management plan, however, has changed in the last 12 months with the approval of the Australian Health Practitioner Regulation Agency (AHPRA) whereby optometrists can initiate and commence treatment for chronic glaucoma and must provide a referral to an ophthalmologist within four months for ophthalmological assessment and advice (43). This resulted in a level of concern amongst the ophthalmology community with an appeal to APRHA overturning this decision in favour of the ophthalmologists.

A two-year National Eye Health Demonstration project, the Community Eye Care Partnership (CECP), funded by the Commonwealth Government through the Department of Health and Ageing (DoHA) was conducted during 2007-2009 testing a model of shared care between the RVEEH and community practitioners, predominantly optometrists but also including GPs. This model of care focused on three chronic eye diseases, AMD, DR and glaucoma. The project involved the accreditation of 14 practitioners across 9 different sites in the state of Victoria (40). To obtain accreditation, learning modules on the three eye conditions were completed online and practitioners were required to attend observation sessions at the RVEEH. Suitable patients with stable eye disease who required monitoring were discharged from the care of the RVEEH to participating practitioners and were to be referred according to specific guidelines. Glaucoma was the exception as patients would undertake a shared care arrangement and have alternate annual appointments between the community optometrist and a RVEEH ophthalmologist. Limitations of the study included the restricted geographical coverage and low number of community sites involved in the
partnership and the low number of referrals to the practitioners. A reason for the low number of involved practitioners was the stringent guidelines and credentialing process. Patient numbers were also low (n=98), limiting the outcomes to be assessed for viability on a larger scale. Although the demonstration identified that the optometrists’ knowledge and diagnostic skills were dependable, the main obstacle to the success of the program was the lack of inter-professional trust and positive relationship building. Ophthalmologists were required to entrust patient care to optometrists with whom there was no previous working interaction. The concept of the demonstration had the potential to collaboratively develop standards for shared care however several factors inhibited this outcome.

In general, ophthalmologists and orthoptists have developed a positive and collaborative relationship and this is probably due to the fact that they work closely together in public and private clinics, there is a clear understanding of each other’s scope of practice and there is inter-professional trust. Ophthalmologists and optometrists, however, have a history of strained relations that has influenced how these professions work together. This is not unique to Australia as it is mentioned in articles from both the USA (44) (45) and the UK (7). In the USA, the relationship and dynamics between ophthalmologists and optometrists is remarkably different to that in Australia and the question of trust has arisen for different reasons. In the past, optometrists in the USA have made an unprecedented push to constantly expand their scope of practice, including requests to perform refractive surgery; such actions have resulted in the American Academy of Ophthalmology (AAO) taking the step of banning optometrists from attending their annual meetings (46). Such drastic actions have not occurred in Australia. The AAO acknowledges the issue of co-management is “delicate and complex” (46). A review paper published in the ‘Current Opinion in Ophthalmology (2011)’ (46), clearly stated the disapproval of co-management models, particularly in relation to post-operative cataract care, however, it did support a new model of integrated management. This is a result of changing employment patterns of ophthalmic practices incorporating optometrists to work alongside ophthalmologists. This integrated-management model is based on sharing a patient between the ophthalmologist and the optometrist in the same practice. This suggests a change over time and has promoted new co-operation and open-mindedness.

In the UK the concept of shared care has evolved positively and the question of trust is in relation to safe clinical practice. The Bristol Shared Care Glaucoma Study (BSCGS)
in 1999 assessed the reliability of community optometric and hospital service eye test measures (39) (47). The results of that study demonstrated that optometrists using specified measurement techniques were as accurate as those performed in outpatient clinics by ophthalmologists. The results suggested this practice would contribute to improved quality of referrals by including all relevant clinical information required for triage and correct clinical allocation and potentially reduce the outpatient load for the ophthalmologist to focus on activities only they are qualified to perform, such as ophthalmic surgery. Moorfields Eye Hospital also undertook a similar study in 1998 to evaluate the extended role of the hospital optometrist (48). The model focused on the accuracy of the optometrists’ clinical evaluation of new referrals in an outpatient clinic, rather than the monitoring of diabetes and glaucoma that have been the focus of multiple studies in the past (48). The study was designed as a double blind study where the provisional diagnosis was documented in a log book by the optometrist and then a diagnosis was also independently made by the ophthalmologist. The diagnosis of the optometrist and ophthalmologist were then compared. The correct diagnosis was achieved in 79.6% of all cases and 92.6% in the cataract sub-group (48). The results of that study indicated a high level of diagnostic accuracy and that appropriately trained optometrists had the clinical skills to play a substantive role in primary care. Although this differs from a hospital setting, this model can impact referrals and identify the most appropriate patients for tertiary services.

The BSCGS conducted a follow-up randomised controlled study two years after the initial study to examine the outcome of care of patients monitored by the hospital service or community optometrists (49). No significant statistical differences were identified in any of the key vision-related variables in each setting and the model of care was deemed feasible (49). The limitations of the BSGS study and of the CECP were the absence of a cost-benefit evaluation and the financial requirements to establish and conduct such services. The cost-effectiveness of a glaucoma shared care model was evaluated by the Rotterdam Eye Hospital (REH) (26). The study compared the costs and quality of care of the glaucoma follow up clinic managed by optometrists and ophthalmic technicians and that of the glaucoma clinic managed by ophthalmologists in a hospital setting (26). The 30-month randomised clinical trial found the quality of care to be similar, however the mean hospital costs per patient per year were lower in the glaucoma follow-up clinic staffed by the optometrist and ophthalmic technicians despite
a higher number of visits per year. Similar studies have not been conducted in Australia but are vital for future planning and to inform service model redesign.

Task shifting is an important concept and a necessity for both developing and developed countries. There are many examples of task shifting such as that demonstrated by the Kenya Ophthalmic Programme (50) (51) and the nurse-led cataract assessment clinic at Flinders Medical Centre, Adelaide, Australia (52). Although the two programmes were implemented for different reasons and purposes they each had a positive impact on eye service delivery. In the Kenya Ophthalmic Programme, for example, the Ophthalmic Clinical Officers (OCOs) demonstrated that with training and willingness, eye services can be delivered in non-traditional methods and cataract surgical rates increased in the Kenyan region. The OCOs have expanded the capacity of the Kenyan eye workforce. In 2000, the OCO to population ratio was 1:300,000 versus an ophthalmologist to population ratio of 1:600,000. There were a total of 50 ophthalmologists at the time (50). The nurse-led cataract assessment clinic in Adelaide improved clinical access and reduced waiting times and enabled ophthalmologists to perform more surgeries, reducing the waiting list. The practice proved to be safe and effective and the methods to be potentially applicable to other ophthalmology departments (52).

There have been several studies to assess the sensitivity and specificity of DR screening among health professionals such as optometrists, orthoptists and GPs (53) (54) (55). A survey completed by 45 orthoptists to evaluate 36 digital fundus images found the correct detection of abnormalities was high, with mean sensitivity 86% and specificity 91% (53). This aligns with the NHMRC guidelines recommendation that sensitivity for a screening method should be at least 60%, and specificity 90-95% (24). Overall, orthoptists compared well to both optometrists and GPs. One study performed in the UK identified optometrists’ detection of DR had sensitivity 88% and specificity 68%, and for GPs’, sensitivity was 79% and specificity 73% (53). Although these studies involved a lower number of health professionals the number of patients involved was much greater than in the study of the orthoptists. Such studies support the utilisation of existing skilled workforce to address the growing demand on eye care services.

An evolving concept of shared care is telemedicine, with ‘tele-ophthalmology’ emerging to facilitate shared care for glaucoma and DR screening in different settings worldwide, including numerous studies in India (56) (57). Tele-ophthalmology is the use of telecommunication for electronic transfer of eye health data and imaging, usually
from rural to urban settings (56). The increased utilisation of highly specialised equipment for both diagnostic and therapeutic purposes will further contribute to this practise in the future. The Rotterdam Eye Hospital demonstrated in 2004 a successful shared care tele-ophthalmology screening service (58). Optometrists screened patients for glaucoma in the community and resulting images were further assessed by trained ophthalmic technicians at the hospital. The study included a sample of 1,729 patients, and the data demonstrated an 81% agreement rate for the test results between the hospital and the optometrists, and only 27% of patients were called for additional testing; only 11% were required to see an ophthalmologist (58). The study demonstrated a positive combination between task shifting and the use of technology to facilitate change. Further advancements in technology and development of diagnostic equipment will enable changes in patient management plans and is expected to enhance the delivery of eye health services.

While these models and studies have both limitations and advantages and are practised within different health systems and scope of practice, they all emphasise the importance of strict protocols and guidelines and the fact that open communication is critical between all parties. These studies also support the idea that quality of care to patients provided by different types of health professionals is instrumental to remove professional barriers, increase job satisfaction and provide a cost-effective well-functioning health system. This reiterates the importance of the WHO building blocks to address issues of accessibility, future demand and workforce challenges.

2.5 Referral Practices

Appropriate referrals are critical in enabling appropriate access for patients who require tertiary services. The understanding of the types of referrals can highlight potential areas for task sharing in response to the demand. The referral pathway for eye care services in Australia is predominantly from two primary care groups, optometrists and GPs. Health service delivery is based on a three tier system, primary, secondary and tertiary care. Primary Care is defined as care provided following self-referral. This includes services provided by community optometrists and GPs. Secondary care is defined as specialist care provided following referral from another practitioner, but not including highly specialised care, which due to cost, quality or technical issues, is best provided from a small number of service sites. Secondary care includes most
ophthalmic surgical and medical services. Tertiary care is defined as highly specialised care provided following referral from another practitioner, ophthalmologist, optometrist or GP. This framework is based on the services provided by the public sector however it also applies to the whole eye health service including the private sector.

Variations of referral pathways and the inappropriateness of some referrals by eye care professionals and GPs are impacting access for patients who are in need of tertiary services. For example, some patients are referred to tertiary hospitals for refraction and routine eye examinations rather than to community providers such as optometrists. GPs play a central role in the referral process and often refer patients to eye health care specialists in the first instance. During 2006-07, GPs managed 2.5 eye health problems per 100 encounters. GPs referred patients to ophthalmologists at a rate of 0.8 referrals per 100 encounters and optometrists, at a rate of 0.1 referrals per 100 encounters (59). In 2010 the RVEEH conducted an audit of the quality of GP referrals as there was the untested belief that GP referral letters are difficult to triage appropriately as a result of poor quality clinical information and lack of adequate pre-diagnostic testing (60). An audit tool was developed by General Practice Victoria (GPV) to assess Primary Care Referrals to Outpatient Clinics and this was used to collect the baseline data (60). Results indicated poor quality referrals and of significant importance was the proportion of referrals that did not indicate relevant clinical investigations undertaken by the GP; 86.0% did not include a visual acuity measurement. Interestingly, only 32.0% of referrals received on the hospital specific referral form (which included a designated section for visual acuity recording) had the vision completed. A third of referrals (32.0%) could have potentially been treated elsewhere in the community without compromise to patient safety and care; examples included referrals for diabetic eye check and review of glasses. This issue will be further investigated in this research with possible recommendations. A similar study was conducted in Belfast in 2007 where a comparison of referrals to ophthalmology by optometrists and GPs was evaluated (59). The study identified that optometrists contributed the greatest number of referrals and cataract was the most common condition referred by both practitioners. Agreement with ophthalmological diagnosis was high for both groups, however, optometrists referred more false positive patients for glaucoma and this was the case for lid/ tear duct/ conjunctival conditions referred by the GPs. This highlights the variations in training and skills and lack of regular exposure to certain eye conditions and the need for uniform clinical guidelines and referral pathways.
It is important that health professionals understand the roles and scope of practice of other health professionals to ensure appropriate referrals. It is also important for health professionals to work collaboratively to build understanding of each other’s roles and scope of practice and to meet each other’s expectations. In Queensland, RANZCO and the Royal Australian College of General Practitioners collaborated to deliver National GP Eye Skills Workshops to enhance eye skills of GPs. Historically, formal eye skills have been a very small component of undergraduate or postgraduate training for GPs and this is evident in current referral practices. The workshops in Queensland focused on clinical abilities such as vision testing, removal of foreign body, ocular first aid and even incision of a chalazion. The workshops were positively received and over 90% of participants rated the workshops relevant at 90% and 96% answered ‘yes’ to fulfilling their learning expectations (61). The program demonstrated an effective approach in supporting primary care practitioners.

A major inefficiency of the current system is that not all people referred for ophthalmological care require services or ongoing treatment in a secondary or especially a tertiary setting. Lack of effective referral pathways is suggested to be due to lack of understanding of the roles and scope of practice of different eye care professionals by other health care professionals and the historical fragmentation between optometry and ophthalmology, a result of inherent professional boundaries and traditional factors that today are slowly being eradicated and new bridges are being built to narrow the gap.
Chapter 3 RESEARCH DESIGN

This chapter presents the methodology used to design and implement the Optometry-Ophthalmology Workforce Collaboration (OOWC) and the rationale for the data collected to determine the occasions of service in an outpatient setting for the three main chronic eye conditions, AMD, DR and glaucoma over a 5 year period. The research was comprised of two related components (Figure 1). Common themes in the two components were workforce and each component incorporated task sharing and the use of technology.

Figure 1: Components of the study and how they relate
3.1 Optometry-Ophthalmology Workforce Collaboration Trial Clinic

The OOWC project was a pilot study designed to test an integrated model of care of workforce collaboration between optometrists and ophthalmologists. The Royal Victorian Eye and Ear Hospital (RVEEH) and the Australian College of Optometry (ACO) were the two organisational partners.

The RVEEH is Australia’s only specialist eye, ear, nose and throat hospital. It provides care to more than 250,000 patients each year through outpatient services, emergency department, specialist clinics and surgical services. The hospital offers services in general ophthalmology equivalent to secondary care in the general eye clinics and specialist ophthalmology equivalent to tertiary care in the special eye clinics (www.eyeandear.org.au). The ACO is a not-for-profit organisation that provides public community optometric care. It has multiple metropolitan sites and in addition provides eye care services to rural and regional areas of Victoria (www.aco.org.au). Both the RVEEH and ACO are key organisations in eye health service delivery and the project was an opportunity to build future relations. The RVEEH outpatient capacity and the ACO commitment to community optometry created an ideal setting as a test platform for this study.

The trial clinic operated weekly at the ACO for a full day over a six month period and the ophthalmologist from the RVEEH was present at all times.

The primary objectives of the OOWC project were:

- Improve patient access to clinical eye care in the most appropriate clinical setting
- Determine the role of collaborative care between community and tertiary settings
- Determine the benefits of utilising an existing skilled community workforce
- Build an integrated workforce through increasing collaboration between disciplines

3.1.1 Ethics

Prior to project commencement ethical approval for this research including surveys and patient recruitment and consent procedures was granted by the Royal Victorian Eye and
Ear Hospital Human Research and Ethics Committee in July, 2011 (Project number 11/1028H) (Appendix 1). The project adhered to the principles of the Declaration of Helsinki.

3.1.2 Governance

The OOWC project established an accountability framework. Throughout the duration of this project both organisations were governed by the Service Level Agreement signed by both parties. The OOWC Steering Committee was established to ensure accountability and collaborative decision making according to the terms of reference ( Appendix 2 ). Membership of the Steering Committee consisted of RVEEH and ACO Executive members, clinical leaders (ophthalmologists and optometrists who would lead staff to meet project objectives), a community advisory member, a GP Liaison Officer and a Centre for Eye Research Australia (CERA) representative. The Steering Committee met at least monthly to monitor project progress. Decisions were made through a consensus approach.

A Communication and Consultation Plan was developed to ensure information was communicated effectively and on a timely basis to develop an environment with opportunities to engage with a broad spectrum of key stakeholders. Identified key stakeholders included:

- Royal Victorian Eye and Ear Hospital (RVEEH)
- Australian College of Optometry (ACO)
- Royal Australian and New Zealand College of Ophthalmologists (RANZCO)
- Optometry Australia
- General Practice Victoria (GPV)
- Melbourne General Practice Network (MGPN)
- Department of Health (DH)

Communication was primarily targeted at referring GPs and clinical staff. Activities undertaken to communicate with stakeholders included letters to referring GPs to inform them of their patient's participation in the trial clinic, articles in the GPV network newsletters, a published article in the Optometry Association Journal and a presentation at the RVEEH GP education night. Ongoing and open communication with RVEEH ophthalmologists, including RANZCO representatives, was critical to the
success of the project as was the dedication of the identified clinical leaders. This occurred via regular updates at RV EES H Senior Medical Staff meetings.

3.1.3 Patient Selection

To identify eligible patients to participate in the study all new patients referred by GPs who were on the RV EEE H waiting list for a general eye clinic appointment were assessed. Inclusion and exclusion criteria were established with the consensus of the Steering Committee (Table 11).

Table 11: Patient triage criteria for new patients referred by GPs according to reason for referral

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>• GP referral with unclear but apparently</td>
<td>• Optometrist or ophthalmologist referral</td>
</tr>
<tr>
<td>non-urgent diagnosis</td>
<td>• Clear diagnosis</td>
</tr>
<tr>
<td>• Blurred vision</td>
<td>• Specified medical or surgical intervention</td>
</tr>
<tr>
<td>• Eye review</td>
<td>• Lid lesions or abnormalities</td>
</tr>
<tr>
<td>• General eye exam</td>
<td>• Children (&lt;18 years)</td>
</tr>
<tr>
<td>• Diabetic eye exam</td>
<td>• Prisoners</td>
</tr>
<tr>
<td>• Dry eyes</td>
<td>• Rural residents</td>
</tr>
<tr>
<td>• Itchy eyes</td>
<td>• Referrals to other off-site RV EE H clinics</td>
</tr>
<tr>
<td>• Floaters with no other symptoms</td>
<td></td>
</tr>
<tr>
<td>• Eye check due to family history e.g.</td>
<td></td>
</tr>
<tr>
<td>glaucoma, AMD</td>
<td></td>
</tr>
</tbody>
</table>

The inclusion criteria were predominantly for patients requiring vision screening, such as diabetic eye check, and with non-specific symptoms that did not suggest permanent or severe threat to vision loss. The exclusion criteria were predominantly for specific requests or conditions that would require ophthalmological intervention. Specific eye conditions were not listed so as not to have an exhaustive list. Clear diagnoses such as cataract or glaucoma were excluded as ophthalmological intervention would be
required. Prisoners were excluded from the study due to consideration of resources required such as security that were not available at the ACO. Rural residents were also excluded due to the consideration of long travel and potential RVEEH follow-up would require additional future travel. Current RVEEH patients waiting for a review, planned or post-operative appointment were also excluded.

The outpatient waiting list was obtained from the RVEEH patient information management system, PiMs. All RVEEH medical records with new GP referrals were assessed. The outcomes of the triage of each referral were recorded in a password protected spread sheet even though data collected were unidentifiable. Medical record access was in accordance with RVEEH policy and procedures.

Patients with the longest wait time on the list were assessed first. The longest wait time was 21 months. Triage review started from August 2011 and by December 2011 the extensive waiting list had been entirely reviewed. From January 2012 patients were identified upon receipt of referral before being placed on a waiting list.

Patients meeting the inclusion criteria were invited to participate in the study via a phone call with an explanation of what was involved. Those wishing to participate were given a date to attend and their referring GP was also informed by mail. Patients had the option of declining the appointment. Those who did not accept remained on the waiting list for a RVEEH general eye clinic outpatient appointment. Outcomes of phone calls from RVEEH staff were recorded; the numbers of patients called, the numbers accepting appointments, the numbers declining appointments and the reasons.

### 3.1.4 Selection of Optometrists

Based on their level of experience, suitable optometrists were identified by senior ACO clinicians and invited to participate in the trial. Ten optometrists were recruited. All the participating optometrists were given RVEEH honorary appointments to ensure standard patient care and adherence to RVEEH policy and procedures.

An orientation day was held at the hospital that included a tour of hospital areas, and clinical attendance with the supervising ophthalmologist on general eye clinics to acquire an understanding of hospital practice and services.
The participating optometrists did not require training for the purposes of this project as it was considered within their currently recognised scope of practice. Education was an ongoing component of the project with tutorials held at the end of each clinical day. The ophthalmologist presented a topic for group discussion such as latest research, surgical techniques and case studies. There was only one ophthalmologist participating in the trial clinic and they also received an ACO honorary appointment.

3.1.5 Clinical Guidelines

Clinical decision making was facilitated through the use of clinical management protocols and referral pathways developed for this project to ensure standard quality of care. Evidence-based guidelines were developed prior to commencement of the trial clinic in collaboration with clinical champions and final sign-off by the joint Steering Committee which included representation from the Royal Australian and New Zealand College of Ophthalmology (RANZCO) (Appendix 3). The initial clinical guidelines were for the following conditions:

- AMD
- Blepharitis
- Cataract
- DR
- Dry eye
- Glaucoma

The guidelines were further reviewed at the end of the trial clinic and following feedback from the participating optometrists additional conditions were included:

- Choroidal naevus
- Epiretinal membrane
- Epiphora
- Floaters
- Headaches
- Pterygia

Sources reviewed to formulate the guidelines included The College of Optometrists (UK), International Council of Ophthalmology Guidelines, National Guideline
Clearinghouse (USA), NHS Nice Clinical Guidelines (UK), National Health and Medical Research Council (NHMRC) Diabetic Retinopathy Management Guidelines (Aus), NHMRC Glaucoma Management Guidelines (Aus), Optometry Board of Australia and RANZCO.

3.1.6 Patient Assessment

The OOWC clinic operated with 6 of the 10 ACO optometrists each day independently performing an optometric examination including dilation if appropriate. After completion the patient was seen by the RVEEH ophthalmologist and the diagnosis and management plan for each patient was made in collaboration with the RVEEH ophthalmologist; this at times also included a re-examination of the patient for clarification. Upon completion of the examination the appointment outcome would be determined from the four options:

1) Discharge to ACO
2) RVEEH review
3) Discharge to GP for ongoing care
4) Discharge, no follow-up care required

Patients who required urgent access to the RVEEH Emergency Department could be seen on the same day of attendance at the OOWC clinic.

A specifically designed examination form was developed based on current ACO and RVEEH examination documentation to capture all appropriate clinical information, including optometrist diagnosis and ophthalmologist diagnosis if these were different (Appendix 4). The basic optometric assessment consisted of:

- History taking (reason for referral, symptoms, previous ocular history, general health and medications, allergies and family history)
- Visual acuity assessment
- Refraction (subjective and/or objective)
- Pupillary function
- Ocular alignment and motility
- Slit-lamp biomicroscopic examination: eyelid margins and lashes; tear film; conjunctiva; sclera; cornea; anterior chamber; and assessment of central and peripheral anterior chamber depth, iris, lens, and anterior vitreous
Intraocular pressure measurement (Goldman applanation)
Dilated fundus examination (unless contra-indicated)
Optic nerve head evaluation

In addition several other tests were performed by the optometrists if indicated to assist diagnosis and determine a management plan, these included:

- Colour vision testing
- Confrontation visual field testing
- Amsler grid
- Tear break up time
- Gonioscopy
- Functional evaluation of the nasolacrimal tear drainage system (lacrimal lavage)
- Analysis of the corneal shape (e.g. keratometry or corneal topography)
- Measurement of corneal thickness (pachymetry)
- Anterior segment and fundus photography
- Optical coherence tomography (OCT) of the macular and retinal nerve fibre layer (RNFL)
- Visual fields by automated perimetry (preference Humphrey Visual Field (HVF) analyser)
- Prescribe eye drops

3.1.7 Data Collection

An electronic database was developed using the software Opinio (version 6.5), a program to create, analyse and maintain surveys (www.objectplanet.com/opinio). The database was protected on a secure server with passwords for approved access only. Quantitative data were analysed using SPSS version 18. The database captured the following data:

- Acceptance or declination of appointment including reason
- Clinic attendance (including cancellation and did not attend)
- Patient demographics (age, sex, postcode, interpreter requirements, Aboriginal or Torres Strait Islander (ATSI) status)
- Clinical assessment according to the assessment form
• Clinical outcome (discharge or review)

3.1.8 Monitoring

Weekly reports generated from Opinio and the triage spread-sheet was critical for the ongoing monitoring of the clinics to determine the efficiency and impact of the trial clinic. Monitoring occurred throughout the project to ensure bookings and patient attendances were adequate for the purpose of the pilot study. In the early stages of the project, monitoring was conducted weekly to record the clinical outcomes with an emphasis on number of patients remaining at the ACO versus those requiring RVEEH follow-up. After four weeks from the start of the program, the consultation time for each patient, the numbers seen and patient outcomes of examinations were reviewed to determine the appropriate number of appointments for each pilot clinic. These data were presented at the monthly Steering Committee meetings in a flowchart to summarise the triage and the booking processes and the clinical outcomes (Figure 2). Lessons learnt regarding appointment bookings, referral triage and clinical outcomes from the early stages of monitoring were reviewed by the Steering Committee and after consensus, improvements were made to ensure positive lessons were taken up and trialled during the course of the pilot study.
A mid-term report was completed to assess the progress and clinical outcomes of the trial clinic and to identify factors to be considered for a sustainable model. The report included data based on clinic attendances from October to December 2011.

Clinical risks were monitored throughout the study via three different means. The first, monthly reports from the RVEEH patient information management system (PiMs) were monitored throughout the study and up to one month post clinic attendance. The aim was to review RVEEH outpatient attendance outcomes and to identify any Emergency Department presentations of patients previously discharged from the trial clinic. The
second, the RVEEH clinical incident reporting system (Riskman) was also used to monitor any incidents. The third, patient complaint forms were available to patients at the time of their appointments at the ACO.

3.1.9 Feedback

Feedback was sought from four different perspectives:

- patients attending the trial clinic
- participating optometrists
- participating ophthalmologist
- referring GPs

a) Patient Experiences Survey (PES)

The purpose of the PES was to fully understand the patients’ experiences throughout their engagement in the project. The PES was developed by the CERA Population Health Unit in conjunction with comment and consensus from the Steering Committee. In developing the survey several other patient surveys were reviewed including the RVEEH Victorian Patient Satisfaction Monitor, the Community Eye Care Partnership patient survey and the Australian College of Optometry patient satisfaction survey. A 21 item patient experience survey including quantitative and qualitative measures was developed (Appendix 5). The survey included closed questions with answers ‘yes’, ‘yes partly’, ‘don’t remember’ and ‘no’, and others used a 5-point likert-type scales with options of ‘excellent’, ‘very good’, ‘good’, ‘fair’, ‘poor’ or ‘very satisfied’, ‘satisfied’, ‘neutral’, ‘dissatisfied’ and ‘very dissatisfied’. Most questions allowed for additional open ended comments.

The format of the PES was reflective of the patients’ journey through the appointment. The PES was presented under the following topics:

- Understanding the project (reason for referral, understanding why appointment was at the ACO, access to optometrist or private ophthalmologist)
- Access (travel to the ACO)
- Communication (interaction with optometrist and management of queries)
- Quality of care (length of appointment, satisfaction and understanding of clinical outcome)
Patients who attended the pilot clinic from January 2012 to April 2012 were invited to participate in the PES. Patients who gave written informed consent to participate in this survey were randomly selected and contacted by phone approximately a week after their appointment. To ensure a representative sample of patients from across the different clinical outcome groups (discharge, discharge to GP, ACO for review and RVVEEH for review) a minimum of 10% of patients was selected from each outcome group. This also included patients who required an interpreter.

b) Participating Optometrists’ Survey
The ten participating Optometrists from the ACO were invited to complete a confidential online feedback survey. The survey was developed in conjunction with CERA and consisted of 16 questions with a combination of closed questions such as ‘yes’, ‘yes partly’ and ‘no’ and open ended questions (Appendix 6). The aim of the survey was to capture both quantitative and qualitative data on the optometrists’ perceptions of how this project potentially could influence the optometry profession and recommendations should this model of care continue. The survey focused on four themes:

- Overall experience (initial expectations, future aspirations)
- Teaching and education (benefits of working alongside an ophthalmologist and tutorial sessions, future professional support)
- Model of care (pros and cons, use of clinical guidelines and referral management pathways)
- Future (collaborations, impact on profession)

c) Ophthalmologist Observations
As there was only one ophthalmologist involved in the trial clinic a survey was not applicable and a written statement was obtained by CERA to ascertain the observations and feedback on the clinic.

d) Referring GP Survey
The aim of the GP survey was to obtain feedback from GPs who referred patients to the RVVEEH but who attended the trial clinic. Feedback was focused on two topics, communication and referral practices. The survey was created in collaboration with CERA and the RVVEEH GP Liaison Officer. The survey consisted of 6 multiple choice questions with an option of a phone call to discuss responses (Appendix 7). The survey
was hardcopy and mailed with the patient’s assessment sheet and outcome summary. Participation was voluntary and the form was requested to be returned by fax.

3.1.10 Communication with Referrers

The referrer of every patient who accepted to attend the trial clinic received a letter to inform them their patient was attending a collaborative clinic with the ACO (Appendix 8). Referrers were also informed with a follow up letter of the clinical outcome of their patient’s appointment (Appendix 9) and a copy of the examination report.

3.1.11 Cost-benefit Analysis

A cost benefit analysis was conducted on to determine the feasibility and possibility for the clinic to become ‘business as usual’ on a monthly basis. A monthly clinic would ensure adequate patient numbers and lower ongoing costs. The outcome was not a cost-effectiveness analysis but rather a comparison of direct costs of patients attending the trial clinic versus attending RVEEH outpatient clinics. Based on the cost-benefit analysis, a business case was proposed to the executive representatives of both organisations.

Costs were based on the following service and activities:

RVEEH key activities and responsibilities:

- Processing of referrals
- Triage, booking and scheduling of patient appointments
- Employment of ophthalmologist (Consultant) to all-day monthly clinic
- Employment of outpatient booking clerk to attend all-day monthly clinic
- File management resources
- GP correspondence management
- Provision of interpreters
- Governance to ensure supervision of outcomes and activity
ACO key activities and responsibilities:

- Provide space, equipment and consumables for service
- Employment of optometrists and support clerical staff for all day monthly clinic
- Governance to ensure supervision of outcomes and activity

If this model was to be considered to be implemented elsewhere additional costs such as a project manager would need to be considered for the trial phase. The responsibilities of the project manager would include central co-ordination between the two organisations, establish appropriate clinic trial design and evaluation, engage stakeholders and manage expectations, facilitate the delivery of project objectives and ensure project milestones are on schedule.

3.2 Occasions of Service: a retrospective study

A retrospective study of patient medical records was conducted to quantify the average number of occasions of service, over a 5-year period in the RVEEH outpatient clinics for patients with the three main chronic eye diseases, AMD, glaucoma and DR.

Occasions of service are defined in accordance with the Australian Institute of Health and Welfare (AIHW) Metadata online registry, METeOR, a repository for national metadata standards for health, housing and community services statistics and information:

“The number of occasions of examination, consultation, treatment or other service provided to a patient in each functional unit of a health service establishment. Each diagnostic test or simultaneous set of related diagnostic tests for one patient referred to a hospital pathology department consists of one occasion of service” (69)

The aim of this retrospective, exploratory study was to investigate the occasions of service required for service provision for the three main chronic eye conditions and what this means for future eye care delivery. The aim of these data is to understand future demand on the eye care workforce and to use the data to inform future models of care in eye health service delivery.
Chapter 3: Research Design

The primary objectives of this exploratory retrospective study were:

- Quantify the average number of visits over a 5 year period of non-admitted patient service provision
- Quantify the total and average number of examinations, diagnostic tests and treatments provided within each outpatient visit
- Quantify the number of interactions with health professionals who deliver the examinations, diagnostic tests and treatments
- Identify the tasks delivered by each health professional within each outpatient visit
- Identify potential task shifting opportunities to inform future models of eye care service provision

3.2.1 Ethics

Ethics approval was not required for this component of the research as it was a retrospective study of medical records. Medical record access was in accordance with RVEEH policy and procedures.

3.2.2 Patient Selection

To identify eligible patients’ medical records for review, triage criteria were developed (Table 12). The principal inclusion criterion was patient attendance for 5 consecutive years for both new and chronic patients. The 5-year follow-up period was based on patients with first visits between 2005-2007 to ensure the data reflected current treatments and management within current guidelines such as the NHMRC guidelines for DR and glaucoma. Potential eligible patients were identified through the outpatient review waiting list obtained from the RVEEH patient management system, PiMs. New and chronic patient medical records were reviewed from both General Eye Clinic (GEC) and Special Eye Clinic (SEC) outpatient clinics to ensure patients were captured at all stages of disease. GEC caters for patients in early stages of disease who require minimal intervention. SEC provides care for patients who have advanced disease in possible need of intervention. Data were categorised according to diagnosis (Table 13) (24) (70) (71).
The main exclusion criterion was that of ocular co-morbidity. This was defined as the diagnosis of more than one of the main diseases and/or other eye diseases that could influence the number of outpatient visits, management and treatment. Cataract was not considered for exclusion, as this is a treatable eye condition and is developed as the natural ageing process and often develops sooner for DR and glaucoma patients. It needs to be acknowledged that the exclusion of ocular co-morbidities is a limitation of this study, however these co-morbidities are not within the scope of this thesis. If data were collected to include ocular co-morbidities the outcomes could potentially be different.

Table 12: Triage criteria to identify eligible patients’ medical records for review for component 2 of the study

<table>
<thead>
<tr>
<th>Inclusion</th>
<th>Exclusion</th>
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<tbody>
<tr>
<td><strong>New Patients</strong></td>
<td><strong>Chronic Patients</strong></td>
</tr>
<tr>
<td>• First year attendance</td>
<td>• Attendance between</td>
</tr>
<tr>
<td>• Follow up over 5</td>
<td>• Follow up over 5</td>
</tr>
<tr>
<td>consecutive years</td>
<td>consecutive years</td>
</tr>
<tr>
<td>• Attendance at GEC or SEC</td>
<td>• GEC or SEC</td>
</tr>
<tr>
<td>• Any referrer</td>
<td>• No ocular co-morbidity</td>
</tr>
<tr>
<td>(ophthalmologist,</td>
<td></td>
</tr>
<tr>
<td>optometrist, GP, self)</td>
<td></td>
</tr>
<tr>
<td>• No ocular co-morbidity</td>
<td></td>
</tr>
<tr>
<td><strong>Exclusion</strong></td>
<td><strong>Inclusion</strong></td>
</tr>
<tr>
<td>• Ocular co-morbidity</td>
<td>• First year attendance</td>
</tr>
<tr>
<td>• First year attendance</td>
<td>• Attendance between</td>
</tr>
<tr>
<td>after 2007</td>
<td>2005-2012</td>
</tr>
<tr>
<td>• Attendance less than 5</td>
<td>• GEC or SEC</td>
</tr>
<tr>
<td>years</td>
<td>• No ocular co-morbidity</td>
</tr>
</tbody>
</table>

GEC = General Eye Clinic, SEC = Special Eye Clinic
Table 13: Definitions of diagnoses to categorise patients in this study

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atrophic AMD</td>
<td>thinning of retinal pigment epithelium (RPE) in the macula, characterised by presence of drusen and atrophic thinning of the macula</td>
</tr>
<tr>
<td>Neovascular AMD</td>
<td>active blood vessel growth under the retina, leaking blood and fluid</td>
</tr>
<tr>
<td>DR</td>
<td>presence of typical microvascular signs in a person with diabetes</td>
</tr>
<tr>
<td>NPDR, non-prolific DR</td>
<td>characterised by microaneurysms, dot, blot or flame haemorrhages, hard exudates, cotton wool spots, intraretinal microvascular abnormalities, venous beading</td>
</tr>
<tr>
<td>PDR, prolific DR</td>
<td>characterised by growth of abnormal new vessels and subsequent fibrous proliferation, pre-retinal and vitreous haemorrhage</td>
</tr>
<tr>
<td>Glaucoma suspect</td>
<td>Intraocular pressure &gt; 21mmHg, suspicious discs or cup to disc (C/D) ratio asymmetry (&gt;0.2). Suspicious visual field (VF) defect and a positive family history</td>
</tr>
<tr>
<td>POAG, Primary open-angle glaucoma</td>
<td>glaucomatous disc features (C/D &lt;0.65-0.85), both early/moderate and moderate VF defect not within 10 degrees of fixation</td>
</tr>
<tr>
<td>Advanced POAG</td>
<td>advanced glaucomatous disc features (C/D &gt;0.9) and/or VF defect within 10 degrees of fixation</td>
</tr>
</tbody>
</table>

(24) (70) (71)

3.2.3 Sample Size

There was no formal calculation to determine a sample size for this component of the study. Initially a small sample of medical records (n=60), 20 of each condition was reviewed to obtain preliminary data and to determine if the eligibility criteria were
appropriate. Due to the unknown variation of all the medical records, a specific sample size could not be determined, instead, the data outcomes were monitored throughout collection to identify any substantial differences. Initially there were great variations and this indicated the need for continued data collection. Data were collected until adequate numbers reflected minimal variation in practice of each condition.

3.2.4 Data Collection

A retrospective audit of 149 medical records was conducted to assess the number of appointments attended by each patient, what tests were undertaken at each visit over a 5-year period for each condition (AMD, DR, glaucoma), and by which health professional.

Data collected were de-identified and stored on a password secured spread sheet. Data were categorised into service delivery and patient assessment for each chronic eye condition.

3.2.4.1 Service delivery

The following data relating to service delivery were collected:

- **Patient demographics**
  Age, sex, and status (new or chronic patient). Age was recorded at the time of initial presentation to the hospital. Postcode, interpreter dependency or Australian or Torres Strait Islander (ATSI) status were not collected as it was not relevant for this component of the study.

- **Collection date**
  Date of the first appointment for new patients. The date 5 years prior to most recent or last outpatient appointment, for chronic patients.

- **Clinic**
  Attendance to GEC or SEC. Referrals to other RVEEH specialty clinics over the 5-year follow-up were also noted to identify progression of disease.
• **Referral source**

All referrals from ophthalmologists, optometrists and GPs were included. Self-referrals to the RVEEH Emergency Department (ED) were also included. Reasons for referral were documented to identify trends in incidental findings versus disease specific referrals.

• **Number of outpatient appointments**

The total number of appointments over a 5-year period were categorised into acute and review appointments. Acute was defined as care of an episode of an illness that is of short duration and potentially rapidly progressive. For the purpose of this study any appointment within a 6-week timeframe was considered acute. This is based on the RVEEH appointment scheduling system that only allows appointments to be booked up to 6 weeks, thereafter patients are on a recall list. A review appointment was defined as all other appointments beyond 6 weeks. The recommended review timeframe versus the actual appointment allocated was reviewed and if it was overdue, by how many weeks. Cancellation and did not attend rates were also recorded.

Cataract surgery and post-op review appointments were excluded from the data, as these were not directly linked to review of the investigated eye conditions. Surgery related to the eye conditions such as trabeculectomy for glaucoma and vitrectomy for DR were noted but also excluded as an occasion of service, surgery is considered as a day procedure and not an outpatient appointment which was the focus of the study. Post-op review appointments were accounted for as an occasion of service. ED attendances within the 5 year review period were noted but were not included in the total number of occasions of service.

• **Clinical outcomes**

The review timeframe, referral to other internal clinics, surgical waiting list rate and discharge rate were noted.

3.2.4.2 Patient assessment

The tasks delivered by each health professional at each visit were categorised into three groups; examination, investigation and intervention (Table 14). The tasks listed are not exhaustive of the competencies of eye health professionals, however they are the most
common in relation to these three main chronic eye conditions. The health professionals who delivered the tasks included ophthalmologists, optometrists, orthoptists, nurses and medical photographers. Before the data were collected, the tasks each health professional were qualified to perform were summarised (Table 15).

In certain instances tasks where a patient saw more than one individual of the same profession to deliver two different tasks, the interaction with the professional was accounted for once however the tasks were individually counted.

Table 14: Tests categorised into delivery of examination, investigation and intervention

<table>
<thead>
<tr>
<th>Examination</th>
<th>Investigation</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>History assessment</td>
<td>Perimetry</td>
<td>Laser (all types)</td>
</tr>
<tr>
<td>Visual acuity (VA)</td>
<td>Fundus Photography</td>
<td>Intravitreal injection</td>
</tr>
<tr>
<td>Subjective refraction</td>
<td>OCT</td>
<td>Surgery consent</td>
</tr>
<tr>
<td>Glasses prescribing</td>
<td>HRT</td>
<td>Eye surgery</td>
</tr>
<tr>
<td>Laser retinometry</td>
<td>Corneal topography</td>
<td>Initiation of eye drops</td>
</tr>
<tr>
<td>Blood pressure</td>
<td>Angiography</td>
<td></td>
</tr>
<tr>
<td>Tonometry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instillation of mydriatic eye drops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gonioscopy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slit lamp anterior segment assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slit lamp fundus assessment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Table 15: Tasks each eye health professional is qualified to deliver

<table>
<thead>
<tr>
<th>Task</th>
<th>Ophthalmologist</th>
<th>Optometrist</th>
<th>Orthoptist</th>
<th>Ophthalmic Nurse</th>
<th>Medical Photographer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual Acuity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjective refraction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glasses prescribing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupil function</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ocular motility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intraocular pressure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corneal pachymetry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupil Dilation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gonioscopy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slit lamp anterior segment assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disc assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundus assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intravitreal Injection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investigation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perimetry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundus photography</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OCT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corneal topography</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
For the purposes of this study, presenting vision impairment was defined according to the WHO guidelines (9) (Table 16).

**Table 16: Level of vision impairment defined by visual acuity and visual field in the better eye**

<table>
<thead>
<tr>
<th>Vision Impairment</th>
<th>Visual Acuity</th>
<th>Visual Field</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>$\geq 6/12$</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td>$&lt;6/12$ $\geq 6/18$</td>
<td>Homonymous hemianopia</td>
</tr>
<tr>
<td>Moderate</td>
<td>$&lt;6/18$ $\geq 6/60$</td>
<td>$&gt;20$ $\geq 10$ degrees radius</td>
</tr>
<tr>
<td>Severe</td>
<td>$&lt;6/60$ $\geq 3/60$</td>
<td>$&lt;10$ $\geq 5$ degrees radius</td>
</tr>
<tr>
<td>Blindness</td>
<td>$&lt; 3/60$</td>
<td>$&lt;5$ degrees radius</td>
</tr>
</tbody>
</table>
Chapter 4 RESULTS

This chapter presents the outcomes of the OOWC pilot clinic and the occasions of service data. Key outcomes measured for the OOWC project were related to efficiency, effectiveness, quality, impact and sustainability. In terms of measuring the occasions of service, data collected provided an overview of the number of appointments and the tests undertaken at each appointment to inform future work and development of models of care in eye health service delivery.

4.1 Optometry and Ophthalmology Workforce Collaboration Trial Clinic

4.1.1 Patient Selection

Eligible patients were identified based on the selection criteria (Table 11, page 32). A total of 3,834 new GP referrals were reviewed for triage to identify eligible patients (Figure 3).
Figure 3: Outcomes of triage, booking process and clinical attendances.

*Pink* = triage process, *Blue* = booking process, *Green* = Clinical outcomes
*DNA* = did not attend

4.1.1.1. Ineligible Referrals

Following triage, 2,587 (67%) patients were excluded (Figure 3). The majority of referrals were excluded based on a clear diagnosis (n= 1,641, 63%) (Table 17). The most common reason for referral based on a specific diagnosis was cataract (n=1,110, 67%) (Table 18). This is consistent with the RVEEH referral data that indicates 60% of
referrals per annum are for cataract. A small proportion of these GP referrals were also accompanied by an optometrist or ophthalmologist report (3%) confirming the diagnosis. In regards to RVEEH specific medical or surgical intervention (n= 149, 6%), these referrals specified procedures such as peripheral iridotomies for narrow angles, YAG laser capsulotomy for posterior capsule opacification, lid electrolysis and also included referrals for a second opinion after the patient had consulted either an optometrist or ophthalmologist in the community. Of note, rural residents also included 9 living interstate.

Table 17: Reasons and frequency referrals were excluded from the OOWC trial clinic

<table>
<thead>
<tr>
<th>Exclusion Criteria</th>
<th>Total referrals excluded (n=2,587)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear diagnosis</td>
<td>1,641</td>
</tr>
<tr>
<td>Lid lesions/abnormalities</td>
<td>367</td>
</tr>
<tr>
<td>Rural residents</td>
<td>243</td>
</tr>
<tr>
<td>Specific medical or surgical intervention requested</td>
<td>149</td>
</tr>
<tr>
<td>Children (&lt;18 years)</td>
<td>114</td>
</tr>
<tr>
<td>Other</td>
<td>41</td>
</tr>
<tr>
<td>Prisoner</td>
<td>32</td>
</tr>
</tbody>
</table>

Table 18: Summary of specific diagnosis category for unsuitable referrals

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Total patients excluded for clear diagnosis (n=1,641)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract</td>
<td>1,110</td>
</tr>
<tr>
<td>Pterygium</td>
<td>194</td>
</tr>
<tr>
<td>Other</td>
<td>156</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>123</td>
</tr>
<tr>
<td>Blocked tear duct</td>
<td>58</td>
</tr>
</tbody>
</table>

The demographic characteristics of ineligible patients referred by GPs (Table 19) were similar in comparison to that of patients who attended the clinic. Considering a significant p value as equal to or less than 0.05, the similarity of the mean age of the two groups was statistically significant (p=0.22) (ineligible 64 ±21.1 and eligible 62 ±16.0
years), and both groups included more females (ineligible n= 1,411, 55% and eligible n=405, 59%) (p=0.09). There were more eligible patients identified as interpreter dependent (20%) requiring interpreter services than ineligible patients (13%). This result is not statistically significant (p=0.22).

Table 19: Demographic summary of ineligible patients and eligible patients who attended the OOWC trial clinic

<table>
<thead>
<tr>
<th></th>
<th>Total Ineligible Patients (n=2,587)</th>
<th>Total Eligible Patients who attended OOWC trial clinic (n=686)</th>
<th>‘p’ value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>1,176 45</td>
<td>281 41</td>
<td>0.09</td>
</tr>
<tr>
<td>Female</td>
<td>1,411 55</td>
<td>405 59</td>
<td></td>
</tr>
<tr>
<td><strong>Age (years)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>64 (±21.1)</td>
<td>62 (±16)</td>
<td>0.02</td>
</tr>
<tr>
<td>Range</td>
<td>1-98</td>
<td>18-99</td>
<td></td>
</tr>
<tr>
<td><strong>Aboriginal or Torres Strait Islander (ATSI)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7 1</td>
<td>4 0.6</td>
<td>0.29</td>
</tr>
<tr>
<td>No</td>
<td>786 30</td>
<td>245 36</td>
<td></td>
</tr>
<tr>
<td>Unknown</td>
<td>1,794 69</td>
<td>433 63</td>
<td></td>
</tr>
<tr>
<td><strong>Interpreter dependent</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>324 13</td>
<td>135 20</td>
<td>0.22</td>
</tr>
<tr>
<td>No</td>
<td>2,263 87</td>
<td>550 80</td>
<td></td>
</tr>
</tbody>
</table>

4.1.1.2 Eligible Referrals

The total number of eligible referrals was 1,247 (Figure 3). Based on the inclusion criteria the most common GP referrals received were for blurred vision (n=178, 26%) and diabetic eye check (n=130, 19%). Of the GP referrals reviewed for triage, 33% were
suitable for the purpose of the study. This is consistent with a GP referral audit conducted in 2010 at the RVEEH, whereby results indicated 33% of patients referred by GPs could potentially be seen elsewhere in the community. The majority of patients (n=434, 63%) were new to both the RVEEH and the ACO (Table 20).

The acceptance rate of suitable referrals was lower than anticipated. Although the triage process identified over 1000 referrals to be eligible for the pilot clinic, these did not convert to appointments due to the difficulty in contacting patients by phone during business hours and the low response rates to letters requesting them to contact the RVEEH for an appointment. This issue was presented to the Steering Committee during the recruitment process and it was agreed to revise the initial sample size from 1000 to 800 accepted appointments. This decision was based on consistent clinical outcomes and a reduced sample size would not impact the broad conclusions. This target was met with 833 appointments booked; however, only 686 patients attended the clinic. This did not have any implications to the results as the clinical outcomes remained consistent throughout the trial phase.
Table 20: Referral characteristics of patients who attended the OOWC trial clinic

<table>
<thead>
<tr>
<th>Patient status</th>
<th>Total Patients (n=686)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td>New patient to RVEEH and ACO</td>
<td>434</td>
</tr>
<tr>
<td>New patient to RVEEH (been to ACO before)</td>
<td>21</td>
</tr>
<tr>
<td>New referral (been to RVEEH before)</td>
<td>207</td>
</tr>
<tr>
<td>New referral (been to both RVEEH and ACO)</td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Triage category</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blurred vision</td>
<td>178</td>
<td>26</td>
</tr>
<tr>
<td>Diabetic eye check</td>
<td>130</td>
<td>19</td>
</tr>
<tr>
<td>General eye check</td>
<td>93</td>
<td>13</td>
</tr>
<tr>
<td>Other reasons*</td>
<td>68</td>
<td>10</td>
</tr>
<tr>
<td>Dry eyes</td>
<td>53</td>
<td>8</td>
</tr>
<tr>
<td>Floaters with no other symptoms</td>
<td>52</td>
<td>8</td>
</tr>
<tr>
<td>Unclear diagnosis (non-urgent)</td>
<td>49</td>
<td>7</td>
</tr>
<tr>
<td>Eye review</td>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td>Itchy eyes</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>Eye check due to family history</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>

*Other reasons for referral included: colour blindness check, sore and watery eyes, redness, difficulty reading, Blepharitis and early cataract

In the planning phase, it was identified that 20% of eligible referrals required interpreters and as there were no available funds within the allocated budget for this cost, this cohort of patients had to be excluded from the project. The Steering Committee noted the importance of including this cohort of patients to ensure consistency and not to compromise the outcomes of the study. A request for additional funding was approved by the Department of Health so subsequently interpreter-dependent patients were then included in the study from the beginning of enrolment.

One fifth of patients attending the clinic (n=135, 20%) requested the use of an interpreter (Table 21). The most common language requested was Mandarin (n= 44, 33%). The numbers were not fully reflective of interpreter requirements as some patients relied on family members to act as interpreter. Interestingly, of the interpreter-dependent patients, the ‘Other’ category consisted of 19 different languages, a reflection of our culturally
diverse society. The proportion was higher than that reported in the RVEEH community mapping report 2008, where 13% of eye patients required interpreters (72). This difference could be due to a change in languages spoken, since the report was published in 2008. At the time, a higher proportion of patients spoke Greek versus in 2010 at the time of this study, a higher proportion of patients spoke Mandarin (Table 21).

**Table 21: Number of interpreter dependent eligible patients and the most common languages**

<table>
<thead>
<tr>
<th>Interpreter dependent</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>135</td>
<td>20</td>
</tr>
<tr>
<td>No</td>
<td>551</td>
<td>80</td>
</tr>
</tbody>
</table>

**Interpreter dependent (n=135)**

<table>
<thead>
<tr>
<th>Interpreter</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mandarin</td>
<td>44</td>
<td>33</td>
</tr>
<tr>
<td>Greek</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>Other</td>
<td>24</td>
<td>18</td>
</tr>
<tr>
<td>Cantonese</td>
<td>21</td>
<td>15</td>
</tr>
<tr>
<td>Italian</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

**4.1.1.3 Declining Patients**

The number of patients who declined an appointment was relatively low. The main reasons being the problem had resolved or medical advice was sought in the private sector (Table 22).
Table 22: Reasons eligible patients declined to attend the OOWC trial clinic

<table>
<thead>
<tr>
<th>Reason</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saw Ophthalmologist privately</td>
<td>19</td>
<td>32</td>
</tr>
<tr>
<td>Problem resolved</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Inconvenient to travel to ACO (transport)</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>Wednesday not a suitable day</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Saw Optometrist privately</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Saw GP</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Other or no reason given</td>
<td>16</td>
<td>27</td>
</tr>
</tbody>
</table>

Total patients declining (n=60, 5%)  

4.1.2 Examination of Patients

Patient examination was based on the assessment sheet designed for the purpose of this project. Almost all examinations consisted of VA measurement, subjective refraction, external eye exam, IOP measurement, fundus and disc assessment. This included 98% of cases where the C/D ratio was documented (Figure 4). Data also indicated a low number of Humphrey Visual Fields (HVF) performed on the day due to time constraints, however, it should be noted 30 patients were rebooked for ACO review and VF testing.
A third of patients (n=206, 30%) were prescribed glasses during their attendance at the trial clinic. Patients who were prescribed glasses had the opportunity to also order their glasses at the ACO. The majority of these patients (n=147, 71%) elected this option. This was an additional benefit of patients attending the trial clinic as this is not a service provided directly at the RVEEH.

There were 5 cases where drops were prescribed. Of these, 4 cases were for initiation of treatment for increased IOP with the prospective approval of the ophthalmologist present. All 5 cases had follow-up appointments at the RVEEH.

On average, patients arrived 22 minutes (±25.9) before their appointment time as specified in the appointment letter. Often patients were seen within a short time of their allocated appointment, (12 minutes ±24.5); however, the range was broad and suggests patients were seen between 77 minutes before their appointment time and up to 110
minutes past their appointment time. On average consultations took 59 minutes (±16.0), which was longer than the allocated 40 minute appointment slot. This has remained constant from the beginning of the pilot clinic over the first 3 months (61 minutes in the mid-term report). This will need to be considered for the booking template in developing a sustainable model.

### 4.1.3 Clinical Outcomes

Clinical outcomes remained consistent throughout the trial clinic. Of the 730 patients who accepted to attend the trial clinic, a significant number (n=686, 82%) attended their appointment (Figure 3). The number of booked appointments (n= 833) was higher than the number of accepted patients as this included appointments that had been rescheduled due to cancellation or did not attend. Surprisingly, 55% of patients who cancelled their appointment did not request another appointment. Patients who did not attend had a higher rate of rescheduled appointments (87%), however, if they did not attend two subsequent appointments they were discharged. These data were not captured.

There are two key features of note regarding the clinical outcomes: the majority of patients (n=378, 55%) were discharged to the ACO requiring no tertiary services at the RVEEH and only (n=195, 28%) of patients required a RVEEH review (Figure 3). The majority of patients discharged from the RVEEH and retained at the ACO were to be reviewed in their General clinic (n= 333, 88%) and the majority of reviews were scheduled for 12 months (n=229, 61%) (Table 23). This suggests inactive disease and the ACO was an appropriate clinical setting for this care. As mentioned earlier, this included patients who required VF testing to confirm a diagnosis. There were 61 patients who were reviewed for VF testing and these were scheduled to be performed within 1 month. Only 4 of these patients after their ACO review required RVEEH follow-up due to abnormal results. The majority (55%) of the patients retained at the ACO within 6 weeks post-trial clinic attendance were also rebooked for a 12-month review.

The principal reasons for discharge to the GP for ongoing care (n= 16, 3%) was if the patient was currently under the care of a private ophthalmologist or optometrist (n=7,
44%) or the patient’s eye examination was normal but required further general health investigations.

Of the group of patients who were discharged with no follow up care (n=97, 14%), just over half (n= 50, 52%) did not require further review as a result of a normal eye examination, and the remaining patients (n= 47, 48%) required routine review between 12 months and 2 years. Diagnoses in this latter group of patients included dry eyes, refractive error and early cataract. A small proportion (n=9, 9%) of patients who were discharged had a regular optometrist they were attending. Although the number of patients (n=16) who were under the care of a private ophthalmologist or optometrist was relatively low it does highlight the need for improved communication between referrer and health practitioners. It is evident that GPs were either unaware of patient practices or lacked understanding of optometrists’ scope of practice. If GPs had a clearer understanding of the abilities of optometrists they would refer patients for an initial assessment in the primary care setting rather than unnecessarily using tertiary care resources.
Table 23: Patients discharged to ACO and review times for follow-up ACO appointment

<table>
<thead>
<tr>
<th>ACO clinic</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>333</td>
<td>88</td>
</tr>
<tr>
<td>Retina</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>5</td>
<td>0.5</td>
</tr>
<tr>
<td>Binocular Vision</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Cataract</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>Contact Lens</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Anterior Segment</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>Diabetes</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Satellite Clinics</td>
<td>3</td>
<td>0.5</td>
</tr>
<tr>
<td>Review Range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-6 weeks</td>
<td>106</td>
<td>28</td>
</tr>
<tr>
<td>2 months</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Between 2 and 5 months</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>6 months</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>9 months</td>
<td>4</td>
<td>0.5</td>
</tr>
<tr>
<td>12 months</td>
<td>229</td>
<td>61</td>
</tr>
<tr>
<td>&gt;12 months</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

The complexity of the patient assessment was evident in the fact that in most cases (n= 222, 59%) patients had more than one diagnosis and some (n=43, 11%) had three diagnoses. The most common diagnoses of patients discharged to the ACO (Table 24) were for DR screening (n= 84, 22%), glaucoma suspects (n=63, 17%) and review of not visually significant cataracts (n=51, 13%). Although management guidelines are published for DR management this highlights the possibility of developing not only RVEEH referral triage guidelines but also management guidelines for broader use by GPs and optometrists to improve reviews and referral pathways.
Table 24: Diagnosis discharged to the ACO

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic eye screening</td>
<td>84</td>
<td>22</td>
</tr>
<tr>
<td>Glaucoma suspect</td>
<td>63</td>
<td>17</td>
</tr>
<tr>
<td>Cataract</td>
<td>51</td>
<td>13</td>
</tr>
<tr>
<td>Refractive error</td>
<td>50</td>
<td>13</td>
</tr>
<tr>
<td>Dry Eye</td>
<td>29</td>
<td>8</td>
</tr>
<tr>
<td>Blepharitis</td>
<td>27</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>26</td>
<td>7</td>
</tr>
<tr>
<td>AMD (Atrophic)</td>
<td>16</td>
<td>4</td>
</tr>
<tr>
<td>Posterior Vitreous Detachment</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Epi-retinal membrane</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>Choroidal naevus</td>
<td>9</td>
<td>3</td>
</tr>
</tbody>
</table>

The majority of patients (n= 137, 70%) for RVEEH follow up received appointments to the GEC. Patients for review in the SEC (n=57, 29%) had direct access to these clinics, whereas prior to the project, all GP referrals would attend GEC first. The Medical Retina Clinic received the most SEC referrals (n=20, 35%) (Table 25). The majority of appointments for both the GEC and the SEC were within 1-6 weeks (n=157, 80%). This suggests these patients had some level of active disease that required tertiary services within a short timeframe.
Table 25: RVEEH follow-up clinics for ophthalmological assessment and intervention

<table>
<thead>
<tr>
<th>Clinic review</th>
<th>Total Patients review at RVEEH (n=195)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td>RVEEH GEC</td>
<td>137</td>
</tr>
<tr>
<td>RVEEH SEC</td>
<td>57</td>
</tr>
<tr>
<td>RVEEH ED referral same day (attended GEC)</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total patients SEC review (n=57)</td>
</tr>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td>Medical Retina</td>
<td>20</td>
</tr>
<tr>
<td>Orbital Plastics</td>
<td>13</td>
</tr>
<tr>
<td>Vitreo-retinal</td>
<td>7</td>
</tr>
<tr>
<td>Neuro-Ophthalmology</td>
<td>6</td>
</tr>
<tr>
<td>Corneal</td>
<td>6</td>
</tr>
<tr>
<td>Glaucoma Monitoring</td>
<td>2</td>
</tr>
<tr>
<td>Ocular Motility</td>
<td>2</td>
</tr>
<tr>
<td>Contact Lens</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Review range</td>
</tr>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td>Same day</td>
<td>1</td>
</tr>
<tr>
<td>1-6 weeks</td>
<td>157</td>
</tr>
<tr>
<td>2 months</td>
<td>1</td>
</tr>
<tr>
<td>Between 2 and 5 months</td>
<td>12</td>
</tr>
<tr>
<td>6 months</td>
<td>23</td>
</tr>
<tr>
<td>9 months</td>
<td>1</td>
</tr>
</tbody>
</table>

The most common reason for RVEEH follow up was diagnosed cataract to be considered for surgery (n=27, 30%) followed by glaucoma suspect (n=10, 11%). Interestingly, these diagnoses are also similar to the ones that were discharged to the ACO. It is evident that referral thresholds for these diseases need to be more specific and established. Other diagnoses (n= 26, 29%) included idiopathic reduced visual acuity, macular hole, epiretinal membrane and ongoing headaches. A small number of patients required intervention for narrow angles, blocked tear duct and posterior capsular opacities (n=13, 14%).
Of 195 patients requiring RVEEH follow-up, 133 (68%) patients attended a RVEEH appointment over a 5-month period (Table 26). An audit of the RVEEH clinical outcomes indicated that in 120 cases (90%) the initial ACO diagnosis was confirmed. There was one instance where glaucoma treatment initiated at ACO was changed and 6 cases where patients referred for cataract surgery did not provide consent. Some patients (25%) who did not require immediate intervention but required further investigation were booked into a planned appointment. A planned appointment is when review is required in greater than 6 weeks (the RVEEH booking system can only book up to 6 weeks in advance) and the patient is placed on a recall system at the specified review timeframe. Most of these planned reviews were within 6 months.

Table 26: RVEEH follow-up clinical outcomes over a 5-month period post-trial clinic attendance

<table>
<thead>
<tr>
<th>Appointment Outcome</th>
<th>Total Patients attending RVEEH over 5 months post-trial clinic attendance (n=133)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consent for surgery</td>
<td>n=49</td>
</tr>
<tr>
<td>Treatment e.g. Laser, angiogram</td>
<td>n=36</td>
</tr>
<tr>
<td>No treatment - planned review</td>
<td>n=33</td>
</tr>
<tr>
<td>Discharge</td>
<td>n=15</td>
</tr>
</tbody>
</table>

4.1.4 Monitoring

Monitoring occurred throughout the project at different intervals with a particular focus on possible improvement. In the early stages of the project, monitoring was conducted weekly to record the clinical outcomes with emphasis on the number of patients remaining at the ACO versus those requiring RVEEH follow-up. The results were reported for discussion at the OOWC Joint Steering Committee meetings on a monthly basis. After four weeks from the start of the program, the consultation time for each patient, the numbers seen and patient outcomes of examinations were reviewed to determine the appropriate number of appointments for each pilot clinic.
Lessons learnt from the early stages of monitoring were reviewed by the Steering Committee and after consensus, improvements were made to ensure positive lessons were taken up and trialled during the course of the pilot study. An example of this was the consideration of the high did not attend rate (15%) when the clinics were first implemented and the positive impact after the introduction of a mobile phone SMS patient appointment reminder system reduced it to 11\% three months later (Figure 5). The number of patients attending the trial clinics was also critical as this would impact the decision to implement a sustainable model. If the clinic did not see a sufficient number of patients, from a financial perspective it would not have been viable. The patient numbers were monitored throughout the trial phase with the aim of increasing numbers. Changes such as increasing the number of optometrists from 6 to 8 and decreasing the ‘did not attend’ rate contributed to seeing more patients. This increase was achieved by the end of the 6-month trial phase, from 40 patients to 72 patients per day.

There were no clinical risks reported and no patient complaints were received.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{timeline.png}
\caption{Timeline of significant monitoring phases and changes and improvements made during the OOWC trial clinic}
\end{figure}

$DNA = did\ not\ attend$
4.1.5 Impact

The OOWC trial clinic demonstrated a positive impact on RVEEH outpatient clinic access. At the beginning of the trial clinic in October 2011, the median wait time for a first appointment in GEC was 60 weeks (Figure 6). In comparison, patients attending the trial clinic generally had waited half the time for their first appointment (median 28 weeks, mean 31 ±22). Two months post-trial clinic implementation, the median wait time for a first appointment in GEC had reduced to 53 weeks. The number of new patients receiving a first appointment increased markedly since the trial clinic began in October 2011. Just one month after the trial clinic commenced the number of patients for a first appointment in November 2011 increased from 199 to 310. This included the patients attending the trial clinic and demonstrated a noteworthy improvement in access for patients via two avenues rather than one. The 48-weeks patient wait for a first time appointment in GEC when the trial clinic ended in April 2012 was the lowest wait period seen in over 12 months. Although there was an improvement in wait time, it needs to be noted it is not entirely a result of this project as other improvements in outpatient access were also undertaken during this time. While there was a drop in patient attendance in December 2011 (n=272) and January 2012 (n=251), in comparison to the same time 12 months earlier, the trend exhibits an improvement and there were still more patients accessing the GEC services during this time. The reduced activity and an increase in weeks waiting in February 2011 could be explained by reduced activity during the Christmas school holiday period.
4.1.6 Feedback

Feedback was sought from patients, the participating optometrists, ophthalmologist and referring GPs. The aim of the feedback was to ascertain the level of satisfaction with their experiences in the OOWC project.

4.1.6.1 Patient Feedback

From the 686 patients who attended the clinic, a representative sample of 78 (11%), (n=40, 52% males) completed the PES (Figure 7). The sample included more than half (n=42, 54%) of patients who were discharged to the ACO and interpreter dependent patients (n=12, 20%). The PES was conducted via phone interviews. Results identified four themes; understanding the project, access, communication and quality of care.
Figure 7: Clinical outcomes and Patient Experiences Survey participation for patients attending the OOWC trial clinic

Understanding the project

The majority of patients (n=45, 58%) attending appointments at the trial clinic who completed the PES said they understood fully or at least partly why they were attending the ACO instead of going to the RVEEH. Positive statements included:

“It was clear communication”,

“It was explained in the letter”,

“I was very happy I received the appointment so quick”.

Of the 33 (42%) patients who said they did not know why they went to the ACO instead of the RVEEH some of the following insights were provided:

“I have difficulty reading English”,

“I was just told to go there”,

“The specialist will be over there for a while”.

In regards to communication from the RVEEH about their appointments at the ACO the majority of patients (n=65, 83%) said they were comfortable reading letters in English and understanding messages over the phone in English. Of those people, a few added that while they could not read or understand English they were comfortable being contacted in English as their family members would translate. Thirteen people (17%) said they would prefer communication in their own language if the option was available. This
Chapter 4: Results

included, not only included identified CALD patients but also patients who did not request an interpreter.

When asked, do you have an optometrist that you normally visit? Twenty four patients (31%) said yes they saw an optometrist recently between 2 and 18 months ago. Of patients who regularly visited an optometrist the predominant reason was for new glasses. Of these patients who had a regular optometrist, (27%) said their GP knew about their optometrist.

Access
When patients were asked whether travelling to the clinic was convenient most said yes or yes partly (74, 95%). Almost half of patients travelled alone (n=36, 46%), the next most common answer was, patients travelling with someone (n=25, 32%). The main reasons patients reported travelling with someone were related to having company, for help as an interpreter or a carer, they were unable to drive because of their vision, lacked confidence on public transport or they were concerned about driving and travelling alone because of eye drops being instilled at the appointment. Patients expressed an appreciation of the information and the map supplied with the appointment letter:

“We just followed the directions; the map you sent was very helpful”,
“All the directions including transport options were quite comprehensive”.

A few patients expressed concern about parking however once they arrived they found parking was ok. Other comments regarding the location,

“I was concerned about parking but it was OK”,
“It was a short walk from the tram, better than I expected”.

While there were only four people who said the ACO location was not convenient to travel to, for two of them it was easier to travel by train to the RVEEH compared to the ACO and for the other two of those people their reasons would equally apply to travelling to the RVEEH:

“it is far away and we are elderly”.

Communication
Patients were asked to rate the politeness of the optometrist, communication of other staff, amount of time allocated and advice provided (Table 27). Most patients attending
the pilot clinic had positive comments about the politeness of the optometrists, the majority rating them excellent (n=48, 62%), and very good (n=24, 32%), and the communication of other ACO staff including reception and dispensary was very good (n=38, 49%). The majority of patients stated the time they had to spend with the optometrist to discuss their eye problems was excellent (n=44, 56%), and the advice which was provided by the optometrist during their consultation was either excellent (n=35, 45%) or very good (n=33, 42%). Again confirmation of positive feedback was seen in patient responses when they were asked if they felt that all their questions and problems were dealt with satisfactorily. Nearly all patients (96%) said ‘yes’ or ‘yes partly’. Patient statements included:

“It was good clear layman’s language and I was very impressed”,

“They took so much time and care to explain everything really well”

Table 27: Summary of PES responses

<table>
<thead>
<tr>
<th></th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Politeness of optometrist</td>
<td>48 (62%)</td>
<td>24 (32%)</td>
<td>3 (4%)</td>
<td>3 (4%)</td>
<td>-</td>
</tr>
<tr>
<td>Communication of other ACO staff</td>
<td>31 (40%)</td>
<td>38 (49%)</td>
<td>6 (8%)</td>
<td>-</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>(reception, dispensary)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time spent with optometrist to</td>
<td>44 (56%)</td>
<td>29 (37%)</td>
<td>3 (4%)</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>discuss eye problem</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advice by optometrist during eye</td>
<td>35 (45%)</td>
<td>33 (42%)</td>
<td>5 (6%)</td>
<td>1 (1%)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>exam**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Two patients stated that they had no interaction with other ACO staff and could therefore not comment. ** One patient said no advice was given and could therefore not comment

Quality of Care

When patients were asked if they were happy with the length of time they spent at the ACO, the majority of patients (n=74, 94%) answered ‘yes’ or ‘yes partly’. It is interesting
to note that of the two people who said ‘no’ they were not happy, they were both referred for further tests either to the ACO or the RVVEH. Patient responses included,

“I didn’t wait too long and there was no time wasted”.

Patients were then asked to think about their eye exam and consider how satisfied they were with the outcome of their appointment; nearly all patients (n=73, 94%) were satisfied with the outcome of their appointment. Of the small number of patients who were dissatisfied, reasons included

“I have some concerns about keeping my files and information in one place for future check-ups”,

“Difficulty rescheduling an appointment, nobody returned my call”.

Finally, patients were asked how they would rate the quality of care provided by the clinic at the ACO; 76 of the 78 (97%) people interviewed rated the quality of care provided as excellent, very good or good.

4.1.6.2 Participating Optometrists’ Feedback

Feedback was sought from the ten participating optometrists via two online confidential surveys, the first six weeks after the start of the project and the second upon completion of the trial clinic. The purpose of the first survey was to identify any issues in relation to clinical flow and patient management. The common themes included:

- 42.9% agreed there was sufficient time in the allocated appointment time to complete required tasks, 28.6% disagreed, 28.6% neither agreed or disagreed
- 85.7% agreed or strongly agreed there was enough time to consult with the ophthalmologist
- 100% agreed or strongly agreed the debriefing/tutorial sessions were beneficial.
- Regarding the usefulness and ease of following the clinical guidelines, although followed, the optometrists felt they were too rigid in some cases (e.g. dry eye management) and that these would need to be reviewed when defining a sustainable model.

The aim of the final survey was to capture both quantitative and qualitative data on the optometrists’ perception of how the project potentially could influence the optometry
profession and recommendations, should the model of care continue. Feedback was divided into four theme; overall experience, teaching and education, model of care and the future. The survey was completed by eight of the ten participating optometrists.

**Overall experience**

The majority of the participating optometrists (n=7, 88%) were very satisfied with their involvement in the project. In particular, developing a collaborative relationship and working alongside an ophthalmologist was an opportunity to enhance clinical learning. There was also a level of satisfaction in the positive impact the project was having on the RVEEH waiting list and to be involved in,

“Delivering a high standard of patient care”.

When asked if their initial expectations were met most responded yes (n=6, 75%). Where initial expectations were partly met (n=2, 25%) was in relation to service delivery and teamwork during the clinical sessions. There was also the expectation that the patients attending the clinic would be more clinically complex,

“Initially was expecting to see patients with more pathology”.

There were mixed responses when asked if their involvement in the project inspired them to be involved in working in different ways for the optometry profession, (yes n=4, 50%, partly n=3, 38% and no n=1, 12%). Some felt they weren’t working any differently than their current roles,

“Already have a focus on ocular health, rather than retail optometry”.

Most were inspired to continue the collaboration and to also expand the collaboration to other health professionals including GPs.

“The project is a wonderful illustration that optoms and ophthals can work together to provide optimal patient care”

All optometrists who completed the survey (n=8, 100%) would like to continue to be involved in the trial model of integrated care in the future.

**Teaching and Education**

All of the respondents stated yes that they benefited clinically working alongside an ophthalmologist, particularly having instant access to ophthalmological opinion and feedback on suggested management plans. The trial clinic also was an opportunity to
share knowledge with colleagues and working in a team environment enabled open
discussion of case management. The theme of ongoing learning emerged again,

“There were many instances where I was able to draw on the expertise...to learn
something new”.

Most of the optometrists (n=6, 75%) benefited from the post clinic tutorials and all would
like these to be an ongoing component of a future model of care. It was suggested future
tutorials have an emphasis on interesting cases seen during clinic and also conditions
commonly seen by optometrists that are referred to ophthalmologists. Although all would
like the tutorials to continue, feedback suggests it was quite tiring to be held at the end of
the day and to possibly consider another time during the clinical session or even before
the clinics start at the beginning of the day. In relation to further professional support that
would be required to continue their involvement in this model of care, the recurrent
emphasis appeared to be on clinical support rather than professional development,

“We were seeing patients who were typical of the types of patients we normally
see”.

Additional clinical support suggested included an optical dispenser and floating staff
member to assist with imaging tests.

Model of Care

The responses in relation to the model of care reflected the recurrent theme of ‘Right
Care, Right Setting’ with a focus on the patient being seen in the most appropriate
setting. The perceived benefits the model of care could offer patients included the
potential to reduce the waiting time and improve access to the specialist hospital service.
Some also saw this as an opportunity to

“Introduce patients to the optometry profession”.

When asked what worked well with the model of care, the primary response was the
positive relationship and presence of the ophthalmologist and the instant discussion was
appreciated by both the optometrists and patients. What didn’t work well about the model
of care was again focused on operational aspects of the clinics. This included the process
in dealing with late patients, no dispensing support, review of appointment scheduling
and time restraints.
The majority of optometrists (n=6, 75%) ‘partly agreed’ the clinical guidelines and referral pathways were an effective clinical tool for this model of care. Although it was acknowledged the clinical guidelines and pathways were useful for setting expectations, the majority expressed,

“Too strict”,
“Not reflective of optometry training”
“For this model to work effectively...we should utilise the full capabilities of each profession”.

Future
In relation to the future of the optometry and ophthalmology clinical collaboration as a model of care, it was acknowledged there were many possibilities and the impact of such collaboration would be positive for both professions and the public health system. There was positive enthusiasm for the collaboration to continue as an ongoing service.

This model of care could support,

“A more cohesive and timely public eye service in Victoria”.

Valuable insights provided by the feedback survey will be useful when considering the development of a sustainable future model of care. Although most of the feedback was positive, some issues that emerged from the optometrist feedback survey included:

• Identified the need for a review of the Clinical Guidelines for an ongoing model of care, particularly from an optometry perspective.
• Identified clinical support options which could reduce optometrist assessment time and benefit the cost effectiveness of the model in the future.
• Reinforcement of introducing patients to the optometry profession has also aligned with the patients' perspective on the need to reaffirm the optometrist role.

4.1.6.3 Ophthalmologist feedback

Feedback was also sought at two instances from the ophthalmologist. There was only one ophthalmologist and feedback received was in written statements. Feedback was themed in relation to clinical practice and the collaboration.
Clinical Practice

Overall the ophthalmologist supported the fact that many patients were more appropriately seen at the ACO rather than the RVEEH and the optometrists involved in the trial clinic were highly capable and experienced, however, the presence of an ophthalmologist at the trial clinic supported appropriate RVEEH follow ups and the outcomes may have been different if one was not present at all times,

“The optometrists involved in the project are highly capable and experienced, although I do feel referral numbers back to RVEEH would be higher without an ophthalmologist present. This is not a reflection of safety, as to date we have not had an optometrist miss a sight threatening or serious diagnosis. This more likely represents an overall conservative approach in general and as they are a part of this project and are aiming to be thorough”.

The clinical guidelines were regarded as useful particularly in the beginning to facilitate the expectation of referral pathways. There were some recommendations for review such as the guidelines for dry eye being deemed as too conservative and the glaucoma guidelines not being practical in a busy clinical setting. The benefits of an ophthalmologist presence was reiterated to facilitate appropriate clinical practice,

“There was initially a tendency to over investigate, however I feel this has improved following ongoing discussion and education regarding intentional investigations only”.

Collaboration

There was strong support for the ongoing presence of an ophthalmologist if the clinic was to be implemented as business as usual, with a particular focus on support and mentoring for new optometrists involved in the model of care. This supports the importance of building inter-professional trust and relationships. It was also suggested more than one ophthalmologist be involved in future clinics to provide some variety in clinical expertise and would also benefit the after clinic tutorial session. Overall there was positive enthusiasm for the collaboration and the potential future benefits,

“Overall, I am pleased that a collaborative relationship is developing between ACO and RVEEH, and feel it is beneficial to both parties, as well as our patients if we can encourage further development and collaboration.”
4.1.6.4 Referring GP feedback

Feedback was sought from the referring GPs. A total of 113 feedback surveys were sent with a 14% (n=16) response rate. Feedback was themed in relation to communication and referral practices.

Communication

Overall GPs were satisfied or very satisfied (n=15, 94%) with communication received regarding their patient’s involvement in the project regardless of the patient’s clinical outcomes (ACO n=9, RVEEH n=6, discharge n=1). Most GPs also found it useful or very useful (n=14, 88%) to receive a copy of the patient’s assessment sheet and it was easy or very easy to understand the patient’s outcome and management plan. There were 2 GPs who found it a little useful and not very useful to receive the patient’s assessment sheet and very difficult to understand the patient’s outcome and management plan. Both comments were in relation to the use of ophthalmological terms and the letter they would have preferred to have been typed rather than hand written. This suggests some GPs may be unfamiliar with ophthalmological terms or abbreviations.

Referral Practices

Just over half of GPs (n=9, 56%) had occasionally or frequently referred to the ACO before this project. Interestingly one GP who had never referred to the ACO before commented,

“I am not clear on the criteria for direct referral to ACO versus RVEEH”.

In comparison, when asked in the future if they would consider referring directly to the ACO, most respondents (n=15, 94%) would frequently or occasionally do so. It was the same response when asked if their referral practices will be influenced by this project. This highlights the need for improved communication and education of GPs regarding appropriate referral practices.

It needs to be acknowledged that although the responses were consistent, the sample size was small and results possibly could have been different if the survey had a larger sample.
4.1.7 Key Findings

In summary, the key findings of the OOWC trial clinic were:

- After initial assessment at the OOWC trial clinics 72% of patients did not require tertiary care and were discharged from the RVEEH. The most common clinical outcome was discharge to the ACO (n=378, 56%).

- A positive impact in reducing outpatient waiting times for first GEC appointments. Two months after the trial clinic had begun, the wait time for a first appointment in the GEC had reduced by 7 weeks, and just one month after the trial clinic commenced, the number of patients attending the GEC appointment in November 2011 (including the trial clinic) increased from 199 to 310.

- The quality of examinations facilitated 29% of patients for RVEEH follow-up direct access to sub-specialty clinics, reducing the number of patient appointments. This would not have previously occurred as adequate clinical information would often not be included in a GP referral.

- An audit of the RVEEH clinical outcomes indicated that in 120 cases (90%) the initial ACO diagnosis was confirmed and 69% of patients received treatment or consented for surgery at their first RVEEH appointment.

- Reform in GP referral practices is required to identify patients who truly need access to tertiary services with 33% of GP referrals received at the RVEEH suitable to be seen by optometrists in the community.
4.2 Occasions of Service: a retrospective study

4.2.1 Patient Selection

Of the 580 patient medical records reviewed, 149 were eligible to include in the study. The majority of patients were excluded due to ocular co-morbidities or the review period was less than 5 years. Data were not collected on ineligible patients. Data collected were categorised according to diagnosis with the three main eye conditions (Figure 8). The category of proliferative diabetic retinopathy (PDR) also included patients with quiescent diabetic retinopathy (QPDR) (n=3).

![Figure 8: Diagnosis within each eye condition reviewed for data collection.](image)

**Figure 8: Diagnosis within each eye condition reviewed for data collection.**


Patient demographics of the sample are consistent with current population health data for each eye disease (Table 28). The AMD sample had the highest proportion of female patients (66%) and this is consistent with the demographics of the older age group versus
the glaucoma sample that consisted of more male patients. This was also consistent with studies suggesting men are more likely to have open-angle glaucoma than women (73). The sample captured an appropriate range of age groups, particularly for DR (36-81 years) where patients are being diagnosed at younger ages and in accordance to increased life expectancy it is this cohort who will be dependent on health services for a longer period of time. AMD patients on average were the oldest. The majority of patients were within the 60-69 and 70-79 years ranges for all three eye conditions. This is consistent with the 2008 RVEEH community mapping report where the greatest proportion of patients (40%) were aged 60-79 years (72). A larger number of patients over 60 years is reflective of the association between eye disease prevalence and ageing. Diabetes was the only disease represented in all age groups (Figure 9).

Table 28: Sex and age distribution of patients with the three eye conditions

<table>
<thead>
<tr>
<th></th>
<th>AMD (n=44)</th>
<th>DR (n=56)</th>
<th>Glaucoma (n=49)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Male</td>
<td>15</td>
<td>34</td>
<td>26</td>
</tr>
<tr>
<td>Female</td>
<td>29</td>
<td>66</td>
<td>30</td>
</tr>
<tr>
<td><strong>Age (years)</strong>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>73 (±8.7)</td>
<td></td>
<td>62 (±10.2)</td>
</tr>
<tr>
<td>Median</td>
<td>74</td>
<td></td>
<td>64</td>
</tr>
<tr>
<td>Mode</td>
<td>72</td>
<td></td>
<td>69</td>
</tr>
<tr>
<td>Range</td>
<td>51-90</td>
<td></td>
<td>36-81</td>
</tr>
</tbody>
</table>

AMD = age-related macular degeneration, DR = diabetic retinopathy. *Age was calculated from the first presentation.
Chapter 4: Results

Figure 9: Age distribution of patients with the three eye conditions

*AMD* = age-related macular degeneration, *DR* = diabetic retinopathy

Referral sources were consistent with current RVEEH referral patterns. The majority of referrals (n=127, 85%) were from ophthalmologists, optometrists and GPs. Ophthalmologists were the main referrers to SEC (n=44, 29%) (Figure 10). GPs (n=32, 22%) and optometrists (n=24, 16%) were the main referrers to GEC. This was mainly due to the lack of clinical information on GP referrals and highlights the difficulty in selecting the most appropriate clinic for a patient to attend. While optometrists referred mainly to the GEC, referrals were for all three eye conditions. Self-referral via an emergency department attendance was similar for patients attending GEC (n=8, 4%) and SEC (n=9, 6%). Overall, internal referrals remained low, GEC (n=1, 0.7%) and SEC (n=3, 2%) (Figure 10).
Figure 10: Sources of referral in % for each eye condition to the GEC and the SEC

**AMD** = age-related macular degeneration, **DR** = diabetic retinopathy, **GEC** = general eye clinic, **SEC** = special eye clinic, **A&E** = Accident and Emergency

Most patients referred to the SEC already had a specific diagnosis such as neovascular AMD (n= 22, 81%) (Figure 11) and most were referred by external ophthalmologists. Symptoms of blurred vision was the most common reason for referral to the GEC (n=9, 50%) (Figure 11). This was also consistent with the findings of the OOWC trial clinic where blurred vision was also the top reason for referral (n=178, 26%). Active disease was also the main driver for reason for referral of DR patients (n= 26, 76%) (Figure 12), with a substantial number of referrals for NPDR, PDR and macula oedema. In accordance with NHMRC DR Management Guidelines, referral for people with diabetes to have an eye exam (n=12, 54%) (Figure 12), was the most common reason for referral to GEC. This is surprisingly high considering that the guidelines do not stipulate the eye exam needs to be only performed by an ophthalmologist. Once again, this highlights the lack of understanding by GPs of optometrists’ scope of practice. GPs’ main reasons for referral to GEC were for AMD and DR assessments.
Figure 11: Reasons for referral of AMD new and chronic patients attending either GEC or SEC

\( \text{GEC} = \text{general eye clinic}, \ \text{SEC} = \text{special eye clinic} \)

Figure 12: Reasons for referral of new and chronic patients with diabetes attending the GEC or SEC

\( \text{DEC} = \text{Diabetic eye check}, \ \text{NPDR} = \text{Non-proliferative diabetic retinopathy}, \ \text{PDR} = \text{Proliferative diabetic retinopathy}, \ \text{GEC} = \text{general eye clinic}, \ \text{SEC} = \text{special eye clinic} \)

Most referrals for glaucoma were sign or symptom based rather than diagnosis specific. Both glaucoma suspects and those with increased IOP were referred to GEC (n=7, 26%)
and SEC (n=6, 33%) at similar rates (Figure 13). The differentiation was referrer; patients referred by an ophthalmologist attended the SEC in the first instance. It is important to understand the route of referrals to understand the cohort of patients and their needs.

**Glaucome referrals**

![Graph showing reasons for referral to GEC and SEC](image)

**Figure 13: Reason for referral of glaucoma new and chronic patients to the GEC and SEC**

*GEC= general eye clinic, SEC= special eye clinic*

Glaucome diagnosis also appeared to be more of an incidental finding and this is reflective in the referrals to the GEC for blurred vision (n= 9, 50%) and sore eyes (n= 2, 12%) (Figure 13). Overall the rate of incidental findings amongst all three eye conditions was low (n=12, 8%). The most common finding was glaucoma suspect (n=5) followed by dry AMD (n=3).

The majority of patients (n=107, 72%) had normal vision at the initial presentation to both the GEC and SEC (Figure 14). This is a key feature to note as the aim of clinical management would be that of prevention and maintenance of normal vision. A small number of AMD (n=1) and glaucoma patients (n=2) had severe vision impairment and blindness at initial presentation. The level of vision impairment of both AMD and DR patients increased over the 5 years from normal to moderate, with a small number progressing to severe vision impairment or blindness. Glaucome patients displayed an
improvement in vision. This could potentially be due to several factors including cataract surgery or correction of refractive error.

Figure 14: % of patients with vision impairment from AMD, DR and Glaucoma at initial presentation versus the level of vision impairment after 5 years

Normal = BCVA ≥6/18, Moderate = <6/18-6/60, Severe = BCVA <6/60, Blindness <3/60

4.2.2. Examination of Patients

A total of 2,240 outpatient visits were reviewed for data collection. The average number of tests a patient received per outpatient visit varied according to whether they were attending the GEC or the SEC for each of the three diseases. AMD patients had the most tests performed, on average 6 (±0.8) tests per visit. Patients with DR and glaucoma shared a common trend, 5.25 (±0.58) and 5 (±0.35) tests, respectively, per visit. AMD patients attending SEC had more tests performed versus those attending GEC. This was the opposite case for DR and glaucoma patients who had more tests performed in GEC (Table 29).

On average chronic patients attended the RVIEH for 4.5 years prior to the data collection period. Chronic patients with diabetes had been attending the longest, average
5.4 years (±4.4), followed by glaucoma patients at 5.2 years (±4.8) and AMD patients had been attending the least time, 2.8 years (±2.8) prior to data collection.

Table 29: The average number of tests a patient received at each visit over a 5-year period and the average number of interactions with health professionals. The average percentage of tests performed relative to examination, investigation and intervention

<table>
<thead>
<tr>
<th></th>
<th>Av. number of tests</th>
<th>Av. number of interactions</th>
<th>% of tests for examination</th>
<th>% tests of investigation</th>
<th>% tests of intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AMD</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEC new</td>
<td>5</td>
<td>2</td>
<td>93</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>GEC chronic</td>
<td>6</td>
<td>2</td>
<td>97</td>
<td>3</td>
<td>0.0</td>
</tr>
<tr>
<td>SEC new</td>
<td>7</td>
<td>4</td>
<td>70</td>
<td>14</td>
<td>16</td>
</tr>
<tr>
<td>SEC chronic</td>
<td>6</td>
<td>3</td>
<td>76</td>
<td>10</td>
<td>14</td>
</tr>
<tr>
<td><strong>Diabetes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEC new</td>
<td>5.8</td>
<td>2</td>
<td>97</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>GEC chronic</td>
<td>5.7</td>
<td>2</td>
<td>95</td>
<td>2.9</td>
<td>1.9</td>
</tr>
<tr>
<td>SEC new</td>
<td>4.8</td>
<td>3</td>
<td>84</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>SEC chronic</td>
<td>4.7</td>
<td>3</td>
<td>88</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td><strong>Glaucoma</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEC new</td>
<td>5.0</td>
<td>2</td>
<td>87</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>GEC chronic</td>
<td>5.5</td>
<td>2</td>
<td>91</td>
<td>7.5</td>
<td>1.5</td>
</tr>
<tr>
<td>SEC new</td>
<td>4.7</td>
<td>2</td>
<td>91</td>
<td>5.7</td>
<td>3.3</td>
</tr>
<tr>
<td>SEC chronic</td>
<td>4.8</td>
<td>2</td>
<td>93</td>
<td>3.2</td>
<td>3</td>
</tr>
</tbody>
</table>

On average, patients interacted with 2 health professionals during each outpatient visit in the GEC, the orthoptist and the ophthalmologist. The exception was AMD and DR patients attending SEC whereby, interaction was with 3 or 4 health professionals for new patients, the nurse, the orthoptist, the medical photographer and the ophthalmologist.
Chronic AMD patients attending the SEC interacted with 3 health professionals, the orthoptist, the medical photographer and the ophthalmologist (Table 29). An interaction with a health profession was only accounted for once even if the patient had multiple tests performed by the same individual or from the same health profession.

A large component of the patient’s outpatient appointment for all three eye conditions comprised of testing for examination purposes. The most commonly performed tests on almost all patients across all three eye conditions were visual acuity measurement, tonometry, instillation of mydriatic drops, slit lamp anterior segment and fundus examination and assessment. These were referred to as the ‘standard’ tests. On average, 89% of the visit was dedicated to tests of examination and only 5% for intervention. The exception, AMD patients attending the SEC, both new and chronic, who had on average the highest rate of intervention and investigation, 15% and 12% respectively.

The frequency of tests conducted at each occasion of service over a 5-year period suggested that certain tests were consistently required for all three eye conditions and some tests such as OCT or HVF were diagnosis specific. The rates of tests such as visual acuity measurement were consistent with the average number of visits over a 5-year period. For example, the average number of GEC occasions of service for a patient with AMD is 7.6 over 5 years and the rate of visual acuity measurement is also 7.6, meaning it is expected these patients will have a visual acuity measurement at every visit. This trend was also evident for the ‘standard tests’. Tests less commonly performed such as ocular motility examination (0.03), Amsler testing (0.25), and laser retinometry potential acuity metre (0.03) remained low across all three eye conditions over the 5 years. Ishihara was never performed.

4.2.2.1 AMD

In addition to the five standard vision-related tests, the most common test for examination of AMD patients was blood pressure measurement, on average 18.8 times over 5 years (Table 30). This was specific to neovascular patients attending the SEC. Patients with atrophic AMD had more subjective refractions performed, on average 4.4 times over 5 years in comparison to neovascular patients with an average 1.5 times. This is expected as glasses were not tested for or prescribed during the active neovascular stage. Visual acuity measurement and dilating drops instillation were the only tasks delivered by two different health professionals, an orthoptist and nurse, however, these
tasks were delivered by the orthoptist in 97% of cases. The most common investigation for both atrophic and neovascular patients was the OCT, performed on average 1.8 and 23.2 times over 5 years, respectively (Table 30). The most common intervention delivered for neovascular AMD patients was intravitreal injections. The status of being new or chronic was related to the number of intravitreal injections received over a 5-year period. For new patients attending the SEC, on average 14.8 intravitreal injections were administered, versus 8.3 intravitreal injections for chronic or long term patients. It should be noted in recent times the management of intravitreal injection administration did change from monthly injections to the ‘treat and extend’ regime based on signs of abnormal new vessels. If the data were to be re-collected the outcomes may be different, although it could be expected new patients would still receive more injections than long term patients.
Table 30: Average number of tests for atrophic AMD and neovascular AMD patients over the 5-year period and the health professional who delivered the tests
(*task performed 100% by identified health professional)

<table>
<thead>
<tr>
<th>Test</th>
<th>Atrophic AMD</th>
<th>Neovascular AMD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Av. Number of tests performed over 5 years</td>
<td>Health professional who performed test</td>
</tr>
<tr>
<td>BP measurement</td>
<td>1.3 * 18.8 *</td>
<td></td>
</tr>
<tr>
<td>History</td>
<td>1.2 * 0.8 *</td>
<td></td>
</tr>
<tr>
<td>Vision</td>
<td>9.2 * 28.2 97% 3%</td>
<td></td>
</tr>
<tr>
<td>Refraction</td>
<td>4.4 * 1.5 *</td>
<td></td>
</tr>
<tr>
<td>Glasses prescribed</td>
<td>0.7 * 0.4 *</td>
<td></td>
</tr>
<tr>
<td>Tonometry</td>
<td>8.5 * 18.0 *</td>
<td></td>
</tr>
<tr>
<td>Dilation drops instilled</td>
<td>8.2 98% 2% 28.3 98% 2%</td>
<td></td>
</tr>
<tr>
<td>Anterior segment assessment (slit lamp)</td>
<td>8.4 * 22.9 *</td>
<td></td>
</tr>
<tr>
<td>Fundus assessment (slit lamp)</td>
<td>8.3 * 22.9 *</td>
<td></td>
</tr>
<tr>
<td>Medical Imaging- OCT</td>
<td>1.8 * 23.2 *</td>
<td></td>
</tr>
<tr>
<td>HVF</td>
<td>0.4 * 0.0 *</td>
<td></td>
</tr>
<tr>
<td>Angiogram Injection prep</td>
<td>0.7 * 1.9 *</td>
<td></td>
</tr>
<tr>
<td>Angiogram Injection</td>
<td>0.7 * 1.9 *</td>
<td></td>
</tr>
<tr>
<td>Angiogram fundus photos</td>
<td>0.7 * 1.9 *</td>
<td></td>
</tr>
<tr>
<td>Intravitreal injection</td>
<td>0.0 * 14.4 *</td>
<td></td>
</tr>
<tr>
<td>Injection prep</td>
<td>0.0 * 14.4 *</td>
<td></td>
</tr>
<tr>
<td>Amsler</td>
<td>0.8 * 0.04 *</td>
<td></td>
</tr>
</tbody>
</table>

Legend: Ophthalmologist | Orthoptist | Nurse | Medical Photographer

89
4.2.2.1 DR

Similar to AMD patients, the most common test of examination for DR patients was blood pressure measurement at 4.8 times over 5 years and this was specific to SEC patients (Table 31). DR patients attending the GEC did not have any additional tests to the five standard tests, and these were all performed by the orthoptist. As with AMD patients, visual acuity measurement and instillation of mydriatic drops were the only tests delivered by two different health professionals. Task sharing was evident in SEC service delivery, however, in GEC with the exception of visual acuity measurement no other tasks were shared. Visual acuity testing was conducted by the orthoptist or the nurse, the latter 31%. This is representative of patients having angiograms as these clinics are staffed with nurses not orthoptists. The instillation of dilating drops for PDR patients was delivered by three health professionals, orthoptist (62%), nurses (34%) and ophthalmologists (3%). Although this is not a test it is an important aspect of clinical assessment and cannot be delivered by all health professionals as it has the potential to induce acute angle closure glaucoma but the incidence is rare (1-6% per 20,000 people) (24). Ophthalmologists would dilate in circumstances were gonioscopy was required to be performed in the first instance. Gonioscopy was only performed on PDR patients on average 0.6 times over the 5 years. Patients with NPDR attending the SEC on average had more angiograms performed (1.3) versus NPDR patients attending the GEC (0.5). Laser treatment was predominantly performed on NPDR and PDR patients attending the SEC. The rate was very similar for both new and chronic patients attending the SEC, 4.9 and 4.6 occasions of service, respectively.
### Table 31: Average number of tests performed on DR, NPDR and PDR patients and the health professional who delivered these test
(*task performed 100% by identified health professional)

<table>
<thead>
<tr>
<th>Test</th>
<th>No DR</th>
<th>NPDR</th>
<th>PDR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GEC</td>
<td>GEC</td>
<td>SEC</td>
</tr>
<tr>
<td></td>
<td>Av. Number tests performed over 5 years</td>
<td>Health professional who delivered test</td>
<td>Av. Number tests performed over 5 years</td>
</tr>
<tr>
<td>BP measurement</td>
<td>0</td>
<td>0</td>
<td>8.5 *</td>
</tr>
<tr>
<td>Vision</td>
<td>5.8 *</td>
<td>8.2</td>
<td>90% 10%</td>
</tr>
<tr>
<td>Refraction</td>
<td>3.7 *</td>
<td>3.0</td>
<td>*</td>
</tr>
<tr>
<td>Glasses prescribed</td>
<td>1.2 *</td>
<td>0.5</td>
<td>*</td>
</tr>
<tr>
<td>Tonometry</td>
<td>5.7 *</td>
<td>7.3</td>
<td>*</td>
</tr>
<tr>
<td>Dilation drops instillation</td>
<td>5.4 *</td>
<td>8.2</td>
<td>*</td>
</tr>
<tr>
<td>Anterior segment assessment (Slit lamp)</td>
<td>5.8 *</td>
<td>7.4</td>
<td>*</td>
</tr>
<tr>
<td>Fundus assessment (Slit lamp)</td>
<td>5.8 *</td>
<td>7.4</td>
<td>*</td>
</tr>
<tr>
<td>Medical Imaging-OCT</td>
<td>0.1 *</td>
<td>0.6</td>
<td>*</td>
</tr>
<tr>
<td>Angiogram Injection prep</td>
<td>0 *</td>
<td>0.5</td>
<td>*</td>
</tr>
<tr>
<td>Angiogram Injection</td>
<td>0 *</td>
<td>0.5</td>
<td>*</td>
</tr>
<tr>
<td>Angiogram Fundus photos</td>
<td>0 *</td>
<td>0.5</td>
<td>*</td>
</tr>
<tr>
<td>Laser</td>
<td>0 *</td>
<td>0.5</td>
<td>*</td>
</tr>
</tbody>
</table>

Legend: Ophthalmologist, Orthoptist, Nurse, Medical Photographer
4.2.2.3 Glaucoma

The most common test for investigation for POAG patients was perimetry (HVF). The data indicated that new patients to both the GEC and SEC on average had 3.8 and 3.4, respectively, tests performed over 5 years (Table 32). This is slightly more than a chronic patient attending the GEC (3.2) and SEC (2.1) would have. Tests of investigation such as HRT and disc photos were performed less frequently than the HVF. HRT was only performed on GEC chronic glaucoma patients at an average rate of 0.2 times over 5 years and disc photos an average rate of 0.15 times for GEC patients and 0.1 for SEC patients. There was no difference between new and chronic patients.

The most common test of examination performed for glaucoma patients was gonioscopy, 1.2 times over 5 years. Although pachymetry was specific to glaucoma patients’ diagnosis and management, the test was performed at a low rate, on average 0.5 times over 5 years for both new and chronic patients. POAG patients had the lowest rate of intervention, bleb needling (0.3) and 5Fu injections (0.5).

A key feature to note is the evidence of task sharing in the SEC service delivery, where a number of tasks such as tonometry and slit lamp assessment of the anterior segment and fundus were performed by four different health professionals; an ophthalmologist, an optometrist, an orthoptist or a nurse (Table 32). This is due to the sub-specialty multidisciplinary glaucoma monitoring clinic where patients are assessed by an optometrist, an orthoptist or a nurse and the ophthalmologist confirms their findings and patient management plan (74) Although overall, ophthalmologists perform the highest proportion of slit lamp assessments among SEC patients, this model identifies the future potential of task sharing. The glaucoma monitoring clinic is the only clinic that employs an optometrist.
Table 32: Average number of tests for POAG patients attending the GEC and the SEC over the 5-year period and the health professional who delivered the tests (*task performed 100% by identified health professional)

<table>
<thead>
<tr>
<th>Test</th>
<th>POAG</th>
<th>GEC</th>
<th>Health professional who delivered test</th>
<th>SEC</th>
<th>Health professional who delivered test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vision</td>
<td>12.7</td>
<td>*</td>
<td>16.7</td>
<td>90%</td>
<td>5%</td>
</tr>
<tr>
<td>Refraction</td>
<td>2.4</td>
<td>*</td>
<td>1.9</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Glasses prescribed</td>
<td>0.3</td>
<td>*</td>
<td>1.1</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Tonometry</td>
<td>12.6</td>
<td>*</td>
<td>16.7</td>
<td>55%</td>
<td>37%</td>
</tr>
<tr>
<td>Instillation of eye dilating eye drops</td>
<td>6.6</td>
<td>*</td>
<td>2.6</td>
<td>72%</td>
<td>9%</td>
</tr>
<tr>
<td>Anterior segment assessment (slit lamp)</td>
<td>12.1</td>
<td>*</td>
<td>16.5</td>
<td>84%</td>
<td>8%</td>
</tr>
<tr>
<td>Fundus assessment (slit lamp)</td>
<td>11.4</td>
<td>*</td>
<td>16.0</td>
<td>90%</td>
<td>6%</td>
</tr>
<tr>
<td>OCT</td>
<td>0.7</td>
<td>*</td>
<td>0.7</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Fundus photos</td>
<td>0.1</td>
<td>*</td>
<td>0.2</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Perimetry (HVF)</td>
<td>3.8</td>
<td>*</td>
<td>3.4</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Pachymetry</td>
<td>0.7</td>
<td>*</td>
<td>0.1</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Gonioscopy</td>
<td>1.1</td>
<td>*</td>
<td>1.2</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Laser</td>
<td>0.5</td>
<td>*</td>
<td>1.0</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>5FU</td>
<td>0</td>
<td>*</td>
<td>0.1</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Bleb needling</td>
<td>0</td>
<td>*</td>
<td>0.2</td>
<td>*</td>
<td></td>
</tr>
</tbody>
</table>

Consent for surgery was low for all three eye conditions. DR patients attending the SEC had the highest rate with 1.1 surgeries performed for new patients and 0.8 for chronic patients over the 5 year period.

4.2.3 Service Delivery

The service delivery between GEC and SEC had different trends for all three eye conditions. SEC patients attended more frequently over the 5-year period than did those attending the GEC. AMD patients attending the SEC had the highest average number of outpatient visits over a 5-year period, (new patients 29.0, ±6.9 and chronic
patients 22.7, ±6.4) (Table 33). New and chronic DR patients attending the GEC had the lowest average number of outpatients visits over 5 years, 6.9 (±2.0) and 7.1 (±2.3) respectively. New patients to the SEC for all three eye conditions had a higher average percentage of acute visits, AMD 52%, DR 54% and glaucoma 46%. The rate of acute visits was similarly divided between new and chronic patients, with the exception of glaucoma patients where the rate of acute visits was higher for new patients (46%) in comparison to chronic patients (23%).

Table 33: Average number of outpatient visits over 5 years for AMD, DR and Glaucoma patients attending GEC and SEC. The % of acute (<6 weeks) appointments

<table>
<thead>
<tr>
<th></th>
<th>Av. Number of visits over 5 years (mean, SD)</th>
<th>Range</th>
<th>Av. % Acute appointments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AMD</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEC new</td>
<td>7.8 (±2.4)</td>
<td>6-13</td>
<td>23</td>
</tr>
<tr>
<td>GEC chronic</td>
<td>8.6 (±1.3)</td>
<td>6-10</td>
<td>5</td>
</tr>
<tr>
<td>SEC new</td>
<td>29.0 (±6.9)</td>
<td>18-42</td>
<td>52</td>
</tr>
<tr>
<td>SEC chronic</td>
<td>22.7 (±6.4)</td>
<td>12-30</td>
<td>42</td>
</tr>
<tr>
<td><strong>DR</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEC new</td>
<td>6.9 (±2.0)</td>
<td>4-10</td>
<td>12</td>
</tr>
<tr>
<td>GEC chronic</td>
<td>7.1 (±2.3)</td>
<td>5-13</td>
<td>23</td>
</tr>
<tr>
<td>SEC new</td>
<td>18.5 (±5.9)</td>
<td>7-31</td>
<td>54</td>
</tr>
<tr>
<td>SEC chronic</td>
<td>16.3 (±7.4)</td>
<td>5-31</td>
<td>45</td>
</tr>
<tr>
<td><strong>Glaucoma</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEC new</td>
<td>12.1 (±3.5)</td>
<td>7-24</td>
<td>26</td>
</tr>
<tr>
<td>GEC chronic</td>
<td>10.4 (±3.0)</td>
<td>6-15</td>
<td>25</td>
</tr>
<tr>
<td>SEC new</td>
<td>18.3 (±5.0)</td>
<td>12-25</td>
<td>46</td>
</tr>
<tr>
<td>SEC chronic</td>
<td>13.1 (±4.1)</td>
<td>7-22</td>
<td>23</td>
</tr>
</tbody>
</table>

Based on the average number of visits over a 5 year period for each condition and the AIHW life expectancy in 2011-2013 female patients with DR will likely attend the most number of appointments over their lifetime (57.8) (Table 34). The AIHW reports that for males aged 65 years in 2011-2013, life expectancy is 84.2 years and for
females aged 65 years life expectancy is 87.1 years (75). This means for a male AMD patient they will live an average 9.2 years with the disease and females 13.1 years. The projection for DR patients may be overestimated as they have a shorter life expectancy and half the deaths (48%) attributed to diabetes globally are in people aged <60 years (76).

Table 34: Estimated total number of appointments over lifetime based on AIHW life expectancy 2011-2013 and average number of appointments over 5 years

<table>
<thead>
<tr>
<th>Condition</th>
<th>Median Age at first appointment</th>
<th>Life expectancy from 65 years in 2011-2013; male 84.2 years Female 87.1 years (AIHW)</th>
<th>Av. Number of appointments over 5 years</th>
<th>Total appointments over lifetime</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMD</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>75</td>
<td>9.2</td>
<td>17.0</td>
<td>31.3</td>
</tr>
<tr>
<td>Female</td>
<td>74</td>
<td>13.1</td>
<td></td>
<td>44.5</td>
</tr>
<tr>
<td>DR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>64</td>
<td>20.2</td>
<td>12.2</td>
<td>50.5</td>
</tr>
<tr>
<td>Female</td>
<td>64</td>
<td>23.1</td>
<td></td>
<td>57.8</td>
</tr>
<tr>
<td>Glaucoma</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>70</td>
<td>14.2</td>
<td>13.5</td>
<td>38.4</td>
</tr>
<tr>
<td>Female</td>
<td>68</td>
<td>19.1</td>
<td></td>
<td>51.6</td>
</tr>
</tbody>
</table>

The majority of patients with glaucoma were seen within a 12-month review timeframe. Glaucoma patients seemed to display similar trends for both GEC and SEC patients, in particular 22% of both new patients’ reviews were within 3 months (Table 35). The interval of review varied depending on new or chronic status and attendance to GEC or SEC. The majority of GEC AMD patients were reviewed between 6-12 months versus SEC AMD patients who were reviewed within 3 months. Reviews greater than 12 months were less frequent across all three eye conditions with the exception of DR patients (8.5%).
Referral from GEC to SEC remained low, (GEC AMD patients, 2% and GEC DR patients, 2%). There were no internal referrals of glaucoma patients. The overall discharge rate was significantly low (0.16%). There was only one patient transferred to another hospital or private practitioner for continuation of care.

In total, 81 patients underwent surgery over the 5-year period. The majority of surgery was cataract (n=62, 76%) with the majority of patients having diabetes (n=30, 48%), and the least AMD (n=9, 14%). Disease-specific surgery remained low with only DR patients (n=11, 19%) requiring a vitrectomy, most with PDR (n=9, 82%).

Table 35: Outcome of outpatient review appointments (>6 weeks) and follow-up timeframes

<table>
<thead>
<tr>
<th></th>
<th>≤ 3 months</th>
<th>≤ 6 months</th>
<th>≤ 12 months</th>
<th>&gt;12-24 months</th>
<th>Surgical W/l</th>
<th>Referral to other clinic</th>
<th>D/C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AMD</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEC new</td>
<td>3%</td>
<td>26%</td>
<td>37%</td>
<td>1%</td>
<td>4%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>GEC chronic</td>
<td>9%</td>
<td>30%</td>
<td>49%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>SEC new</td>
<td>41%</td>
<td>5%</td>
<td>1.5%</td>
<td>0%</td>
<td>0.5%</td>
<td>0.2%</td>
<td>0%</td>
</tr>
<tr>
<td>SEC chronic</td>
<td>42%</td>
<td>13%</td>
<td>1.5%</td>
<td>0%</td>
<td>0.5%</td>
<td>0%</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>DR</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEC new</td>
<td>8%</td>
<td>32%</td>
<td>35%</td>
<td>8%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>GEC chronic</td>
<td>8%</td>
<td>17%</td>
<td>36%</td>
<td>9%</td>
<td>5%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>SEC new</td>
<td>21%</td>
<td>15%</td>
<td>2%</td>
<td>0%</td>
<td>6%</td>
<td>1%</td>
<td>0.5%</td>
</tr>
<tr>
<td>SEC chronic</td>
<td>24%</td>
<td>22%</td>
<td>3.5%</td>
<td>0%</td>
<td>4.5%</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>Glaucoma</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GEC new</td>
<td>22%</td>
<td>39%</td>
<td>6%</td>
<td>2%</td>
<td>4%</td>
<td>0%</td>
<td>0.5%</td>
</tr>
<tr>
<td>GEC chronic</td>
<td>17%</td>
<td>45%</td>
<td>9%</td>
<td>0%</td>
<td>4%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>SEC new</td>
<td>22%</td>
<td>22%</td>
<td>3.5%</td>
<td>0.5%</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>SEC chronic</td>
<td>26%</td>
<td>44%</td>
<td>0%</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

*GEC* = general eye clinic, *SEC* = special eye clinic, *W/l* = waiting list, *D/C* = discharge
Overall, the ‘did not attend’ (1.8%) and cancellation (0.8%) rates of appointments remained low across GEC and SEC for all diseases. New and chronic patients with diabetes attending the SEC most frequently failed to attend (1%) in comparison with AMD and glaucoma patients. This is considerably lower than the RVEEH community mapping report of 7% of patients having a high ‘did not attend’ rate (did not attend 50% of booked appointments) (72). This variance may be attributed to the difference in age demographics as the higher trend was prevalent among working-age adults. Patients with diabetes had more presentations to the ED than any other disease, with 7 patients presenting over the 5-year period and only 1 patient presenting twice for a recurrent vitreous haemorrhage.

There was substantial variation in practice in adherence to NHMRC DR Management Guidelines (Figure 15). The majority of patients (82%) who had no signs of DR were not seen in accordance to the recommendations of the NHMRC guidelines which is 2-yearly review, however, data indicated the majority of these patients (n=35, 49%) were asked to return at 12 months and 6 months intervals. Patients with active NPDR also displayed variation in review timeframes as recommended in the NHMRC guidelines. Patients with moderate NPDR had review appointments <6 weeks (n=57, 37%), 3 months (n=30, 20%) or 6 months (n= 46, 30%), rather than the recommended 6-month review for moderate NPDR.
Overall, an average of 30% of all outpatient appointments were overdue the recommended review timeframe, by an average of 16.5 weeks (± 5.1). For all three eye conditions, patients attending the SEC had the greatest proportion of their appointments within the requested review timeframe by the doctor. SEC AMD patients, both new and chronic had the highest rate, 96% and 91%, respectively. GEC DR patients both new and chronic had the lowest rate within the requested timeframe, 55% and 57%, respectively. On average, appointments were overdue by 20 weeks (±17.8) for new patients and 27 weeks (±17.0) for chronic patients. Although SEC DR new and chronic patients had a lower proportion of overdue appointments, 18% and 28% respectively, the numbers of weeks overdue were very similar to those of GEC patients, new patients an average 17 weeks (±13.4) and chronic patients 22 weeks (±27.8). New glaucoma patients of GEC and SEC shared similar trends with 33% and
25%, of appointments being overdue. Chronic glaucoma patients attending GEC had the highest overdue rate within this group, (43%) appointments were on average 17 weeks (±15.0) overdue. These data are of interest as it highlights issues and inadequacy in service delivery and reviewing patients within appropriate timeframes that could lead to disease progression and permanent visual impairment.

### 4.2.4 Stages of disease

Over the 5-year period the stage of each disease in patients was tracked to understand disease progression to provide insight into future needs. Of the atrophic AMD patients (n=18), the majority remained stable (n=13, 27%) and a small number developed neovascular AMD (n=3, 17%) Of the patients with neovascular AMD (n=26) at initial presentation, just over a third (n= 8, 31%) continued to have active neovascular AMD and continued treatment with intravitreal injections. The majority of neovascular AMD patients post intravitreal injection treatment did not progress after 5 years (n=14, 54%) and vision loss remained stable. A small number of patients with neovascular AMD (n=4, 15%) after 5 years developed significant geographic atrophy with irreversible vision loss and no further treatment.
The majority of patients with no diabetic retinopathy at initial presentation developed no disease after 5 years (n=9, 60%) and almost a third of patients with no DR at initial presentation developed NPDR (n=4, 27%) after 5 years. Overall patients with NPDR remained stable (n=22, 71%) and just over a quarter (n=8, 26%) progressed to PDR. Patients with PDR at initial diagnosis remained stable with the majority (n=6, 86%) developing QPDR and only one patient having active PDR after 5 years. More than half of glaucoma suspects (n=14, 61%) had confirmed POAG after 5 years. The diagnosis was made on average after 4 outpatient attendances. Some patients remained as suspects after the 5 year period (n=9, 39%) with ongoing testing and monitoring. The majority of POAG patients (n=19, 83%) remained stable but a few progressed to advanced POAG (n=4, 17%). All chronic acute angle closure glaucoma patients remained at the same stage as initial presentation after 5 years.

### 4.2.5 Task sharing

Based on the data of the tests performed for each eye disease and by whom they were performed, there are two key factors of note. First, the GEC has the least amount of task sharing yet considering the cohort of patients and that many of whom are reviews yields the greatest potential to introduce new models of care. Second, the use of technology can facilitate the introduction of task sharing as there are devices or imaging tools applicable to all three eye diseases for diagnosis and management purposes.

Of the tests for examination and investigation there are several tests that could potentially be delivered by a different health professional (Table 36). Tests such as gonioscopy, slit lamp and retinal examination could be performed by the orthoptist. Other tests currently performed by the orthoptist such as visual acuity, tonometry and instilling mydriatic eye drops could be shared with the ophthalmic nurse, although nurses are currently qualified to perform the tasks the majority are performed by the orthoptist. Ophthalmic nurses could also potentially learn new skills such as pachymetry and perimetry. Medical photographers under current qualifications could not perform tests for examination, however they could be utilised further to deliver more diagnostic imaging at more regular intervals if required. Suggested task sharing
does not require additional qualifications as they are within the current scope of practice. Some tasks may require internal training and a credentialing process to ensure understanding and safe clinical practice. Certain tasks such as eye surgery and laser treatment can only be performed by an ophthalmologist and cannot be shared by other health professionals due to training and qualification requirements.
Table 36: Tasks currently performed by eye health professional versus tasks that could potentially be shifted to other eye health professionals

<table>
<thead>
<tr>
<th>Task</th>
<th>Ophthalmologist</th>
<th>Optometrist</th>
<th>Orthoptist</th>
<th>Ophthalmic Nurse</th>
<th>Medical Photographer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Examination</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Visual Acuity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjective refraction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prescribing glasses</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pupil function</td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Ocular motility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tonometry</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pachymetry</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Pupil Dilation</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gonioscopy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slit lamp anterior segment assessment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Slit lamp retinal examination</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Image grading</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Intervention</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Laser</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intravitreal injection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eye surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Investigation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perimetry</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fundus photography</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>OCT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Legend: 
- Current tasks
- Shifted tasks
4.2.5.1 Future Practice

Considering the data on disease progression and the group of patients with a higher proportion of overdue review appointments there are several opportunities where task sharing can be implemented. Within the three eye diseases there is a cohort of patients who require minimal intervention by an ophthalmologist. The following categories of patients were considered to demonstrate the potential for task sharing; atrophic AMD, mild-moderate NPDR and POAG. The modelling is based on a hypothetical patient attending a tertiary service for each of these diagnoses demonstrating current practice versus prospective future practice of service delivery.

Atrophic AMD patients demonstrated a low rate of progression to neovascular AMD (17%) which suggests this group of patients are low risk and care could be delivered differently (Table 37). It is suggested these patients be monitored by a multidisciplinary team and ophthalmologist review would only be required in accordance to management guidelines once the patient has reached a certain clinical threshold and ophthalmologist intervention is required. Some tests such as subjective refraction need not be delivered in future practice as this can be performed by optometrists in the community and is not required to make an informed diagnosis; this is applicable to all three eye conditions. Utilisation of imaging software would allow instant access to patient imaging results for grading and interpretation by orthoptists and ophthalmologists. A basic cost benefit in terms of human resources to deliver current versus future practice demonstrates a reduction in the costs per outpatient visit even though the consultation time may be longer (Table 38). Costs for the ophthalmologists were not calculated as it is anticipated a small number of patients would require further follow up with an ophthalmologist due to the low rate of disease progression of atrophic AMD patients. These calculations were based on current enterprise agreements and award rates in the public sector (77) (78) (79).
Table 37: Current practice of tasks delivered and by which health professional for a hypothetical patient with atrophic AMD attending the GEC versus future practice of tasks delivered

<table>
<thead>
<tr>
<th>Current Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orthoptist</td>
</tr>
<tr>
<td>-----------</td>
</tr>
<tr>
<td>• VA measurement</td>
</tr>
<tr>
<td>• Subjective refraction</td>
</tr>
<tr>
<td>• Amsler screening</td>
</tr>
<tr>
<td>• Tonometry</td>
</tr>
<tr>
<td>• Instillation of mydriatic eye drops</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Future Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ophthalmic Nurse</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>• VA measurement (including pinhole)</td>
</tr>
<tr>
<td>• Amsler screening</td>
</tr>
<tr>
<td>• Tonometry (non-contact)</td>
</tr>
</tbody>
</table>
Table 38: Cost of human resources to deliver current practice versus future practice for a hypothetical patient with atrophic AMD attending the GEC

<table>
<thead>
<tr>
<th>Position</th>
<th>Salary classification</th>
<th>Hourly Rate</th>
<th>Consultation Time</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current Practice</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ophthalmologist</td>
<td>Specialist Year 9</td>
<td>$155.90</td>
<td>15 mins</td>
<td>$39.00</td>
</tr>
<tr>
<td>Orthoptist</td>
<td>Grade 2 Year 4</td>
<td>$40.40</td>
<td>15 mins</td>
<td>$10.10</td>
</tr>
<tr>
<td><strong>Future practice</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ophthalmic Nurse</td>
<td>RN Grade 2 Year 10</td>
<td>$36.00</td>
<td>15 mins</td>
<td>$9.00</td>
</tr>
<tr>
<td>Medical Photographer</td>
<td>Grade 2</td>
<td>$34.60</td>
<td>15 mins</td>
<td>$8.65</td>
</tr>
<tr>
<td>Orthoptist</td>
<td>Grade 2 Year 4</td>
<td>$40.40</td>
<td>15 mins</td>
<td>$10.10</td>
</tr>
</tbody>
</table>

According to the NHMRC DR Management Guidelines patients are to be referred to an ophthalmologist when mild NPDR is identified. This cohort of patients is considered low risk as the rate of progression to PDR within the first year is 5% (24). Through task sharing patients can potentially be monitored by orthoptists until further disease develops and ophthalmological intervention is required in accordance with management guidelines (Table 39). Although the NHMRC recommends patients should have a dilated fundus exam, retinal photographic screening with a non-mydriatic camera has adequate sensitivity to detect any change (24). The medical photographer’s role does not change in future practice as it is not a new task being performed but it is proposed to be a task that is routinely performed rather than occasionally as required. Orthoptists and optometrists are qualified to grade and identify disease change in fundus photography. This is supported by the literature that reports orthoptists and optometrists perform well with a high rate of sensitivity and specificity to detect abnormal retinal changes (53).
Table 39: Current practice of tasks delivered and by which health professional for a hypothetical patient with mild-moderate NPDR attending the GEC versus future practice of tasks delivered

<table>
<thead>
<tr>
<th>Current Practice</th>
<th>Future Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ophthalmic Nurse</strong></td>
<td><strong>Orthoptist</strong></td>
</tr>
<tr>
<td>- BP measurement</td>
<td>- VA measurement</td>
</tr>
<tr>
<td></td>
<td>- Subjective refraction</td>
</tr>
<tr>
<td></td>
<td>- Tonometry</td>
</tr>
<tr>
<td></td>
<td>- Instillation of mydriatic eye drops</td>
</tr>
<tr>
<td><strong>Orthoptist</strong></td>
<td><strong>Medical Photographer</strong></td>
</tr>
<tr>
<td>- BP measurement</td>
<td>- Non-mydriatic fundus photography</td>
</tr>
<tr>
<td></td>
<td>- VA measurement including pinhole</td>
</tr>
<tr>
<td></td>
<td>- Tonometry (non-contact)</td>
</tr>
</tbody>
</table>

Data in this study in relation to the stages of POAG indicated the majority of patients remained stable (83%) so task sharing could potentially be applied to this group of patients (Table 40). Current practice indicates tasks are delivered to patients in the majority of cases by two health professionals, the orthoptist and the ophthalmologist. Recommended future practice would include the nurse and medical photographer with the ophthalmologist to assess the patient every alternate visit or as referred from the clinic in accordance to specific management guidelines. Alternate visits would enable patients to obtain repeats for eye drops or if necessary have the treatment regime changed. This suggested model is based on the PBS glaucoma co-management plan between optometrists and ophthalmologists (42). The utilisation of technology would
enable a thorough examination of stable POAG patients at every visit and permit any changes to be detected for referral to the ophthalmologist. In comparison to AMD and DR, it is suggested tonometry to still be performed by the orthoptist. Goldmann Applanation Tonometry (GAT) is the gold standard for intraocular pressure measurement. Currently nurses are not qualified to use this method of tonometry. For AMD and DR patients tonometry can be performed by other methods such non-contact i-Care tonometry, where the intraocular pressure reading is not as critical or indicative of disease progression and is performed for screening purposes.
Table 40: Current practice of tasks delivered and by which health professional for a hypothetical patient with stable POAG attending the GEC versus future practice of tasks delivered

<table>
<thead>
<tr>
<th>Current Practice</th>
<th>Orthoptist</th>
<th>Ophthalmologist</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• VA Measurement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Subjective refraction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pachymetry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Tonometry (GAT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Instillation of mydriatic eye drops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perimetry</td>
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<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th>Future Practice</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nurse</td>
<td>Medical</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Photographer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Orthoptist</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ophthalmologist</td>
</tr>
<tr>
<td>• VA Measurement (including pinhole)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Pachymetry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perimetry (HVF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• OCT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Disc and fundus photography</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Slit lamp anterior segment assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Tonometry (GAT)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Disc and fundus grading</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Perimetry (HVF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Review results when required or as per guidelines</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Full eye examination alternate visits</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Gonioscopy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Prescribing of eye drops</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Such examples of task shifting potentially can utilise ophthalmologists’ time and expertise to focus on intervention and complex patient management and to perform
tasks only they are qualified to deliver. The suggested modelling for future practice is not only applicable to the three eye conditions discussed but can also be considered for other models of care such as cataract service delivery or management of simple anterior uveitis.

4.2.6 Key Findings

In summary, the key findings of this retrospective, exploratory component of the study were in relation to the processes and inputs from a hospital perspective:

- The highest average number of outpatient visits over a five year period, was by AMD patients attending the SEC; new patients (29.0, ±6.9) and chronic patients (22.7, ±6.4) had greater number of visits than new glaucoma patients to the SEC 18.3 (± 5.0) and the GEC 12.1 (±3.5). New and chronic DR patients attending the GEC had the lowest average number of outpatients visits over 5 years, 6.9 (±2.0) and 7.1 (±2.3) respectively.
- Based on life expectancy in Australia patients will need to attend on average between 31.3-57.8 outpatient appointments over their lifetime.
- The average number of tests a patient received per outpatient visit was similar across all three diseases. SEC AMD patients had the most tests performed, on average 6.5 (±0.7) tests per visit and GEC AMD patients had on average 5.5 (±0.7) tests per visit. Patients with DR and glaucoma attending the GEC had more tests than those attending the SEC, 5.75 (±0.07) and 5.2 (±0.35), respectively.
- On average patients interacted with 2 health professionals during each outpatient visit, the orthoptist and the ophthalmologist in the GEC, the clinic with the most potential for task sharing.
- On average, 89% of the visit was dedicated to tests of examination and only 5% for intervention. The most common tasks performed routinely on almost all patients across all three eye conditions were visual acuity measurement, tonometry, instillation of mydriatic drops, slit lamp examination and fundus examination.
• Through the application of technology, opportunities of task sharing exist for certain eye diagnoses such as atrophic AMD, mild-moderate NPDR and stable POAG.

• Tasks such as visual acuity measurement, tonometry and instillation of mydriatic drops could be shifted to health professionals such as nurses who are qualified to perform these tasks but are not actively doing so on a regular basis.

• The majority of patients (82%) who had no signs of diabetic retinopathy were not seen in accordance to the recommendations of the NHMRC guidelines with most patients seen within shorter timeframes impacting access and potentially unnecessarily increasing patient waiting lists.
Chapter 5 DISCUSSION

The research evaluated the potential of task sharing from two aspects: the first aspect was an evaluation of a demonstration trial clinic between ophthalmology and optometry that aimed to improve patient access to clinical eye care in the most appropriate clinical setting. This research demonstrated integrated care between optometry and ophthalmology is a safe and effective approach to deliver primary eye care and not all GP referrals need to be seen by an ophthalmologist in a tertiary setting. The second aspect assessed the occasions of service necessary for new and chronic patients of the RVEEH with any of the three main chronic eye diseases, age-related macular degeneration, diabetic retinopathy and glaucoma. This research also demonstrated that there are numerous opportunities for task sharing with existing skilled workers to meet the future demands in the tertiary eye care setting to manage patients who require long-term monitoring. Thus, potential task sharing was demonstrated from two aspects, the first in primary care and the second in tertiary care. The findings confirmed that task sharing can positively impact service delivery, and each cadre can benefit the others through change of workforce roles and understanding the inter-dependencies of a well-functioning health system.

This research can inform future practice to impact and benefit four key areas to eye health service delivery: accessibility, demand, workforce and referral practices.

5.1 Implications and Benefits

5.1.1 Accessibility of health services

A key implication of collaborative care is accessibility of health services. The OOWC trial clinic successfully demonstrated the impact of collaborative care and the benefits of improved access to the most appropriate services. Appropriate and timely access to both primary and tertiary eye care services is pivotal in ensuring quality and safety of care is provided to patients. The public ophthalmology outpatient waiting list at the RVEEH was under significant strain in terms of the time to gain a first outpatient appointment, when alternative access to service delivery was considered. The OOWC successfully identified
patients who required tertiary eye care services versus those who could be managed in
the primary eye care setting. A substantial number of patients (72%) were discharged
from the OOWC trial clinic after initial assessment. These patients were discharged to the
ACO (55%), discharged to their GP for ongoing care (3%) or discharged with no follow
up care required (14%). This highlights the fact that patients were initially not referred to
the most appropriate services. In fact, they did not require referral for tertiary
ophthalmological care and could be initially or wholly managed in the community with
more than half (56%) of patients who were initially discharged to the ACO remained at
the ACO for ongoing monitoring. The theme of ‘Right Care, Right Setting’ from the
optometrists’ feedback highlights the need to promote the most appropriate setting for
specific eye conditions for both patients and health professionals.

Eye care is usually delivered in three settings - primary, secondary and tertiary. Primary
care is delivered in the community predominantly by optometrists in terms of screening
and managing non-complex eye conditions and is considered “first contact care” (80).
Secondary care is often delivered in a tertiary setting, as is the case at the RVEEH with
the role of the GEC which services patients with non-active disease who require
monitoring rather than intervention, unlike patients who require tertiary care for active
disease which can only be delivered by an ophthalmologist. The benefits of ensuring
access to the most appropriate settings, as demonstrated in this study, and removing
people from the waiting list who could be managed in the community can be considered
from several perspectives - the ophthalmologist, the optometrist and the patient. In terms
of ophthalmology and the tertiary eye care service, correct access implies only patients
who require specialist care have easy and timely access to such services. This addresses
the workforce shortage solution and means ophthalmologists’ focus is on management of
ocular pathology and delivering expertise that no one else can and not screening and
monitoring eye conditions that can safely be detected by others in the community.

Identifying patients who truly need access to tertiary services also aids the understanding
of patient cohorts and service delivery needs. This informs service planning to implement
models of care that utilise task sharing. For example, patients referred for mild NPDR
can be initially assessed by a multidisciplinary team until an ophthalmologist’s
intervention is required. Rather than this patient being among other patients with more
severe disease who would take priority for appointments they would be managed in a
separate stream ensuring timely access to outpatient services when required. Appropriate
access to a tertiary service can also have a positive impact in reducing outpatient waiting times for appointments as was demonstrated in this research. Two months after the trial clinic had begun the wait time for a first appointment in the GEC had reduced by 7 weeks. Just one month after the trial clinic commenced the number of patients attending a first appointment in the GEC or the OOWC trial clinic in November 2011 increased from 199 to 310. This demonstrated that accessibility improved by creating two avenues of access to the most appropriate service rather than all waiting to be admitted via the one entry point that may not necessarily be appropriate for every patient resulting in unnecessary queuing and waiting. Reducing waiting times means patients who need primary, secondary or tertiary services have access, but more importantly, in a timely manner.

From an optometrist’s perspective the benefits of appropriate patient access is an increase in awareness and understanding of their scope of practice, both from other health professionals and patients. It would also be an opportunity to see more patients and potentially be exposed to a range of eye conditions not previously seen. From the perspective of the ACO, the OOWC trial clinic was an opportunity to significantly increase the number of patients attending the organisation and to develop an ongoing patient database ensuring future patient attendance and revenue.

From a patient’s perspective services such as the OOWC trial clinic would provide timely access to expertise and knowledge without the unnecessary long wait for secondary or tertiary services that may not be required. Based on patient feedback nearly all patients were satisfied with the outcome of their appointments and when asked how they would rate the quality of care provided by the clinic at the ACO, almost all (97%) people interviewed rated the quality of care provided as excellent, very good or good.

The importance of accessibility of health services is not only relevant to new patients but is just as essential for review and long term patients. The data collected showed that on average 30% of appointments were overdue for both new and chronic patients, regardless of which clinic they attended. On average it was over by 16.5 weeks. This is an ongoing issue faced by many tertiary services and one that is likely to intensify with the increasing demand on services. Data in relation to the review period in comparison to the NHMRC guidelines revealed that the majority of patients (82%) who had no signs of
diabetic retinopathy were not seen in accordance to the recommendations of the NHMRC guidelines. Most DR patients were seen within shorter timeframes, impacting access and potentially unnecessarily increasing patient waiting lists. For example, a patient with minimal DR is required to be seen every 12 months, however, the data suggests some patients were seen every 6 months. By allocating an appointment to patients who do not need to be assessed prevents an appointment to be allocated to the patient who actually requires review. Task sharing is an opportunity to address this issue. Through utilising existing skilled health professionals and not only depending on the ophthalmologist to see all patients, enables a different cohort of patients to be seen in different streams rather than all waiting for access via the one avenue ensuring review within the recommended timeframe.

5.1.2 Demand on health services

The second key implication to collaborative care and task sharing is to understand health care expectations and demand on services. There is an abundance of published data about the future projections of global vision loss and the number in the population this will impact (13) (1). The projected forecast of workforce shortages has also been addressed by several reports including the Australian Institute of Health and Welfare, Eye Health Labour Force in Australia and the Health Workforce 2025 Medical Specialists Volume 3 (30) (32). What is lacking in the literature is an understanding of what the expected demand will be on outpatient services, that is how many times a patient attends outpatient services and what are the occasions of service and by whom they are delivered.

This research identified that the majority of patients (72%) had vision in the normal range at initial presentation to both the GEC and SEC. This highlights that service delivery will be with the aim of prevention of vision impairment and maintenance of normal vision. The highest average number of outpatient visits over a five year period was by AMD patients attending the SEC, (new patients, 29.0, ±6.9 and chronic patients, 22.7, ±6.4). This equates to an average of 5.8 times per year for new patients which is approximately every 2 months. New and chronic DR patients attending the GEC had the lowest average number of outpatients visits over 5 years, 6.9 (±2.0) and 7.1 (±2.3) respectively. Given that life expectancy is increasing, the demand on services could be for a greater period of
time and access to services will become more frequent. For example, AMD patients in this study with an average age (73 years) would need to be monitored or treated for an additional 5 years according to the Global Burden of Disease study projections (1). Based on the life expectancy of Australians 2011-2013 reported by the AIHW and the average number of appointments over a 5-year period for each condition, patients will require monitoring for a longer time in the future. Patients with DR and glaucoma will live approximately 20 years with their conditions. Female patients with DR will require an average 57.8 appointments and males 50.5 appointments over the lifetime of their eye disease. This may be an over-estimate for patients with diabetes as they have a shorter life expectancy than those without diabetes (76). Female glaucoma patients will require an average of 51.6 appointments and males an average of 38.4 appointments. AMD patients would require fewer appointments and this is reflective of the later onset of the disease and monitoring would be required for a shorter time (males 9.2 years and females 13.1 years). Despite the time in years being shorter, a substantial number of appointments would still be required during this period, for females an average 44.5 appointments. Although these data are retrospective there is a benefit in informing health information services to review readiness for future demand and to drive the development and implementation of models of health care to meet these requirements.

With developments in treatments such as anti-VEGF intravitreal injections for neovascular AMD it is anticipated that more and more patients will require treatment and long term monitoring. Data collection on the number of tests over a five-year period for neovascular AMD patients identified the most common intervention was intravitreal injections, on average 14.4 times over five years. This suggests more of the ophthalmologists’ time will be required to administer injections and so they may not have the ability to deliver tasks previously exclusively carried out by ophthalmologists. Nurse-delivered intravitreal injection services have been successfully established in the United Kingdom to address this issue (81). Studies suggest the practice is safe, with one study suggesting 4,000 nurse-delivered injections were without serious vision-threatening complications (82) (83). This may be considered a controversial practice in Australia, however in the United Kingdom the Royal College of Ophthalmologists deem it reasonable for non-medical health care practitioners to administer intravitreal injections within specific protocols (81). Points for consideration include indemnity, training and supervision by an ophthalmologist and training to recognise complications and to refer
accordingly. Although there are multiple benefits of task sharing it is dependent on current methods of treatment; and if these change, task sharing may not be appropriate to deliver these treatments.

5.1.3 Workforce

The third key implication of collaborative care is the need to deliver the same service via different cadres through utilising the existing skilled workforce in the primary, secondary and tertiary settings. In Australia, the reasons for task sharing differ from those of developing countries. It is not a matter of significant shortage of workers as in Kenya where there was a need to introduce Ophthalmic Clinic Officers but rather one of increasing demand on services (50). Task sharing as suggested in this research will unlikely change total workforce numbers but rather workforce roles will evolve to address needs of demand and shortage of ophthalmologists to meet these needs. The OOWC successfully demonstrated significant impacts on access through collaborative care and shifting referrals from tertiary services to primary eye care services. The data collected on the occasions of service for the three main chronic eye conditions demonstrated areas for potential task sharing and how the workforce can collaborate to deliver services more efficiently.

Eye care services at the RVEEH were predominantly delivered by two health professionals, ophthalmologists and orthoptists. This was particularly evident in the GEC, where limited task sharing was in practice yet this is the clinical setting that bears the greatest potential for task sharing. On average, 89% of the visit was dedicated to tests of examination and only 5% for intervention. This suggests not all visits might require ophthalmologist intervention and so there is potential for sharing some of those tests of examination. There are certain tasks such as visual acuity measurement and instillation of mydriatic eye drops that are currently performed by both orthoptists and nurses but these tasks were delivered by the orthoptist in 97% of cases. Tasks such as visual acuity measurement, tonometry and instillation of mydriatic drops could be shifted to health professionals such as nurses who are qualified to perform these tasks but are not actively doing so on a regular basis. Although these tasks may appear simple, they are not straightforward and may require professional development to ensure accurate measurements and
outcomes. Such tasks that do not need further qualifications are the ideal platform to initiate task sharing. Other tasks such as gonioscopy, slit lamp anterior assessment and retinal examination could be performed by an orthoptist given their knowledge and training curriculum, and ophthalmic nurses could also potentially learn new skills such as pachymetry and perimetry. Developing a workforce with more skills will enable them to be flexible and work in a variety of secondary and tertiary clinical settings. Professional development in terms of training and accreditation could be recommended to ensure patient safety.

Currently at the RVEEH there are two models of care where service provision is being delivered differently to glaucoma patients. One is a multidisciplinary approach, the Glaucoma Monitoring Clinic (EGMON) and the other is via task sharing, the Glaucoma Orthoptic Review Clinic (EGOR). The EGMON clinic was established in 2007 in response to the increasing number of patients attending RVEEH glaucoma clinics and a long waiting list for review appointments. The clinic comprises a team of four orthoptists, two optometrists, three ophthalmic nurses, a glaucoma ophthalmology fellow and a glaucoma consultant (74). The optometrists, orthoptists and nurses do a full work up on patients including gonioscopy and use of the indirect lens to assess the optic disc. Such skills were developed through one-on-one training during clinics. Once the assessment is completed the findings are presented to an ophthalmologist who makes the final management decision. This model of care has provided a significant platform for clinicians to develop clinical skills and expand their scope of practice. However, there have been limitations to meet the target of seeing an increased number of patients in each clinic to ensure a positive impact on the waiting list (74). This is representative of the limitations of task sharing due to several factors, including frequent staff changeover meaning that skills need to be re-developed and different learning paces amongst health professionals reflective of their background training. The requirement that the ophthalmologist needs to check each patient also places time constraints as each health professional needs to wait before they can assess the next patient.

The EGOR clinic was introduced in late 2014. The clinic was established again in response to long wait times for new appointments and to referrals that don’t necessarily need tertiary services. New referrals of glaucoma suspects from GPs and predominantly optometrists are seen in the first instance by an orthoptist. On average, 27% of new
glaucoma referrals to the RVEEH are suitable for the clinic, this equates to approximately 39 referrals per month suitable for the EGOR clinic. All other glaucoma referrals (73%) require an appointment with an ophthalmologist. Patients attending the EGOR clinic have a full examination which includes perimetry (HVF), pachymetry, tonometry (GAT), anterior segment slit lamp assessment, non-mydriatic fundus photography for disc assessment, and an OCT is performed by the medical photographer. Through the utilization of technology the following day a glaucoma consultant reviews the file and all the imaging online to determine if the patient is required to return for ophthalmology review or if they could be discharged for management by an optometrist in the community. There are no published data on clinical outcomes to date, however, a report from the RVEEH Patient Information Management System (PiMs) showed an 80% discharge rate from the EGOR clinic and for patients to return to their referring optometrist for ongoing monitoring. This means only 20% of patients returned for a second appointment to see the ophthalmologist. This may seem as a disadvantage to patients who were required to return for an ophthalmologist review. Often the patients who required ophthalmologist review, cases were non-urgent and the review timeframe was within 3-6 months. Considering the number of patients returning for reviews was low, the benefits of improving access via two different avenues and allocating an appointment to patients with greater clinical need who must be assessed by an ophthalmologist outweighs this disadvantage.

Both the EGMON and EGOR models of care have demonstrated the advantages of up-skilling existing skilled workers’ services to address the needs of glaucoma patients who need secondary care that do not necessarily need to be delivered by an ophthalmologist. Such skills and practice could also be potentially applied to patients with other diseases such as DR. A combination of the two models, EGMON and EGOR, whereby stable POAG patients are assessed by an orthoptist at one visit and an ophthalmologist the next could provide the opportunity for patients to access the most appropriate care via multiple avenues and permit the ophthalmologist to manage patients who require their expertise and deliver treatment only they are trained and qualified to administer.

Orthoptists in Australia with their training are well placed with their clinical knowledge and skills to deliver collaborative models of care. Training has developed from traditional strabismus and has become more focused on the assessment of eye disorders in all
aspects of eye care. Orthoptists have the necessary skill set to detect and diagnose ophthalmic disease. Orthoptists in a hospital setting such as the RVEEH are well positioned to take on new tasks as described in this study to alleviate the demand on ophthalmologists. According to the 2009 AIHW workforce report, between 2001 and 2006 orthoptists demonstrated the highest rate of growth (19.2%) compared to optometrists (13.6%) (30). Task sharing is an opportunity to benefit from this growth, particularly in a tertiary setting. Optometrists are employed in low numbers at the RVEEH, which includes the EGMON clinic and the contact lens clinic. The role of optometrists in a tertiary setting in Victoria is yet to be defined and at this point in time they are effectively utilised to deliver primary care mainly in the community setting to identify appropriate referrals to tertiary services, as demonstrated in this study. The OOWC exhibited the willingness of the two professions to work together and this is a stepping stone in building trustful relationships between both parties.

Task sharing and collaborative care in other areas of health service in Australia have proven to be beneficial and supported by policy makers. Maternity care collaboration programs and nurse practitioners in primary care to support GPs have improved effectiveness and efficiency of health service delivery. Maternity care collaboration endorses inter-professional patient management between midwives and obstetricians to promote and enable women to be active participants in their own care (84). The collaboration incorporates clearly defined roles and responsibilities and is supported by the National Guidance of Collaborative Maternity Care developed by the National Health and Medical Research Council (84). Another example is nurse practitioners being introduced in general practice in Australia in 2000 (85). Nurse practitioners are registered nurses educated and authorised to work autonomously and collaboratively in an advanced and extended clinical role (85). The Australian Government has been supportive of this role and to encourage further development through changes in legislation permitting endorsed nurse practitioners to access the MBS and PBS from November 2010 (85). Such examples demonstrate both clinical and economic benefits, such as reduced costs associated with service delivery and patient costs, that could inform changes in eye health delivery particularly in terms of establishing collaborations and policy endorsement.

Advancements in technology are a key contributing factor in the delivery and possibility of task sharing. Data collected indicated OCT was the main diagnostic device used on
patients with any of the three eye conditions in this study. OCT is a diagnostic device analogous to an optical ultrasound that provides high resolution images of the different layers of the retina. It is useful not only for diagnosis, but also as a monitoring tool, in particular for AMD and glaucoma patients. OCT is mandatory for the care of neovascular AMD patients to identify if treatment is effective (86). This is seen in the data in this study, where neovascular AMD patients had an OCT performed an average of 23.2 times over a five year period which equates to an average of 4.6 times a year. Such digital imaging and others such as non-mydriatic photography allow for results to be stored to facilitate the possibility of testing patients and results being assessed at a later time. Diagnostic tools such as the OCT are more sensitive in detecting changes and are more useful in documenting disease progression than traditional methods of hand written notes or drawings, which may be difficult to interpret by others. Applying such technology to clinical practice also facilitates ease of transmission of results in a timely manner in this evolving digital era.

5.1.4 Referral practices

The fourth key implication of collaborative care is the broader impact on referral practices from primary caregivers. Both the OOWC trial clinic and the data regarding the occasions of service highlighted the need to review referral practices and the roles in eye health service delivery. Referrals to tertiary services are predominantly from three sources, ophthalmologists, optometrists and GPs. This research has primarily focused on referrals from GPs, the appropriateness and the quality. Triage for the OOWC trial clinic demonstrated 33% of GP referrals received at the RVEEH are suitable to be seen by optometrists in the community. This was further validated with only 28% of those who attended the trial clinic requiring tertiary services. The top reason for referral to the OOWC trial clinic was blurred vision and this was also the case for the data on occasions of service. The question needs to be raised, why are patients who are presenting to the GP with blurred vision automatically referred to a tertiary service for this complaint to be investigated? There are several factors for consideration. First, relates to GPs uncertainty over the cause of blurred vision, and eye examinations. Second, the main factor seems to be a lack in adequate understanding of each profession’s training and competencies and the roles each play in eye health service delivery. This was highlighted by the GPs
feedback where over half of GPs (n=9, 56%) had occasionally or frequently referred to the ACO before this project. Interestingly one GP who had never referred to the ACO before commented, they were unsure of the criteria for referral. In comparison, when asked if they would consider referring directly to the ACO, most respondents (n=15, 94%) would frequently or occasionally do so. It was the same response when asked if their referral practices will be influenced by this project. This highlights the need for improved communication and education of GPs regarding appropriate referral practices and to strive for the GP to be the “whole patient” practitioner.

The OOWC trial clinic demonstrated the benefits of receiving detailed information regarding the patient’s examination to be of a high standard that enabled appropriate clinic allocation. Patients who required RVEEH follow-up after OOWC clinic attendance (29%) had direct access to sub-specialty clinics. Prior to the project this would not have been possible and all GP referrals would attend GEC first for a routine ophthalmic work up to determine the most appropriate clinic for care. This contributes to unnecessary multiple appointments at the RVEEH. An audit of the RVEEH clinical outcomes indicated that in 120 cases (90%) the initial ACO diagnosis was confirmed. This finding is much higher compared to the study undertaken by Moorfields Eye Hospital in 1998 where optometrists’ clinical evaluation of new referrals in an outpatient clinic was compared to the diagnosis of an ophthalmologist; the correct diagnosis was achieved in 79.6% of all cases (48). Although the OOWC trial clinic was not a double blind study the clinical management guidelines and referral pathways and the presence of an ophthalmologist may have contributed to the higher agreement rate. Improving the content of referrals and the information received from referrers also improves timely treatment to patients and reduces the need for unnecessary tests and investigations as demonstrated in the patients for RVEEH follow-up, as 69% of patients received treatment or consented for surgery at their first RVEEH appointment.

Further development of clinical guidelines and referral pathways for both optometrists and GPs would have a significant benefit in the appropriateness of referrals to the most suitable clinical setting. This recommendation is also in line with the Victorian Ophthalmology Service Planning (VOSP) Framework that provides the framework for the delivery of public ophthalmology services to the year 2016 (2). The recommendation in the VOSP framework for accessing public ophthalmology outpatient services is to
develop consistent guidelines ensuring access is based on clinical need and is equitable and appropriate (2). It is understandable for GPs not to be able to deal with all ophthalmological-related complaints presented by their patients, as eye-related complaints make up only a small proportion of their daily work, and time constraints would present a significant barrier to deliver exams they are unsure of and possibly not competent in delivering. This was evident in a questionnaire of rural and urban GPs across Australia in 2007-2008 to describe current DR screening and management practices which identified only 29% had read the NHMRC DR Management Guidelines at least once and 74% reported not routinely examining diabetic patients for DR (87). Although this statistic is of concern, it further highlights the need to educate and inform GPs of appropriate referral pathways even when they are unsure of how to manage these patients in their practices and to empower the GP to be the central coordinator of a patient’s care. Education of GPs can be initiated by tertiary institutions with the introduction of a minimum clinical threshold for referral acceptance and information on referral alternatives. This will potentially link primary care givers and inform each other of scope of practice and clinical competencies.

5.2 Generalisability

The findings of this study could be applied to most ophthalmology outpatient settings where there is a similar cohort of patients to the RVVEEH. Data in relation to task sharing may be more applicable to services based in Australia than abroad as the training curriculum and scope of practice of optometrists, orthoptists and ophthalmic nurses may differ. The OOWC trial clinic has the potential to be implemented elsewhere with consideration for feasibility and sustainability.

5.2.1 Feasibility

To determine the feasibility of the OOWC trial clinic the replicability and the scalability will be considered according to the Victorian Innovation and Reform Impact Assessment Framework (VIRIAF) to Inform Regional or National Rollout of Specific Workforce Australia as developed by Health Workforce Australia (88). The replicability of relates to the ability of the project to be implemented elsewhere and the scalability is the ability of the project to be replicated many times over and scaled-up within a practice. In relation to the OOWC clinic, factors such as the endorsement of the clinical guidelines and the
adoption of these by both optometrists and ophthalmologists in the community would need to be considered as would the availability of the workforce to deliver this model of care. Feedback from the participating ophthalmologist strongly suggested the ongoing presence of an ophthalmologist to ensure the continuum of building of relationships between the two professions, appropriate referrals and ensure ongoing safe practice within the clinical guidelines (Table 41).

**Table 41: Factors for feasibility to consider for replicability and scalability**

<table>
<thead>
<tr>
<th>Feasibility</th>
<th>Replicability</th>
<th>Scalability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enablers</strong></td>
<td>• Ability of the hospital to develop pathways for collaborative work between hospital and optometrists (accreditation of optometrists)</td>
<td>• An accreditation process for optometrists to ensure familiarity with clinical guidelines</td>
</tr>
<tr>
<td></td>
<td>• The development of the clinical guidelines to be endorsed and implemented in similar settings</td>
<td>• Ongoing presence of an ophthalmologist</td>
</tr>
<tr>
<td></td>
<td>• Ongoing presence of an ophthalmologist</td>
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</tbody>
</table>
Risks should be assessed for any project to be considered for implementation. This is critical in the planning phase to enable adoption of risk mitigation and risk management. The biggest risk for implementation of the OOWC trial clinic model is resistance by ophthalmologists to change traditional roles; this is also applicable to task sharing in the hospital setting (Table 42). The second highest risk is the capability and capacity to financially sustain the model of care as standard practice. Costs to be considered include facilities, human resources, consumables and equipment. Costs to the patients were not considered as both services were publicly funded and no direct costs were incurred by the patient.

Governance and engagement with key stakeholders is also critical for successful implementation. Ongoing governance is recommended as is a service level agreement between the two organisations to embed shared patient care as standard practice.
Table 42: Risk matrix to categorise risk to determine likelihood and impact

<table>
<thead>
<tr>
<th>Risk Likelihood</th>
<th>Low</th>
<th>Medium</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>Patient’s reluctance to follow referral pathway</td>
<td>Lack of engagement from key stakeholders</td>
<td></td>
</tr>
<tr>
<td>Medium</td>
<td>Ophthalmologists express vulnerability of changing current scope of practice</td>
<td>Inadequate ongoing revenue</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>Resistance by ophthalmologists to change traditional roles of respective workforces</td>
<td>Inappropriate clinical assessment of patients</td>
<td></td>
</tr>
</tbody>
</table>

5.2.2 Sustainability

The key factor in sustainability is cost. For the potential of task sharing this factor has not been explored and therefore cannot be commented on in this thesis as it was a retrospective study and it was not possible to determine costs. The main obstacle for a model of care such as the OOWC to be sustainable is ongoing funding. Limited financial analysis was undertaken to determine the best cost-benefit option.
5.2.2.1 Cost-benefit of OOWC clinic

Direct costs such as operational costs, resources and consumables in terms of projected costs and revenues were considered to determine the expected cost of a model of care such as the OOWC would be $92,818 (Appendix 10). This is a combined cost of the expenses of both the RVEEH ($30,402 - 48%) and the ACO ($62,416 - 52%). This cost would be in addition to current operating costs. In comparison to the alternate RVEEH internal model based on Victorian Ambulatory Classification System (VACS) funding, the OOWC model does not generate as much potential revenue (Appendix 10), however, it is an opportunity to enhance hospital activity independently without additional VACS funding and improve patient access.

Several options were considered to determine the most appropriate and feasible financial model. The following options were considered:

a) Cease pilot clinic and cease to provide service
b) Continue model as per pilot form as an MBS billed service
c) Continue model without the presence of an Ophthalmologist
d) Continue model with the presence of an Ophthalmologist less frequently with increased patient numbers as an MBS billed service 100% donation model

Option A suggests the service to cease at the completion of the pilot phase. Lessons learned would have been documented, however they would not be put in to practice or demonstrated. Issues relating to not proceeding with the service model include increased demand on RVEEH services, poor utilisation of ophthalmologists’ time and skill to assess patients with non-specific referrals and poor utilisation of the existing skilled community workforce.

Option B required the clinic to continue weekly at the ACO with the presence of an ophthalmologist. Clinics were booked with 45 patients per day and staffed by 5 optometrists and one ophthalmologist. Once this model was evaluated it was identified it was not financially viable and the costs outweighed the revenue. For this model to be financially viable the ophthalmologist would need to assess every patient regardless if a
referral is warranted and this practice would not fall within the referral requirements of the Medicare Benefits Schedule (MBS).

To continue the model as per Option C without the presence of an ophthalmologist was not be supported by multiple RVEEH staff ophthalmologists, including the one who was attending the pilot clinic. Withdrawing the ophthalmologist from the clinic also potentially risked broader relationships with key stakeholders, such as RANZCO.

The most viable solution was to be funded via the Medicare Benefits Schedule (MBS), the Medicare services subsidised by the Australian Government. The clinic would need to be established as a MBS-billed service, 100 percent Donation Model in line with the Health Insurance Act and the National Healthcare Agreement. A 100 percent Donation Model is where the ophthalmologist would donate 100 percent of all MBS billings generated to the hospital in return for a higher base salary (89).

In accordance with the MBS ‘Optometrists may refer directly to specialist ophthalmologists with the patient being able to claim benefits for the ophthalmologist’s services as the referred specialist rate’. ‘A referral letter must have been issued by the optometrist for all such services provided by specialist ophthalmologists in order for patients to be eligible for Medicare benefits’. A referral is defined as, ‘a request to a specialist for investigation, opinion, treatment and/or management of a condition or problem of a patient or for the performance of a specific examination or test’ (90).

Optometry and Ophthalmology services are independently billed according to specific MBS Item numbers: Optometry Services (Item numbers 10900, 10905, 10907, 10912, 10913, 10914, 10915) and Ophthalmology Services (Item number 104) (90). There are some limitations on certain optometry item numbers dependent on the patient’s last consultation. Cost analysis has been based on Item numbers 10900, a comprehensive initial consultation and 10907-comprehensive initial consultation by another practitioner within 24 months of a previous comprehensive consultation. There are no limitations on Item number 104.
In accordance with the MBS all consultations that are billed must include face-to-face time between the patient and the billing practitioner. There is no specification, in particular with Item number 104, of the time required with each patient. There is also no specification in the schedule regarding a limit on the number of claims per day.

Consultations with representatives from the Victorian Department of Health from the Specialists Clinics Program and the Funding Information Policy Unit have indicated there are two potential funding options. The first is to consider the patient’s consultation with the optometrist and the ophthalmologist as two separate episodes of care. This is achieved by booking two separate appointments; the optometry appointment is a private patient episode and the ophthalmology service is a public patient episode. Otherwise, in accordance with clause A6 and G17 of the National Healthcare Agreement only one service can be claimed if the patient only has one appointment (91). The second is to treat patients attending the proposed service as private patients with their consent. This is in accordance with clause G19b of the National Healthcare Agreement (91). In this instance both the optometry and ophthalmology services can be MBS billed where a referral has occurred. Under the National Healthcare Agreement patients can be treated as private patients on the basis of informed financial consent. The requirement for election to be a private patient applies even if the patient does not incur any out-of-pocket expense and the cost is bulk billed. It was recommended that patients sign consent for the purpose of potential audits. For both these options to be efficient it is essential to consider patient numbers and the number of bookings required to be of cost benefit. Cancellation and did not attend rates would also need to be considered in the planning phase.

It is critical the service be established as a 100 per cent Donation Model in line with the Health Insurance Act as Medical practitioners involved in the service will be indemnified and any breach of this Act could result in significant penalties. Although this sustainability proposal follows the key policies and legislative requirements of the MBS, Health Insurance Act and the National Healthcare Agreement at the time of writing, independent legal advice would be required about how these requirements will be met in practice.
5.3 Strengths

Most previous research in models of care have been reported by international institutions and the OOWC trial clinic has been the first to test such a collaboration in Australia (46) (47) (81) (92) (93). This research made key contributions to bridge the gap between ophthalmology and optometry in eye health service delivery in Victoria with the opportunity for the two professions to work closely together to better understand each other’s scope of practice. While the 2007-2009, the Community Eye Care Partnership tested a model of shared care, the main obstacle to success was lack of inter-professional trust and positive relationship building (40). Addressing these was identified as a critical objective at the inception of this study and ophthalmologists and optometrists worked closely together at each phase of the trial clinic to mitigate these limitations. Stakeholder engagement and successful buy in was also critical and sought from the instigation of this research. Stakeholder engagement included representatives from professional bodies of ophthalmology, optometry, orthoptics, GPs, community consumer representation and the Department of Health. This was a key component of this research’s design that addressed key limitations in other studies.

A key strength of this research was that the data collection was from one of the largest specialist eye hospitals in Australia that delivers secondary and tertiary care. This enabled ample data on all stages of the three main chronic eye conditions of both new and chronic patients.

5.4 Limitations and Future Research

There were some limitations to each component of this research. The OOWC trial clinic was possible due to two organisations’ willingness to seek a change in eye care service delivery and this might not be able to be translated to other organisations. The trial clinic was also conducted at one site in a metropolitan setting but had the same model been tested at several sites, including rural, the outcomes may have been different. There was no follow up study such as that of the Bristol Shared Care Glaucoma Study to monitor the outcomes of the patients who were discharged to the ACO for ongoing monitoring and had one occurred two years later it could have further informed future eye health service delivery. Although there was no follow-up study, the presence of an
ophthalmologist at each trial clinic verified the optometrists’ findings. Another limitation was the low response rate from GPs regarding feedback about the OOWC clinic. Due to time constraints there were no follow-up attempts to gain an understanding of why GPs did not respond to the survey. Low response rates by GPs appears to be common in the literature, as identified by a study of Victorian GPs in relation to the management of DR, whereby the response rate was just over half (59%) of invited participants (94). Reasons cited included time constraints and multiple requests for survey participation.

In regards to the data to determine the occasions of service for each chronic eye condition, there were two identified limitations. First, the sample size for the occasions of services component was small for some diagnoses, for example, angle closure glaucoma (n=3), and this could be considered insufficient to construct conclusions. Had a larger sample been assessed the outcomes could have been different. Retrospective collection of the data may also be considered a limitation, and the results may differ had the data been collected prospectively over a 5-year period.

Second, it was an exploratory study of the tasks and although the research, based on the data, suggested potential future practice of task sharing it did not test models of task sharing in the tertiary setting to assess safe delivery of practice, economic impact and patient satisfaction.

The role of the orthoptist in potential future practices of task sharing was based on the training now provided in Australia. There may be a limitation in other countries where training is quite different. This research, though, demonstrates potential in the roles of allied health in eye health service delivery.

There are two recommendations for future research. The first is in relation to clinical guidelines. The project developed clinical guidelines and referral pathways used for the OOWC trial clinic could be further endorsed and applied for optometry and ophthalmology care as a tool for referral practices on a national level in Australia. This would require open communication and engagement with stakeholders from each professional body. This future research could have the potential for an improved understanding of each profession’s scope of practice and close the gap between uncertainty and mistrust.
Second, is a demonstration of the recommended future practice of task sharing as described in this research. A prospective study would include a pilot of the recommended models, cost-effectiveness modeling of such task sharing models of care in the tertiary setting, and the need for professional development, training and accreditation. Such research could translate evidence-based practice to inform future planning in eye services delivery.
Chapter 6 CONCLUSION

This research demonstrated the theory of task sharing in two different settings, primary and tertiary care and how one can influence and inform the other. Task sharing can generate a strengthened and flexible health workforce that can respond to the changing landscape of clinical and public health needs, such as accessibility and demand and to ease bottlenecks in service delivery. Task sharing can create opportunities to expand community relationships and also better utilise the availability of ophthalmologists, optometrists, orthoptists and ophthalmic nurses.

The OOWC trial clinic successfully identified patients who required tertiary services versus those who could be managed in the primary care setting. Introduction of the trial clinic had a positive impact on the trend of median wait time for first outpatient appointments with the shortest wait time in the previous 12 months for a first appointment to the RVEEH General Eye Clinic, and an increase in the number of new patients receiving appointments. If such an improvement was evident in a short period it can be predicted that implementation of this model of care would contribute to positive long term effects. Clinical guidelines were an effective tool to deliver safe clinical practice and build trust between the two professions and a key to successful outcomes. The development of community relationships and the collaboration between optometry and ophthalmology lays the foundation for future possibilities in patient care.

The exploratory, retrospective study of occasions of service over a five-year period demonstrated that opportunities for task sharing exist in the outpatient setting. Existing skilled health professionals such as orthoptists and nurses could be utilised to potentially improve service provision and address issues such as inequitable and inappropriate access to tertiary services to meet the increased demand of eye care services and address workforce shortages. Such opportunities are possible due to advancements in technology and the willingness of key stakeholders to support such changes. Patients who require long-term monitoring for chronic eye diseases will be dependent on services for longer and if changes do not occur in methods of service
delivery then access to quality of care could be compromised. Although the suggested task sharing as discussed in this study has not been extensively adopted at this stage, it has the potential to review practices within a hospital setting and changing scope of practice in different levels of care, for example, primary care in a tertiary hospital setting. This research can be further utilised to develop and trial models of task sharing and inform future service provision.

To further support these findings and their possible benefits it is critical to consider the role and necessity of further improvements in referral practices and raise patient awareness of the types of eye health care services available and the specific roles of different eye care professionals. This is also applicable to eye care professionals and the need to define and understand each other’s scope of practice. This can only be achieved through open discussion and implementation of clinical and referral guidelines to support professionals such as community optometrists and in particular GPs who should be considered as having a central role in a patient’s care. This is essential in delivering collaborative care programs.

The significance of these conclusions is that collaborative care between ophthalmology, optometry, orthoptics and nursing is a worthwhile way to deliver patient care. Task sharing is an efficient means to manage the future demand of patients who require long term monitoring. Future training and education will need to be built on contemporary and predicted future needs and not based on historic patterns of service delivery. These findings come at a time where the need for change has been acknowledged and open dialogue is closing the gap between professions introducing an innovative approach for the future of eye health service delivery.
References

68. The Royal Australian and New Zealand College of Ophthalmologists. Eye Conditions 2011. [Internet] [cited 2011, July 12]. Available from:


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Appendices

Appendix 1: Ethics Approval

Eye & Ear Hospital

caring in every sense

July 4, 2011

Ms Stephanie Tsonis
Orthoptist
RVEEH

Dear Ms Tsonis

Re: Human Research & Ethics Committee – NEW PROJECT
Research Project - Opatometry-Ophthalmology Workforce Collaboration Project

The Human Research & Ethics Streamline Sub-Committee considered the above project. I am pleased to inform you that ethical approval was granted. This decision will be ratified by the full HREC committee at their next meeting.

The project number 11/1028H was allocated, and this number should be used in all future correspondence. The following Researchers were approved:

- Ms Stephanie Tsonis

The Human Research & Ethics Committee of the Royal Victorian Eye & Ear Hospital is constituted and operates in compliance with the National Health & Medical Research Council National Statement on Ethical Conduct in Human Research (2007).

The Committee requires an annual progress report, and must approve any proposed amendments to the protocol. All serious or unexpected adverse effects on participants or any unforeseen events that might affect continued ethical acceptability of the trial must be reported to the Committee.

The Committee requires you to preserve the confidentiality of information about research subjects, and to ensure the confidentiality of records. Information obtained for your research that is confidential or personal must not be used for purposes other than those specified in the approved protocol.

Ethical approval is valid from the date of this letter until 4 July, 2014. At the end of this period, or at the conclusion of the research, a final report is required along with a copy of any publications.

On behalf of the Committee, I wish you every success with your project. This decision will be ratified at the 1 September 2011 meeting.

Yours sincerely

[Signature]

Kerryn Baker
Secretary
Human Research & Ethics Committee
kerryn.baker@eyeandear.org.au
Telephone +61 3 9929 8525
Appendix 2: OOWC Project Steering Committee Terms of Reference

TERMS OF REFERENCE- May 2011

1. Project Background:

This pilot project has been funded by the Department of Health and will design and test an integrated model of care of workforce collaboration with optometry and ophthalmology. New patients referred to the RVEEH by GPs with an unclear referral will be seen in the first instance by the Australian College of Optometry to determine those that are suitable to attend the RVEEH. Inappropriate referrals can then be more appropriately diverted to other providers, and complex patients can be referred directly into our sub-specialty clinics, without the need for general eye clinic triage.

2. Purpose:

The establishment of a Project Steering Group will provide a structure to ensure that key stakeholders provide input and advice regarding the development, implementation and evaluation of the project.

3. Objectives:

The objectives of the Steering Group are to:
- Determine the critical success factors for the project and the project scope
- Guide and provide expert advice for the development of the pilot and management tools
- Monitor the progress of the objectives and key activities of the project against timelines and budget
- Determine the evaluation framework to measure project outcomes and successes
- Share information and learning from meetings/conferences and other similar or related work
- Establish communication and coordination between the two working groups at the respective sites
- Ensure engagement of external local stakeholders

4. Membership:

The following people and organisations are proposed for consideration for membership of the Project Steering Group:

Chair
- Dr Mark McCombe, Chair Senior Medical Staff

Secretary
- Stephanie Tsonis, Project Manager

Membership (TBC)
- David Lau, Hospital Improvement Program Director
- Prof Sarah Hosking, ACO Chief Executive Officer
- Dr Michael Coote, Clinical Director Ophthalmology Services
- Dr Richard Stawell, RVEEH Senior Ophthalmologist
- Dr Anne Brooks, RVEEH Senior Ophthalmologist
- Dr Jacqueline Beltz, RVEEH Ophthalmologist
- A/Prof. Jonathan Jackson, ACO Head of Clinics (from September 2011)
- Neville Turner, ACO Director Clinical Operations
- Timothy Fricke, ACO Director Specialty & Community Services
- Kathryn Day, RVEEH Outpatient Bookings Unit Manager
- Professor Jill Keefe, Head of Population Health Unit, CERA
- Jennifer Hassell, Researcher, CERA
- Dr Lina Nido, GP Liaison Officer
- Patricia Bruce, Community Advisory member

Quorum:
A quorum comprises of 50% of appointed members.

5. Governance:
The Optometry-Ophthalmology Workforce Collaboration project has established the accountability framework that will take strategic decisions that will impact the project. Throughout the duration of this project both organisations will be governed by the Service Level Agreement agreed upon by both parties.

The RVEEH working group and project manager will be accountable to the Hospital Improvement Program (HIP) Steering Committee who will report directly to the RVEEH Executive and the Project Steering Committee via the Project Sponsor. In the situation of the HIP steering committee dissolution prior to the completion of the project all accountability will be via the RVEEH Executive.

Decisions will be made through a consensus approach. In a situation where consensus cannot be reached in the first instance, the Project sponsors of the respective organisations, the Chair of the steering committee and the Department of Health will work together to seek agreement and reach consensus.

6. Meeting Frequency:

The Project Steering Group will meet a minimum of monthly prior to the pilot phase anticipated to commence in October 2011. More frequent meetings may be required depending on the stage of the project.

7. Proposed dates

Yet to be determined

8. Recording of proceedings:

The agenda together with previous meeting minutes will be forwarded to members one week prior to scheduled meetings dates by the Project Manager.
Appendix 3: Clinical management and referral pathway guidelines

Clinical Management and Referral Pathway Guidelines 2011
PATIENT ASSESSMENT

HISTORY

In general, a thorough history will include the following items, although the exact content will vary with the patient’s particular presenting problem and needs.

- Reason for referral
- Chief complaint and history of present illness
- Present status of visual function (e.g. patient’s self-assessment of visual status, visual needs, any recent or current visual symptoms, and use of glasses or contact lenses)
- Ocular symptoms (e.g. eyelid swelling, diplopia, redness, photophobia)
- Previous Ocular history (e.g. prior eye diseases, injuries, surgery, including cosmetic eyelid and refractive surgery, or other treatments and medications)
- Systemic history: relevant medical conditions
- Medications: ophthalmic and systemic medications currently used, including nutritional supplements
- Allergies or adverse reactions to medications
- Family history: relevant familial ocular and systemic diseases

OCULAR EXAMINATION

The comprehensive eye examination consists of the anatomical status of the eye and adnexae, and an assessment of the function visual system, and its related structures. This will include the following elements:

- Visual acuity with current correction (the power of the present correction recorded) at distance and, when appropriate, at near
- Measurement of best corrected visual acuity (with a refraction when indicated)
- External examination (e.g. eyelid position and character, lashes, lacrimal apparatus and tear function)
- Pupillary function (e.g. size and response to light, relevant afferent pupillary defect)
- Ocular alignment and motility
- Slit-lamp biomicroscopic examination: eyelid margins and lashes; tear film; conjunctiva; sclera; cornea; anterior chamber; and assessment of central and peripheral anterior chamber depth, iris, lens, and anterior vitreous
- Intraocular pressure measurement, preferably with a contact applanation method (typically a Goldmann tonometer); Other forms of tonometry may be employed if applanation is impossible or likely to be inaccurate
- Dilated Fundus examination (unless contra-indicated): mid and posterior vitreous, central and peripheral retina, vasculature and optic nerve
- Optic nerve head evaluation particularly for evidence of glaucomatous optic neuropathy or other optic nerve disease
Based on the patient's history and findings, additional tests or evaluations might be indicated to evaluate further a particular structure or function. These are not routinely part of the comprehensive eye clinical evaluation. Specialised clinical evaluation may include the following:

- Monocular near-vision testing
- Colour vision testing
- Testing of stereo acuity and fusion
- Testing of accommodation and convergence amplitudes
- Central visual field testing and Amsler grid
- Tear break up time
- Schirmer testing and ocular surface dye staining
- Corneal sensation
- Anterior segment depth centrally and peripherally
- Gonioscopy - passive light and dark
- Functional evaluation of the nasolacrimal tear drainage system
- Analysis of the corneal shape (e.g. keratometry or corneal topography)
- Measurement of corneal thickness (pachymetry)
- Fundus photography, including higher magnification disc images
- Optical coherence tomography or macular and RNFL
- Visual fields by automated perimetry (preference HVF analyser)
- Computer based analysis of optic nerve and retinal fibre layer such as HRT or GDx
CLINICAL GUIDELINES AND REFERRAL PATHWAYS

The following evidence based clinical guidelines and referral pathways have been created on the basis of the patient inclusion cohort.

- Age-related Macular Degeneration
- Blepharitis
- Cataract
- Choroidal Naevus
- Diabetes
- Dry Eyes
- Epiphora
- Epi-retinal Membrane
- Floaters
- Glaucoma
- Headaches
- Pterygia
Age-Related Macular Degeneration

Clinical Signs/ Symptoms
- No visual symptoms
- No change in recordable visual acuity
- No evidence of abnormality
- Few-many drusen
- Pigment abnormalities (RPE)
- Progressive areas of atrophy
- Amsler unaltered
- Reports no new visual symptoms
- Fibrotic submacular scarring
- Cystoid Macular Oedema
- No fresh macular haemorrhage
- Reports no new visual symptoms
- Only eye situation (poor outcome in their first eye)
- Reports no new clinical symptoms, or change in vision
- New onset of visual symptoms: distortions, blurred vision
- Macular changes on fundus exam: Blood, fluid, lipid or thickening /elevation of retina suggestive of CNV

Classification
- Family History of ARMD
- Non-exudative ARMD
- Disciform Scarring
- Only eye. High Risk
- Non-Exudative ARMD
- Exudative ARMD
- Fundus photography for records
- Macular OCT
- Macular OCT
- Macular OCT

Suggested Investigations
- Fundus photography for records

Management
- Discharge. Educate patient on use of Amsler. Suggest ACO review in 2 years
- ACO follow up. Educate patient on use of Amsler Review 12 months with dilated fundus exam
- ACO follow up. Educate patient in use of Amsler Review 12 months with dilated fundus exam for fellow eye
- ACO follow up. Educate patient on use of Amsler Review 3-6 months with dilated fundus exam
- Referral RVEEH GEC
- Urgent Referral RVEEH MRET or ED

Low Vision Referral
- VA ≤ 6/18 caused by degenerative condition
- Reduced VF associated with degenerative condition
- Do you have difficulty moving around safely and with confidence?
- Do you have difficulty reading or close work with up to glasses?
- Do you have difficulty with daily activities?
- ACO Low Vision Clinic

* Based on Optometric Practice Guideline: Care of patient with Age-Related Macular Degeneration
Blepharitis

- **Clinical Signs/Symptoms**
  - Excess lipid deposits
  - Foamy discharge
  - Mild to moderate conjunctiva injection
  - Aqueous tear deficiency

- **Classification**
  - Meibomian Gland Dysfunction

- **Management**
  - Regime of warm compresses
  - Eyelid hygiene

- **Referral**
  - ACO monitor

- **Clinical Signs/Symptoms**
  - Oily or greasy eyelid deposits
  - Mild conjunctiva injections
  - Frequent Aqueous tear deficiency
  - Inferior punctate epithelial erosions

- **Classification**
  - Seborrheic Blepharitis

- **Management**
  - Eyelid hygiene and massage

- **Referral**
  - ACO monitor

- **Clinical Signs/Symptoms**
  - Matted, hard eyelid deposits
  - Eyelash loss and misdirection
  - Severe eyelid exacerbations
  - Frequent Aqueous tear deficiency

- **Classification**
  - Staphylococcal Blepharitis

- **Management**
  - Eyelid hygiene and massage
  - If no response topical antibiotic e.g. tetracycline prescribed to apply bd or nocte for one week

- **Referral**
  - ACO monitor

- **Clinical Signs/Symptoms**
  - Recurrent anterior Blepharitis with severe inflammation not responding to therapy

- **Possibility of infection**

- **Referral**
  - RVEEH GEC

- **Clinical Signs/Symptoms**
  - Marked asymmetry
  - Resistance to therapy
  - Unifocal recurrent chalazia

- **Possibility of Sebaceous cell carcinoma**

- **Requires biopsy**

- **Referral**
  - RVEEH OPAL

*Based on International Council of Ophthalmology Guidelines and American Academy of Ophthalmology Preferred Practice Pattern*
Appendices

Cataract

Clinical Signs

Patient Discussion

Management

Best Corrected vision ≤ 6/12

Does the cataract interfere with daily activities?

Y

N

Is the patient interested in surgery?

Y

N

Referral RVEEH GEC

ACO follow up. Review 12 months

Best corrected vision =6/9

Prescribe glasses. Discharge

Best corrected vision ≥ 6/6

EXCEPTION

Best corrected vision =6/6

Lens opacity cause of significant glare symptoms

Clinically significant anisometropia in post fellow eye cataract surgery in the absence of cataract

Is the patient interested in surgery?

Y

N

Referral RVEEH GEC

ACO follow up. Review 12 months

Lens opacity interferes with optimal decisions or management of posterior pathology

Referral RVEEH GEC early appt

Lens cause of inflammation (phacolysis)

Referral RVEEH GEC

Lens induced angle closure (phacomorphic)

Normal IOP <26

Increased IOP >26

Referral RVEEH GEC

Urgent Referral RVEEH ED

* Based on International Council of Ophthalmology Guidelines
Choroidal Naevus

**Clinical Signs/Symptoms**

- Lesion Flat or slightly elevated (<2mm)
  - Size <2DD
  - Colour grey
  - No risk factors

**Suggested Investigations**

- Fundus Photography of lesion

**Classification**

- Benign Choroidal naevus

**Management**

- ACO
  - Review 3 months, 6 months, 12 months
  - Monitor size

**Classification**

- Suspicious Choroidal naevus

**Management**

- Referral RVEEH Oncology
Diabetic Retinopathy

**Clinical signs**

- No evidence of any retinopathy
- Microaneurysms (Ma) only
- Ma and one or more of: retinal haemorrhages, Hard exudates, Cotton wool spots (CWS)
- Ma and haemorrhages in at least one quadrant and one or more of: CWS, Venous Beading (VB), IRMA
- More than 20 intraretinal haemorrhages in each of 4 quadrants. Definite venous beading in 2+ quadrants. Prominent IRMA in 1+ quadrant AND no signs of PDR
- Any of: Neovascularisation elsewhere (NVE) or Neovascularisation disc (NVD)
- Any of NVD >½ TO 1/3 disc area, or with vitreous/preretal haem, or NVE <½ disc area (DA) without NVD
- High-risk PDR with tractional detachment involving macular or vitreous haem obscuring ability to grade NVD and NVE

**Classification**

- None
- Minimal NPDR
- Mild NPDR
- Moderate NPDR
- Severe NPDR
- Proliferative Diabetic Retinopathy (PDR)

**Suggested Investigations**

- Funds photography
- OCT if CMO suspected
- Fundus photography
- Macular OCT
- Macular Oedema
- Macular OCT
- Macular OCT

**Management**

- ACO review 12 months
- Referral RVEEH MRET
- Referral RVEEH MRET
- Referral RVEEH MRET
- Referral RVEEH MRET
- Referral RVEEH VRU
- Referral RVEEH VRU
- Referral RVEEH VRU
- Referral RVEEH VRU
- Referral RVEEH VRU

**MACULAR OEDMEA**

- No retinal thickening or hard exudates in posterior pole
- Retinal thickening within 2 disc diameters of macula centre
- Retinal thickening within 500µm of macular centre or hard exudates within 500µm of macular centre with adjacent thickening

N.B. Macular oedema can occur at any stage of DR

*Based on NHMRC Guidelines for the Management of Diabetic Retinopathy*
Dry Eye

Clinical Signs/Symptoms
- Burning, itching stinging eyes
- No visual symptoms
- No Conjunctival injection
- TBUT variable

Classification
- Mild Dry eye

Management
- Education and environmental modifications
- Elimination of offending topical or if possible systemic medication
- Aqueous enhancement using artificial tear substitutes (preserved or preservative free)

Referral
- ACO ongoing care

Episodic discomfort
- Intermittent visual symptoms
- Variable Conjunctival staining
- TBUT ≤10

Classification
- Moderate Dry eye

Management
- Above treatments

Referral
- ACO ongoing care

Constant pain and discomfort
- Marked Conjunctival staining
- Severe punctate erosions
- TBUT Immediate or ≤5
- Compliant with treatment

Classification
- Severe Dry eye

Referral
- RVEEH EGE

Corneal infiltration or ulceration

Urgent Referral
- RVEEH ED
Epiphora

Clinical Signs/ Symptoms | Classification | Management | Referral
---|---|---|---
Chronic epiphora Entropion or ectropion present | Lid-globe appositional abnormality | Patient interested in surgery | Yes
| | | Referral RVEEH OPAL
| | | No
| | | ACO monitor Review 12 months
Chronic epiphora Obstructive lacrimal drainage disorder Lacrimal lavage to assess stenosis Patient interested in surgery | Yes
| | | Referral RVEEH OPAL
| | | No
| | | ACO monitor Review 12 months
Excessive and symptomatic reflex tearing Ocular surface disorder Recommend Artificial tears | | ACO monitor Review 12 months
Hypersecretion of tears Unknown cause Possible Neurogenic lacrimal hypersecretory disorder | | | Referral RVEEH GEC
Epi-retinal Membrane

Clinical Signs/ Symptoms

VA <6/12
Asymptomatic
(no other possible cause of reduced VA)

Suggested Investigations

Amsler grid
OCT macula

Management

ACO monitor
Amsler grid self-testing
Review 12 months

VA ≤ 6/12
Symptomatic
(Blurred, distortion, monocular diplopia)

OCT macula

Referral RVEEH VRU

VA <6/18

OCT macula

Referral RVEEH VRU
Floaters

<table>
<thead>
<tr>
<th>Clinical Signs/ Symptoms</th>
<th>Suggested Investigations</th>
<th>Findings/ Classification</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute onset of floaters and photopsias</td>
<td>Dilated peripheral fundus exam</td>
<td>Acute Posterior Vitreous detachment</td>
<td>Referral RVEEH ED</td>
</tr>
<tr>
<td>Acute onset floaters No photopsia</td>
<td>Dilated peripheral fundus exam</td>
<td>Vitreous haemorrhage</td>
<td>Referral RVEEH ED</td>
</tr>
<tr>
<td>Long term floaters No photopsia</td>
<td>Dilated peripheral fundus exam</td>
<td>Posterior Vitreous Detachment No retinal tears</td>
<td>Discharge Warn patient of RD symptoms</td>
</tr>
</tbody>
</table>
Glaucoma

Clinical Signs/Symptoms | Classification | Suggested Investigations | Management
---|---|---|---
IOP >21-25 ONH Normal | OHT | OCT RNFL Disc photos for records | Yes → Referral RVEEH GEC
No → ACO monitor Low risk review 12 months High risk review 6 months

IOP ≤ 25 ONH suspicious (RNFL loss, asymmetry) | Glaucoma suspect | OCT RNFL Disc photos for records | Yes → Referral RVEEH GEC
No → ACO monitor Low risk review 12 months High risk review 6 months

Any VF defect irrespective of ONH or IOP | | | Referral RVEEH GEC

Above clinical signs In addition signs of PXF, PDS, low CCT, older age or family history | | | Referral RVEEH GEC

IOP ≤ 25 ONH Damage VF defects | POAG or Secondary Glaucoma | Diagnosis early/moderate POAG | Referral RVEEH GEC

IOP >26 | | Diagnosis Advanced POAG indications for surgical intervention | Referral RVEEH GIRU

Signs of Narrow Angles via Van Herick Method (Grade 0-II) | Primary Angle Closure | | Referral RVEEH GEC

Frontal Headaches, Haloes around lights, Blurred vision, nausea, signs of occluded angles | Acute Angle Closure | | Urgent Referral RVEEH ED

Grossly increased IOP for immediate treatment | | | Urgent Referral RVEEH ED
**Headaches**

- **Clinical Symptoms**
- **Clinical signs**
- **Classification**
- **Management**
- **Referral**

**Recurrent mild frontal headache**
- Normal eye examination
- Headache not attributed to eyes
- Discharge to GP for further investigations

**Recurrent mild headache, frontal and in the eyes themselves**
- Absent upon waking
- Aggravated by prolonged visual tasks
- Uncorrected or miscorrected refractive error
- Headache attributed to refractive error
- Prescribe corrective lenses and review 1 week if symptoms relieved
- Yes: ACO review 12 months
- No: Discharge to GP for further investigation

**Recurrent non-pulsatile mild-moderate frontal headache**
- Develops or worsens during a visual task
- Relieved or improved on closing on eye
- Heterophoria or heterotropia with intermittent blurred vision or diplopia
- Difficulty adjusting focus from near and distance objects
- Headache attributed to Heterophoria or heterotropia
- Consider exercises and/or corrective lenses
- Review 2 weeks if symptoms relieved
- Yes: ACO review 6 months
- No: RVEEH review OMC

**Constant headaches**
- Papilloedema
- Referral RVEEH ED

**New onset localised headache- temporal or occipital area**
- Suggestive of GCA
- Referral RVEEH ED

*Source: International Headache Society Guidelines*
Pterygia

Clinical Signs/Symptoms

No irritation
Good cosmesis
Asymptomatic

Mild irritation

Significant inflammation and irritation

Medium- large sized pterygia
Acceptable cosmesis

Medium- large sized pterygia
Encroachment of visual axis
Unacceptable cosmesis

Lesion elevated, gelatinous, deep irregular vascularisation
Suspected Conjunctival Intraepithelial Neoplasia (CIN)

Suggested Investigations

Refraction
Measurement of pterygia
Anterior slit lamp photography

Management

Low risk of progressing
Advise patient on sunglass use
Topical lubricants

Referral

Discharge

ACO monitor
Review 12 months

Topical lubricants

Referral RVEEH GEC

ACO monitor
Review 6 months

Referral RVEEH GEC

Referral RVEEH ECR
Referrals for EMERGENCY DEPARTMENT (ED)

- Grossly elevated IOP for immediate treatment
- Acute Angle Closure Glaucoma
- Recent or sudden LOV for unexplained reason
- Retinal Detachment or tear
- Retinal Artery Occlusion
- Exudative ARMD (when MRET unavailable)
- Eye pain for unexplained reason
- Corneal infiltration or ulceration

For urgent RVEEH review:

Call ED (9929 8333) to speak with Eye Admitting Officer to inform patient to be transferred for RVEEH ED management and possible admission

Call Amanda Hicks - Health Information Services Manager (9929 8233) to inform medical record in transfer

Place patient medical record in the blue folder and direct patient to RVEEH
Referrals for GENERAL EYE CLINIC (GEC)
(This is list is to be used as guide and not exhaustive of all conditions)

**Diagnosis**

- All Active Uveitis with good vision (treatment initiated)
- Blepharitis (Chronic)
- Cataract (for surgery)
- Chalazion >6 weeks
- Choroidal naevus
- Corneal inflammation
- Diabetic retinopathy (mild-moderate)
- Dry eyes (severe)
- Ectropion
- Entropion
- Epi-retinal membrane, symptomatic
- Narrow Angles
- Ocular Hypertension (high risk factors for POAG)
- Posterior Vitreous Detachment (with symptoms)
- Primary Open Angle Glaucoma, Secondary Glaucoma
- Pterygium
- Red eye (chronic)

**Procedures**

- Capsulotomy, Peripheral Iridotomy

---

**For urgent RVEEH review:**

Call General Eye Clinics ANUM (9929 8322) to inform patient to be transferred for same day RVEEH care

Call Amanda Hicks- Health Information Services Manager (9929 8233) to inform medical record in transfer

Place patient medical record in the blue folder and direct patient to RVEEH
Referrals for SPECIAL EYE CLINIC (SEC)
(This is list is to be used as guide and not exhaustive of all conditions)

Corneal Ocular Plastics Clinic (ECOP)
- Conjunctival inflammatory condition

Corneal Clinic (ECR)
- Keratoconus (progressive)
- Corneal disease or opacity not diagnosed

Glaucoma Investigation Research Unit (GIRU)
- Advanced Glaucoma

Medical Retina Clinic (EMR)
- ARMD (Exudative)
- Central serous retinopathy
- Cystoid Macula Oedema
- Diabetic Retinopathy (severe NPDR-PDR)
- Retinal Vein Occlusion

Neuro-ophthalmology Clinic (ENOP)
- Optic Neuritis (diagnosed)
- Suspected or proven GCA
- New onset diplopia in adults

Ocular Immunology Clinic (EOI)
- Chronic uveitis
- Active Uveitis with poor vision

Ocular Motility Clinic (EOM)
- Diplopia
- Neurological palsies
- Strabismus surgery

Oncology Clinic (EONC)
- Intraocular melanoma
- Iris lesions
- Conjunctival lesions

Orbital plastics & Lacrimal Unit (EOPL)
- BCC (suspected)
- Naso-lacrimal duct obstruction
- Proptosis
- Ptosis (surgical repair)

Vitreo-Retinal Unit (VRU)
- Epiretinal membrane with VA <6/9
- Macular Hole (full or partial thickness)
- Retinal Detachment
- Vitreous haemorrhage
Appendix 4: OOWC Patient examination form

<table>
<thead>
<tr>
<th>Reason for referral</th>
<th>Symptoms</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Previous Ocular History</th>
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</thead>
<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>General Health</th>
<th>Current Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Diabetes</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Family History</th>
<th>Allergies</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Current glasses: D / N / B / M</th>
<th>Age of Glasses:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>VA with / without glasses: RE PH LE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PH</td>
</tr>
<tr>
<td>PH</td>
</tr>
<tr>
<td>Near VA</td>
</tr>
</tbody>
</table>
### Refraction:

<table>
<thead>
<tr>
<th>PD</th>
<th>R.</th>
<th>L.</th>
</tr>
</thead>
</table>

### Retinoscopy

<table>
<thead>
<tr>
<th>R.</th>
<th>L.</th>
</tr>
</thead>
</table>

### Subjective

<table>
<thead>
<tr>
<th>RVA</th>
<th>ADD</th>
<th>LVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Near VA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Final Prescription

- □ VES
- □ Replacement Surcharge
- □ C
- □ PP
- □ DVA

**Pupils:** PERLA Marcus Gunn + \(\cdot\) D C N diam=  

**Excursions**

**NPC**

**Cover Test D**

**N**

**Phoria** D  

### External Examination:

**RE**

- Lids/ Lashes
- Conjunctiva
- Cornea
- AC depth
- Lens
- PXF/PDS

**LE**

### IOP

- **CCT**
- **RE:**
- **LE:**

### Internal Examination:

**Mydriasis Y/N**

**Agents used:**

- Macula
- Periphery

### Fundus

- **"**
- **"**
Appendices

DISC

OTHER TESTS:

☐ HVF  ☐ VF confrontation  RE: _______
LE: ______________________

☐ Amsler  RE: ___________________  LE: ______________________

☐ Ishihara  RE: ___________________  LE: ______________________

☐ OCT  ☐ HRT  ☐ GDx  ☐ Fundus photography

☐ Other ____________________________

DIAGNOSIS 1: ____________________________

MANAGEMENT 1: ____________________________

DIAGNOSIS 2: ____________________________

MANAGEMENT 2: ____________________________

Optometrist Name/Signature: ____________________________

Ophthalmologist Name/ Signature: ____________________________

Outcome and Follow Up Plan

☐ Discharge no follow up care required
☐ Discharge to GP for on-going care
☐ Discharge to Low Vision Service
☐ Discharge to ACO for on-going care. Review
☐ RVEEH Review  ☐ GEC  ☐ SEC ___________  ☐ ED  ☐ Copy sent to GP
☐ Medical imaging filed in RVEEH record
Appendix 5: Patient Experience Survey (PES)

Optometry-Ophthalmology Workforce Collaboration Project

Patient experiences survey

Introduction:
Hi I’m calling you today regarding your recent appointment at the Eye & Ear Hospital’s clinic at the Australian College of Optometry. I would like to talk to you about your experiences of the appointment. It should take about 10-15 minutes of your time. All your answers are confidential.

Thinking about before your appointment at the Australian College of Optometry

1. Why did your GP refer you to the Eye and Ear Hospital?

2. Based on the information you received about the Eye and Ear Hospital clinic at the Australian College of Optometry either by phone or by letter, did you understand why you were attending that clinic?
   Yes, □ yes partly, □ No □
   Comment:

3. Are you comfortable reading and understanding messages (letter/calls) in English?
   Yes □ No □ If no, what is your preferred language of communication?

______________
4. Do you have an optometrist that you normally visit? No, (Go to question 6) □ Yes □

If yes, does your GP know about your optometrist? Yes □ No □

5. When was the last time you visited that optometrist? _____ years _____ months

6. Do you have a private ophthalmologist that you normally visit? No, (Go to question 8) □ Yes □

7. When was the last time you visited that ophthalmologist? _____ years _____ months

Getting there - Accessibility

8. When you travelled to the Australian College of Optometry did you travel with someone or alone?
   Alone □ (Go to question 10)
   Partner/spouse/friend □
   Other family member □ Please specify_________________
   Volunteer driver □
   Other □ Please specify_________________

9. Why did you travel with this person? (Tick all that apply)
   Company □
   Interpreter □
   Unable to drive because of vision □
   Unable/lacks confidence to travel alone on public transport □
   Other □ Please specify_________________

10. Was it convenient for you to travel to this clinic? Yes, □ yes partly, □ No □
   Comment:
Consultation:

11. Did a member of staff at the Australian College of Optometry explain what would happen to you during your clinic appointment?

Yes, □ yes partly, □ don’t remember, □ No □

Comment:

12. How would you rate the following during your clinic appointment:

a. the politeness of the optometrist? Excellent 5 4 3 2 Poor

b. the communication of other Australian College of Optometry staff? (Eg reception, dispensary)

   Excellent 5 4 3 2 1 Poor

   Excellent, very good, good, fair, poor

c. the amount of time you had to discuss your eye problem/s with the optometrist?

   Excellent 5 4 3 2 1 Poor

   Excellent, very good, good, fair, poor

d. the advice provided by the optometrist during your eye exam?

   Excellent 5 4 3 2 1 Poor

   Excellent, very good, good, fair, poor

13. Did a member of staff explain the results of your eye exam in a way you could understand?

Yes, □ yes partly, □ don’t remember, □ No □
Comment:

14. During your clinic appointment did you feel that all your questions and problems were dealt with satisfactorily?
   Yes, [ ] yes partly [ ] don’t remember, [ ] No [ ]

Comment:

**Glasses (if purchased)**

15. Did you feel under pressure to purchase new glasses?
   Yes, [ ] yes partly, [ ] don’t remember, [ ] No [ ]

Comment:

**Leaving the Australian College of Optometry**

16. Were you happy with the length of time you spent at the Australian College of Optometry?
   Yes, [ ] yes partly, [ ] don’t remember, [ ] No [ ]

Comment:

17. Thinking about your eye exam were you satisfied with the outcome of your appointment?
   Very satisfied [5 4 3 2 1] very dissatisfied
   Very satisfied, satisfied, neutral, dissatisfied, very dissatisfied

Comment:

18. Thinking about your eye exam did you understand the information you were given about the next steps (including discharge and follow up plans)?
   Yes, [ ] yes partly, [ ] don’t remember, [ ] No [ ]
19. How would you rate the information you were given about the next steps (including discharge or follow up plans)?

Excellent | Very Good | Good | Fair | Poor
---|---|---|---|---
5 | 4 | 3 | 2 | 1

Excellent, very good, good, fair, poor

Comment:

20. How would you rate the quality of care provided by the clinic at the Australian College of Optometry?

Excellent | Very Good | Good | Fair | Poor
---|---|---|---|---
5 | 4 | 3 | 2 | 1

Excellent, very good, good, fair, poor

Comment:

21. Is there anything else you would like to tell us about your experience at the clinic at the Australian College of Optometry?

Thank you for your help. Your time and feedback is much appreciated.
Appendix 6: Optometrists’ feedback survey

Optometry-Ophthalmology Workforce Collaboration Project

ACO Optometrist Survey. (Participation in this survey is voluntary).

**Overall experience**

a) Were you satisfied with your involvement in this innovative project?

- [ ] very satisfied  
- [ ] satisfied  
- [ ] unsatisfied  
- [ ] very unsatisfied

Please give reasons for your answer.

b) Were your initial expectations met?

- [ ] yes  
- [ ] partly  
- [ ] no

Please give reasons for your answer.

c) Would you like to continue to be involved in this model of care in the future?

- [ ] yes  
- [ ] no

Please give reasons for your answer.

d) Has your involvement in the project inspired you to be involved in different ways of working for the Optometry profession?

- [ ] yes  
- [ ] partly  
- [ ] no

Please give reasons for your answer

**Teaching and Education**

a) Did you benefit clinically working alongside an Ophthalmologist?

- [ ] yes  
- [ ] partly  
- [ ] no

Please give reasons for your answer.

b) Do you see this model of care as an opportunity to share knowledge with your Optometry colleagues?

- [ ] yes  
- [ ] partly  
- [ ] no

Please give reasons for your answer.

c) Did you benefit from the post clinic tutorials?

- [ ] yes  
- [ ] partly  
- [ ] no

Please give reasons for your answer.

d) Would you like these tutorials to be ongoing as part of this model of care?

- [ ] yes  
- [ ] no
Appendices

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e) If yes, what topics would you like to be presented and do you like them at the end of the day or at another time?

f) What professional support would you require to continue to be involved in this model of care?

Model of Care
a) What do you think worked well for you with the model of care?

b) What do you think did not work well for you with the model of care?

c) Were the clinical guidelines and referral pathways an effective clinical tool for this model of care?
☐ yes ☐ partly ☐ no

Please give reasons for your answer

d) What benefits do you think this model of care can offer patients?

Future
a) What future do you see for the Optometry and Ophthalmology clinical collaboration as a model of care?

b) How do you think this model of care will impact the future of the Optometry profession?

Any other comments

Thank you for your time and participation, your feedback is greatly appreciated.
Appendix 7: GP feedback survey

Optometry-Ophthalmology Workforce Collaboration Project
GP FEEDBACK SURVEY

Dear GP,
The Optometry-Ophthalmology Workforce Collaboration Project tested an integrated model of care where patients referred to the RVEEH by GPs for non-specific eye conditions were assessed by Optometrists under the supervision of an RVEEH Ophthalmologist. We would like some feedback on your understanding of the project and outcome of your patient’s attendance. Participation in this survey is voluntary.

INSTRUCTIONS: Please tick any response that applies. Please write any comments.

SURVEY QUESTIONS:

Overall, how satisfied are you with the communication regarding your patient’s involvement in the project?
- [ ] very satisfied
- [ ] satisfied
- [ ] unsatisfied
- [ ] very unsatisfied

Is it useful to receive your patient’s assessment sheet?
- [ ] very useful
- [ ] useful
- [ ] a little useful
- [ ] not very useful

Was it easy to understand your patient’s appointment outcome and management plan?
- [ ] very easy
- [ ] easy
- [ ] difficult
- [ ] very difficult
If difficult, why?

Have you directly referred to the Australian College of Optometry (ACO) before?
- [ ] yes frequently
- [ ] yes occasionally
- [ ] never

In the future, would you consider referring directly to the ACO?
- [ ] yes frequently
- [ ] yes occasionally
- [ ] no

Do you think your referral practices will be influenced by this project?
- [ ] yes definitely
- [ ] possibly
- [ ] no

Any other comments:

Thank you for your time and assistance
GP Name/Stamp:

You may be randomly selected for a 10 minute phone call to further discuss your feedback. Please indicate suitable days: and times:

☐ Please tick if you do not wish to receive a follow up phone call.

Please FAX this form to Project Manager, Stephanie Tsonis, Royal Victorian Eye and Ear Hospital

FAX NUMBER: 9929 8966

PATIENT RVEEH UR: ____________________________
Appendices

Appendix 8: Letter to referrer

Dear Dr…………………………….,

Re: (patient details)

To expedite the first appointment of your patient the hospital is currently trialling a new referral pathway. Your patient will be attending the Royal Victorian Eye and Ear Hospital (RVEEH) clinic at the Australian College of Optometry (ACO) in Carlton (Corner Keppel and Cardigan Streets), for their first appointment. An optometry assessment will be performed under the supervision of an RVEEH ophthalmologist to provide an initial work-up and determine the most appropriate clinical setting for your patient’s care.

Not all patients referred to the RVEEH will attend the ACO for optometry assessment. Once completed, the pilot will be subject to analysis to assess the benefits and efficacy of this process. Continued refinement of our protocols and systems will improve the care we can offer your patient.

We hope with the better use of community optometry workforce we can reduce clinic waiting times at the RVEEH and offer swifter access to more specialised care should it be required for your patient.

A clinical summary of your patient’s visit will be sent to you. Your patient’s appointment details are:

If you have any questions about this pilot hospital clinic, please contact Project Manager, Stephanie Tsonis on 9929 8453 or Stephanie.Tsonis@eyeandear.org.au. If you have any questions about your patient’s appointment please contact us at the Outpatient Bookings Unit on 9929 8500 between 8.00am and 4.30pm weekdays (Fax: 9929 8404).
Appendix 9: Letter to GP

This letter is to inform you of the outcome of your patient’s attendance to the pilot hospital clinic at the Australian College of Optometry, Carlton.

Please see the attached assessment form for a clinical summary and diagnosis.

The following management plan has been decided:

- [ ] Further follow up and management in our Outpatient Services East Melbourne
- [ ] Ongoing care at the Australian College of Optometry
- [ ] Discharge - no follow up appointment is required. If you feel specialist assessment is required in the future, a new referral will be required.

If you have any questions about our Outpatient Services please contact us at the Outpatient Bookings Unit on 9929 8500 (Fax: 9929 8404). Assistance is available between the hours of 8.00am and 4.30pm, Monday to Friday. (Closed on Public Holidays and Weekends)
# Appendix 10: Operational costs of the OOWC per annum

## Proposed Model

<table>
<thead>
<tr>
<th>To achieve 72 patients attending, need to book in 88 with the cancelled/FTA rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients booked</td>
</tr>
<tr>
<td>Attendance rate</td>
</tr>
<tr>
<td>Patients attending</td>
</tr>
<tr>
<td>Patients to see ophthalmological (ophthal)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>RVEEH</th>
<th>ACO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Revenue</strong></td>
<td>55% Patients to see Ophthal</td>
<td>-10%</td>
</tr>
<tr>
<td>Consulting revenue</td>
<td>34,272</td>
<td>28,274</td>
</tr>
<tr>
<td>Dispensing profit (lenses)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Revenue</strong></td>
<td>34,272</td>
<td>28,274</td>
</tr>
<tr>
<td><strong>Less Expenses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salary Expense (inc oncosts)</td>
<td>29,234</td>
<td>29,234</td>
</tr>
<tr>
<td>Interpreter Service</td>
<td>14,040</td>
<td>14,040</td>
</tr>
<tr>
<td>Consumable Costs</td>
<td>1,168</td>
<td>1,168</td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
<td>30,402</td>
<td>30,402</td>
</tr>
<tr>
<td><strong>Total Operating Surplus/Deficit, after first year transition costs</strong></td>
<td>3,870</td>
<td>-2,128</td>
</tr>
<tr>
<td><strong>One Off Costs</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Setup capital</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>Transition Costs</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td><strong>Total One Off Costs</strong></td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td><strong>Total First Year Surplus/(Deficit) - projected</strong></td>
<td>3,670</td>
<td>-2,328</td>
</tr>
</tbody>
</table>

Unrealised Gain/Loss:
- ACO unrealised gain (55% patients visit after the first consulting) | 27,939 |

**Total First Year Surplus/(Deficit) inclusive unrealised costs** | 3,670 | -2,328 | 9,667 | 17,588 |

## Alternate RVEEH internal model

<table>
<thead>
<tr>
<th>Revenue</th>
<th>VACS</th>
<th>143,150</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Revenue</strong></td>
<td>143,150</td>
<td>0</td>
</tr>
<tr>
<td><strong>Less Expenses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salary Expense (inc oncosts)</td>
<td>111,956</td>
<td>111,956</td>
</tr>
<tr>
<td>Interpreter</td>
<td>14,040</td>
<td>14,040</td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
<td>125,996</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Surplus/(Deficit)</strong></td>
<td>17,154</td>
<td>0</td>
</tr>
</tbody>
</table>

*Note: VACS cap currently breached, therefore, no revenue possible*

Please note
- Alternate model calculation is based on average revenue and expenses (exc other expenses) in Gen Eye Clinic 1-5 (assumed clinics only run once per month)
Author/s:
Tsonis, Stephanie

Title:
The role and benefits of collaborative care through task sharing in eye health service delivery

Date:
2015

Persistent Link:
http://hdl.handle.net/11343/58160

File Description:
The role and benefits of collaborative care through task sharing in eye health service delivery