

# Real-time teleophthalmology in rural Western Australia: a service evaluation

Johnson KA, Meyer JY & Turner AW

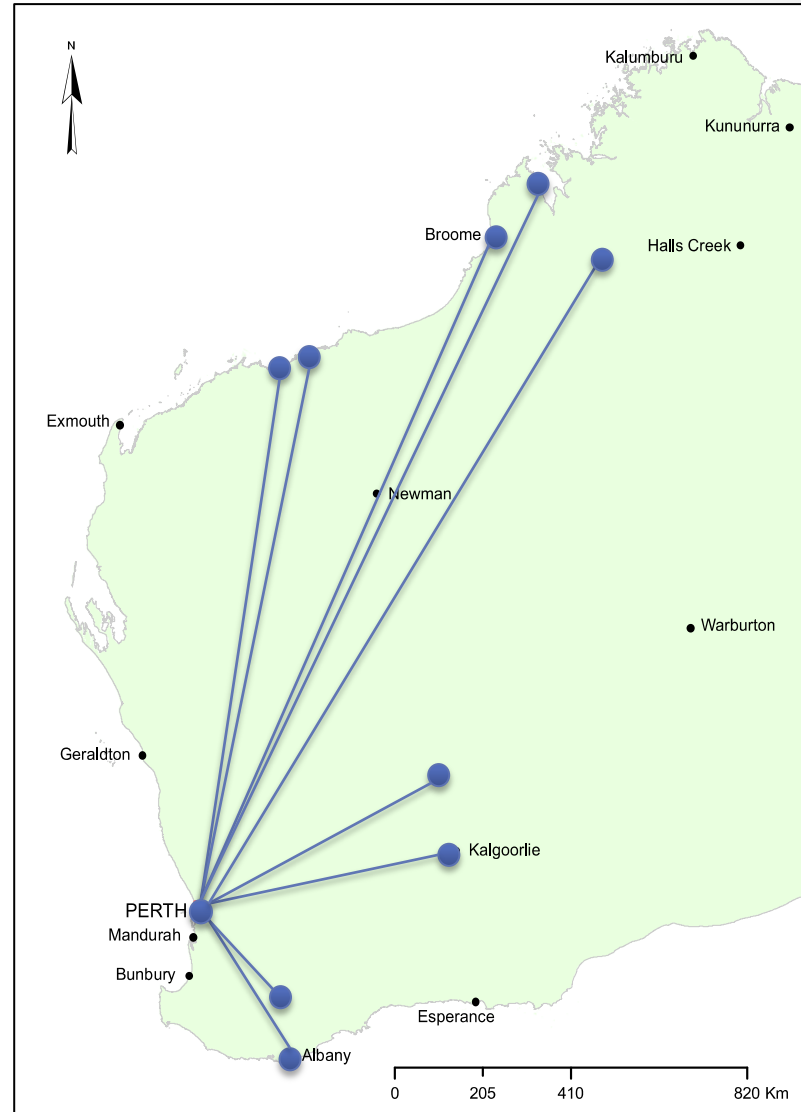
*Lions Eye Institute*



THE UNIVERSITY OF  
WESTERN AUSTRALIA

*Achieving International Excellence*

# The service...



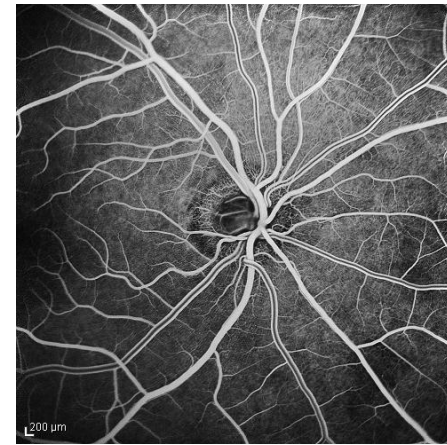
This map is adapted from Telehealth Eligible Service Areas available from:  
<http://www.mbsonline.gov.au/internet/mbsonline/publishing.nsf/content/connectinghealthservices-eligible-geo>

# Aims of the evaluation

- Who is using the service?
- What is the service being used for?
- How is the service being used?

# What is telemedicine?

- Definition
- Store-and-forward vs Real-time



## The reported benefits of telehealth for rural Australians

*Jennifer J. Moffatt*<sup>1,2</sup> PhD, Postdoctoral Research Fellow

*Diann S. Eley*<sup>1</sup> MSc, PhD, Research Director

<sup>1</sup>The University of Queensland, School of Medicine, Rural Clinical School, Locked Bag 9009, Toowoomba DC, QLD 4350, Australia. Email: d.eley@uq.edu.au

<sup>2</sup>Corresponding author. Email: j.moffatt@uq.edu.au

### Abstract

**Objective.** A literature review was conducted to identify the reported benefits attributed to telehealth for people living and professionals working in rural and remote areas of Australia.

**Data sources.** Scopus and relevant journals and websites were searched using the terms: telemedicine, telehealth, telepsychiatry, teledermatology, teleradiology, Australia, and each state and territory. Publications since 1998 were included.

**Study selection.** The initial search resulted in 176 articles, which was reduced to 143 when research reporting on Australian rural, regional or remote populations was selected.

**Data synthesis.** A narrative review was conducted using an existing ‘benefits’ framework. Patients are reported to have benefited from: lower costs and reduced inconvenience while accessing specialist health services; improved access to services and improved quality of clinical services. Health professionals are reported to have benefited from: access to continuing education and professional development; provision of enhanced local services; experiential learning, networking and collaboration.

**Discussion.** Rural Australians have reportedly benefited from telehealth. The reported improved access and quality of clinical care available to rural Australians through telemedicine and telehealth may contribute to decreasing the urban–rural health disparities. The reported professional development opportunities and support from specialists through the use of telehealth may contribute to improved rural medical workforce recruitment and retention.





# PUBLIC HEALTH AND THE EYE

DONALD FONG AND JOHANNA SEDDON, EDITORS

## Telemedicine and Ophthalmology

Helen K. Li, MD

*Department of Ophthalmology and Visual Sciences, University of Texas Medical Branch, Galveston, Texas, USA*

**Abstract.** Technology to create and move multimedia medical information is creating alternatives to physically transporting patients and health care professionals. Teletechnology is a physician extender, both supplementing and reinventing traditional health care delivery systems. The potential of comprehensive teleophthalmology is compelling. This article provides a historical perspective of telemedicine, describes various teleophthalmology systems, and surveys teleophthalmology in clinical consultation, research, and education programs around the world. It also discusses basic issues in applying teleophthalmology to public health. (*Surv Ophthalmol* 44:61–72, 1999. © 1999 by Elsevier Science Inc. All rights reserved.)xc

**Key words.** diabetic retinopathy • telemedicine • teleophthalmology • public health

# Method of evaluation

Date of consult: \_\_\_/\_\_\_/\_\_\_

Consult number (K): \_\_\_\_\_

**TELEOPHTHALMOLOGY, AUDIT, DATA, COLLECTION, SHEET**

**1. PATIENT DEMOGRAPHICS**

Name: \_\_\_\_\_

DOB: \_\_\_/\_\_\_/\_\_\_

Gender:      M      F

Indigenous status:      ATSI      non-Indigenous

Hometown: \_\_\_\_\_

**2. REFERRAL INFORMATION**

Date of referral: \_\_\_/\_\_\_/\_\_\_

Mode of referral:      Email      Fax      Paper

Referring practitioner:

- |  |                                       |
|--|---------------------------------------|
| <input type="checkbox"/> Optometrist           | <input type="checkbox"/> Hospital DMO |
| <input type="checkbox"/> GP – AMS              | <input type="checkbox"/> Other _____  |
| <input type="checkbox"/> GP – Private practice |                                       |

Location:

- |                                    |                                       |
|------------------------------------|---------------------------------------|
| <input type="checkbox"/> Albany    | <input type="checkbox"/> Kalgoorlie   |
| <input type="checkbox"/> Broome    | <input type="checkbox"/> Karratha     |
| <input type="checkbox"/> Derby     | <input type="checkbox"/> Roebourne    |
| <input type="checkbox"/> Kununurra | <input type="checkbox"/> Other: _____ |

Reason for referral: \_\_\_\_\_ OR      Follow-up

Booking:      scheduled      unscheduled

Mode of booking:

- |  |  |
|--|--|
| <input type="checkbox"/> Telephone with specialist | <input type="checkbox"/> Telephone with PA |
| <input type="checkbox"/> SMS with specialist       | <input type="checkbox"/> Email with PA     |
| <input type="checkbox"/> Email with specialist     | <input type="checkbox"/> Other: _____      |

**3. TECHNICAL INFORMATION**

Telehealth mode:      store-and-forward      real-time

Specialist location:      At base practice      On the road

VC software:      N/A      Skype      Scopia      Other: \_\_\_\_\_

Referral medical record:      MMEx      Communicare      Private records

Images provided:      Y      N

Are they adequate:      Y      N      If no explain: \_\_\_\_\_

Equipment used to take image:

- |   |  |
|---|--|
| <input type="checkbox"/> digital camera | <input type="checkbox"/> fundus camera |
| <input type="checkbox"/> smartphone     | <input type="checkbox"/> OCT           |
| <input type="checkbox"/> slit lamp      | <input type="checkbox"/> perimeter     |
| <input type="checkbox"/> other: _____   |  |

Describe any technical difficulties experienced: \_\_\_\_\_

**4. CLINICAL INFORMATION**

Duration of consult: \_\_\_\_\_ mins

Diagnosis: \_\_\_\_\_

Was this diagnosis known before the consult?      Y      N

Treatment:      none required      to be determined      as below

Follow-up plan location:

- |   |   |
|---|---|
| <input type="checkbox"/> None required            | <input type="checkbox"/> Local hospital               |
| <input type="checkbox"/> GP                       | <input type="checkbox"/> Metropolitan transfer        |
| <input type="checkbox"/> Optometrist              | <input type="checkbox"/> Ophthalmologist – telehealth |
| <input type="checkbox"/> Aboriginal health worker | <input type="checkbox"/> Ophthalmologist – outpatient |

Follow-up plan timeframe: \_\_\_\_\_

Describe any other difficulties experienced: \_\_\_\_\_

# Aims of the evaluation

- Who is using the service
- What is the service being used for
- How is the service being used

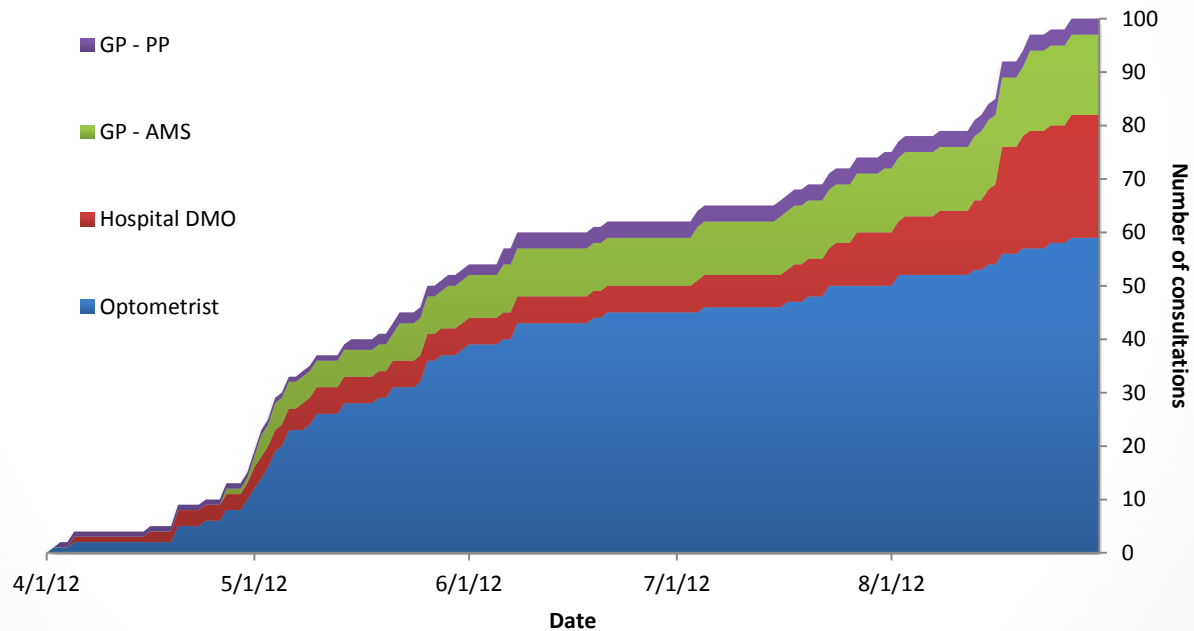
# Patients using the service

**Table 1. Demographic data of the participants**

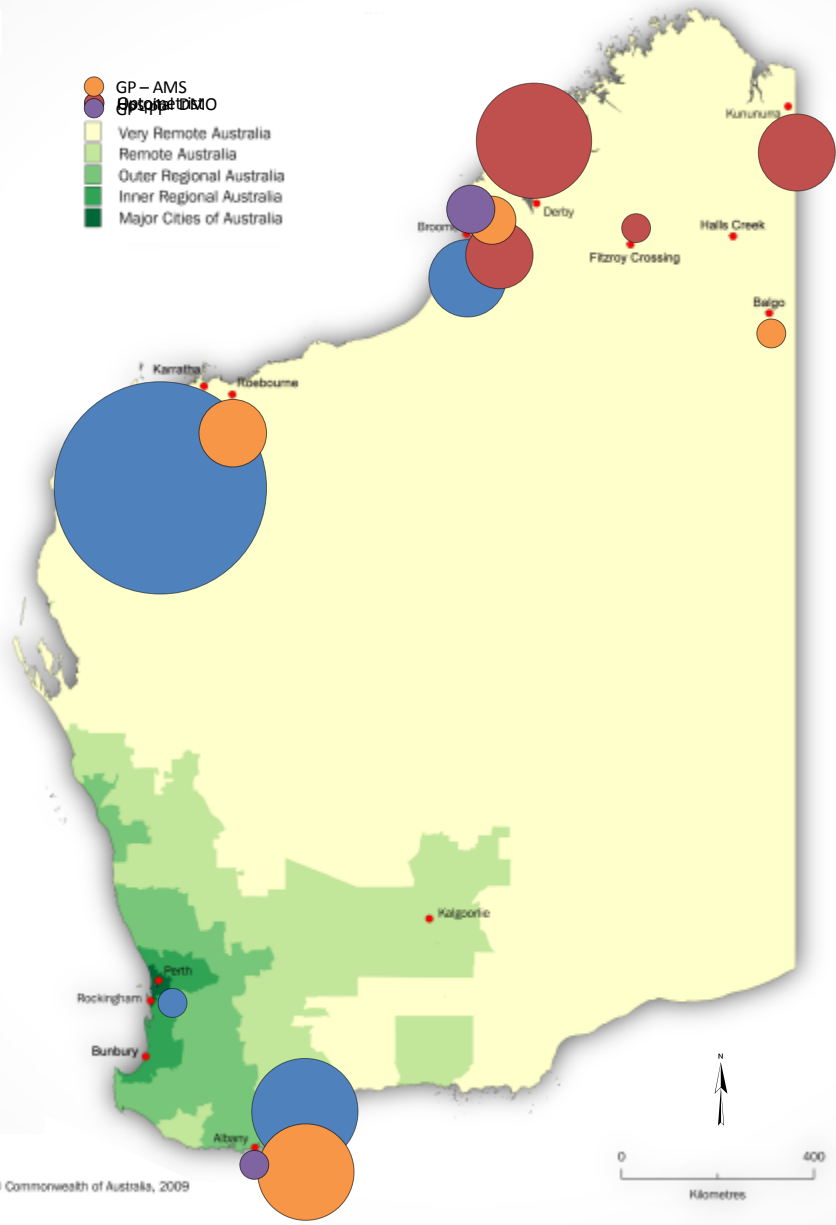
	Number of Participants (%)
<b>Gender</b>	
Males	49 (58%)
Females	36 (42%)
<b>Ethnicity</b>	
ATSI*	31 (37%)
Non-Indigenous	42 (49%)
Unknown	12 (14%)
<b>Residential Region</b>	
Kimberley	28 (33%)
Pilbara	31 (36%)
Great Southern	20 (24%)
Perth Metro	4 (5%)
Interstate	1 (1%)
Overseas	1 (1%)

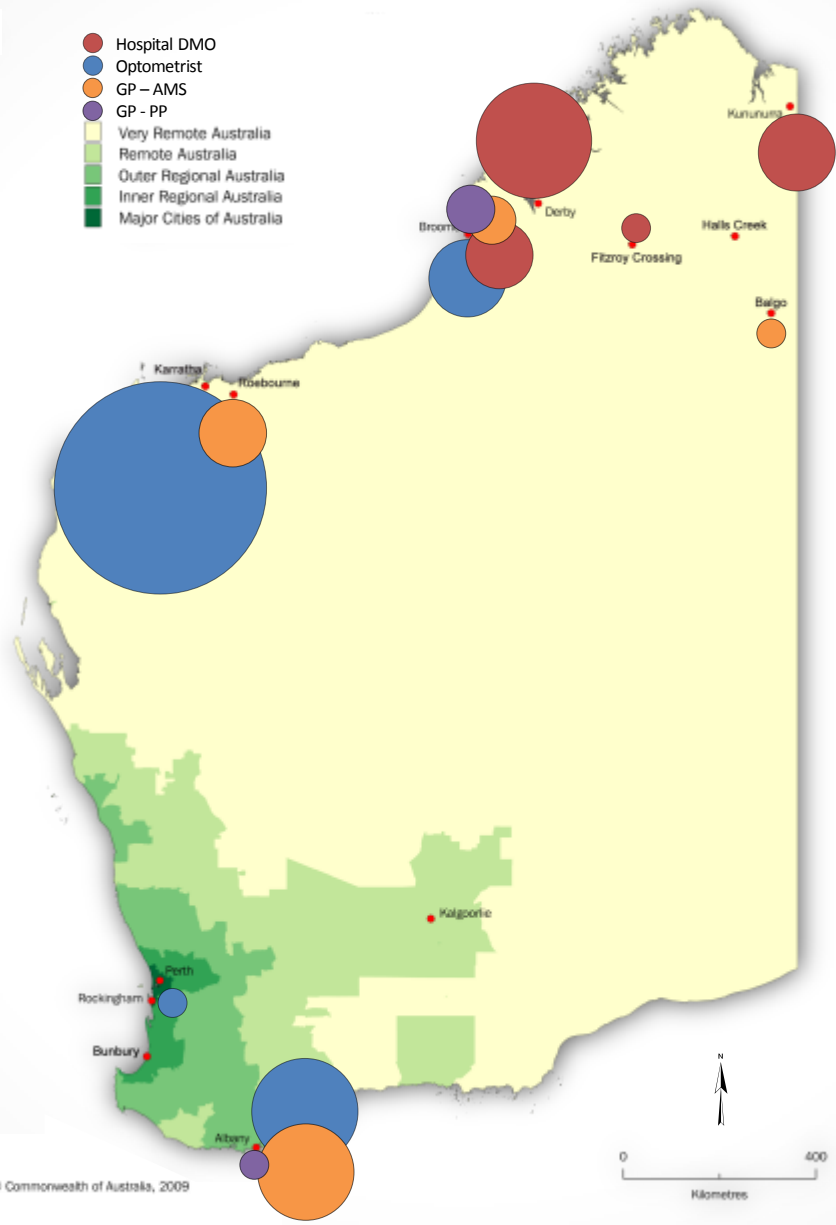
\*ATSI = Aboriginal or Torres Strait Islander.

# Referring practitioners using the service



**Figure 1. The cumulative number of real-time teleophthalmology consultations by referring health practitioner.** 'GP - PP' is a general practitioner in a private practice. 'GP - AMS' is a general practitioner in an Aboriginal Medical Service.





# Aims of the evaluation

- Who's using the service
- What is the service being used for
- How is the service being used

## Reasons for consultation

- 56 diagnosis & management
- 32 management for known diagnosis
- 12 follow-up

**Table 2. The reasons for real-time tele-ophthalmology consultations when the diagnosis was not known prior to the consultation (n=56).**

Reason for consultation	Frequency
Diabetic retinopathy screening	16
Red eye	16
Vision loss	
Painless	5
Painful	2
Flashes and/or floaters	5
Painful eye	3
Abnormal image	
Retinal photo	2
OCT	1
Other	
Glaucoma suspect	2
Eyelid pathology	2
Diplopia	1
Headache	1

- 32 diagnoses managed

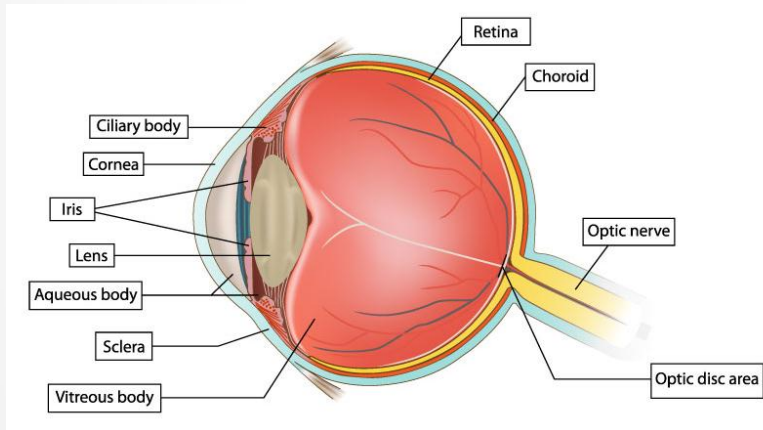


Table 3. The working diagnoses managed by real-time teleophthalmology consultations (n=88).

Diagnostic category	Diagnosis	Diagnosis unknown prior (n=56)	Diagnosis known prior (n=32)
External eye	Blepharitis	1	1
	BCC eyelid	1	-
	Chalazion	1	-
Conjunctiva	Pterygium	3	-
	Allergic conjunctivitis	1	1
	Bacterial conjunctivitis	1	-
	Episcleritis	1	-
	Subconjunctival haemorrhage	1	-
Cornea	Foreign body	-	2
	HSV keratitis	1	1
	Marginal keratitis	1	-
	Microbial keratitis	1	-
	Adenoviral corneal infiltrates	1	-
	Corneal oedema	1	-
	-	-	-
Anterior chamber	Anterior uveitis	-	-
	Idiopathic	4	4
	Shingles	1	2
	Hypohaema	1	-
Lens	Cataract	-	-
	Age-related	1	2
	Traumatic	-	1
	Congenital	-	1
	Posterior capsular opacification	1	-
Retina	Diabetic retinopathy	-	-
	Diabetic retinopathy only	4	-
	Diabetic maculopathy	3	1
	Posterior vitreous detachment	2	1
	Retinal tear	2	-
	Age-related macular degeneration	-	1
	Branch retinal vein occlusion	-	1
	RPE detachment	1	-
	Retinal oedema	1	-
	-	-	-
	-	-	-
Optic disc	Primary open angle glaucoma	-	9
	Myelinated nerve fibre layer	1	-
Other	Ocular migraine	2	-
	Benign intracranial hypertension	-	2
	Couzon syndrome	-	1
	Simple anisocoria	1	-
	4 <sup>th</sup> nerve palsy	1	-
Normal/Unknown	Normal	13	1
	Unknown	2	-

# Management plan

Management plans for initial teleophthalmology consultations

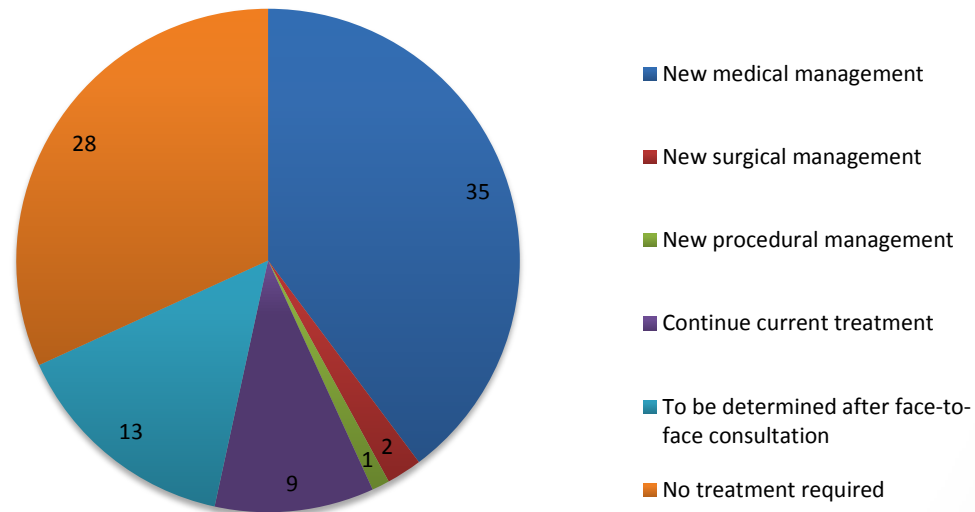
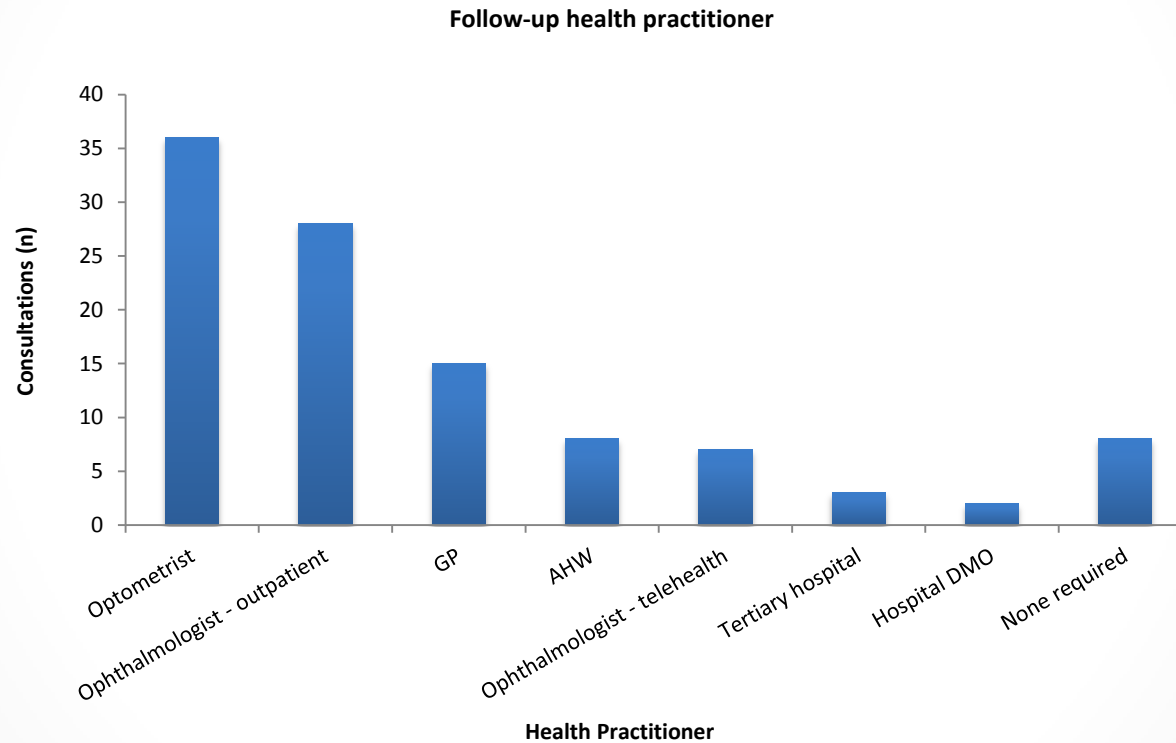


Figure 2. The different management plans provided in the initial video-consultations (n=88).

# Follow-up plan



**Figure 3. The number of consultations in which health practitioners were recommended in the follow-up plan (n=100). GP = general practitioner, AHW = Aboriginal Health Worker, Hospital DMO = hospital district medical officer.**

# Aims of the evaluation

- Who is using the service
- What is the service is being used for
- How is the service is being used

# Means of booking the consultation

**Table 4. The means of organizing a video-consultation by referring health practitioner.** Percentages are the proportion of unscheduled/scheduled consultations for each specialist.

	Unscheduled (n=86)	Scheduled (n=14)
Optometrist	47 (80%)	12 (20%)
Hospital DMO	22 (96%)	1 (4%)
GP	17 (94%)	1 (6%)

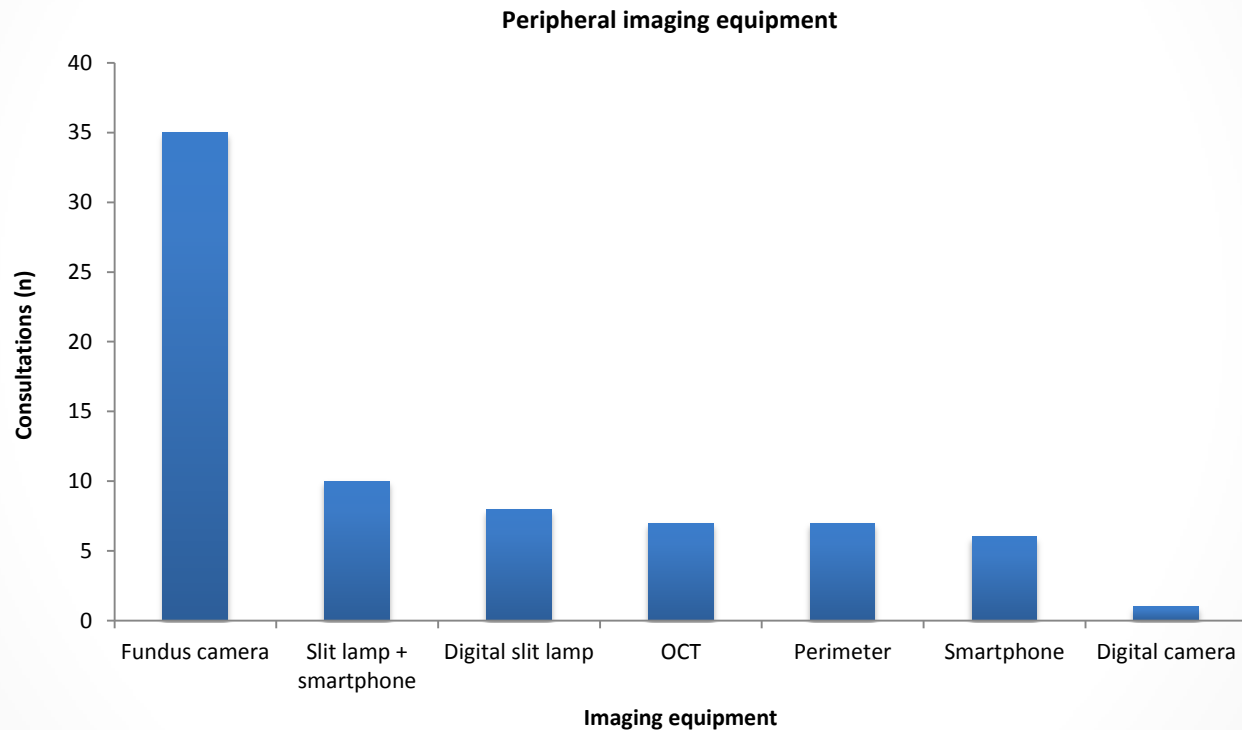
# Video-conferencing software used



versus



# Images provided



**Figure 4.** The number of consultations in which peripheral imaging equipment was used (n=63). OCT = optical coherence tomography. Note that some consultations had multiple images from different types of peripheral imaging equipment thus in this figure n>63.



+

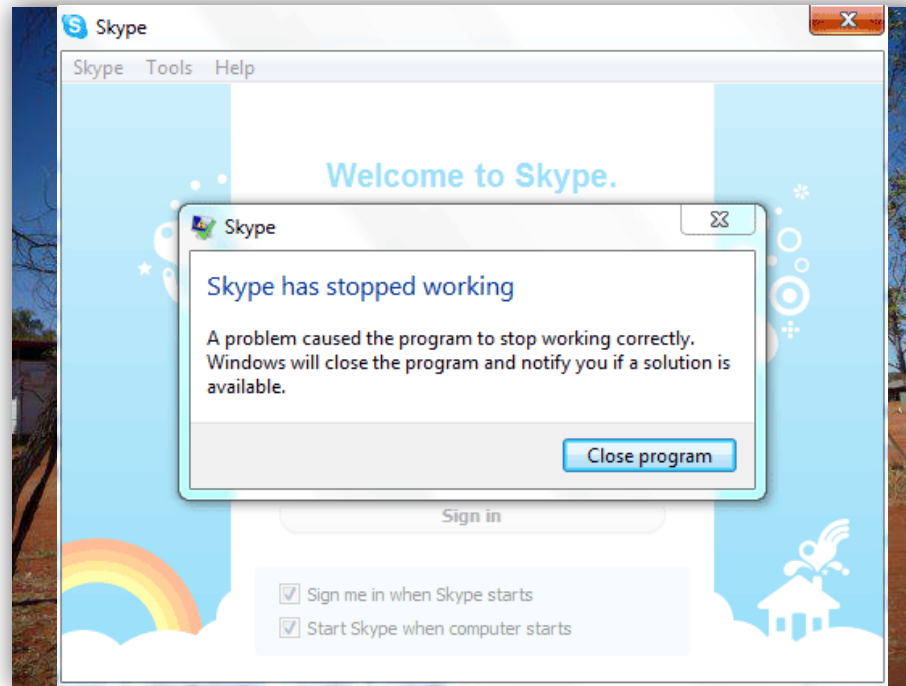


# Technical difficulties

Table 5. The reported technical difficulties for real-time consultations (n=7).

	Technical difficulty
<b>Connection problem</b> (n=4)	<i>"Scopia access problem (wasted 30 minutes)"</i> <i>"internet connection problem"</i> <i>"poor connection, had to revert to phone"</i> <i>"no audio received, had to use phone line"</i>
<b>Imaging problem</b> (n=3)	<i>"slit lamp globe broken"*</i> <i>"visual field testing results couldn't be uploaded"</i>

# The barriers...



# Conclusion

# Acknowledgements

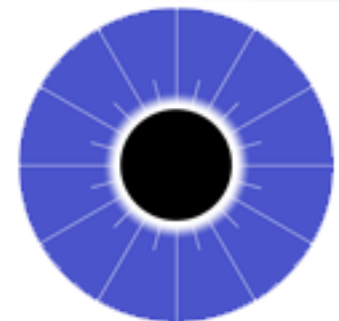
- Assoc/Prof Angus Turner, Joos Meyer, Seyhan Yazar, Dr Maria Franchina, Dr Alex Hewitt, Prof Mackey
- Alvina King Scholarship



THE UNIVERSITY OF  
WESTERN AUSTRALIA

*Achieving International Excellence*

*Lions Eye Institute*



EYE SURGERY  
FOUNDATION

Any Questions?

