



OPEN ACCESS

# Establishing a method to estimate the effect of antimyopia management options on lifetime cost of myopia

Tim R Fricke <sup>1,2,3</sup> Padmaja Sankaridurg <sup>1,3</sup> Thomas Naduvilath,<sup>1,3</sup>  
Serge Resnikoff,<sup>1,3</sup> Nina Tahhan,<sup>1,3</sup> Mingguang He,<sup>4,5</sup> Kevin D Frick <sup>6</sup>

► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/bjophthalmol-2021-320318>).

<sup>1</sup>Brien Holden Vision Institute, Sydney, New South Wales, Australia

<sup>2</sup>Department of Optometry and Vision Sciences, University of Melbourne, Melbourne, Victoria, Australia

<sup>3</sup>School of Optometry and Vision Science, University of New South Wales, Sydney, New South Wales, Australia

<sup>4</sup>Zhongshan Ophthalmic Center, Sun Yat-Sen University, Guangzhou, Guangdong, China

<sup>5</sup>Centre for Eye Research Australia, Royal Victorian Eye and Ear Hospital, East Melbourne, Victoria, Australia  
<sup>6</sup>Johns Hopkins Carey Business School, Baltimore, Maryland, USA

## Correspondence to

Mr Tim R Fricke, Brien Holden Vision Institute, Sydney, New South Wales, Australia; [t.fricke@bhvi.org](mailto:t.fricke@bhvi.org)

Received 25 August 2021  
Accepted 21 February 2022  
Published Online First  
8 March 2022



© Author(s) (or their employer(s)) 2023. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

**To cite:** Fricke TR, Sankaridurg P, Naduvilath T, et al. *Br J Ophthalmol* 2023;**107**:1043–1050.

## ABSTRACT

**Background** Informed decisions on myopia management require an understanding of financial impact. We describe methodology for estimating lifetime myopia costs, with comparison across management options, using exemplars in Australia and China.

**Methods** We demonstrate a process for modelling lifetime costs of traditional myopia management (TMM=full, single-vision correction) and active myopia management (AMM) options with clinically meaningful treatment efficacy. Evidence-based, location-specific and ethnicity-specific progression data determined the likelihood of all possible refractive outcomes. Myopia care costs were collected from published sources and key informants. Refractive and ocular health decisions were based on standard clinical protocols that responded to the speed of progression, level of myopia, and associated risks of pathology and vision impairment. We used the progressions, costs, protocols and risks to estimate and compare lifetime cost of myopia under each scenario and tested the effect of 0%, 3% and 5% annual discounting, where discounting adjusts future costs to 2020 value.

**Results** Low-dose atropine, antimyopia spectacles, antimyopia multifocal soft contact lenses and orthokeratology met our AMM inclusion criteria. Lifetime cost for TMM with 3% discounting was US\$7437 (CI US\$4953 to US\$10 740) in Australia and US\$8006 (CI US\$3026 to US\$13 707) in China. The lowest lifetime cost options with 3% discounting were antimyopia spectacles (US\$7280, CI US\$5246 to US\$9888) in Australia and low-dose atropine (US\$4453, CI US\$2136 to US\$9115) in China.

**Conclusions** Financial investment in AMM during childhood may be balanced or exceeded across a lifetime by reduced refractive progression, simpler lenses, and reduced risk of pathology and vision loss. Our methodology can be applied to estimate cost in comparable scenarios.

## INTRODUCTION

Myopia, high myopia and associated pathological complications are large and growing problems with significant costs.<sup>1–6</sup> Traditional myopia management (TMM) provides single-vision optical correction of a person's full refractive error throughout childhood and beyond, responding to progression and complication as they occur. There are now also a range of active myopia management (AMM) options, including atropine, novel spectacle designs and specialised contact lenses.<sup>7</sup> AMM options have

demonstrated around 50% reduction in myopia progression compared with TMM during childhood.<sup>7–13</sup> Some efficacy questions remain, but the lack of broader value analysis creates perhaps greater uncertainty regarding public health, industry and clinical approaches to childhood myopia.<sup>7 14 15</sup>

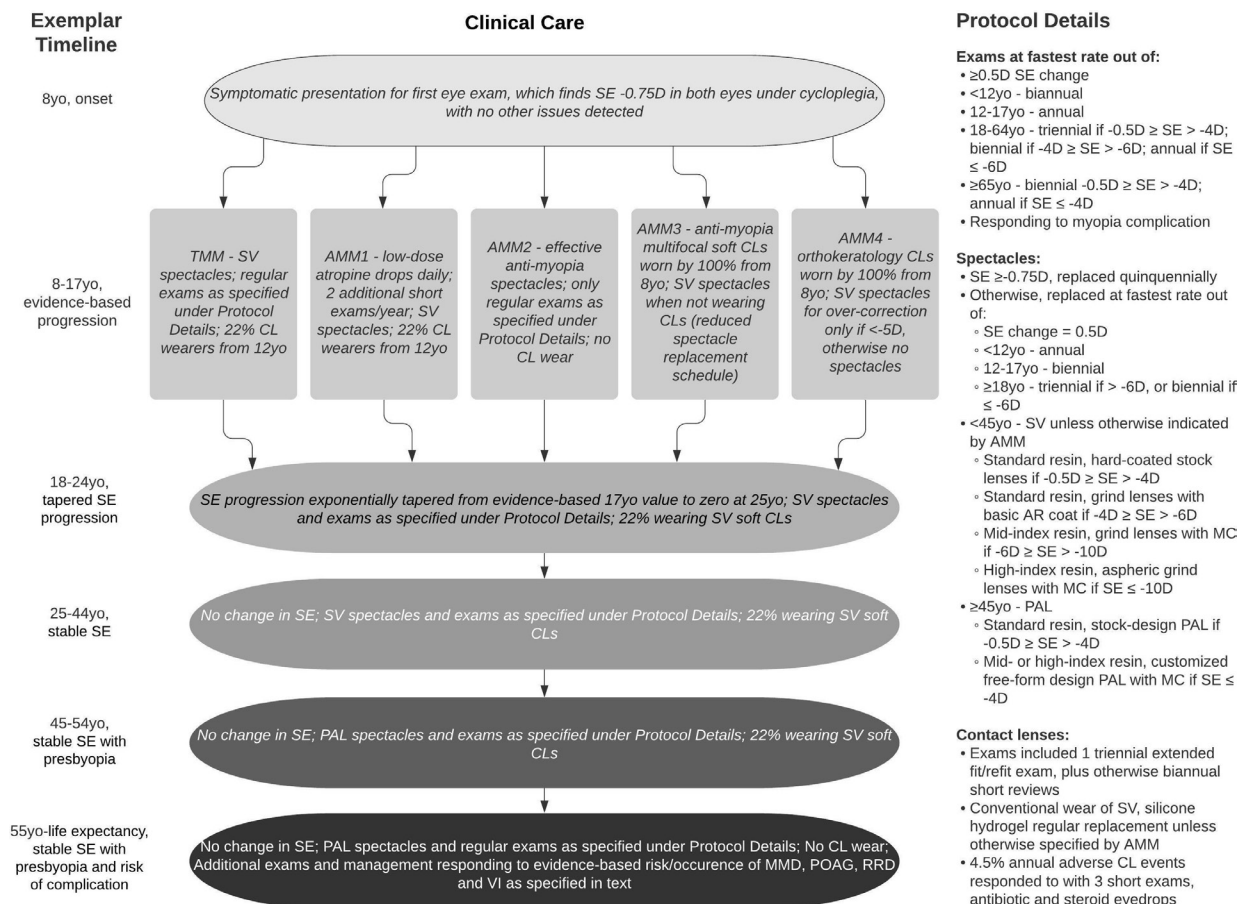
AMM options have implementation costs in childhood, whereas savings from lower myopia are likely later in life.<sup>16</sup> For instance, the frequency of myopia complications later in life increases markedly with the level of myopia.<sup>6 17 18</sup> Individuals, and the health practitioners, systems and funders that support them, face an early choice between TMM and various AMM options. In addition to efficacy evidence, they deserve evidence on the value proposition of their choices.

We compared estimated lifetime societal costs between TMM and AMM options for an 8-year-old child who presents with  $-0.75D$  myopia in both eyes. Estimates were completed for ethnic majority, urban dwellers in Australia and China, providing contrasting myopia and health system situations. We present these as exemplars of a methodology that can be applied to myopia of any amount, at any age, in any place and ethnicity, and can be updated for new costs or new AMM options as they become available.

## METHODS

TMM served as our reference case.<sup>19</sup> AMM options were identified via PubMed without restriction using terms “myopia”, “progression” AND “clinical trial”, together with “contact lens”, “spectacle” OR “atropine”. We excluded combination trials, studies not describing efficacy and studies less than 12 months in duration. We included only products that were available in both exemplar countries and supported by peer-reviewed randomised controlled trials. We used spherical equivalent results to indicate treatment efficacy except in orthokeratology, which can only report axial length data.

We chose specific starting scenarios to develop methodology that can be adapted to explore lifetime societal costs associated with TMM and AMM options in any situation. Our exemplars were an 8-year-old European Australian in an urban area of Australia and an 8-year-old Han Chinese in an urban area of China, each presenting to an eye examination reporting blurred distance vision and found to have  $-0.75$  DS cycloplegic refraction in both eyes but otherwise normal. We assumed they



**Figure 1** Clinical care flow diagram. AMM, active myopia management; AMM1, low-dose atropine; AMM2, antimyopia spectacles; AMM3, antimyopia multifocal soft contact lenses; AMM4, orthokeratology; AR, antireflection; CL, contact lens; D, diopter; MC, multicoat; MMD, myopic macular degeneration; PAL, progressive addition lens; POAG, primary open-angle glaucoma; RRD, rhegmatogenous retinal detachment; SE, spherical equivalent; SV, single vision; TMM, traditional myopia management; VI, vision impairment; yo, year old.

began TMM and AMM options from this first symptomatic myopia presentation and tracked the consequences through life expectancy following the Consolidated Health Economic Evaluation Reporting Standards and figure 1.<sup>20</sup>

### Cost estimates

In Australia, costs associated with myopia-related clinical care were based on Medicare scheduled fees<sup>21</sup>; spectacle and contact lens costs were based on the Optical Distributors and Manufacturers Association price reference guide<sup>22</sup>; spectacle frame costs were based on the Victorian Eyecare Service<sup>23</sup>; and the majority of pharmaceutical costs were based on the Pharmaceutical Benefits Scheme (PBS).<sup>24</sup> Prepackaged low-dose atropine is not available in Australia, not covered by the PBS and only available from compounding pharmacies.<sup>25</sup> Key informants at the Zhongshan Ophthalmic Centre in Guangzhou, Guangdong, and the Aier Eye Hospital system with centres across China provided representative ophthalmic examination, vision correction, myopia control and myopia complication management costs for China.<sup>26 27</sup> Given our reliance on key informants in China and the evolving nature of Chinese healthcare delivery systems, we checked for outliers by reviewing any costs that our standard methodology suggested were more than three times more expensive in China than Australia. Our checking process was to ask a wider array of key informants including a cost comparison with Hong Kong Special Autonomous Region, China.

In addition to the direct costs, we accounted for related and productivity costs associated with myopia care. Related costs include transport to relevant examinations, spectacle collection, collection of myopia control options and access to management of myopia complications. Productivity costs monetised time spent receiving eye care, both for adults attending their own myopia-related examinations and taking dependents to theirs. Disability weights were used as a proxy to estimate the potential productivity impact of each level of vision impairment.<sup>28</sup> All related and productivity costs were based on estimates for travel, and average adult income adjusted for labour force participation rates and employment rates.<sup>26 27 29 30</sup>

We took a societal perspective in our cost approach, incorporating all myopia-related costs regardless of who paid for them.<sup>19</sup> All costs were current in 2020, and converted from local currency to US dollars at the rate provided by the US Federal Reserve for 20 October 2020.<sup>31</sup> We have not predicted future inflation nor price changes as technologies age and become mainstream. Similarly, we have not predicted new technologies or combinations of techniques that may improve myopia control over the single options that are currently validated. Our main outcome has future costs discounted at 3% per annum, and we tested the effects of 0% and 5% per annum discounting as a sensitivity analysis.<sup>32 33</sup> Discounting adjusts future costs to present value (2020 value in this case). There is broad consensus in economics that discounting is important, but there is ongoing

debate regarding the rate that should be applied in various circumstances, resulting in our sensitivity analysis range.

### Likelihood of refractive outcomes

From the common starting point ( $-0.75D$  at 8 years of age), average and variance in myopia progression under TMM were modelled on data from Guangzhou (Guangdong, China) and Shanghai (China).<sup>34,35</sup> This progression was used directly for the Han child in urban China and adjusted to an urban European Australian child using the method of Donovan *et al* through to 18 years of age.<sup>36</sup> The spherical equivalent progression at 18 years of age was exponentially decayed towards an assumed zero progression at 25 years of age. The average and variance data were used to generate probability profiles for TMM refractive error outcomes at 25 years of age for each exemplar.

We analysed the treatment efficacy results of all AMM options that satisfied our inclusion criteria. Results from different studies of the same treatment type were weighted by sample size and averaged. After averaging, we additionally rejected treatment types with  $<25\%$  treatment efficacy.

### Clinical care protocols

Clinical care protocols and evidence-based risk calculations governed all decisions on myopia-related need—when and what type of ophthalmic examinations would be provided<sup>21,37–39</sup>; spectacle type and replacement schedule<sup>22,23,26,27,40,41</sup>; additional care required by AMM options<sup>8,37,42–44</sup>; contact lens wear, type, replacement schedule and complications<sup>21,45–49</sup>; risk of myopia complications and responses to them<sup>21,26,50–75</sup>; and risk of vision impairment and responses to it.<sup>17,18,21,76–78</sup> Figure 1—our clinical care flow diagram—illustrates and describes the protocols in all age groups.

### Adding up the costs

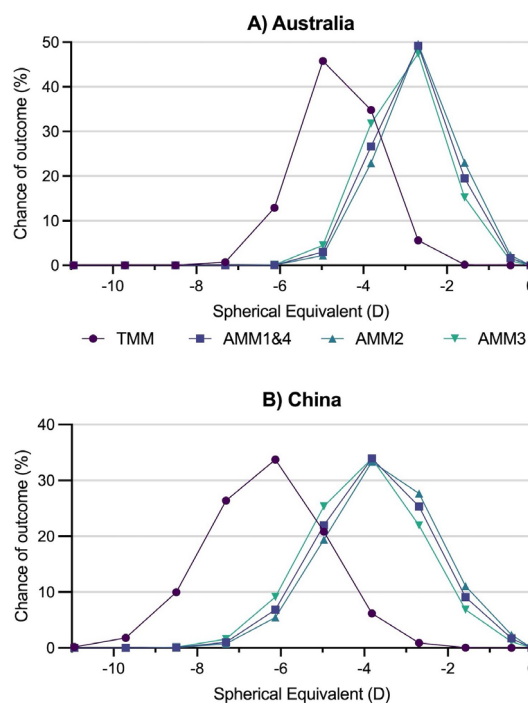
We modelled and compared TMM and each AMM option in Australia and China. Each scenario had its own unique refractive error outcome profile (see the Likelihood of refractive outcomes section) that defined the probability of an 8-year-old child with  $-0.75 D$  progressing to each different spherical equivalent level by adulthood. Costs were added up for each possible spherical equivalent level, within each scenario, across life expectancy and then weighted according to the refractive error outcome probability profile for each scenario. These weighted costs across the spectrum of spherical equivalent outcomes were added to obtain our overall cost estimate for each scenario.

### Threshold analysis

We performed a threshold analysis for any AMM option in either country which exceeded the TMM cost of the same country under 3% annual discounting. The threshold analysis determined the critical, price-adjustable item of each identified AMM option, and the price point of that item that would equalise the AMM and TMM cost in that country.

### Sensitivity analysis

Upper and lower limits of our cost estimates were derived from varying spherical equivalent outcomes and all costs to reasonable extremes. The upper and lower limits for spherical equivalent outcome represent 95% CIs. Cost limits depended on type and location. Examples of cost limits include Medicare's 'no gap' option for lowest, and industry accepted private rates for highest, cost of services in Australia<sup>21</sup> and  $\pm SD$  across ophthalmic lens options in Australia.<sup>22</sup> Tenth and seventy-fifth percentiles were



**Figure 2** Probability profiles for adult spherical equivalent outcomes from a starting point of an 8-year-old child presenting with  $-0.75 D$ . Profiles are for (A) European in Australia and (B) Han in China. AMM, active myopia management; AMM1, low-dose atropine; AMM2, antimyopia spectacles; AMM3, antimyopia multifocal soft contact lenses; AMM4, orthokeratology; D, diopter; TMM, traditional myopia management.

used to define the lower and upper limits of adult income.<sup>30</sup> Potential productivity lost to each level of vision impairment was bracketed using the WHO recommendations.<sup>28</sup>

As an additional sensitivity analysis, we also varied the discount rate from 3% (our estimate) to 0% and 5%.<sup>32</sup>

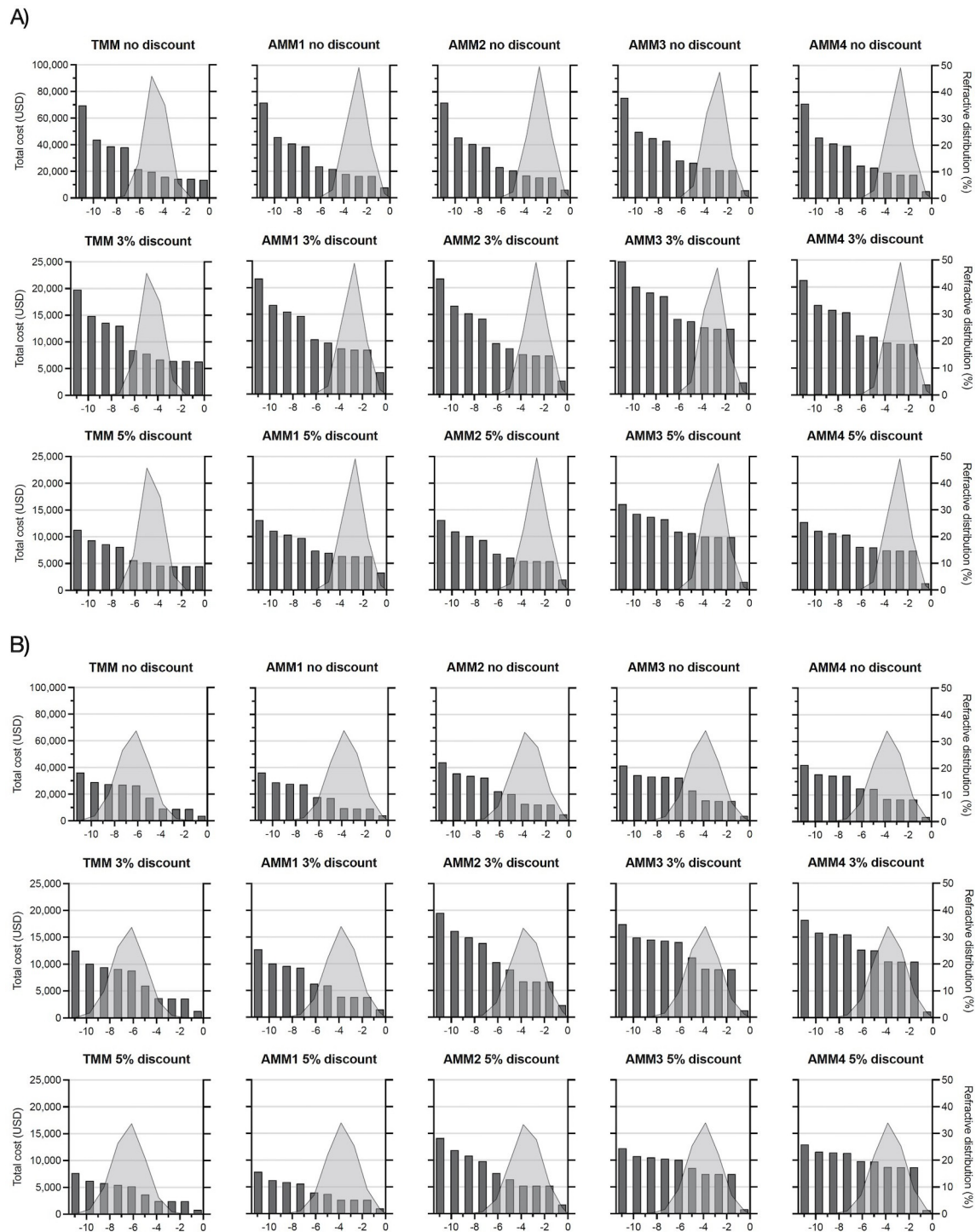
### RESULTS

Our online-only online supplemental result 1 provide all relevant unit costs in online supplemental table S1, estimated spherical equivalent progressions in online supplemental figure S1 and estimated myopia complications, related protocols and resulting vision impairment in online supplemental table S2) for our exemplar scenarios. Four AMM options were identified by our methodology to have adequate evidence supporting clinically meaningful effects on childhood myopia progression:

- ▶ Low-dose (0.01%–0.05%) atropine was designated as AMM1, with a 46% reduction in spherical equivalent progression compared with TMM.<sup>8,9,79</sup>
- ▶ Effective antimyopia spectacle designs were designated as AMM2, with a 49% reduction based on executive bifocal and defocus incorporated multiple segment designs.<sup>10,11</sup>
- ▶ Antimyopia multifocal soft contact lenses were designated as AMM3, with a 42% reduction.<sup>12,80–89</sup>
- ▶ Orthokeratology was designated as AMM4, with a 46% reduction.<sup>13,90–95</sup>

The effect of the AMM options on the likelihood of adult refractive error outcomes is shown in figure 2.

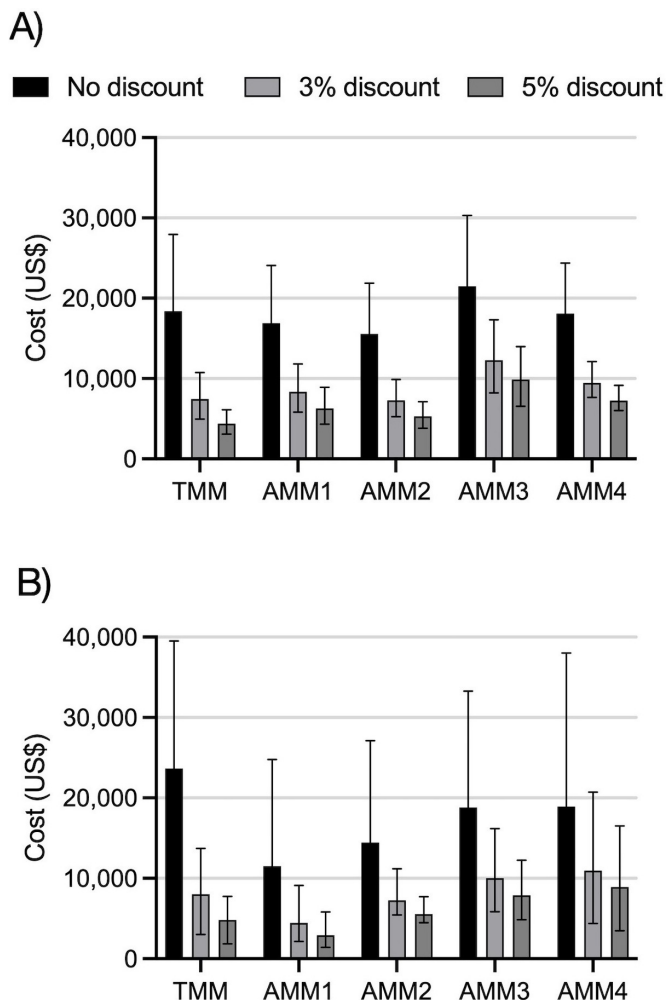
The lifetime cost estimates for all possible spherical equivalent outcomes under each scenario are shown in figure 3. The cost implications of high myopia are clearly demonstrated. They derive from more technical and expensive corrective lenses that



**Figure 3** Lifetime costs of myopia for each scenario (dark grey bars against left vertical axis), at all possible spherical equivalent outcomes (in dioptres on the horizontal axis), with likelihood of each spherical equivalent outcome (light grey area curves against the right vertical axis). Costs are shown with no discounting, 3% discounting and 5% discounting in Australia (A) and China (B). AMM, active myopia management; AMM1, low-dose atropine; AMM2, antimyopia spectacles; AMM3, antimyopia multifocal soft contact lenses; AMM4, orthokeratology; TMM, traditional myopia management.

are replaced more often, best-practice protocols that include more regular and specialised ophthalmic examinations, higher frequency of pathological complications and higher likelihood of vision impairment. The variations between management options are less than the changes between spherical equivalent powers in most cases. The intuitive implication is that early investment to reduce myopia progression may be worthwhile to an individual.

Our estimated lifetime societal costs of myopia under each exemplar scenario were derived by multiplying the two components of figure 3—that is, by weighting the cost estimate for each possible spherical equivalent (dark grey columns) by the likelihood of reaching that spherical equivalent (light grey area). The resultant cost estimates are shown in figure 4 and online supplemental table S3 in our online-only online supplemental results.



**Figure 4** Lifetime costs of myopia for five interventions in urban Australia (A) and China (B). Error bars show bounds of sensitivity analysis. AMM, active myopia management; AMM1, low-dose atropine; AMM2, antimyopia spectacles; AMM3, antimyopia multifocal soft contact lenses; AMM4, orthokeratology; TMM, traditional myopia management.

China shows greater variation in overall costs between interventions than Australia. One reason is that Han Chinese have higher risk of greater myopia progression, meaning the

percentage effect of AMM interventions spreads the probability distributions further across the power spectrum. Another reason is that the cost increment from standard spectacles and contact lenses (used for correcting lower refractive powers) to premium spectacles and contact lenses (used for controlling myopia progression and correcting higher refractive powers) is steeper in China than in Australia.

#### Age at which costs are incurred

Figure 5 presents the costs associated with each scenario against age. AMM options show additional costs compared with TMM during childhood with one exception: low-dose atropine is cheaper than TMM at 18 years in China. TMM is more expensive than all AMM options later in life, with the relative cost by the end of life depending on place, ethnicity and the discount applied. The TMM curve is noticeably steeper in later life for Han Chinese than European Australians due to increased risk of higher myopia.

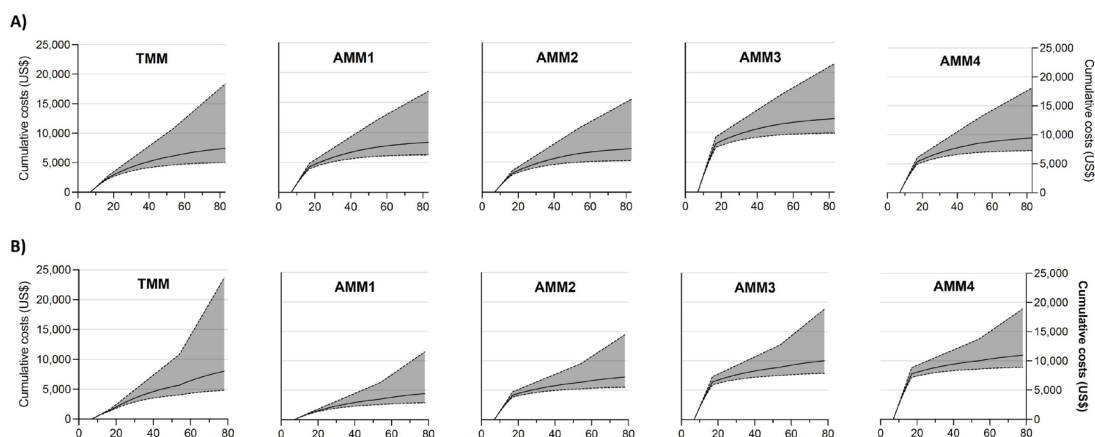
#### Threshold analysis

In our exemplars with 3% annual discounting, only AMM2 is cheaper than TMM in Australia, whereas both AMM1 and AMM2 are cheaper than TMM in China across a lifetime. Threshold analysis was undertaken at the 3% discount level to determine the price point of critical items that would equalise the cost of other AMM options with TMM:

- ▶ AMM1 critical item: 1-month supply of low-dose atropine.  
In Australia: current price US\$21.52, threshold price US\$8.33.
- ▶ AMM3 critical item: 3-month supply of antimyopia multifocal soft contact lenses.  
In Australia: current price US\$166.47, threshold price US\$27.22.  
In China: current price US\$157.25, threshold price US\$99.22.
- ▶ AMM4 critical item: 2-year period of subsequent orthokeratology care and lenses.  
In Australia: current price US\$599.85, threshold price US\$85.54.  
In China: current price US\$1623.87, threshold price US\$865.93.

#### DISCUSSION

In our exemplars, the additional early costs of AMM options are substantially balanced across a lifetime by reduced refractive



**Figure 5** Cumulative costs of myopia in US dollars against age in years, showing each intervention and discount level in Australia (A) and China (B). Solid line shows estimate with 3% annual discounting, upper and lower bounds are estimates with no and 5% annual discounting respectively.

progression, simpler corrective lenses, fewer lens replacements, reduced risk of eye disease and vision loss, and reduced management of myopia complications. The cheapest lifetime cost of all scenarios tested was low-dose atropine in China, regardless of discount level.

Pricing extremes—such as a bottle of low-dose atropine being 14 times more expensive in Australia than China—suggest likely fluidity over time. Low-dose atropine is currently diluted from 1% atropine by specialised compounding pharmacies in Australia; changing to direct manufacture would likely reduce AMM1 costs. Distribution and supply of antimyopia multifocal soft contact lenses are likely to improve in China and result in lower AMM3 costs. Our exemplars are based on static 2020 prices. New technologies, competition, generic versions, professional preferences, consumer trends and demand are likely to change prices over time.

Specialty contact lenses represent a significant step in commitment and cost for a family who otherwise intended to wear spectacles, but a relatively small step for a family who intended to pursue regular contact lenses regardless of any AMM option. We have compared the contact lens-based AMM options with an average TMM case, that is, someone with a 22% chance of wearing standard soft contact lenses to correct (not control) their myopia between 12 and 54 years of age. However, families most likely to consider AMM3 or AMM4 are likely to be interested in contact lenses regardless. As such, it is worth knowing the comparison between TMM, AMM3 and AMM4 for a child/family who want to correct myopia using contact lenses rather than spectacles between 8 and 18 years of age, that is, having a 100% chance of wearing standard soft contact lenses to correct myopia in TMM. Under this variation, lifetime TMM costs in Australia increase to US\$22 809 without discounting, US\$11 345 with 3% discounting or US\$7851 with 5% discounting. Under the same variation in China, TMM costs increase to US\$25 787 without discounting, US\$9896 with 3% discounting, or US\$6561 with 5% discounting. The lifetime cost of AMM4 under this variation is less than TMM in Australia at the 3% discount level. Combining 100% contact lens wear in TMM during childhood with threshold analysis for the remaining scenarios at the 3% discount level:

- ▶ Threshold price of AMM3 in Australia would be US\$139.55 per 3-month supply of antimyopia multifocal soft contact lenses.
- ▶ Threshold price of AMM3 in China would be US\$153.60 per 3-month supply of contact lenses.
- ▶ Threshold price of AMM4 in China would be US\$1352.04 for care and lenses per subsequent 2-year periods.

Our exemplars persist with each AMM intervention for 10 years regardless of myopia progress in the specific case. This would effectively mean persisting with a specific AMM in an individual even when the AMM appears ineffective in slowing myopia progression in that individual. It also effectively means persisting with an AMM when it appears to have been effective enough to consider ceasing treatment. In reality, clinicians make adaptive, iterative decisions based on evidence and observation. They are likely to change management as cases evolve, potentially to a different AMM if rapid myopia progression continues with the first option, or ceasing intervention if progression drops below an acceptable threshold.<sup>37</sup> The rigidity of our assumptions is a sensibly conservative modelling approach, increasing our estimated cost of AMM options compared with TMM.

The strengths of our methodology include the use of evidence-based refractive outcomes, the application of evidence-based AMM effectivity, the probabilistic approach to refractive

outcome in each scenario, and the broad consideration and sourcing of cost data. Our exemplars provide a comparison between an established health system dealing with relatively low myopia prevalence and progression (Australia) with an evolving health system dealing with very high myopia prevalence and progression (China).

There are also several limitations. First, we have excluded some broader indirect costs and benefits. We have not factored in potential utility reductions that could occur with AMM options, such as in response to daily atropine instillation, or cosmetic issues with antimyopia spectacles. Likewise, we have not factored in potential utility benefits of reduced myopia progression, such as thinner corrective lenses, less dependency on refractive correction, or less anxiety regarding complications or vision impairment. We have also not accounted for the potential productivity impact of uncorrected and undercorrected myopia, nor care costs for assisting a person with vision impairment.

Second, we have taken a simple average of product options for items within a scenario, for example, across the 12 options for single vision aspheric 1.67 index spectacle lenses listed in Australia's EyeTalk,<sup>22</sup> rather than weighting costs by market share. Weighted costs would potentially improve the accuracy of the estimates for policymakers but distort the choice for the end user.

Third, we have taken antimyopia treatment efficacy data from trials of 1–5 years and extended them to 10 years, unmodified for place, ethnicity or age. It is possible that efficacy will vary over time, and between places, ethnicities and ages, but there is no clear data to dictate modifications at this stage.

Fourth, we have done our best to model profession and industry norms, but management variations exist, and some may be cheaper and/or better. Changes in review schedules or lens replacement schedules would alter costs. Orthokeratology is perhaps the clearest example in which this might change the estimation significantly.

Fifth, we based risk of myopia complications on the best population-based evidence, which suggests the risk does not rise dramatically until 55 years of age. However, clinicians know that complications occur earlier and there is certainly evidence in support. It is possible that the population-based evidence is distorted by the tendency to survey those over 50 years of age far more frequently than younger groups.

Our estimates suggest the greatest impact on lifetime cost of myopia in Australia and China is the level of myopia reached. The financial benefits of AMM are likely to be greatest in communities experiencing larger myopia progression, that is, in this comparison, more in China than Australia. While AMM options have upfront cost impacts in childhood, these are mostly balanced or exceeded across a lifetime by savings associated with the reduced myopia achieved.

Specific supply and distribution issues are influencing relative costs in some newer or niche products—contact lens options in China and low-dose atropine in Australia are the most obvious examples from 2020. However, healthy threshold prices for each suggest supply should be commercially viable judged on lifetime cost alone. The methodology presented here could be used as a guide to test cost-effective prices for antimyopia products and services.

In addition to new products and services, there are multiple other existing strategies and options that we have not tested but could be explored using this methodology. Any antimyopia managements that have efficacy and cost data can be tested. The effect of refractive surgery at different stages of adulthood could

be tested. Local costs or protocol variations can provide comparisons in or between any location/s.

In summary, the methodology established here can be applied to any myopia scenario to increase clinician confidence in the outcomes that are likely under each intervention. Costs can be updated and/or adjusted to local circumstance, and modelling can be adjusted for additional evidence on TMM progression or AMM option efficacy.

**Twitter** Kevin D Frick @ProfKevinFrick

**Acknowledgements** We acknowledge the assistance of Liqiong Xie (Zhongshan Ophthalmic Center), Rebecca Yan Shun Weng (Brien Holden Vision Institute), Qingyao Chen (BHVI China), Yinyi Song (BHVI China) and Carl Zeiss Vision (Germany) in gathering Chinese cost and protocol information.

**Contributors** TRF: guarantor for the paper and involved in all aspects of its conception, design, data collection, analysis, manuscript creation and editing. PS: conception, project design, data collection, analysis and manuscript editing. TN: conception and data analysis. SR: design, analysis, review, manuscript creation and editing. NT: data analysis, review and editing. MH: analysis and review. KDF: involved in conception, project design, analysis and review.

**Funding** This work was supported by a public health grant (no award/grant number) from the Brien Holden Vision Institute, Sydney, Australia.

**Competing interests** TF and SR consult for BHVI, and PS, TN and NT are employed by Brien Holden Vision Institute (BHVI), which holds patents in myopia control.

**Patient consent for publication** Not applicable.

**Ethics approval** This study does not involve human participants.

**Provenance and peer review** Not commissioned; externally peer reviewed.

**Supplemental material** This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

**Open access** This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

#### ORCID iDs

Tim R Fricke <http://orcid.org/0000-0001-8087-6835>

Padmaja Sankaridurg <http://orcid.org/0000-0001-5537-6193>

Kevin D Frick <http://orcid.org/0000-0002-0178-5319>

#### REFERENCES

- Holden BA, Fricke TR, Wilson DA, *et al.* Global prevalence of myopia and high myopia and temporal trends from 2000 through 2050. *Ophthalmology* 2016;123:1036–42.
- Naidoo KS, Fricke TR, Frick KD, *et al.* Potential lost productivity resulting from the global burden of myopia: systematic review, meta-analysis, and modeling. *Ophthalmology* 2019;126:338–46.
- Modjtahedi BS, Ferris FL, Hunter DG, *et al.* Public health burden and potential interventions for myopia. *Ophthalmology* 2018;125:628–30.
- Resnikoff S, Jonas JB, Friedman D, *et al.* Myopia – a 21st century public health issue. *Invest. Ophthalmol. Vis. Sci.* 2019;60:Mi-Mii:Mi.
- Morgan IG, French AN, Ashby RS, *et al.* The epidemics of myopia: aetiology and prevention. *Prog Retin Eye Res* 2018;62:134–49.
- Haarman AEG, Enthoven CA, Tideman JW, *et al.* The complications of myopia: a review and meta-analysis. *Invest. Ophthalmol. Vis. Sci.* 2020;61:49.
- Wildsoet CF, Chia A, Cho P, *et al.* IMI – interventions for controlling myopia onset and progression report. *Invest. Ophthalmol. Vis. Sci.* 2019;60:M106–31.
- Chia A, Lu Q-S, Tan D. Five-Year Clinical Trial on Atropine for the Treatment of Myopia 2: Myopia Control with Atropine 0.01% Eyedrops. *Ophthalmology* 2016;123:391–9.
- Yam JC, Jiang Y, Tang SM, *et al.* Low-concentration Atropine for Myopia Progression (LAMP) Study: a randomized, double-blinded, placebo-controlled trial of 0.05%, 0.025%, and 0.01% atropine eye drops in myopia control. *Ophthalmology* 2019;126:113–24.
- Cheng D, Woo GC, Drobe B, *et al.* Effect of bifocal and prismatic bifocal spectacles on myopia progression in children: three-year results of a randomized clinical trial. *JAMA Ophthalmol* 2014;132:258–64.
- Lam CSY, Tang WC, Tse DY-Y, *et al.* Defocus incorporated multiple segments (DIMS) spectacle lenses slow myopia progression: a 2-year randomised clinical trial. *Br J Ophthalmol* 2020;104:363–8.
- Chamberlain P, Peixoto-de-Matos SC, Logan NS, *et al.* A 3-year randomized clinical trial of MiSight lenses for myopia control. *Optom Vis Sci* 2019;96:556–67.
- Hiraoka T, Kakita T, Okamoto F, *et al.* Long-Term effect of overnight orthokeratology on axial length elongation in childhood myopia: a 5-year follow-up study. *Invest Ophthalmol Vis Sci* 2012;53:3913–9.
- Woodward MA, Prasov L, Newman-Casey PA. The debate surrounding the pathogenesis of myopia. *JAMA Ophthalmol* 2019;137:894–5.
- Prousal E, Haidich A-B, Fontalis A, *et al.* Efficacy and safety of interventions to control myopia progression in children: an overview of systematic reviews and meta-analyses. *BMC Ophthalmol* 2019;19:106.
- Modjtahedi BS, Abbott RL, Fong DS, *et al.* Reducing the global burden of myopia by delaying the onset of myopia and reducing myopic progression in children: the Academy's task force on myopia. *Ophthalmology* 2021;128:816–26.
- Tideman JW, Snabel MCC, Tedja MS, *et al.* Association of axial length with risk of uncorrectable visual impairment for Europeans with myopia. *JAMA Ophthalmol* 2016;134:1355–63.
- Verhoeven VJM, Wong KT, Buitendijk GHS, *et al.* Visual consequences of refractive errors in the general population. *Ophthalmology* 2015;122:101–9.
- Russell LB, Gold MR, Siegel JE, *et al.* The role of cost-effectiveness analysis in health and medicine. panel on cost-effectiveness in health and medicine. *JAMA* 1996;276:1172–7.
- Husereau D, Drummond M, Petrou S, *et al.* Consolidated Health Economic Evaluation Reporting Standards (CHEERS)—explanation and elaboration: a report of the ISPOR Health Economic Evaluation Publication Guidelines Good Reporting Practices Task Force. *Value Health* 2013;16:231–50.
- Australian Government, Department of Health. Medicare Benefits Schedule (MBS) Online (including Medicare Benefits Schedule Book, 2019. Available: <http://www9.health.gov.au/mbs/fullDisplay.cfm?type=note&q=AN.0.10&qt=notelD&criteria=optometry> [Accessed 13 Jun 2019].
- Optical Distributors and Manufacturers Association. *EyeTalk reference guide, April 2019 ED*. Terrey Hills, NSW, Australia: ODMA, 2019.
- Victorian State Government, Australian College of Optometry. Victorian Eyecare service, 2020. Available: <https://www.aco.org.au/victorian-eyecare-service/>
- Australian Government, Department of Health. *PBS - The Pharmaceutical Benefits Scheme*. Canberra, Australia: Australian Government, 2020. <https://www.pbs.gov.au/browse/medicine-listing>
- Fricke T. Informal survey of low-dose atropine prices at major Australian compounding pharmacies, 2020. Available: <https://customcarepharmacy.com.au/>, <https://sladepharma.com.au/>, <http://www.pharmacysmart.com.au/>
- Zhongshan Ophthalmic Center. *Zhongshan ophthalmic center; sun Yat-Sen university*. Guangzhou, Guangdong, China: ZOC, 2020. <http://www.gzzoc.com/>
- Aier Eye Hospital. *About Aier eye Hospital group*. Guangzhou, Guangdong, China: Aier Eye Hospital, 2020. <http://en.aierchina.com/about>
- World Health Organization. Who methods and data sources for global burden of disease estimates 2000-2015 (global health estimates technical paper WHO/HIS/IER/GHE/2017.1). Geneva: who department of information evidence and research, 2017. Available: [http://www.who.int/gho/mortality\\_burden\\_disease/en/index.html](http://www.who.int/gho/mortality_burden_disease/en/index.html)
- Australian Taxation Office. *Travel expenses*. Canberra, ACT, Australia: Australian Government, 2019. <https://www.ato.gov.au/Business/Income-and-deductions-for-business/Deductions/Deductions-for-motor-vehicle-expenses/Cents-per-kilometre-method/>
- Australian Bureau of Statistics. ABS statistics on Australian earnings and work hours. Belconnen, act, Australia: Australian Bureau of statistics. accessed 23 October, 2020. Available: <https://www.abs.gov.au/statistics/labour/earnings-and-work-hours>
- US Federal Reserve. Foreign exchange rates. US federal reserve, 2020. Available: <https://www.federalreserve.gov/>
- Weinstein MC, Siegel JE, Gold MR, *et al.* Recommendations of the panel on cost-effectiveness in health and medicine. *JAMA* 1996;276:1253–8.
- Atik A, Barton K, Azuara-Blanco A, *et al.* Health economic evaluation in ophthalmology. *Br J Ophthalmol* 2021;105:602–7.
- Holden B, Sankaridurg P, Smith E, *et al.* Myopia, an underrated global challenge to vision: where the current data takes us on myopia control. *Eye* 2014;28:142–6.
- Sankaridurg PR, Holden BA. Practical applications to modify and control the development of ametropia. *Eye* 2014;28:134–41.
- Donovan L, Sankaridurg P, Ho A, *et al.* Myopia progression rates in urban children wearing single-vision spectacles. *Optometry Vis Sci* 2012;89:27–32.
- Gifford KL, Richdale K, Kang P, *et al.* IMI - Clinical Management Guidelines Report. *Invest Ophthalmol Vis Sci* 2019;60:M184–203.
- Celorio JM, Pruett RC. Prevalence of lattice degeneration and its relation to axial length in severe myopia. *Am J Ophthalmol* 1991;111:20–3.
- American Academy of ophthalmology. *Posterior vitreous detachment, retinal breaks, and lattice degeneration preferred practice pattern*. San Francisco, Ca, USA, 2019.

- 40 Wilson DA, Daras S. *Practical optical dispensing*. 3 edn. Sydney: TAFE NSW - The Open Training and Education Network, 2014.
- 41 Fricke TR, Holden BA, Wilson DA, et al. Global cost of correcting vision impairment from uncorrected refractive error. *Bull World Health Organ* 2012;90:728–38.
- 42 Wu P-C, Yang Y-H, Fang P-C. The long-term results of using low-concentration atropine eye drops for controlling myopia progression in schoolchildren. *J Ocul Pharmacol Ther* 2011;27:461–6.
- 43 Wu P-C, Chuang M-N, Choi J, et al. Update in myopia and treatment strategy of atropine use in myopia control. *Eye* 2019;33:3–13.
- 44 Swarbrick HA. Orthokeratology review and update. *Clin Exp Optom* 2006;89:124–43.
- 45 Lee YC, Lim CW, Saw SM, et al. The prevalence and pattern of contact lens use in a Singapore community. *Claio J* 2000;26:21–5.
- 46 Morgan P, Woods CA, Tranoudis IG. *International contact lens prescribing 2019. Contact lens spectrum*, 2020: 1–11.
- 47 Cheng X, Brennan NA, Toubouti Y, et al. Safety of soft contact lenses in children: retrospective review of six randomized controlled trials of myopia control. *Acta Ophthalmol* 2020;98:e346–51.
- 48 Bullimore MA. The safety of soft contact lenses in children. *Optom Vis Sci* 2017;94:638–46.
- 49 Lim CHL, Stapleton F, Mehta JS. Review of contact lens-related complications. *Eye Contact Lens* 2018;44 Suppl 2:S1–10.
- 50 Vongphanit J, Mitchell P, Wang JJ. Prevalence and progression of myopic retinopathy in an older population. *Ophthalmology* 2002;109:704–11.
- 51 Wong YL, Zhu X, Tham YC, et al. Prevalence and predictors of myopic macular degeneration among Asian adults: pooled analysis from the Asian eye epidemiology Consortium. *Br J Ophthalmol* 2021;105:1140–8.
- 52 Cheung CMG, Arnold JJ, Holz FG, et al. Myopic choroidal neovascularization: review, guidance, and consensus statement on management. *Ophthalmology* 2017;124:1690–711.
- 53 Chan NS-W, Teo K, Cheung CMG. Epidemiology and diagnosis of myopic choroidal neovascularization in Asia. *Eye Contact Lens* 2016;42:48–55.
- 54 Lai TYY, Cheung CMG. Myopic choroidal neovascularization: diagnosis and treatment. *Retina* 2016;36:1614–21.
- 55 Leveziel N, Caillaux V, Bastuji-Garin S, et al. Angiographic and optical coherence tomography characteristics of recent myopic choroidal neovascularization. *Am J Ophthalmol* 2013;155:913–9.
- 56 Kasahara K, Moriyama M, Morohoshi K, et al. Six-Year outcomes of intravitreal bevacizumab for choroidal neovascularization in patients with pathologic myopia. *Retina* 2017;37:1055–64.
- 57 Flitcroft DI. The complex interactions of retinal, optical and environmental factors in myopia aetiology. *Prog Retin Eye Res* 2012;31:622–60.
- 58 Flitcroft DI, He M, Jonas JB, et al. Imi – defining and classifying myopia: a proposed set of standards for clinical and epidemiologic studies. *Invest Ophthalmol Vis Sci* 2019;60:M20–30.
- 59 Mitchell P, Hourihan F, Sandbach J, et al. The relationship between glaucoma and myopia: the blue Mountains eye study. *Ophthalmology* 1999;106:2010–5.
- 60 Australian Government National Health and Medical Research Council. *NH&MRC Guidelines for the screening, prognosis, diagnosis, management and prevention of glaucoma*. Canberra, ACT, Australia: Commonwealth of Australia, 2010.
- 61 Tang W, Zhang F, Liu K, et al. Efficacy and safety of prostaglandin analogues in primary open-angle glaucoma or ocular hypertension patients: a meta-analysis. *Medicine* 2019;98:e16597.
- 62 Mitry D, Charteris DG, Fleck BW, et al. The epidemiology of rhegmatogenous retinal detachment: geographical variation and clinical associations. *Br J Ophthalmol* 2010;94:678–84.
- 63 Kim MS, Park SJ, Park KH, et al. Different mechanistic association of myopia with rhegmatogenous retinal detachment between young and elderly patients. *Biomed Res Int* 2019;2019:1–6.
- 64 Wong TY, Tielsch JM, Schein OD. Racial difference in the incidence of retinal detachment in Singapore. *Arch Ophthalmol* 1999;117:379–83.
- 65 Polkinghorne PJ, Craig JP. Northern New Zealand rhegmatogenous retinal detachment study: epidemiology and risk factors. *Clin Exp Ophthalmol* 2004;32:159–63.
- 66 Li X, Beijing Rhegmatogenous Retinal Detachment Study Group. Incidence and epidemiological characteristics of rhegmatogenous retinal detachment in Beijing, China. *Ophthalmology* 2003;110:2413–7.
- 67 Wakabayashi T, Oshima Y, Fujimoto H, et al. Foveal microstructure and visual acuity after retinal detachment repair: imaging analysis by Fourier-domain optical coherence tomography. *Ophthalmology* 2009;116:519–28.
- 68 Stirpe M, Heimann K. Vitreous changes and retinal detachment in highly myopic eyes. *Eur J Ophthalmol* 1996;6:50–8.
- 69 Heimann H, Bartz-Schmidt KU, Bornfeld N, et al. Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment: a prospective randomized multicenter clinical study. *Ophthalmology* 2007;114:2142–54.
- 70 Sun Q, Sun T, Xu Y, et al. Primary vitrectomy versus scleral buckling for the treatment of rhegmatogenous retinal detachment: a meta-analysis of randomized controlled clinical trials. *Curr Eye Res* 2012;37:492–9.
- 71 Brucker AJ, Hopkins TB. Retinal detachment surgery: the latest in current management. *Retina* 2006;26:S28–33.
- 72 Jackson TL, Donachie PHJ, Sallam A, et al. United Kingdom national ophthalmology database study of vitreoretinal surgery: report 3, retinal detachment. *Ophthalmology* 2014;121:643–8.
- 73 Jackson TL, Donachie PHJ, Sparrow JM, et al. United Kingdom national ophthalmology database study of vitreoretinal surgery: report 1; case mix, complications, and cataract. *Eye* 2013;27:644–51.
- 74 Liao L, Zhu X-H. Advances in the treatment of rhegmatogenous retinal detachment. *Int J Ophthalmol* 2019;12:660–7.
- 75 Do DV, Gichuhi S, Vedula SS, et al. Surgery for post-vitrectomy cataract. *Cochrane Database Syst Rev* 2013;12:CD006366.
- 76 Markowitz SN. Principles of modern low vision rehabilitation. *Can J Ophthalmol* 2006;41:289–312.
- 77 Bourne RRA, Flaxman SR, Braithwaite T, et al. Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis. *Lancet Glob Health* 2017;5:e888–97.
- 78 Flaxman SR, Bourne RRA, Resnikoff S, et al. Global causes of blindness and distance vision impairment 1990–2020: a systematic review and meta-analysis. *The Lancet Glob Health* 2017;5:e1221–34.
- 79 Fu A, Stapleton F, Wei L, et al. Effect of low-dose atropine on myopia progression, pupil diameter and accommodative amplitude: low-dose atropine and myopia progression. *Br J Ophthalmol* 2020;104:1535–41.
- 80 Lam CSY, Tang WC, Tse DY-Y, et al. Defocus incorporated soft contact (disc) lens slows myopia progression in Hong Kong Chinese schoolchildren: a 2-year randomised clinical trial. *Br J Ophthalmol* 2014;98:40–5.
- 81 Walline JJ, Greiner KL, McVey ME, et al. Multifocal contact lens myopia control. *Optometry Vis Sci* 2013;90:1207–14.
- 82 Sankaridurg P, Bakaraju RC, Naduvilath T, et al. Myopia control with novel central and peripheral plus contact lenses and extended depth of focus contact lenses: 2 year results from a randomised clinical trial. *Ophthalmic Physiol Opt* 2019;39:294–307.
- 83 Walline JJ, Walker MK, Mutti DO, et al. Effect of high add power, medium add power, or single-vision contact lenses on myopia progression in children: the blink randomized clinical trial. *JAMA* 2020;324:571–80.
- 84 Cheng X, Xu J, Chehab K, et al. Soft contact lenses with positive spherical aberration for myopia control. *Optom Vis Sci* 2016;93:353–66.
- 85 Sankaridurg P, Holden B, Smith E, et al. Decrease in rate of myopia progression with a contact lens designed to reduce relative peripheral hyperopia: one-year results. *Invest Ophthalmol Vis Sci* 2011;52:9362–7.
- 86 Aller TA, Liu M, Wildsoet CF. Myopia control with bifocal contact lenses: a randomized clinical trial. *Optom Vis Sci* 2016;93:344–52.
- 87 Ruiz-Pomeda A, Pérez-Sánchez B, Valls I, et al. MiSight assessment study Spain (mass). A 2-year randomized clinical trial. *Graefes Arch Clin Exp Ophthalmol* 2018;256:1011–21.
- 88 Pauné J, Morales H, Armengol J, et al. Myopia control with a novel peripheral gradient soft lens and orthokeratology: a 2-year clinical trial. *Biomed Res Int* 2015;2015:1–10.
- 89 Fujikado T, Ninomiya S, Kobayashi T, et al. Effect of low-addition soft contact lenses with decentered optical design on myopia progression in children: a pilot study. *Clin Ophthalmol* 2014;8:1947–56.
- 90 Cho P, Cheung S-W. Retardation of myopia in Orthokeratology (ROMIO) study: a 2-year randomized clinical trial. *Invest. Ophthalmol. Vis. Sci.* 2012;53:7077–85.
- 91 Santodomingo-Rubido J, Villa-Collar C, Gilmartin B, et al. Myopia control with orthokeratology contact lenses in Spain: refractive and biometric changes. *Invest Ophthalmol Vis Sci* 2012;53:5060–5.
- 92 Walline JJ, Jones LA, Sinnott LT. Corneal reshaping and myopia progression. *British Journal of Ophthalmology* 2009;93:1181–5.
- 93 Cho P, Cheung SW, Edwards M. The longitudinal orthokeratology research in children (LORIC) in Hong Kong: a pilot study on refractive changes and myopic control. *Curr Eye Res* 2005;30:71–80.
- 94 Chen C, Cheung SW, Cho P. Myopia control using toric orthokeratology (TO-SEE study). *Invest Ophthalmol Vis Sci* 2013;54:6510–7.
- 95 Charm J, Cho P. High myopia-partial reduction ortho-k: a 2-year randomized study. *Optom Vis Sci* 2013;90:530–9.



## Supplementary Results (online-only)

**Table S1.** Estimated unit costs in US\$, compiled from sources as referenced.**A) Australia**

Item	Expected cost (US\$)	Lowest likely cost (US\$)	Highest likely cost (US\$)
<b>General ophthalmic examination costs</b>			
Comprehensive, general ophthalmic exam <sup>1</sup>	\$47.14	\$40.08	\$56.46
Brief ophthalmic exam; <sup>1</sup> Low vision assessment; <sup>1</sup> Children's vision assessment <sup>1</sup>	\$23.61	\$20.08	\$28.23
Contact lens fitting, prescription and delivery <sup>1</sup>	\$117.01	\$99.47	\$141.14
<b>Optical correction costs</b>			
Single vision, stock, standard resin spectacle lenses (plano to -4D combined) <sup>2</sup>	\$76.62	\$65.66	\$87.57
Single vision, grind, standard resin spectacle lenses with basic anti-reflection coating (-4D to -6D combined) <sup>2</sup>	\$132.83	\$109.76	\$155.90
Single vision, grind, mid-index resin spectacle lenses with anti-reflection coating (-6D to -10D combined) <sup>2</sup>	\$224.41	\$203.28	\$245.55
Single vision, aspheric, high-index spectacle lenses with anti-reflection coating (-10D and stronger) <sup>2</sup>	\$306.27	\$219.75	\$392.80
Entry-level progressive addition lenses (-0.50D to -4D) <sup>2</sup>	\$232.25	\$180.41	\$284.09
Customised, free-form progressive addition lenses (-4D and stronger) <sup>2</sup>	\$376.84	\$265.44	\$488.25
Standard spectacle frames <sup>3</sup>	\$48.16	\$26.46	\$69.86
6-month supply of single vision, regular replacement silicone hydrogel contact lenses (plano to -12D) <sup>2</sup>	\$171.34	\$145.48	\$197.21
6-month supply of single vision, regular replacement silicone hydrogel contact lenses (-12D to -20D) <sup>2</sup>	\$212.77	\$173.19	\$252.34
Contact lens consumables (per quarter year of contact lens wear)	\$16.74	\$13.02	\$20.46
Magnifier (low vision aid) <sup>3</sup>	\$27.82	\$15.44	\$40.21
Magnifier with illumination (low vision aid) <sup>3</sup>	\$137.86	\$101.74	\$173.99
Loupe (low vision aid) <sup>3</sup>	\$82.57	\$82.57	\$82.57
Telescope (low vision aid) <sup>3</sup>	\$87.95	\$42.34	\$136.55
<b>Anti-myopia management costs</b>			
1 bottle of low-dose atropine eye drops <sup>4</sup>	\$21.52	\$19.76	\$23.29
Executive bifocal spectacle lenses <sup>2</sup>	\$211.71	\$211.71	\$211.71
6-month supply of daily disposable anti-myopia multifocal soft contact lenses (plano to -10D with various adds) <sup>2</sup>	\$332.93	\$219.66	\$446.20
Orthokeratology initial treatment fee (care and lenses for first year) <sup>5</sup>	\$837.76	\$739.92	\$987.26
Orthokeratology subsequent biennial treatment fee (care and lenses) <sup>5</sup>	\$599.85	\$493.99	\$705.70

Costs to manage myopia-related complications			
Sub-specialty ophthalmic examination <sup>1</sup>	\$112.91	\$62.28	\$137.61
Brief sub-specialty ophthalmic exam <sup>1</sup>	\$42.34	\$31.30	\$63.51
Optical Coherence Tomography <sup>1</sup>	\$63.51	\$28.69	\$84.68
Computerized perimetry <sup>1</sup>	\$63.51	\$48.59	\$84.68
Retinal angiogram <sup>1</sup>	\$108.96	\$92.62	\$176.43
Ophthalmic surgery – lens extraction and insertion of intraocular lens <sup>1</sup>	\$545.36	\$486.51	\$846.84
Anaesthesia to support lens and implant surgery <sup>1</sup>	\$70.92	\$60.30	\$119.97
Laser capsulotomy (1 eye) <sup>1</sup>	\$253.35	\$215.34	\$352.85
Vitrectomy <sup>1</sup>	\$959.65	\$719.74	\$1,411.40
Anaesthesia to support vitrectomy <sup>1</sup>	\$99.29	\$84.40	\$169.37
Paracentesis of anterior or posterior chamber, or intravitreal injection <sup>1</sup>	\$215.63	\$183.31	\$317.57
Pneumatic retinopexy for retinal detachment <sup>1</sup>	\$646.95	\$588.10	\$1,058.55
Retinal photocoagulation <sup>1</sup>	\$323.42	\$274.94	\$493.99
Removal of vitreous substitute from vitreous cavity <sup>1</sup>	\$452.95	\$339.72	\$677.47
Anti-glaucoma eye drops (1 bottle latanoprost) <sup>6</sup>	\$16.34	\$16.34	\$16.34
Antibiotic eye drops (1 bottle of broad-spectrum standard) <sup>6</sup>	\$15.30	\$15.30	\$15.30
Steroid eye drops (1 bottle of dexamethasone) <sup>6</sup>	\$15.06	\$15.06	\$15.06
Anti-vascular endothelial growth factor intravitreal injection doses (1.65mg/0.165mL single injection of Ranibizumab) <sup>6</sup>	\$764.70	\$764.70	\$802.53
Related and productivity costs*			
Travel cost per kilometre <sup>7</sup> (5km for general, 24km for sub-specialty, and 50km for orthokeratology care) <sup>8,9</sup>	\$0.48	\$0.48	\$0.48
Median hourly income of an employed adult <sup>10</sup>	\$27.11	\$17.23	\$37.14

**B) China** (all costs from key informants,<sup>11, 12</sup> unless otherwise specified)

Item	Expected cost (US\$)	Lowest likely cost (US\$)	Highest likely cost (US\$)
<b>General ophthalmic examination costs</b>			
Comprehensive, general ophthalmic exam	\$15.58	\$6.21	\$24.95
Brief ophthalmic exam; Low vision assessment; Children's vision assessment	\$7.89	\$2.96	\$12.82
Contact lens fitting, prescription and delivery	\$49.19	\$16.74	\$81.63
<b>Optical correction costs</b>			
Single vision, stock, standard resin spectacle lenses (plano to -4D combined)	\$41.20	\$18.95	\$63.44
Single vision, grind, standard resin spectacle lenses with basic anti-reflection coating (-4D to -6D combined)	\$94.38	\$41.41	\$147.34
Single vision, grind, mid-index resin spectacle lenses with anti-reflection coating (-6D to -10D combined)	\$146.81	\$87.49	\$206.13
Single vision, aspheric, high-index spectacle lenses with anti-reflection coating (-10D and stronger)	\$373.01	\$201.41	\$544.61
Entry-level progressive addition lenses (-0.50D to -4D)	\$311.37	\$183.02	\$439.71
Customised, free-form progressive addition lenses ( $\leq$ -4D)**	\$896.38	\$425.10	\$1,231.61
Standard spectacle frames	\$35.95	\$19.47	\$74.15
6-month supply of single vision, regular replacement silicone hydrogel contact lenses (plano to -20D)	\$104.26	\$91.55	\$116.97
Contact lens consumables	Included with lenses in China		
Magnifier (low vision aid)	\$17.23	\$16.17	\$18.29
Magnifier with illumination (low vision aid)	\$52.28	\$1.50	\$103.06
Loupe (low vision aid)	\$10.79	\$6.74	\$14.83
Telescope (low vision aid)	\$20.97	\$19.47	\$22.47
<b>Anti-myopia management costs</b>			
1 bottle of low-dose atropine eye drops	\$1.50	\$1.35	\$1.65
Average of executive bifocal, Miyosmart and Stellest spectacle lenses	\$571.50	\$331.35	\$811.65
6-month supply of daily disposable anti-myopia multifocal soft contact lenses (plano to -10D with various adds)**	\$314.50	\$251.60	\$377.40
Orthokeratology initial treatment fee (care and lenses for first year)	\$1,225.99	\$915.82	\$1,536.17
Orthokeratology subsequent biennial treatment fee (care and lenses)	\$1,623.87	\$563.40	\$2,684.34
<b>Costs to manage myopia-related complications</b>			
Sub-specialty ophthalmic examination	\$17.08	\$7.71	\$26.45
Brief sub-specialty ophthalmic exam	\$9.39	\$4.46	\$14.31
Optical Coherence Tomography	\$35.88	\$34.75	\$37.00
Computerized perimetry	\$17.23	\$14.98	\$19.47
Retinal angiogram	\$49.06	\$26.96	\$71.16
Ophthalmic surgery – lens extraction and insertion of intraocular lens	\$441.92	\$367.77	\$516.07
Anaesthesia to support lens and implant surgery	\$1.05	\$0.94	\$1.15

Laser capsulotomy (1 eye)	\$250.17	\$201.45	\$298.90
Vitrectomy	\$396.98	\$259.27	\$534.69
Anaesthesia to support vitrectomy	\$77.90	\$70.11	\$85.69
Paracentesis of anterior or posterior chamber, or intravitreal injection	\$1.50	\$0.30	\$2.70
Pneumatic retinopexy for retinal detachment	\$299.61	\$257.24	\$341.98
Retinal photocoagulation	\$374.51	\$162.65	\$586.36
Removal of vitreous substitute from vitreous cavity	\$370.76	\$259.54	\$481.99
Anti-glaucoma eye drops (1 bottle latanoprost)	\$32.21	\$28.99	\$35.43
Antibiotic eye drops (1 bottle of broad-spectrum standard)	\$3.96	\$3.56	\$4.36
Steroid eye drops (1 bottle of dexamethasone)	\$5.54	\$4.99	\$6.10
Anti-vascular endothelial growth factor intravitreal injection doses (1.65mg/0.165mL single injection of Ranibizumab)	\$599.22	\$569.25	\$629.18
Related and productivity costs*			
Travel cost per kilometre (3km for general, 6km for sub-specialty care)	\$0.58	\$0.00	\$1.00
Median hourly income of an employed adult <sup>13</sup>	\$2.16	\$1.10	\$3.04

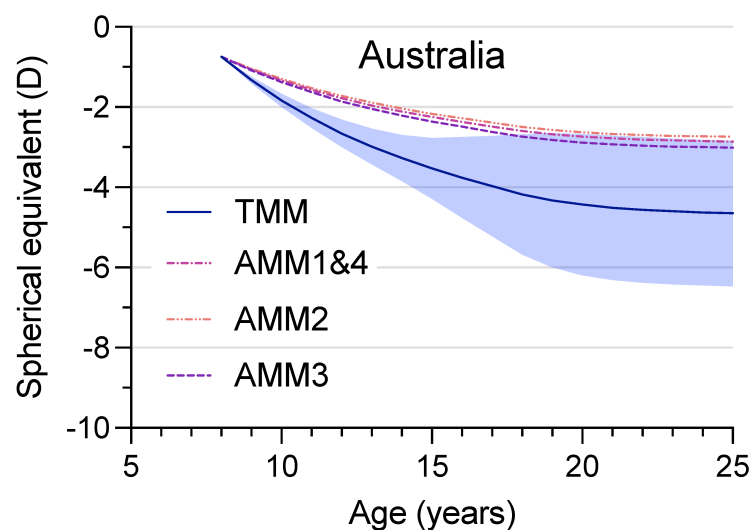
\* Travel cost and median income of an employed adult were converted to related and productivity costs using the following estimates:

- Australian labour force participation rates were 66% for all ages to 70 years, reducing to 7% for 70-79 year olds, and 2% for 80+ year olds;<sup>14, 15</sup>
- Chinese labour force participation rates were 75% for all ages to 70 years, reducing to 10% for 70-79 year olds;<sup>14, 16</sup>
- The employment rate was 94% in Australia and 96% in China;<sup>14, 15</sup>
- We used World Health Organization disability weights – 0.089 for moderate vision impairment, 0.314 for severe vision impairment, and 0.338 for blindness.<sup>17</sup>

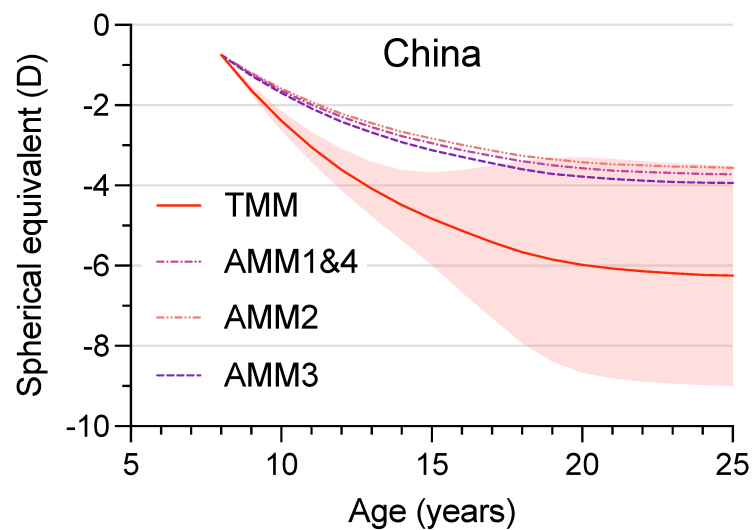
\*\* Two Chinese costs were flagged as outliers following our methodology: anti-myopia multifocal soft contact lenses used in active myopia management (AMM) option 3 were originally estimated to be almost 4 times more expensive in China than Australia, and customized free-form progressive addition spectacle lenses used after 45 years of age for simultaneous correction of myopia and presbyopia were originally estimated to be over 5 times more expensive in China than Australia. Following our methodology, we consulted a wider array of key informants. We were advised that anti-myopia multifocal soft contact lenses were rarely used in mainland China, probably due to both supply and demand issues. We replaced this outlier cost from mainland Chinese hospital systems with the retail cost of Coopervision MiSight anti-myopia multifocal soft contact lenses in Hong Kong Special Autonomous Region, China, which was similar to the Australian cost. We were advised that mainland Chinese hospital systems also rarely use customized free-form progressive addition spectacle lenses for myopic presbyopes. In response we added recommended retail prices for mainland Chinese optical shops from industry sources to the mix of prices and removed the highest hospital price.

**Figure S1.** Spherical equivalent progression from a starting point of an 8-year-old with -0.75D in Australia (A) and China (B), consisting of evidence-based progression from 8 to 17 years of age,<sup>18-20</sup> then exponential decay\* from 18 to 24 years of age. 95% confidence intervals are shown shaded for TMM (traditional myopia management) but omitted for clarity from AMM (active myopia management) options. AMM1 = low-dose atropine; AMM2 = anti-myopia spectacles; AMM3 = anti-myopia multifocal soft contact lenses; AMM4 = orthokeratology.

A)



B)



\* Annual spherical equivalent progression (17-25 years of age) =  $p * \text{EXP}(-0.33*y)$ , where  $p$  = the spherical equivalent progression of the 17-year-old, and  $y$  = the number of years after 17, up to a maximum of 7 (that is, at 24 years of age, the final year of progression).

**Table S2.** Myopia complications, protocols and vision impairment. (A) describes the complications and related protocols, while (B) and (C) provide estimates of vision impairment due to myopia in Australia and China respectively. MMD = myopic macular degeneration; POAG = primary open angle glaucoma; RRD = rhegmatogenous retinal detachment; MSVI = moderate and severe vision impairment.

A) Myopia complications and related protocols

When	While myopia-related complications are known to occur and to cause vision impairment in individuals younger than 55 years of age, <sup>21, 22</sup> population-level evidence suggests this is rare. <sup>23-28</sup> As such, we have assumed the potential for widespread myopia-related complications to start at 55 years of age. The upper age limit was taken as the life expectancy in each country – 83 years in Australia and 79 years in China. <sup>29</sup>
MMD	Presence of MMD was taken as zero for a spherical equivalent >-1D then increased to 0.7% for ≤ -1D to > -3D, 3.0% for ≤ -3D to > -5D, 11.4% for ≤ -5D to > -7D, 28.6% for ≤ -7D to > -9D, and 52.4% for ≤ -9D. <sup>23</sup> The rate at which MMD needed treatment was taken as 0.1% when spherical equivalent > -5D, and 11.6% for ≤ -5D. <sup>28</sup> MMD care followed evidence and accepted protocols. <sup>1-11, 30-34</sup>
POAG	Myopia imparts increased risk for POAG. <sup>26, 35</sup> We represented the relative prevalence of POAG due to myopia as 0% for > -1D, 2.7% of people with ≤ -1D to > -3D, and 2.9% of people with ≤ -3D. <sup>24</sup> Glaucoma care followed evidence and accepted protocols. <sup>36, 37</sup>
RRD	Myopia imparts increased risk of vitreoretinal complications. <sup>26, 35, 38, 39</sup> Combining evidence on relative risk from myopia level, <sup>26, 40</sup> age and ethnicity, <sup>38, 41-43</sup> we estimated the relative chance of RRD occurring due to myopia between 55 and 83 years of age in Australia as 0% for > -3D, 0.09% for ≤ -3 to > -6D, 1.8% for ≤ -6 to > -9D, 28.6% for ≤ -9 to > -15D, and 74.6% for ≤ -15D, and the chance of occurring between 55 and 79 years of age in China as 0% for > -3D, 0.03% for ≤ -3 to > -6D, 0.8% for ≤ -6 to > -9D, 10.1% for ≤ -9 to > -15D, and 34.8% for ≤ -15D. Vitreoretinal care followed evidence and accepted protocols. <sup>44-52</sup>
VI	We added two low vision rehabilitation sessions per year spent with vision impairment, consisting of a combination of optometry, orthoptics, occupational therapy, and mobility instruction. <sup>1, 53</sup> Additionally, one magnifier, loupe or telescope every second year spent with vision impairment represented the range of assistive and adaptive device options. <sup>53</sup>

B) Vision impairment due to myopia in Australia

Spherical equivalent	Relative prevalence of vision impairment due to myopia			
	MSVI < 60yrs	MSVI ≥ 60yrs	Blind < 60yrs	Blind ≥ 60yrs
≤ -0.50D to > -3D	0.00%	0.00%	0.00%	0.00%
-3 to > -6D	0.95%	1.03%	0.09%	0.10%
≤ -6D to > -10D	2.94%	6.01%	0.29%	0.60%
≤ -10D	14.01%	28.88%	1.40%	3.20%

C) Vision impairment due to myopia in China

Spherical equivalent	Relative prevalence of vision impairment due to myopia			
	MSVI < 60yrs	MSVI ≥ 60yrs	Blind < 60yrs	Blind ≥ 60yrs
≤ -0.50D to > -3D	0.00%	0.00%	0.00%	0.00%
-3 to > -6D	2.26%	2.45%	0.27%	0.29%
≤ -6D to > -10D	7.01%	14.32%	0.84%	1.71%
≤ -10D	33.42%	38.10%	3.99%	9.10%

**Table S3.** Lifetime costs of myopia for five interventions in urban Australia (A) and China (B), at each discount rate, and providing cost type disaggregation details omitted from Figures 4, 5 and 6. TMM = traditional myopia management; AMM = active myopia management; AMM1 is low-dose atropine; AMM2 is anti-myopia spectacles; AMM3 is anti-myopia multifocal soft contact lenses; AMM4 is orthokeratology.

**A) Australia**

Estimates	European Australian without discounting					European Australian with annual discount of 3%					European Australian with annual discount of 5%				
	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4
Ophthalmic exams	\$3,356	\$2,766	\$2,651	\$2,857	\$2,965	\$1,582	\$1,423	\$1,328	\$1,491	\$1,597	\$1,163	\$1,081	\$995	\$1,142	\$1,241
Optical corrections	\$11,043	\$9,454	\$9,268	\$10,088	\$8,673	\$4,678	\$4,134	\$3,998	\$4,654	\$3,447	\$3,165	\$2,831	\$2,712	\$3,303	\$2,198
Anti-myopia	\$0	\$2,037	\$1,260	\$5,746	\$3,228	\$0	\$1,789	\$1,107	\$5,048	\$2,836	\$0	\$1,651	\$1,022	\$4,659	\$2,617
Myopia-related complications	\$954	\$625	\$605	\$684	\$664	\$177	\$121	\$113	\$159	\$155	\$66	\$48	\$42	\$80	\$79
Related and productivity	\$3,028	\$1,995	\$1,756	\$2,107	\$2,569	\$1,000	\$898	\$733	\$929	\$1,402	\$2	\$664	\$519	\$683	\$1,129
Total	\$18,381	\$16,878	\$15,541	\$21,481	\$18,099	\$7,437	\$8,364	\$7,280	\$12,281	\$9,437	\$4,396	\$6,274	\$5,290	\$9,867	\$7,264

Lower limit	European Australian without discounting					European Australian with annual discount of 3%					European Australian with annual discount of 5%				
	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4
Ophthalmic exams	\$2,279	\$2,279	\$2,201	\$2,332	\$2,504	\$1,180	\$1,180	\$1,111	\$1,227	\$1,378	\$900	\$900	\$837	\$944	\$1,083
Optical corrections	\$7,058	\$7,058	\$6,842	\$7,247	\$6,586	\$3,102	\$3,102	\$2,913	\$3,269	\$2,688	\$2,128	\$2,128	\$1,954	\$2,282	\$1,746
Anti-myopia	\$0	\$1,109	\$834	\$3,552	\$3,125	\$0	\$974	\$732	\$3,121	\$2,745	\$0	\$899	\$676	\$2,880	\$2,533
Myopia-related complications	\$549	\$408	\$404	\$440	\$440	\$104	\$80	\$76	\$109	\$109	\$40	\$32	\$29	\$58	\$58
Related and productivity	\$1,706	\$933	\$865	\$966	\$1,237	\$567	\$472	\$413	\$502	\$740	\$1	\$361	\$306	\$389	\$608
Total	\$11,592	\$11,786	\$11,145	\$14,538	\$13,892	\$4,953	\$5,809	\$5,246	\$8,227	\$7,660	\$3,070	\$4,321	\$3,802	\$6,553	\$6,029

Upper limit	European Australian without discounting					European Australian with annual discount of 3%					European Australian with annual discount of 5%				
	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4
Ophthalmic exams	\$4,555	\$3,388	\$3,253	\$3,481	\$3,557	\$2,054	\$1,755	\$1,636	\$1,836	\$1,903	\$1,480	\$1,333	\$1,223	\$1,408	\$1,470
Optical corrections	\$15,745	\$12,031	\$11,970	\$13,076	\$10,916	\$6,605	\$5,284	\$5,231	\$6,202	\$4,305	\$4,471	\$3,625	\$3,575	\$4,472	\$2,721
Anti-myopia	\$0	\$3,359	\$1,726	\$8,464	\$3,461	\$0	\$2,951	\$1,517	\$7,437	\$3,041	\$0	\$2,724	\$1,400	\$6,863	\$2,806
Myopia-related complications	\$2,578	\$989	\$980	\$1,037	\$1,037	\$458	\$188	\$181	\$231	\$231	\$161	\$73	\$66	\$112	\$112
Related and productivity	\$5,074	\$4,315	\$3,941	\$4,265	\$5,422	\$1,623	\$1,652	\$1,323	\$1,608	\$2,624	\$3	\$1,154	\$850	\$1,113	\$2,051
Total	\$27,952	\$24,083	\$21,871	\$30,323	\$24,393	\$10,740	\$11,831	\$9,888	\$17,314	\$12,104	\$6,115	\$8,908	\$7,115	\$13,968	\$9,160

## B) China

Estimates	Han Chinese without discounting					Han Chinese with annual discount of 3%					Han Chinese with annual discount of 5%				
	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4
Cost type															
Ophthalmic exams	\$1,862	\$994	\$939	\$1,133	\$974	\$805	\$508	\$468	\$569	\$490	\$552	\$381	\$347	\$424	\$365
Optical corrections	\$18,940	\$9,301	\$10,304	\$11,303	\$10,286	\$6,504	\$3,458	\$4,549	\$4,567	\$4,323	\$3,918	\$2,181	\$3,229	\$3,075	\$2,979
Anti-myopia	\$0	\$141	\$2,203	\$5,080	\$6,542	\$0	\$124	\$1,936	\$4,463	\$5,748	\$0	\$114	\$1,786	\$4,119	\$5,304
Myopia-related complications	\$1,133	\$462	\$444	\$517	\$475	\$210	\$88	\$88	\$107	\$100	\$73	\$32	\$30	\$45	\$43
Related and productivity	\$1,701	\$628	\$545	\$784	\$646	\$488	\$275	\$217	\$315	\$292	\$274	\$199	\$148	\$220	\$215
Total	\$23,636	\$11,526	\$14,434	\$18,818	\$18,923	\$8,006	\$4,453	\$7,253	\$10,023	\$10,952	\$4,817	\$2,908	\$5,539	\$7,884	\$8,905

Lower limit	Han Chinese without discounting					Han Chinese with annual discount of 3%					Han Chinese with annual discount of 5%				
	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4
Cost type															
Ophthalmic exams	\$452	\$339	\$327	\$351	\$340	\$213	\$182	\$171	\$192	\$182	\$155	\$140	\$130	\$149	\$140
Optical corrections	\$7,483	\$4,455	\$6,139	\$5,120	\$4,640	\$2,685	\$1,798	\$3,279	\$2,383	\$1,962	\$1,655	\$1,176	\$2,542	\$1,715	\$1,326
Anti-myopia	\$0	\$77	\$2,169	\$3,618	\$2,423	\$0	\$67	\$1,906	\$3,178	\$2,129	\$0	\$62	\$1,759	\$2,933	\$1,964
Myopia-related complications	\$392	\$314	\$313	\$321	\$320	\$73	\$59	\$58	\$65	\$64	\$26	\$21	\$20	\$27	\$26
Related and productivity	\$194	\$57	\$76	\$60	\$64	\$54	\$30	\$47	\$33	\$37	\$0	\$23	\$39	\$26	\$29
Total	\$8,521	\$5,241	\$9,025	\$9,469	\$7,788	\$3,026	\$2,136	\$5,461	\$5,851	\$4,374	\$1,836	\$1,422	\$4,489	\$4,850	\$3,486

Upper limit	Han Chinese without discounting					Han Chinese with annual discount of 3%					Han Chinese with annual discount of 5%				
	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4	TMM	AMM1	AMM2	AMM3	AMM4
Cost type															
Ophthalmic exams	\$3,523	\$1,960	\$1,891	\$2,026	\$1,914	\$1,499	\$930	\$869	\$988	\$890	\$1,015	\$677	\$620	\$730	\$639
Optical corrections	\$30,617	\$20,468	\$21,113	\$21,551	\$22,139	\$10,776	\$7,165	\$7,732	\$8,117	\$8,634	\$6,637	\$4,386	\$4,909	\$5,264	\$5,741
Anti-myopia	\$0	\$231	\$2,245	\$6,956	\$11,682	\$0	\$203	\$1,973	\$6,112	\$10,264	\$0	\$187	\$1,820	\$5,640	\$9,472
Myopia-related complications	\$1,624	\$539	\$535	\$1,085	\$560	\$303	\$106	\$103	\$222	\$124	\$107	\$40	\$38	\$92	\$57
Related and productivity	\$3,752	\$1,586	\$1,342	\$1,682	\$1,705	\$1,130	\$710	\$496	\$733	\$815	\$4	\$520	\$323	\$531	\$617
Total	\$39,517	\$24,784	\$27,126	\$33,300	\$38,000	\$13,707	\$9,115	\$11,172	\$16,172	\$20,727	\$7,762	\$5,810	\$7,709	\$12,257	\$16,526



## References for Supplementary Results (online-only)

1. Australian Government, Department of Health. Medicare Benefits Schedule (MBS) Online (including Medicare Benefits Schedule Book 2019). Accessed 13 June 2019, Available from: <http://www9.health.gov.au/mbs/fullDisplay.cfm?type=note&q=AN.0.10&qt=noteID&criteria=optometry>.
2. Optical Distributors and Manufacturers Association. EyeTalk Reference Guide, April 2019 ed. Terrey Hills, NSW, Australia: ODMA, 2019.
3. Victorian State Government, Australian College of Optometry. Victorian Eyecare Service. Melbourne, VIC, Australia. Accessed 1 November 2020, available from <https://www.aco.org.au/victorian-eyecare-service/>.
4. Fricke T. Informal survey of low-dose atropine prices at major Australian compounding pharmacies (<https://customcarepharmacy.com.au/>, <https://sladepharmacy.com.au/>, <http://www.pharmacysmart.com.au/>). 2020.
5. Orthokeratology Society of Australia. Key informant advice. 2020.
6. Australian Government, Department of Health. PBS - The Pharmaceutical Benefits Scheme. Canberra, Australia: Australian Government. Accessed 23 June 2020, Available from: <https://www.pbs.gov.au/browse/medicine-listing>.
7. Australian Taxation Office. Travel expenses. Canberra, ACT, Australia: Australian Government. Accessed 18 July 2019, Available from: <https://www.ato.gov.au/Business/Income-and-deductions-for-business/Deductions/Deductions-for-motor-vehicle-expenses/Cents-per-kilometre-method/>.
8. Healy E, Kiely PM, Arunachalam D. Optometric supply and demand in Australia: 2011-2036. *Clinical Exp Optom* 2015;98(3):273-82.
9. Kiely PM, Chakman J. Optometric practice in Australian standard geographical classification—remoteness areas in Australia, 2010. *Clinical and Experimental Optometry* 2011;94(5):468-77.
10. Australian Bureau of Statistics. ABS statistics on Australian earnings and work hours. Belconnen, ACT, Australia: Australian Bureau of Statistics. Accessed 23 October 2020, Available from: <https://www.abs.gov.au/statistics/labour/earnings-and-work-hours>.
11. Zhongshan Ophthalmic Center. Zhongshan Ophthalmic Center; Sun Yat-Sen University. Guangzhou, Guangdong, China: ZOC. Accessed 1 November 2020, Available from: <http://www.gzzoc.com/>.
12. Aier Eye Hospital. About Aier Eye Hospital Group. Guangzhou, Guangdong, China: Aier Eye Hospital. Accessed 1 November 2020, Available from: <http://en.aierchina.com/about>.
13. National Bureau of Statistics of China. Households' income and consumption expenditure in the first quarter of 2020. Beijing, China: National Bureau of Statistics of China, 2020. Release issued 20 April 2020, Available from: [http://www.stats.gov.cn/english/PressRelease/202004/t20200420\\_1739771.html](http://www.stats.gov.cn/english/PressRelease/202004/t20200420_1739771.html).
14. World Bank. World Development Indicators. Washington DC, USA: World Bank, 2017; Accessed 23 March 2020, Available from: <http://data.worldbank.org/products/wdi>.
15. Australian Bureau of Statistics. Labour force Australia. Belconnen, ACT, Australia: Australian Bureau of Statistics, Accessed 14 August 2019, Available from: <https://www.abs.gov.au/statistics/labour/employment-and-unemployment/labour-force-australia/latest-release>.
16. United Nations. Labour force participation rate (ILO\_KILM database 5th edition) from UNdata. Accessed 9 November 2020, Available from: <https://data.un.org/Data.aspx?q=labor+force+participation&d=GenderStat&f=inID%3a106>.
17. World Health Organization. WHO methods and data sources for global burden of disease estimates 2000-2015 (Global Health Estimates Technical Paper WHO/HIS/IER/GHE/2017.1). Geneva: WHO Department of Information Evidence and Research (available from [http://www.who.int/gho/mortality\\_burden\\_disease/en/index.html](http://www.who.int/gho/mortality_burden_disease/en/index.html)), 2017.

18. Holden B, Sankaridurg P, Smith E, et al. Myopia, an underrated global challenge to vision: where the current data takes us on myopia control. *Eye (Lond)* 2014;28(2):142-6.
19. Sankaridurg PR, Holden BA. Practical applications to modify and control the development of ametropia. *Eye (Lond)* 2014;28(2):134-41.
20. Donovan L, Sankaridurg P, Ho A, et al. Myopia progression rates in urban children wearing single-vision spectacles. *Optometry Vis Sci* 2012;89(1):27-32.
21. Avisar R, Friling R, Snir M, et al. Estimation of prevalence and incidence rates and causes of blindness in Israel, 1998-2003. *Isr Med Assoc J* 2006;8:880 - 1.
22. Farber MD. National Registry for the Blind in Israel: estimation of prevalence and incidence rates and causes of blindness. *Ophthalmic Epidemiol* 2003;10(4):267-77.
23. Vongphanit J, Mitchell P, Wang JJ. Prevalence and progression of myopic retinopathy in an older population. *Ophthalmology* 2002;109(4):704-11.
24. Mitchell P, Hourihan F, Sandbach J, Jin Wang J. The relationship between glaucoma and myopia: The Blue Mountains Eye Study. *Ophthalmology* 1999;106(10):2010-5.
25. Nirmalan PK, Katz J, Robin AL, et al. Prevalence of vitreoretinal disorders in a rural population of southern India: the Aravind Comprehensive Eye Study. *Arch Ophthalmol* 2004;122(4):581-6.
26. Flitcroft DI. The complex interactions of retinal, optical and environmental factors in myopia aetiology. *Prog Retin Eye Res* 2012;31(6):622-60.
27. Tideman JW, Snabel MC, Tedja MS, et al. Association of axial length with risk of uncorrectable visual impairment for Europeans with myopia. *JAMA Ophthalmol* 2016;134(12):1355-63.
28. Wong YL, Zhu X, Tham YC, et al. Prevalence and predictors of myopic macular degeneration among Asian adults: pooled analysis from the Asian Eye Epidemiology Consortium. *Br J Ophthalmol* 2021;105(8):1140-8.
29. United Nations. United Nations World Population Prospects estimate from UNdata. United Nations, 2020. Accessed 13 November 2020, Available from: <https://data.un.org/Data.aspx?q=life+expectancy&d=GenderStat&f=inID%3a36>.
30. Cheung CMG, Arnold JJ, Holz FG, et al. Myopic choroidal neovascularization: review, guidance, and consensus statement on management. *Ophthalmology* 2017;124(11):1690-711.
31. Chan NS, Teo K, Cheung CM. Epidemiology and diagnosis of myopic choroidal neovascularization in Asia. *Eye Contact Lens* 2016;42(1):48-55.
32. Lai TY, Cheung CM. Myopic choroidal neovascularization: diagnosis and treatment. *Retina* 2016;36(9):1614-21.
33. Leveziel N, Caillaux V, Bastuji-Garin S, et al. Angiographic and optical coherence tomography characteristics of recent myopic choroidal neovascularization. *Am J Ophthalmol* 2013;155(5):913-9.
34. Kasahara K, Moriyama M, Morohoshi K, et al. Six-year outcomes of intravitreal Bevacizumab for choroidal neovascularization in patients with pathologic myopia. *Retina* 2017;37(6):1055-64.
35. Flitcroft DI, He M, Jonas JB, et al. IMI - Defining and classifying myopia: a proposed set of standards for clinical and epidemiologic studies. *Invest Ophthalmol Vis Sci* 2019;60(3):M20-M30.
36. Australian Government National Health and Medical Research Council. NH&MRC Guidelines for the screening, prognosis, diagnosis, management and prevention of glaucoma. Canberra, ACT, Australia: Commonwealth of Australia, 2010.
37. Tang W, Zhang F, Liu K, Duan X. Efficacy and safety of prostaglandin analogues in primary open-angle glaucoma or ocular hypertension patients: A meta-analysis. *Medicine (Baltimore)* 2019;98(30):e16597.
38. Mityr D, Charteris DG, Fleck BW, et al. The epidemiology of rhegmatogenous retinal detachment: geographical variation and clinical associations. *Br J Ophthalmol* 2010;94(6):678-84.
39. Kim MS, Park SJ, Park KH, Woo SJ. Different mechanistic association of myopia with rhegmatogenous retinal detachment between young and elderly patients. *Biomed Res Int* 2019;2019:5357241.

40. Ogawa A, Tanaka M. The relationship between refractive errors and retinal detachment--analysis of 1,166 retinal detachment cases. *Jpn J Ophthalmol* 1988;32(3):310-5.
41. Wong TY, Tielsch JM, Schein OD. Racial difference in the incidence of retinal detachment in Singapore. *Arch Ophthalmol* 1999;117(3):379-83.
42. Polkinghorne PJ, Craig JP. Northern New Zealand Rhegmatogenous Retinal Detachment Study: epidemiology and risk factors. *Clinical & Experimental Ophthalmology* 2004;32(2):159-63.
43. Li X, Beijing Rhegmatogenous Retinal Detachment Study Group. Incidence and epidemiological characteristics of rhegmatogenous retinal detachment in Beijing, China. *Ophthalmology* 2003;110(12):2413-7.
44. Wakabayashi T, Oshima Y, Fujimoto H, et al. Foveal microstructure and visual acuity after retinal detachment repair: imaging analysis by Fourier-domain optical coherence tomography. *Ophthalmology* 2009;116(3):519-28.
45. Stirpe M, Heimann K. Vitreous changes and retinal detachment in highly myopic eyes. *Eur J Ophthalmol* 1996;6(1):50-8.
46. Heimann H, Bartz-Schmidt KU, Bornfeld N, et al. Scleral buckling versus primary vitrectomy in rhegmatogenous retinal detachment: a prospective randomized multicenter clinical study. *Ophthalmology* 2007;114(12):2142-54.
47. Sun Q, Sun T, Xu Y, et al. Primary vitrectomy versus scleral buckling for the treatment of rhegmatogenous retinal detachment: a meta-analysis of randomized controlled clinical trials. *Curr Eye Res* 2012;37(6):492-9.
48. Brucker AJ, Hopkins TB. Retinal detachment surgery: the latest in current management. *Retina* 2006;26(6 Suppl):S28-33.
49. Jackson TL, Donachie PH, Sallam A, et al. United Kingdom National Ophthalmology Database Study of Vitreoretinal Surgery: Report 3, retinal detachment. *Ophthalmology* 2014;121(3):643-8.
50. Jackson TL, Donachie PH, Sparrow JM, Johnston RL. United Kingdom National Ophthalmology Database Study of Vitreoretinal Surgery: Report 1, case mix, complications, and cataract. *Eye (Lond)* 2013;27(5):644-51.
51. Liao L, Zhu XH. Advances in the treatment of rhegmatogenous retinal detachment. *Int J Ophthalmol* 2019;12(4):660-7.
52. Do DV, Gichuhi S, Vedula SS, Hawkins BS. Surgery for post-vitrectomy cataract. *Cochrane Database Syst Rev* 2013(12):CD006366.
53. Markowitz SN. Principles of modern low vision rehabilitation. *Can J Ophthalmol* 2006;41(3):289-312.