Five-Year, Private Sector Cost Comparison of iStent *inject*® W, Trabeculectomy, Glaucoma Medications for Primary Open-Angle Glaucoma With and Without Phacoemulsification: A Filipino Patient Perspective

Jose Ma Martinez, MD[1], Rommel Bautista, MD[2], Ivan Tecson, MD[3], Alice Chu, PhD[4], Sheena Suthen, BSc (Hons)[5], David Champion, MPH (Hons)[5], Anand Jha, MBA[5]

[1]The Department of Ophthalmology, East Avenue Medical Center, Quezon City, Philippines
[2] The Medical City, Pasig City, Philippines
[3] Baliwag Eye Clinic, Bulacan, Philippines
[4] Glaukos Corporation, United States of America
[5]ANSEA Consultants Pte Ltd, Singapore

Correspondence: Alice Chu, PhD
Office Address: Glaukos Corporation, One Glaukos Way, Aliso Viejo, CA, 92656, USA
Email Address: achu@glaukos.com

Disclosures: M Martinez has received funding for speaking engagements and travel from Glaukos and AbbVie. A Chu is an employee and shareholder of Glaukos.

ABSTRACT

Objective: To perform a cost comparison of the 5-year total direct medical costs of iStent *inject*® W vs. trabeculectomy vs. glaucoma medications for the treatment of primary open-angle glaucoma, with and without phacoemulsification, from the perspective of Filipino patients.

Methods: This cost-comparative analysis compared total private sector costs of surgery, post-operative care, and medication usage over 5 years on combined phacoemulsification (combined) or standalone (SA) procedures using iStent *inject* W, trabeculectomy, and glaucoma medications for the general population and senior citizens/individuals with disabilities. Data, including unit costs and frequencies, were obtained from published literature and local primary research. Scenario analysis consisted of three payment models: 100% out-of-pocket (OOP), coverage from PhilHealth public health insurance, and combined subsidies from both private and PhilHealth insurance.

Results: iStent *inject* W was less costly than glaucoma medications in all scenarios and patient populations. When compared with trabeculectomy, iStent *inject* W, was less costly in all patient populations in the OOP scenario, providing savings of 5% for SA procedures and 5% to 6% for combined procedures. It was also less costly as a combined procedure in all populations in the combined private health and PhilHealth insurance scenario, offering 6% savings in the general population and 9% in elderly and disabled patients. However, it was costlier by 1% in the PhilHealth scenario. As an SA procedure, it was costlier vs. trabeculectomy in both populations in the PhilHealth and PhilHealth plus private health insurance scenarios by 18% to 22% and 101% to 109%, respectively. The highest incremental cost for iStent *inject* W was US$1,662 vs. trabeculectomy as an SA procedure in the general population under the combined private health and PhilHealth insurance scenario.

Conclusion: For Filipino glaucoma patients who are treated in the private sector, iStent *inject* W, whether combined or as an SA procedure, may be cost-saving compared with glaucoma medications over a 5-year period; however, it may be costlier compared with trabeculectomy depending on health insurance coverage scenarios.

Keywords: glaucoma, minimally invasive glaucoma surgery, trabecular micro-bypass, Philippines, cost analysis.

Philipp J Ophthalmol 2026;52:7-16

Glaucoma is a chronic, progressive disease of the optic nerve that leads to destruction of the retinal ganglion cells and loss of vision.[1] It is the leading cause of irreversible blindness globally and is projected to affect 111.8 million individuals by 2040.[2] In a Philippine population-based survey conducted from 2001 to 2002, glaucoma was identified as the third most common cause of bilateral blindness and the fifth most common cause of low vision.[3]

Primary open-angle glaucoma (POAG) is the most common type of glaucoma, characterized by resistance of aqueous humor outflow at the trabecular meshwork without any underlying cause. [1,4] In Asia alone, the number of individuals with POAG is projected to reach 42 million by 2040. [4]

The main goals of POAG treatment are to reduce and maintain intraocular pressure (IOP) to preserve vision and minimize its negative effects on quality of life. In the Philippines, initial treatment typically starts with topical glaucoma medications, followed by selective laser trabeculoplasty if medications fail. [5] Filtration surgeries, such as trabeculectomy, are reserved as downstream options.

Glaucoma medications have limitations, including ocular side effects such as redness, stinging sensation, itchiness, and patient compliance issues. [6] Prolonged use of glaucoma medications can also reduce the success rate of future glaucoma filtration surgeries due to conjunctival inflammation and scarring. [7,8] Furthermore, ocular surface disease is prevalent in 48% to 59% of patients on glaucoma medications, with severity correlated with the duration of use. [9,10]

Trabeculectomy, the gold standard for glaucoma surgery, effectively lowers IOP but has high complication and failure rates. [11] This invasive procedure requires lifelong monitoring for revisions and complications, including the risk of hypotony.

The traditional treatment algorithm is currently being challenged by the "interventional glaucoma" mindset, which adopts a proactive approach favoring early surgical intervention, such as laser treatments or minimally invasive glaucoma surgery (MIGS), rather than overreliance on topical glaucoma medications. [12] The advent of MIGS has provided surgeons and glaucoma patients with newer, safer surgical approaches to bridge the gap between noninvasive and invasive treatments. A 2016 survey of the Philippine Glaucoma Society revealed that 77% of respondents were interested in performing MIGS, which was not available at that time. [5]

iStent *inject*® W Trabecular Micro-Bypass System (Glaukos Corporation, Aliso Viejo, California, USA), a form of MIGS, offers a safe and effective, tissue-sparing approach to treat mild to moderate open-angle glaucoma without compromising vision acuity. [13] The device implants two titanium stents (350 μm x 350 μm) at two to three clock hours apart in the Schlemm's canal to restore the eye's natural aqueous humor outflow (**Figure 1**). In the Philippines, iStent *inject* W was introduced in March 2023 and is indicated to reduce IOP safely and effectively in patients with POAG, pseudo-exfoliative glaucoma, and pigmentary glaucoma. The device can be implanted in combination with phacoemulsification (combined) or as a standalone (SA) procedure.

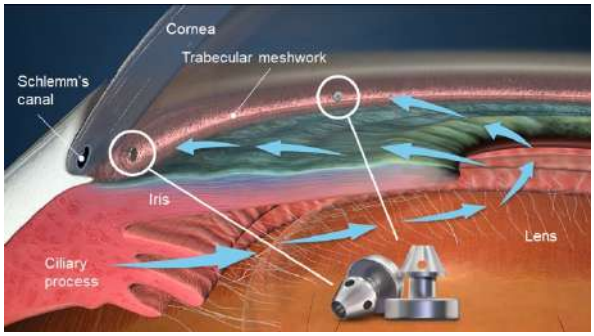

Figure 1. iStent *inject* W Trabecular Micro-Bypass

A review by the American Society of Cataract and Refractive Surgery Glaucoma Clinical Committee concluded that trabecular micro bypass with iStent technologies, combined or SA, achieves IOP and glaucoma medication reduction while maintaining excellent visual function. [14] The American Glaucoma Society reported that trabecular meshwork-canal-based MIGS, compared with traditional filtration surgeries, are safer resulting in less discomfort, less damage to ocular structures, less disturbance to leisure activities, faster recovery, and fewer postoperative visits. [15]

Given the irreversible nature of glaucoma, early diagnosis and access to effective treatments are crucial. Treatment selection should consider quality of life, lifestyle, comorbidities, adverse events, post-

operative interventions, and long-term costs. Considering the limited coverage of medical expenses by social health insurance in the Philippines, the financial implications of treatment choices are significant for Filipino families.

Few health economic studies among different glaucoma treatments have been evaluated in the Philippines. Jacomina *et al.* showed that selective laser trabeculoplasty, a noninvasive treatment, was cost-effective vs. topical prostaglandin analogues as first-line treatment for POAG from the patients' perspective. [16]

This economic analysis compared the five-year estimated total direct medical costs of iStent *inject* W, trabeculectomy, and glaucoma medications for treating POAG (combined or SA), from the perspective of Filipino patients receiving care in the private healthcare setting.

METHODS

This study utilized a cost-comparative model to estimate the five-year total direct medical costs associated with combined or SA iStent *inject* W, trabeculectomy, and glaucoma medications for treating POAG in Filipino patients in the private healthcare setting. The model analyzed two distinct patient populations: the general population and a group comprising senior citizens above 60 years old and persons with disabilities (PWD). In the Philippines, this latter group benefits from a 20% discount on medical treatments and this discount was factored into the model [17]. The general population includes individuals both below and above 60 year old. We used the age-standardized prevalence of POAG from China, as it provided the most recent and comprehensive prevalence data across various age categories. [18] Based on this data, we estimated that 59% of POAG patients in the Philippines were below 60 years of age, while the remaining 41% were above 60 years of age.

Within each patient population, cost scenarios were analyzed for three payment models: 1) purely out-of-pocket (OOP) where patients paid 100% of total costs, 2) with public health insurance (PhilHealth) where subsidies were applied based on existing surgical codes, except for iStent *inject* W, which currently lacks a corresponding PhilHealth surgical code, and 3) with combined PhilHealth and private insurance where full coverage was assumed for procedures with recognized PhilHealth surgical codes. The total computed cost represented the out-of-pocket expenses borne by patients over a five-year period and comprised five components reflective of healthcare services in private institutions. These included: 1) primary treatment: combined glaucoma medications, glaucoma medications only, primary surgery with SA iStent *inject* W, SA trabeculectomy, combined iStent *inject* W, or combined trabeculectomy, 2) post-operative consultations: routine follow-up eye exams, such as IOP measurements, gonioscopy and a bundled package cost covering optical coherence tomography scans and visual field tests, 3) post-operative medications: topical steroids, antibiotics (e.g., prednisolone, levofloxacin, moxifloxacin), and glaucoma medications (prostaglandin analogues, beta-blockers, alpha-2-agonists, carbonic anhydrase inhibitors, and combination drugs), 4) post-operative interventions: needling, laser suture lysis, fluorouracil injections, removal of releasable sutures, anterior chamber reformation, laser capsulotomy, and 5) secondary glaucoma surgeries: laser, minimally-invasive bleb surgery, trabeculectomy, glaucoma drainage implant surgery.

Eight private practice glaucoma specialists from Metro Manila and the Greater Manila Area, all proficient in both iStent *inject* W implantation and trabeculectomy, who were willing to participate, were interviewed individually in 2023 to provide clinical and cost-related insights. These included frequency, type, and costs of consultation with basic eye exam, primary surgery, postoperative steroids/antibiotics, and postoperative interventions, and secondary glaucoma surgeries for either trabeculectomy or medication arms.

Data on glaucoma medication frequency and mean number of medications for all treatments were obtained from peer-reviewed studies with three-to-seven-year follow-up periods and selected based on similar baseline mean number of glaucoma medications. [19–23] Given the lack of long-term data and experience in the Philippines for iStent *inject* W, the frequency and type of secondary glaucoma surgeries for iStent *inject* W were obtained from the seven-year follow-up study from Hengerer *et al.* [24]

Medication costs were obtained from the Philippine Drug Price Reference Index and further supplemented by Watsons Philippines, a local drugstore chain. [25,26] To estimate the cost of glaucoma medications, the number of medications prescribed per patient was approximated based on the average reported usage. If the average number of medications was less than 1.5, it was assumed that the patient was on 1 medication. If it was between 1.5 and less than 2.5, the patient was assumed to be on 2 medications.

For patients on 1 medication, the cost was calculated using the average cost of first-line medications. For those on 2 medications, the total cost was estimated by summing the average cost of a first-line medication and a second-line medication. The treatment hierarchy was based on standard clinical guidelines where the first line was prostaglandin analogues, the second line was beta blockers and the third and fourth line were alpha-2 adrenergic agonists or carbonic anhydrase inhibitors (CAIs).

For antibiotic treatment, the most commonly prescribed agents were levofloxacin, moxifloxacin, and gatifloxacin. The antibiotic cost was estimated using the average cost of these three medications. For steroids, prednisolone was the primary agent used, and its cost was used to represent steroid treatment. All costs were converted to US$ using the April 2024 exchange rate (US$1:₱54.98).

The primary outcome was the total direct five-year medical cost to the patient for POAG treatment, which included costs for surgeries, post-operative consultations, medications, interventions, and secondary surgeries. Within each population and financial coverage scenario, cost differences were calculated by subtracting the five-year total costs of the alternative treatment from those of iStent *inject* W. Negative values indicate cost savings with iStent *inject* W, while positive values reflect additional costs over the five-year period.

RESULTS

Based on Hengerer *et al.* and Motlagh *et al.,* no post-operative interventions were identified for SA iStent *inject* W and glaucoma medication groups. [22,24] This was validated by the glaucoma specialists interviewed for this study. The mean number of medications used in the model for the SA glaucoma medication arm was 2.29 and obtained from the five-year time point from Motlagh *et al.* [22] For the combined glaucoma medication arm, linear extrapolation from the three-year mean number of medications reported in Francis *et al.* resulted in a five-year mean number of medications of 2.37 used for medication costing. [23]

From the primary interviews with glaucoma specialists, in the SA trabeculectomy group, 6 post-operative interventions were noted: needling in clinic, needling in the operating room, laser suture lysis, anti-scarring 5-fluorouracil injections, removal of releasable sutures, and anterior chamber reformation. For combined trabeculectomy, an additional laser capsulotomy was recognized as a postoperative intervention. For combined iStent *inject* W and glaucoma medication with phacoemulsification, one post-operative intervention —laser capsulotomy— was identified.

Secondary glaucoma surgeries for iStent *inject* W included the XEN® Gel Stent (Abbvie Inc., Chicago, Illinois, USA), as reported in published literature. [24] For trabeculectomy, secondary surgeries obtained through interviews from the surgeons included Ahmed® Glaucoma Valve (New World Medical Inc., Rancho Cucamonga, California, USA), Molteno3® Glaucoma Drainage Device (Nova Eye Medical Limited, Kent Town, South Australia, Australia), BAERVELDT™ Glaucoma Implant (Johnson & Johnson Surgical Vision, Inc., Irvine, California, USA), Aurolab Aqueous Drainage Implant (AADI; Aurolab, Madurai, Tamil Nadu, India), iStent *inject* W and repeat trabeculectomy. For the glaucoma medication groups, secondary surgeries obtained from primary research with surgeons included selective laser trabeculoplasty, iStent *inject* W, trabeculectomy, XEN, Ahmed, Molteno, BAERVELDT, and AADI.

The average total cost of consultations including basic eye exams ranged fromUS$385 to US$615, depending on primary treatment scenario. These are not subsidized by PhilHealth insurance, but patients with private health insurance receive full coverage for these services. Additionally, senior citizens aged 60 and above, along with individuals with

disabilities, benefit from a 20% discount on these consultations.

The average total costs for primary SA trabeculectomy, SA iStent *inject* W, phacoemulsification, combined trabeculectomy, and combined iStent *inject* W were estimated to be US$1,229, US$2,542, US$1,605, US$2,688, and US$3,773, respectively. The average total costs for secondary glaucoma surgeries were estimated to be US$1,399 for trabeculectomy, US$2,713 for iStent *inject* W, US$2,085 for XEN, and a range of $1,601 to $2,542 for various glaucoma drainage implants. For primary and secondary glaucoma surgeries, PhilHealth insurance provides coverage only for specific procedures—trabeculectomy, phacoemulsification, Ahmed, Molteno, BAERVELDT, AADI, XEN, and repeat trabeculectomy—all of which are also covered by private health insurance. However, iStent *inject* W does not receive coverage from either PhilHealth public health insurance or private health insurance, although senior citizens and individuals with disabilities receive a 20% discount on the device and associated surgical procedure.

Post-operative medications (average cost per month: antibiotics, US$9; steroids, US$7; glaucoma medications depending on number of medication classes: US$21 to US$67) are not covered by PhilHealth or private health insurance, but senior citizens and individuals with disabilities are eligible for a 20% discount. [17] Additionally, certain post-operative interventions, such as needling in the operating room (average total cost: US$743), laser suture lysis (US$296), anterior chamber reformation (US$394), and laser capsulotomy (US$330), are covered by both PhilHealth public health insurance, and private health insurance, with a 20% discount for senior citizens and individuals with disabilities.

Model results

Figure 2 shows the five-year cumulative costs for patients in general population using the SA treatment model. Among the three treatments, the highest five-year total cost was for glaucoma medications in all financial coverage scenarios, ranging from US$3,654 to US$4,446. For patients paying OOP, iStent *inject* W was the least costly option at $3,713, while trabeculectomy was the second most costly at $3,907. Among patients covered by PhilHealth insurance alone and those with both PhilHealth and private health insurance, trabeculectomy was the least costly treatment at $3,113 and $1,648, respectively. Meanwhile, iStent *inject* W was the second most costly option at $3,681 and $3,310, respectively.

In all three payment scenarios, glaucoma medications (US$3,441) were the highest cost component for patients treated with medications or trabeculectomy, whereas the device cost (US$1,099) was the highest cost component for those treated with iStent *inject* W (**Figure 2**). The combination of private health insurance and PhilHealth insurance provided the best financial coverage overall by minimizing costs in all cost components, except for post-operative glaucoma medications, device costs for secondary glaucoma surgeries, and iStent *inject* W total procedural and device costs.

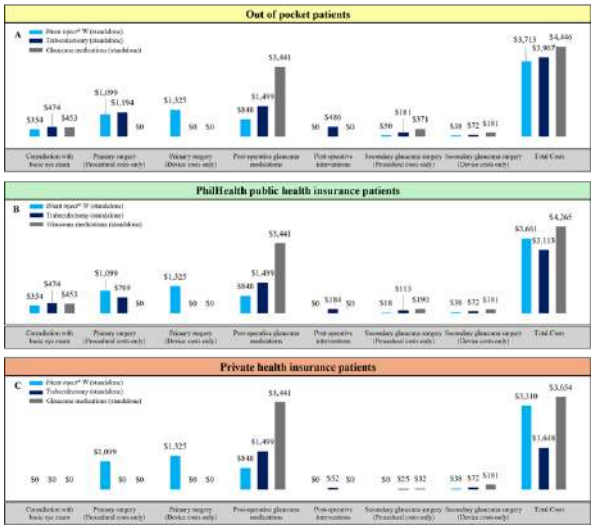

Figure 2: **Five-year post-operative costs for patients in an average population using the standalone treatment model.** (A) Five-year post-operative costs for patients paying 100% of medical expenses out of pocket (B) Five-year post-operative costs for patients eligible for PhilHealth public health insurance (C) Five-year post-operative costs for patients eligible for PhilHealth public health insurance and private health insurance.

Similar cost component trends were observed in the senior citizen population within the SA treatment model (**Figure 3**). The absolute costs were lower than those for the general population because of the 20% discount on services, implants, and medications mandated by national law.

In the phacoemulsification treatment model for the general population, the total cost over a five-year period was highest for glaucoma medications (range:

US$3,992 to US$6,267) regardless of financial coverage (**Figure 4**). In the OOP and combined PhilHealth and private health insurance scenarios, trabeculectomy had the second highest total cost (US$5,382 and US$3,298, respectively) and iStent *inject* W was the least costly (US$5,106 and US$3,106, respectively). In the PhilHealth coverage scenario, iStent *inject* W was the second costliest treatment (US$4,722) and trabeculectomy (US$4,666) was the least costly treatment.

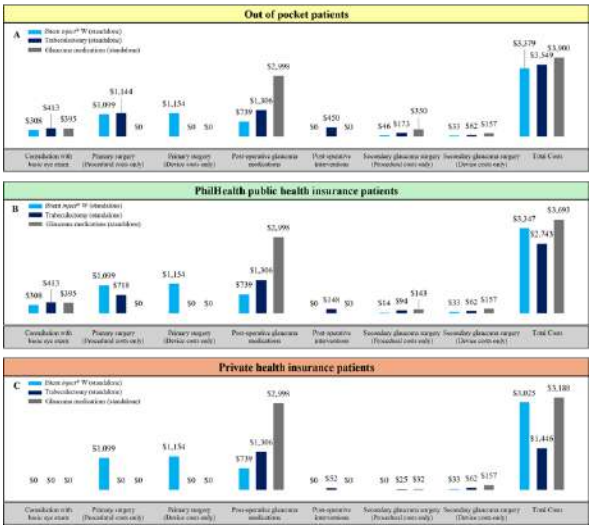

Figure 3: Five-year post-operative costs for patients who are above 60 years old (i.e.: senior citizens) and individuals with disability, using the standalone treatment model. (A) Five-year post-operative costs for patients paying 100% of medical expenses out of pocket (B) Five-year post-operative costs for patients eligible for PhilHealth public health insurance (C) Five-year post-operative costs for patients eligible for PhilHealth public health insurance and private health insurance.

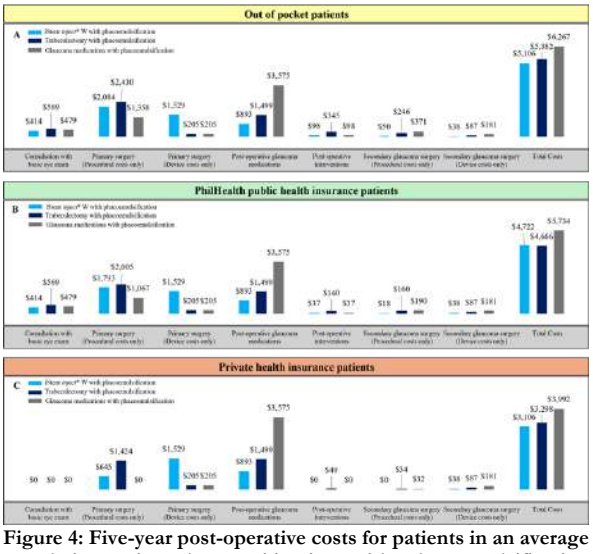

Figure 4: Five-year post-operative costs for patients in an average population using the combination with phacoemulsification treatment model. (A) Five-year post-operative costs for patients paying 100% of medical expenses out of pocket (B) Five-year post-operative costs for patients eligible for PhilHealth public health insurance (C) Five-year post-operative costs for patients eligible for PhilHealth public health insurance and private health insurance.

The highest cost component in the OOP scenario was primary surgery procedural costs for iStent *inject* W (US$2,084) and trabeculectomy (US$2,430), and post-operative glaucoma medications (US$3,575) for glaucoma medication treatment (**Figure 4**). This trend was also observed in the PhilHealth scenario. For patients with both PhilHealth and private health insurance, the highest cost component for iStent *inject* W was the device/implant costs (US$1,529) and post-operative glaucoma medications for trabeculectomy (US$1,499) and glaucoma medications (US$3,575).

In the senior citizen/PWD patient population, the order of the five-year total cost burden was similar to the general population results (**Figure 5**).

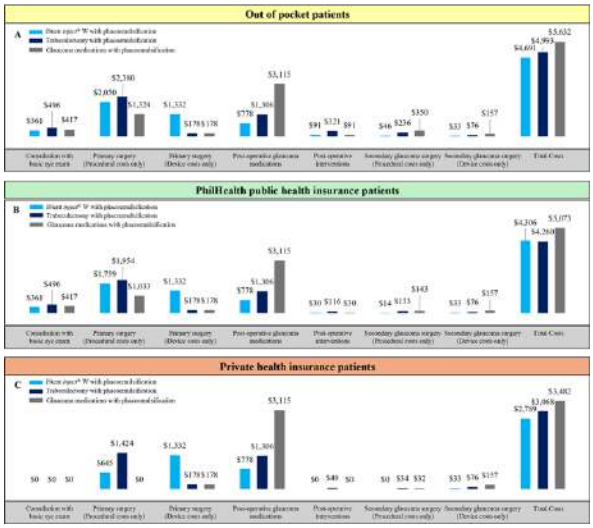

Figure 5: Five-year post-operative costs for patients who are above 60 years old (i.e., senior citizens) and individuals with disability, using the combination with phacoemulsification treatment model. (A) Five-year post-operative costs for patients paying 100% of medical expenses out of pocket (B) Five-year post-operative costs for patients eligible for PhilHealth public health insurance (C) Five-year post-operative costs for patients eligible for PhilHealth public health insurance and private health insurance.

Primary surgery procedural costs contributed to the highest cost component for iStent *inject* W (US$2,050) and trabeculectomy (US$2,380) in the OOP scenario. Post-operative glaucoma medications (US$3,115) were the highest cost component for glaucoma medication treatment with phacoemulsification. The same cost components were identified as providing the highest contribution to total costs for respective treatments in the PhilHealth coverage scenario (**Figure 5**). In the combined PhilHealth and private health insurance scenario, the device/implant cost was the highest cost component for iStent *inject* W at US$1,332,

while the primary surgical cost of US$1,424 was the highest contributor for trabeculectomy. Medication costs (US$3,115) were the highest cost component for glaucoma medication with phacoemulsification.

Treatment comparisons with iStent inject W

In the general population model, SA iStent *inject* W demonstrated cost savings compared to SA glaucoma medication treatment across all financial scenarios, with savings ranging from 9% to 16% (**Table 1**). Compared with trabeculectomy, SA iStent *inject* W was 5% less costly in OOP scenario but was more expensive by 18% under the PhilHealth scenario and by 101% under the combined PhilHealth plus private health insurance scenario.

iStent *inject* W, when performed as a combined procedure with phacoemulsification, was estimated to yield cost savings of 18% to 22%, depending on the financial coverage scenario, compared to glaucoma medication treatment with phacoemulsification (**Table 1**). When compared with combined trabeculectomy, iStent *inject* W was cost-saving by 5% and 6% in the OOP and PhilHealth plus private health insurance scenarios, respectively. It was costlier by only 1% in the PhilHealth scenario.

Table 1: Summary results in the general population. The green boxes are favorable to iStent *inject* W and represent an overall cost saving to the patient. The red boxes are not favorable to iStent *inject* W and represent a cost increase to the patient.

	General population (Cost difference)			
	Standalone model (without phacoemulsification)		Combination model (with phacoemulsification)	
	iStent *inject*® W vs Topical glaucoma medication	iStent *inject*® W vs Trabeculectomy	iStent *inject*® W vs Topical glaucoma medication	iStent *inject*® W vs Trabeculectomy
100% out of pocket	16% (US$733)	5% (US$194)	19% (US$1,161)	5% (US$276)
PhilHealth public health insurance	14% (US$584)	18% (US$568)	18% (US$1,012)	1% (US$56)
PhilHealth public health insurance and Private health insurance	9% (US$344)	101% (US$1,662)	22% (US$886)	6% (US$192)

In the senior citizen population model, SA iStent *inject* W was estimated to provide cost savings of 5% to 13%, depending on the financial coverage scenario, compared to SA glaucoma medication treatment (**Table 2**). It was cost-saving by 5% in the OOP scenario, costlier by 22% in the PhilHealth scenario, and by 109% in the combined PhilHealth and private health insurance scenario when compared with SA trabeculectomy.

Combined iStent *inject* W was cost-saving compared to combined glaucoma medication treatment, with savings ranging from 15% to 20%, depending on the financial coverage scenario (**Table 2**). It was costlier by only 1% in the PhilHealth scenario, but cost-saving by 6% in the OOP scenario and by 9% in the PhilHealth plus private health insurance scenario when compared with combined trabeculectomy.

Table 2: Summary results in the population aged 60 years old and above and individuals with disabilities. The green boxes are favorable to iStent *inject* W and hence represent an overall cost saving to the patient. The red boxes are not favorable to iStent *inject* W and hence represents a cost increase to the patient.

	Senior citizens aged 60 years old and above and individuals with disability (Cost difference)			
	Standalone model (without phacoemulsification)		Combination model (with phacoemulsification)	
	iStent *inject*® W vs Topical glaucoma medication	iStent *inject*® W vs Trabeculectomy	iStent *inject*® W vs Topical glaucoma medication	iStent *inject*® W vs Trabeculectomy
100% out of pocket	13% (US$521)	5% (US$170)	17% (US$941)	6% (US$302)
PhilHealth public health insurance	9% (US$346)	22% (US$604)	15% (US$767)	1% (US$46)
PhilHealth public health insurance and Private health insurance	5% (US$163)	109% (US$1,579)	20% (US$693)	9% (US$279)

DISCUSSION

This cost analysis evaluated the direct medical costs of iStent *inject* W compared with trabeculectomy and glaucoma medications over a five-year horizon from the perspective of Filipino patients with POAG receiving treatment in the private healthcare setting. The results demonstrated that iStent *inject* W, whether implanted as a standalone procedure or combined with phacoemulsification, offered cost savings compared to glaucoma medications across all payment scenarios and patient populations. As a combined procedure, iStent *inject* W was costlier by only 1% compared with the more invasive trabeculectomy in the PhilHealth scenario and cost saving by 5% to 6% and 6% to 9% in the OOP and private health insurance scenarios, respectively. As an SA procedure, the highest incremental cost for iStent *inject* W was observed in the general population under the combined PhilHealth and private health insurance scenario, amounting to US$1,662—roughly equivalent to the average cost of the iStent *inject* W device itself (US$1,443). iStent *inject* W was cost-saving by 5% in the OOP scenario in both

populations. These findings emphasize the importance of considering long-term financial implications, in addition to treatment risks and benefits, in the shared decision-making process between surgeons and patients, especially for chronic conditions like glaucoma.

The cost savings associated with iStent *inject* W align with its published clinical and health economic literature. Clinical studies have consistently shown it to reduce patients' dependency on glaucoma medications, which contributes to overall cost savings. A seven-year real-world prospective study in OAG eyes implanted with iStent *inject*, SA or combined, showed significant glaucoma medication reductions by 61.7% and 63.7%, respectively, from preoperative values. [24] In addition, 56.8% vs. 0.0% (preoperative) in the SA cohort and 54.4% vs. 1.2% in the combined cohort, were medication-free at year seven. Additional glaucoma surgeries were only 9.0% in the SA group and 3.7% in the combined group. The authors reported no additional post-operative interventions. A three-year retrospective study of combined iStent *inject* W in mild to advanced glaucoma resulted in a glaucoma medication reduction of 68.5% (mean 1.5 to 0.5, $P < 0.001$) with 71.6% of eyes medication-free.[27] Secondary glaucoma surgeries were observed in 7.3% of eyes. Cost-utility studies on iStent *inject* vs. glaucoma medications only or phacoemulsification only from Australia, [28] Brazil, [29] Canada,[30,31] Italy,[32] Japan,[33] and Spain[34] have shown cost savings in glaucoma medications and additional glaucoma surgeries.

The frequency of post-operative visits for patients treated with iStent technologies has been shown to be lower than those for trabeculectomy in surveys to glaucoma societies in the United Kingdom and Japan. In the United Kingdom, 50% or more of respondents said that follow-up visits in the iStent group were 3 vs. 9 for trabeculectomy in the first six months post-operation.[35] The Japanese survey indicated 8 visits for iStent and 11 visits for trabeculectomy in the first-year postoperation by 60% or more of respondents.[36] This is representative of the minimally-invasive, non-bleb-forming trabecular micro-bypass procedure of iStent *inject* W compared with the invasive, bleb-forming trabeculectomy, which requires more early and frequent monitoring to optimize IOP.[15]

Our analysis revealed that while iStent *inject* W was estimated to be cost-saving in the OOP scenario, its cost advantages were less pronounced or even reversed in the context of PhilHealth public health insurance and combined insurance coverages. Specifically, iStent *inject* W was more expensive than trabeculectomy under these insurance plans because it currently is not covered as a benefit. These results underscore the need for incorporating both clinical outcomes and financial considerations into the decision-making process for glaucoma treatments. Topical glaucoma medications are costly in the long term and require daily patient or caregiver self-treatment. The financial burden associated with trabeculectomy, particularly in terms of frequent post-operative interventions and higher consultation costs, contrasts with the lower overall costs and reduced follow-up needs associated with iStent *inject* W. These issues are particularly relevant for older patients and those with disabilities, who may benefit from reduced need for topical medication management or post-operative care requirements. Incorporating financial discussions into the patient consultation process may help tailor treatment choices that align better with individual patient circumstances, ultimately supporting the goal of "care that fits" each patient's needs.

A limitation of this analysis is the heterogeneity in the study designs from which the frequency and cost data were sourced. The data were derived from mixed populations from prospective and retrospective studies, randomized controlled trials, and observational studies, which introduce variability in the reported outcomes.[19–24] We tried to identify studies that could provide five-year average medication counts in patient populations that had a similar range of starting mean number of glaucoma medications for SA and combined treatments. The study by Francis *et al.* had only a three-year follow-up, therefore we used linear extrapolation to estimate five-year mean number of glaucoma medications.[23] The eight glaucoma specialists who provided inputs to this study practiced primarily in Manila; hence, their experiences may not represent those surgeons from other regions in the Philippines. Furthermore, costs from private care settings cannot be applied to care in the public setting and are not fixed. Hence, we took an average of the cost inputs from surgeons. With the introduction and growth of more MIGS procedures in the Philippines, costing studies based on local

real-world evidence would substantiate the estimates from this study that is based on best available peer-reviewed evidence with primary research.

CONCLUSION

Based on the cost analysis model derived from data from peer-reviewed literature and local surgeon inputs, the results estimated reduced costs from post-operative consultations, glaucoma medications, post-operative interventions, and secondary surgeries with iStent *inject* W over a 5-year period from a Filipino patient's perspective when compared with glaucoma medications and as a combined treatment compared with trabeculectomy. iStent *inject* W, as a minimally invasive surgery, may be worth the maximum incremental costs around the average cost of iStent *inject* W when compared with trabeculectomy as an SA treatment.

ETHICS COMPLIANCE STATEMENT

This study was a cost-comparative analysis that utilized data obtained from published literature and aggregate data derived from previously conducted local primary research that had been conducted in accordance with applicable ethical and regulatory requirements. No new human participants were recruited, and no additional data collection involving human subjects was performed for the purposes of this study. The authors did not have access to individually identifiable participant information.

Given that this study involved secondary analysis of published and de-identified aggregate data and did not involve direct interaction with human participants, the study was determined not to constitute human subjects research requiring additional ethics review. Nevertheless, the study was conducted in accordance with accepted principles of research integrity, confidentiality, and responsible data stewardship.

REFERENCES:

1. Weinreb RN, Aung T, Medeiros FA. The pathophysiology and treatment of glaucoma: a review. *JAMA* 2014;311(18):1901–1911.
2. Allison K, Patel D, Alabi O. Epidemiology of glaucoma: the past, present, and predictions for the future. *Cureus* 2020;12(11):e11686.
3. Martinez JM, Angelo M, Hosaka B, Rodriguez E. Clinical profile and demographics of glaucoma patients managed in a Philippine tertiary hospital. *Philipp J Ophthalmol* 2015;40:81–87.
4. Tham YC, Li X, Wong TY, *et al.* Global prevalence of glaucoma and projections of glaucoma burden through 2040: a systematic review and meta-analysis. *Ophthalmology* 2014;121(11):2081–2090.
5. Leuenberger EFU, Gomez JPS, Alejo KPL, *et al.* Survey of glaucoma practice patterns among members of The Philippine Glaucoma Society. *Philipp J Ophthalmol* 2020;45(1):9–18.
6. Broadway DC, Cate H. Pharmacotherapy and adherence issues in treating elderly patients with glaucoma. *Drugs Aging* 2015;32(7):569–581.
7. Baudouin C. Mechanisms of failure in glaucoma filtering surgery: a consequence of antiglaucomatous drugs? *Int J Clin Pharmacol Res* 1996;16(1):29–41.
8. Agnifili L, Sacchi M, Figus M, *et al.* Preparing the ocular surface for glaucoma filtration surgery: an unmet clinical need. *Acta Ophthalmol* 2022;100(7):740–751.
9. Kaštelan S, Tomić M, Metež Soldo K, Salopek-Rabatić J. How ocular surface disease impacts the glaucoma treatment outcome. *Biomed Res Int* 2013;2013:696328.
10. Baudouin C, Renard JP, Nordmann JP, *et al.* Prevalence and risk factors for ocular surface disease among patients treated over the long term for glaucoma or ocular hypertension. *Eur J Ophthalmol* 2012;23(1):47–54.
11. Olayanju JA, Hassan MB, Hodge DO, Khanna CL. Trabeculectomy-related complications in Olmsted County, Minnesota, 1985 through 2010. *JAMA Ophthalmol* 2015;133(5):574–580.
12. Radcliffe NM, Shah M, Samuelson TW. Challenging the "topical medications-first" approach to glaucoma: a treatment paradigm in evolution. *Ophthalmol Ther* 2023;12(6):2823.
13. Samuelson TW, Sarkisian SR, Lubeck DM, *et al.* Prospective, randomized, controlled pivotal trial of an ab interno implanted trabecular micro-bypass in primary open-angle glaucoma and cataract: two-year results. *Ophthalmology* 2019;126(6):811–821.
14. Sarkisian SR, Radcliffe N, Harasymowycz P, *et al.* Visual outcomes of combined cataract surgery and minimally invasive glaucoma surgery. *J Cataract Refract Surg* 2020;46(10):1422–1432.
15. Fellman RL, Mattox C, Singh K, *et al.* American Glaucoma Society Position Paper: Microinvasive Glaucoma Surgery. *Ophthalmol Glaucoma* 2020;3(1):1–6.
16. Jacomina MJ, de Leon MS, Martinez MJ. An economic analysis of selective laser trabeculoplasty versus topical prostaglandin analogues as initial therapy for primary open-angle glaucoma in a tertiary government hospital in the Philippines. *Philipp J Ophthalmol* 2023;48(1):4–9.
17. Food and Drug Administration Philippines. FDA Advisory No.2024-0429 Clarification on the Requirements for Senior Citizens to Avail 20% Discount

on Medicines. Available at: https://www.fda.gov.ph (Accessed October 11, 2024).
18. Zhang N, Wang J, Li Y, Jiang B. Prevalence of primary open angle glaucoma in the last 20 years: a meta-analysis and systematic review. *Sci Rep* 2021;11(1):13762.
19. Hengerer FH, Auffarth GU, Conrad-Hengerer I. iStent inject trabecular micro-bypass with or without cataract surgery yields sustained 5-year glaucoma control. *Adv Ther* 2022;39(3):1417–1431.
20. Gedde SJ, Feuer WJ, Lim KS, *et al.* Treatment outcomes in the primary tube versus trabeculectomy study after 5 years of follow-up. *Ophthalmology* 2022;129(12):1344–1356.
21. Lam D, Wechsler DZ. Five-year outcomes of trabeculectomy and phacotrabeculectomy. *Cureus* 2021;13(1):e12950.
22. Motlagh BF. Medical therapy versus trabeculectomy in patients with open-angle glaucoma. *Arq Bras Oftalmol* 2016;79(4):233–237.
23. Francis BA, Berke SJ, Dustin L, Noecker R. Endoscopic cyclophotocoagulation combined with phacoemulsification versus phacoemulsification alone in medically controlled glaucoma. *J Cataract Refract Surg* 2014;40(8):1313–1321.
24. Hengerer FH, Auffarth GU, Conrad-Hengerer I. 7-year efficacy and safety of iStent inject trabecular micro-bypass in combined and standalone usage. *Adv Ther* 2024;41(4):1481–1495.
25. Philippines Drug Price Reference Index. Available from: https://dpri.doh.gov.ph/ (Accessed October 11, 2024).
26. Health and Beauty Online Shop | Watsons Philippines. Available from: https://www.watsons.com.ph/ (Accessed October 11, 2024).
27. Clement C, Howes F, Ioannidis A, *et al.* Multicenter effectiveness and disease stability through 3 years after iStent trabecular micro-bypass with phacoemulsification in glaucoma and ocular hypertension. *Clin Ophthalmol* 2022;16:2955–2968.
28. Healey PR, Tilden D, Jackson D, Aghajanian L. A cost-utility analysis of trabecular bypass devices versus usual care for patients with open-angle glaucoma. *Pharmacoecon Open* 2021;6(3):355–365.
29. Guedes RAP, Pepe C, Dias L, *et al.* Preventing glaucoma progression using the trabecular micro-bypass implant iStent inject®. A cost-effectiveness analysis. *Rev Bras Oftalmol* 2021;80(4):e0014.
30. Patel V, Ahmed I, Podbielski D, *et al.* Cost-effectiveness analysis of standalone trabecular micro-bypass stents in patients with mild-to-moderate open-angle glaucoma in Canada. *J Med Econ* 2019;22(4):390–401.
31. Ahmed IIK, Podbielski DW, Patel V, *et al.* A Canadian cost-utility analysis of 2 trabecular microbypass stents at time of cataract surgery in patients with mild to moderate open-angle glaucoma. *Ophthalmol Glaucoma* 2020;3(2):103–113.
32. Fea AM, Cattel F, Gandolfi S, *et al.* Cost-utility analysis of trabecular micro-bypass stents (TBS) in patients with mild-to-moderate open-angle Glaucoma in Italy. *BMC Health Serv Res* 2021;21(1):1–12.
33. Igarashi A, Ishida K, Shoji N, *et al.* iStent inject® and cataract surgery for mild-to-moderate primary open angle glaucoma in Japan: a cost-utility analysis. *Int J Ophthalmol* 2022;15(6):954–961.
34. Teus MA, Belda JI, Lavín C, *et al.* Cost-effectiveness analysis of iStent inject® implantation during cataract surgery compared to cataract surgery alone for mild to moderate open-angle glaucoma patients in Spain. *Expert Rev Ophthalmol* 2021;16(4):319–328.
35. Rodriguez-Una I, Azuara-Blanco A, King AJ. Survey of glaucoma surgical preferences and post-operative care in the United Kingdom. *Clin Exp Ophthalmol* 2017;45(3):232–240.
36. Iwasaki K, Arimura S, Takamura Y, Inatani M. Clinical practice preferences for glaucoma surgery in Japan: a survey of Japan Glaucoma Society specialists. *Jpn J Ophthalmol* 2020;64(4):385–391.