SUMMARY REPORT ON GOOD PRACTICES IN FINANCING HEALTHCARE SERVICES IN OPHTHALMOLOGY

Visegrad Fund

Warsaw School of Economics

National University of Kyiv-Mohyla Academy (NaUKMA)

Prague University of Economics and Business

University of Debrecen

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INSTITUTIONS & TEAM MEMBERS

This report is the final deliverable of a project that was financed through Visegrad Grants from the **International Visegrad Fund**.

The research team consists of four universities:

- Warsaw School of Economics **(project leader)**.

The SGH Warsaw School of Economics is recognized as one of the best research universities in Poland in the scope of economics and finance, including health economics. SGH researchers have hands-on experience in conducting research on financing health care services and regulatory impact assessment. They also provide expertise to the Ministry of Health, the National Health Fund, and other entities in healthcare. **Team members**: Dr. hab. Barbara Więckowska (principal investigator) and Katarzyna Byszek, PhD. candidate, in cooperation with Prof. Marek Rekas, national consultant for ophthalmology.

- National University of Kyiv-Mohyla Academy (NaUKMA)

The School of Public Health is a renowned research and academic institution. The project members have experience in projects related to the financing of the health care system in Ukraine and preparing recommendations for changes in the legislation, the selection of pilot health facilities for the implementation of the DRG system, the development of methodological recommendations for the establishment of diagnostic-related groups, and the definition of costs of medical services on their basis. **Team members**: Prof. Tetiana Yurochko; Prof. Maryna Shevchenko; Olena Skrypnikova, PhD candidate.

- Prague University of Economics and Business (Vysoká škola ekonomická v Praze)

The Prague University of Economics and Business has a specialized institute for healthcare services management, which is based on Faculty management. Researchers from this institute were responsible in the past for several international projects in healthcare (Hass Passport, Quality). Also today, they are actively participating in a 3-year research project aimed at assessing the economic burden of Alzheimer's disease in the Czech Republic. **Team members**: Peter Pažitný, MSc, PhD; and Daniela Kandilaki, PhD; Kristina Randlova and Zuzana Rajdlova (PhD candidates).

- University of Debrecen

The University of Debrecen was one of the first healthcare institutions to establish and operate a complex performance and financing control system. Meanwhile, its Ophthalmic Clinic is a complex regional service provider of ophthalmic care for around one and a half million inhabitants. **Team members** are Csaba László Dózsa, PhD, MSc, and Melanie Éva Tóth, MSc.

INTRODUCTION

Our research aims to compare our processes so that we may share knowledge on quality, regulatory, and financial solutions.

We think it will be helpful for policymakers in the Visegrad countries and Ukraine to evaluate the availability to ophthalmic services (measured in waiting times/geographical location) in the context of various payment systems (DRG, OOP, mixed methods), and the payer (public/private).

According to WHO (2019), the two main causes of preventable visual impairment are cataracts (33%) and uncorrected refractive errors (42%). According to Resnikoff et al. (2004), 47.8% of adults over 50 around the world have cataracts. According to WHO (2020), cataract surgery is a very effective way to treat cataract, which is a leading cause of blindness (51% of global blindness, 20 million people). The leading causes of preventable blindness are glaucoma and untreated cataracts (WHO, 2019).

Glaucoma can occur in any population group, in people of all ages. There are also known cases of congenital glaucoma in infants. Most often, however, this disease affects people over middle age: 40 to 50-year-olds and older. Risk factors for the development of glaucoma have been known for a long time and allow for the selection of patients at risk of developing this disease. The main risk factors include circulatory system disorders, such as hypertension or arterial hypotension, and arrhythmias. Glaucoma develops more often in people who, due to the above-mentioned factors, have peripheral circulatory disorders characterized by cold hands, cold feet or legs. People suffering from migraines also remain at risk for a higher incidence of glaucoma.

Vitrectomy is frequently a "last resort" procedure that saves patients' vision and enables them to restore the retina to its proper position. The retina and vitreous body will be cleaned of any pathological changes during this ophthalmic surgical procedure. Then, a variety of procedures are carried out to either put the retina back in its proper position or remove pathological changes from it, depending on the type of disease and the state of the retina. The main causes of vitrectomy are diseases brought on by mechanical damage to the retina. It is done particularly when there is a retinal detachment, a macula hole, or subretinal hemorrhages. This procedure is typically carried out after other treatments have failed. An indication for vitrectomy is also damage to the retina caused by adhesions with the vitreous body. Another indication for vitrectomy is the removal of the retinal membranes and the closure of the macular opening. This operation is also helpful when it is necessary to clean the retina of residual blood and deposits that disturb vision. These conditions can be caused by bleeding in the eye, such as from diabetes.

AMD is an age-related macular degeneration of the eye. It affects the central retina, which is the area responsible for what is happening in the central field of our vision, making it difficult to read or write, for example. AMD is a very dynamic process. In fact, one never becomes completely blind, because the peripheral retina remains functional. On the other hand, the absence of this central field can be extremely difficult because it interferes with routine tasks. The patient's visual acuity may occasionally deteriorate to a very low level. Each procedure has a limited number of possibilities. In such a situation, the patient is taken under the care of a team of optometrists who offer him aids for the visually impaired, as well as a team of psychologists, because for many people, finding themselves in these circumstances is

very difficult. The number of people requiring treatment is increasing every year as populations are aging.

The small blood vessels in the eye are harmed by high blood glucose levels, which leads to diabetic macular edema (DME). The vessels begin to leak, which causes swelling of the retina. Additionally, a few of them shut, which results in hypoxia. They may also develop new, abnormal blood vessels that damage the retina.

Cornea transplants are usually performed to correct vision issues caused by specific medical conditions. Additionally, they are occasionally used to relieve pain in an eye that is damaged or diseased or to treat emergencies such as severe infection or damage. It is considered to be the most common type of transplantation worldwide (Gain at al. 2016).

There are several options for ophthalmology treatment, including ambulatory care, one-day surgery (same-day surgery), and in-patient (hospitalization) care. They are appropriate for different types of illnesses and different severity levels of a patient's health status. Financial products should be properly defined for optimal use of healthcare resources and to provide high quality services. This should include incentivizing healthcare providers to achieve desirable outcomes and disincentivizing them from adverse effects.

The international team worked together to analyse good practices in ophthalmology care in Visegrad countries and assessed whether Ukraine could incorporate them into its policies. As 2019 was the final year before the Covid-19 pandemic, we focused primarily on country comparisons of that year's data, but we also gathered the most recent data that had been made available for each country's healthcare sector.

The results of the analysis of scientific publications and research indicate the existence of different methods of determining «good practice». A practice is only «good» or «best» if there is a demonstrable link between what is practiced and the final outcome (Caruso 2011, David Skyrme Associates 2008). In the context of health services, a practical definition of a «best practice» is «knowledge about what works in specific situations and contexts, without using inordinate resources to achieve the desired results, and which can be used to develop and implement solutions adapted to similar health problems in other situations and contexts». «Good practice» is commonly defined as «a technique or methodology that, through experience and research, has proven reliably to lead to a desired result» (WHO 2008). The main rationale for documenting and sharing «best practices» is to enable persons and organizations working in the health sector to avoid «re-inventing the wheel»; to «learn in order to improve performance» and to «avoid the mistakes of others». Documenting and sharing «good practices» affords one the opportunity to acquire knowledge about lessons learned and to continue learning about how to improve and adapt strategies and activities through feedback, reflection and analysis in order to implement larger-scale, sustained, and more effective interventions (Perleth 2001).

For the purpose of this research, the team defines good practice in financing ophthalmic care as **a mechanism of financing that has resulted in increasing access to care,** measured by the number of services provided and funded from public sources, **or quality of care**, measured by quality indicators that were introduced in countries that participate in the research project.

In terms of methodology, the database with data on ophthalmology services was built first. It consists of all publicly available data. The second step was to collect qualitative information, so in-depth interviews were conducted with key stakeholders—healthcare providers and insurance bodies. This enabled us to identify good practices for financing different ophthalmology services. The last step was to verify which identified practices are seen by policyholders (based on in-depth interviews) as good practices for Ukraine.

The main research methodology was the development of a wide set of indicators; this complex data matrix consists of 35 indicators of the 6 different ophthalmic diseases listed above for the 5 participating countries in order to analyse and compare the healthcare capacity and performance of ophthalmic diseases on a macro (national) level and its financing using simple descriptive statistics. On the one hand, the focus of the comparison between countries is the annual performance at the national level: the number of ambulatory cases or cases treated in one-day surgery or acute inpatient care, as well as access to appropriate ophthalmic services. On the other hand, there are the regulatory background, the main characteristics, types, and innovations of reimbursement and payment incentive systems, as well as the regulatory elements of quality assurance.

However, as one of the limitations of our analysis covering 5 countries, it must be acknowledged that the vast majority of the collected ophthalmology care data is demand data for inpatient and outpatient care from the National Health Insurance Fund Administration, but the main purpose of this data set is to reimburse the costs of the care, which primarily contains the simple number of treated cases, DRG weight numbers, nursing days in hospital care, longevity of waiting lists and waiting times, as well as outpatient scores. While it essentially unsuitable for epidemiological or detailed morbidity comparisons between the various countries under consideration.

The value proposition is the collection of good practices on how to balance access to ophthalmology services and public system financing. The project makes use of international cooperation in order to produce recommendations that could be used to address challenges in the Visegrad countries and Ukraine. The experience established on this project would enable additional research into this field (reimbursement methods and incentives systems), particularly for developing a projection model for optimal financing and service delivery systems. The results of the project allow the application of new approaches to the optimal financing and service delivery systems in country-participants in the regional context, as well as changes of methodology for service delivery analyses in other nosologies.

POLAND

In Poland, ophthalmology services financed by public sources are provided in ambulatory care and hospital settings by both public and private providers.

In case of ambulatory settings there are two regimes of financing: **"**satellite" ambulatory providers, which have to get a contract with public third party payer (National Health Fund) and are financed with ambulatory DRG (up to a limit defined separately for each type of outpatient clinic) and "hospital" ambulatory settings (a part of so-called hospital network idea) which are financed within one budget (for all outpatient and inpatient clinics) settled for hospital they belong to (ambulatory DRG play as points and are used to settle a budget for next year).

For hospital settings there are also two different regimes of financing: (1) for hospitals pointed to the so-called "hospital network" a global budget is defined (for hospital and ambulatory services) based on services performed one year before (DRG used as points), (2) for other hospitals DRG is used as a fee for service payment method up to the limit stated in contract for each type of hospital ward. Above it there are some exceptions – services which are financed by DRG on fee for service basis (i.e. without any limits for provider). These are for example: child delivery or cataract treatments.

The public funding is sufficient to cover costs of healthcare delivery but it is not enough to cover the costs of investments in infrastructure, i.e. renewing equipment or buy a new one to grow, develop or provide wider scope of ophthalmic care.

The owner of an ambulatory care facility with the wide range of healthcare services, including ophthalmology care.

There is no co-payment for healthcare services in the Polish healthcare system. If patient wants a higher quality treatment or device, he has to cover the whole cost of treatment. **There is very limited data available on the volume and value of treatments financed from private sources and conducted in private facilities.**

Removing limitations in financing of medical procedures in ophthalmology could help to increase access to services.

A National Health Fund representative, with 20 years of experience in financing healthcare from public sources.

CATARACT

In 2019, the National Health Fund financed over 355 thousand cataract surgeries. This cost amounted to approximately 24 689 million EUR) and is provided as inpatient care. The law states that 100% of cataract surgeries are to be performed on an inpatient basis (which is not the case for privately financed services), which was a strong incentive for treatment lasting longer than one day. Till 2018, the share of a one-day hospital stay was less than 60% (starting at 30% in 2010), but **changes in the payment scheme introduced in April 2019 (decrease in the DRG price by 10% in cases of on-day treatment lower than**

There is a great positive change experienced by patients in ophthalmic care. There are much shorter waiting lists there is no limitation for financing cataract surgeries so all patients that require care timely, will get it. Because the waiting lists are short everywhere, hospitals need to compete with quality, including with good lenses as patients have higher awareness about the products available on the market.

Medical doctor, specialist in refractive surgery, conducts cataract surgeries in a public hospital and private facilities

80%) resulted in a sharp increase of one-day hospitalization (97% in 2020). This has also released a significant increase in the capacities of healthcare providers for ophthalmology treatment. In 2019, the National Health Fund financed over 355 thousand cataract surgeries. This cost amounted to approximately 24 689 million EUR) and was provided as inpatient care. The law states that 100% of cataract surgeries are to be performed on an inpatient basis (which is not the case for privately financed services), which was a strong incentive for treatment lasting longer than one day.

There is problem with quality of care as due constant decrease of DRG price providers cut costs on material used during surgeries (lenses as well as other materials).

Medical doctor, specialist in refractive surgery, conducts cataract surgeries in public hospital and private facilities

Limits on the number of cataract surgeries performed by providers have also been removed as of April 2019. **Now it is financed under a fee-for-service scheme,** i.e., the payment equals the DRG price multiplied by the number of treatments. **This financing mechanism can be pointed to as a second incentive (together with the one-day hospitalization "penalty") for high increases in cataract surgery volumes.**

The DRG is the main payment mechanism for cataract surgery, but the whole price is a 3-module equation**.** The total costs for treatment are a sum for a qualifying visit (paid to the provider before surgery), the DRG for surgery, and a post-op check-up visit (paid to the provider 14 days after the treatment). **The third incentive for increased access to cataract surgeries was changes in qualifying criteria.** Waiting lists were verified using qualifying visit financing; waiting times sharply decreased from 496 days in January 2017 to 119 days in January 2021.

Surgery is paid with 2 types of DRGs (B18G, B19G) – the price is the same for all providers. B18G covers surgeries with preoperative conditions or intraoperative complications requiring use during surgery (anterior access vitrectomies, front bag dyes, retractors or pupil rings, intracapsular rings, angel rings and lenses, toric lenses with 2 or more diopters) or treatments performed on persons under 18 years of age. Other surgeries are financed with B19G (less paid).

There are also additional indicators that are increasing: in the case of simultaneous bilateral surgical procedures (on a paired organ), the price for DRG groups is adjusted using a factor of 1.54, and for toric lenses and iridial lenses, there is an 1,25 increase of B18G costhere are also additional indicators increasing: in the case of simultaneous bilateral surgical procedures (on a paired organ), the price for DRG groups is adjusted using a factor of 1.54, for toric lenses and iridial lenses there is an 1,25 increase of B18G cost.

In 2018, quality indicators were implemented. The idea was to differentiate payments in the future based on these indicators**. Three indicators are reported with DRG (to each patient case): posterior capsule rupture, endophthalmitis, and change in visual acuity. As the indicators' values are publicly available, it gives an incentive for quality increase.**

Patient choice of lens is impossible as the price of the lens is included in DRG price, and no co-payment is allowed. If the patient wants to have a better-quality lens than the one proposed by the provider, he has to cover the total costs of cataract treatment from private sources (usually out-of-pocket).

GLAUCOMA

Overall, the total public spending on glaucoma treatment amounts to approximately 33 million EUR (2019), or 4% of the total costs of treating ophthalmology diseases. Over the last ten years, Poland has seen a steady increase in spending on glaucoma treatments. The drop in spending was observed in 2020 (~27,7 m PLN) and is associated with the impact of the pandemic. The number of patients treated for glaucoma varies each year, but it is around 500,000.

The most common therapeutic option used by specialists in Poland for glaucoma is pharmacotherapy in the form of eye drops. Due to the fact that glaucoma rarely causes symptoms that are felt by the patient, it is difficult to talk about a change in the quality of life after using the drops. The benefit of pharmacotherapy, however, manifests itself in the form of the suppression of further optic nerve neurodegeneration and the preservation of vision. However, looking at this problem from the perspective of long-term benefits for the patient, pharmacotherapy allows the patient to maintain his current quality of life because it protects him against loss of sight.

In Poland, the situation is very favorable when it comes to the pharmacotherapy of glaucoma. There are currently 5 groups of glaucoma medications in use: parasympathomimetics, beta-blockers, carbonic anhydrase inhibitors, adrenomimetics, and prostaglandin derivatives**. The reimbursement covers over 100 glaucoma medications. In general, every active substance is supplied by many manufacturers, in various options and forms, allowing the administration of drops according to the preferences and indications of each patient. This can positively influence the quality of care.**

> *There are hospitals that use both old and new methods, fewer that use the new - less invasive procedures.*
>
> Medical doctor, specialist in refractive surgery, conducts cataract surgeries in public hospital and private facilities

Ambulatory care also covers the screening program for +35-year-old patients, including services such as**:**

a) interviewing for glaucoma,
b) conducting health education in the field of glaucoma prevention and symptoms,
c) detailed ophthalmological examination of the anterior and posterior segment of the eyeball,
d) stereoscopic assessment of the optic nerve disc,
e) intraocular pressure test - by Goldman applanation tonometry or Schotz impression tonometry (it is also recommended to measure the central thickness of the cornea),
f) examination of the filtration angle - gonioscopy with the use of a Goldman triple mirror,
g) determination of the further procedure depending on the test result.

> *I was not aware that such a screening program exists, there was no communication from the Fund, therefore our clinic does not participate in the program.*
>
> Owner of the ambulatory care facility with the contract with the National Health Fund

programThe price for screening (ambulatory DRG) is low, hence, the program is not popular. As each ambulatory visit is financed no matter whether the ophthalmology illness exists or not ("ambulatory DRG system," it is not based on ICD-10 codes), the screening is done outside the dedicated financial scheme.

There are 4 hospital DRGs that cover surgical therapeutic options: B11 - Comprehensive cataract and glaucoma treatments; B72 - Major procedures in glaucoma and choroid; B73 - Moderate procedures in glaucoma and choroid; B74 - Small procedures in glaucoma and choroid. They differ with price and range of ICD-9 procedures referring to each DRG. An average cost of a single surgery (the average value of a tariff for all four DRGs) amounts to ~757 EUR (2020). The cost of the each DRG differs only for minor surgeries - for B11, B72, B73 ~785 EUR/ 3 530,00 PLN in 2020; B74 – ~42 EUR / 190 PLN (2020).

Unlike cataract surgeries, glaucoma hospital treatment is subject to financial restrictions. It is very difficult to increase the financing for ophthalmology treatment because the financing budgets designated for hospital units are subject to internal political games within healthcare provider institutions, despite the fact that they are placed on each hospital as a whole (so the hospital director can increase a budget for the ophthalmology unit).

The limits for glaucoma are too high, so only a few clinics get additional money for meeting the criteria. For others glaucoma surgeries are not profitable. This means that the incentive gives opposite results - there are too little number of glaucoma surgeries in Poland. The limit is too high. It should be around 50 (which would be an aim to reach).

Medical doctor with 20+ years of clinical experience in a regional public hospital

In 2018, additional financial incentives for centralization were introduced with the goal of reducing the learning curve for glaucoma surgeries. A 10% increase in the price of DRG for hospitals that perform more than 250 comprehensive or major surgeries for glaucoma (B11 and B72). No results of this quality measure were observed, i.e., in terms of impact on the increased number of surgeries in medium and large healthcare centers or a decrease in the number of providers providing such services occasionally.

VITRECTOMY

In 2020 there were 176 providers of vitrectomy and they performed nearly 23 thousand of surgeries. Till the end of 2016 there were only 2 DRGs differentiated by weather they were using oil or not. From 2017 there have been 4 DRGs:

There is a vast variation between cases - some can be conducted within 20 minutes and others within 1,5 h and they have the same financing regardless of the level of complications that need to be taken care of during the procedure.

Medical doctor, specialist in refractive surgery, conducts cataract surgeries in public hospital and private facilities

a) B16 - procedures with a vitrectomy using silicone oil or decalin, including multi-procedure,
b) B16G - procedures with phakovitrectomy using silicone oil or decalin, including multi-procedure,
c) B17 - procedures with vitrectomy, including multi-procedure surgeries;
d) B17G - procedures with phakovitrectomy, including multi-procedure.

Since 2019, the cost of DRGs is adjusted using a multiplier of 1.54 for simultaneous bilateral surgical procedures (on a paired organ).

In order to incentivise centralisation of services there was a semi-quality indicator implemented - in case of performing more than 400 surgeries (within a year) DRG payment is increased by 10% (indicator of 1,1 for price level). The change was implemented in July 2018 and the result is none: there was 12 hospitals performing more than 400 surgeries a year in 2018 and in 2020 there were still 12. At the same time the number of providers performing less than 10 surgeries hasn't changed significantly (i.e. in 2019 there was about 40 of them, in 2020 more than 70, in 2021 more than 40.

The reason is probably (1) the payment method for doctors – in main clinics they are paid a fixed salary while in other (smaller clinics) they work for (second place of work) a percentage of DRG payment and (2) the increase in DRG point without increase of budget for hospital ends up in using budget for smaller number of services.

Doctors need to be incentivized to specialize and conduct more procedures or take care of more complicated cases.
Medical doctor, specialist in refractive surgery, conducts cataract surgeries in public hospital and private facilities

Although on average we have the same volumes of treatments like in other countries of Europe, regionally there is more variation, fragmentation is vast. We don't incentivise big facilities to do more, small facilities also conduct vitrectomies, and it is possible that they lag behind with quality of services. Patients who require urgent care usually are the ones who need vitrectomy, they should not wait a whole week to get treatment. Vitrectomies should also be conducted without limitation.
National consultant for ophthalmology with 30+ years of clinical experience

AMD

Around 28 thousands people were treated for AMD in Poland in 2020[1]. AMD comes in two forms: non-exudative (dry) and exudative (wet).

Patients who struggle with this disease can benefit from the AMD Drug Program, which was introduced in 2015, but they have to meet criteria to be qualified for the program. The program only covers the wet form of macular degeneration. Hemorrhagic, dry or scarred form is not treatable. Sometimes it happens a mixed form, i.e. exudative and hemorrhagic. If the hemorrhage does not dominate the picture, then such a patient may also benefit from the injection. The requirement that you be over 45 is another prerequisite. The presence of an active neovascular membrane in the patient should also be confirmed by optical coherence tomography (OCT), which is also found in fluorescein angiography or in angio-OCT. The required distance acuity must be between 20 and 80 percent, and there must be no dominant haemorrhage, fibrosis, or retinal atrophy. Only all these factors make it possible to use the program. This is currently the only method of treating the wet form of AMD, and in order to participate in it, a patient must receive a referral from a specialist physician.

[1] The National Health Fund Database, accessed in April 30th, 2022.

Till 2015 there were 2 DRGs for AMD treatment in hospitals (B01 - Treatment of the wet form of AMD with verteporfin using photodynamic therapy; B02 - treatment of the wet form of AMD with intravitreal injections of anti-VEGF monoclonal antibody). Since May 2015 there has been a drug program implemented (with aflibercept (Eylea, Bayer) and ranibizumab (Lucentis, Novartis)), dedicated to hospitals to finance ambulatory treatment performed by them. **It resulted in switch to ambulatory treatment and sharp decrease of hospitalization for AMD** (removing B02 and adding B84 group for "Injection of recombinant proteins" procedure (bevacizumab (Avastin, Roche)). In the first year 124 hospitals applied for the drug program.

The price of available drugs varies. The drug off label is much cheaper than the drug registered and used in the drug program. The drug program is constructed by the Ministry of Health, those patients who do not qualify for treatment in the drug program receive drugs off label. The National Health Fund representative, with 20 years of experience in financing healthcare from public sources.

From April 1, 2018 changes in financing AMD treatment were introduced based on the provisions of the Ordinance No. 25/2018 / DGL of the President of the National Health Fund of March 21, 2018, amending the ordinance on the conditions for concluding and implementing contracts for drug programs in hospital care. The changes in the settlement of benefits in the AMD treatment program led to shifting the drug program's implementation from hospitalization and one-day hospitalization to outpatient treatment. This shift from hospital care to ambulatory care results in a significant reduction of costs for the AMD treatment. There are two schemes:

1) the drug program (drug program for the treatment of neovascular (wet) age-related macular degeneration). The program is carried out in the ambulatory system as a drug program (dedicated for hospitals);

2) DRG B84 (small vitreoretinal treatments), for those patients who cannot be treated within drug program (patients treated off label).

The financing of the drug program in 2018 was the fixed payment ("ryczałt" 2128,59 PLN/ ~500 EUR) paid annually to health providers for each patient participating in the program[2]. The price of drugs was not included in the payment, it was paid separately. It was the alternative scheme to "the simple" financing of DRG in hospital care (B84; 724 PLN/~158 EUR). In 2020, there were 175 health providers treating AMD in Poland.

In 2021, there was another modification in the financing of the drug program[3]. Instead of the fixed payment for the program delivery, three products were introduced: (1) qualification for treatment in the drug program and verification of its effectiveness (338 PLN/~74 EUR), (2) ambulatory visit combined with intravitreal injection in the drug program (378.56 PLN/~83 EUR), (3) ambulatory visit without injection (108.16 PLN/~24 EUR). **The change in financing with the fee-for service payments can contribute to a greater flexibility in adjusting the treatment scheme to patients needs and coverage of providers' costs linked to the treatment. It also enables greater monitoring and keeping up with the clinical excellence guidelines**.

[2] The Ordinance No. 25/2018/DGL of the President of the National Health Fund of March 21, 2018.
[3] The Ordinance No, 136/2021/DGL of the President of the National Health Fund of July 27, 2021.

DME

It is estimated that there are about 150,000 people in Poland with Diabetic Macular Edema (DME), with young adults between the ages of 40 and 45 accounting for 40% of those cases[4]. Loss or deterioration of vision may be associated with loss of writing and reading ability, fear of leaving home, frequent injuries, loss of driving ability, loss of job, deterioration in financial situation, deterioration of mental health, and withdrawal from social life. Untreated DME causes a rapid loss of vision, and then a young person must go on a pension. Diabetic retinopathy, including primarily DME, is considered as the most common cause of preventable vision loss in working-age adults. Importantly, unlike other retinal diseases, such as AMD, timely treatment improves vision and this vision can be permanently maintained.

> *Artificial Intelligence can help here with early detection of DME. The pilot program was conducted and the results were pretty satisfying.*
>
> Medical doctor, specialist in refractive surgery, conducts cataract surgeries in public hospital and private facilities

Patients in need of this care are referred to an ophthalmic clinic. Qualification for therapy with a drug treatment is made by a specialist in a facility that has a contract with the National Health Fund for the implementation of a specific drug program. It is also possible to use anti-VEGF preparations as part of a hospital procedure, i.e. small vitreoretinal procedures (B84). The treatment method is decided by the specialist based on clinical indications. As of 2020, there were around 15 thousand people treated for DME in Poland. The number of patients treated for DME increases every year[5].

As of 2021, there are two schemes for financing DME treatment: B84 (Small Vitreoretinal Treatments) and the drug program for DME that was introduced in July 2021[6]. **It resulted in switch to ambulatory treatment and sharp decrease of hospitalization for DME as the program is carried out in the ambulatory care, but it is run by hospitals that have a contract with the NHF**. DRG B84 is dedicated to cover the cost of treatment for those patients who cannot be treated within the drug program, are treated off label. Funding for the DME drug program is the same as for the AMD drug program; with the following products: (1) qualification for treatment in the drug program and verification of its effectiveness (338 PLN/~74 EUR) (2) outpatient visit combined with intravitreal injection (378.56 PLN/~83 EUR) (3) outpatient visit (108.16 PLN/~24 EUR). Additionally, there were payments for drugs included in the program. Funding for the DRG B84 amounts to 724PLN/ 158 EUR and it covers also cost of drugs. **The financing DME drug program by fee-for-service payment can contribute to a greater flexibility in adjusting the treatment scheme to patients' needs and coverage of providers' costs linked to the treatment. It also allows greater monitoring and keeping up with the clinical excellence guidelines**.

[4] https://diabetyk.org.pl/dme-nowy-program-lekowy-wynosi-polske-na-swiatowy-poziom/ Accessed April 30th, 2022

[5] The National Health Fund Database. Accessed April 30th, 2022.

[6] The Ordinance No, 136/2021/DGL of the President of the National Health Fund of July 27, 2021.

Later in 2021, the Health Ministry introduced another modification to the drug program[7]. The change included treatments are new to the drug program. The basis is the anti-angiogenic drug bevacizumab (anti-VEGF antibody). If the attending physician documented the lack of effectiveness of bevacizumab, aflibercept, ranibizumab or dexamethasone in an intravitreal implant may be used in the second line of treatment. The implant is in the form of a rod, approximately 0.46 mm in diameter and 6 mm in length, and contains 700 micrograms of dexamethasone. **Switching to implant dexamethasone significantly improves treatment outcomes and visual acuity after an inadequate response to anti-VEGF drugs**. Nearly 40% of anti-VEGF does not respond to early treatment patients with DME. Dexamethasone in an implant can also be used in the third line of treatment.

CORNEA TRANSPLANTATION

Around 1200 cornea transplants are carried out each year in Poland. About 3500 people are waiting for the procedure. The waiting time also depends on the type of transplant. A slightly different type of material is needed for layered grafts, and a different type for full-thickness grafts. In the case of layered transplants, one has to wait about 2-3 years for a transplant. However, in case of patients with acute cases: there are perforations, non-healing infectious ulcers that cannot be treated with pharmacological treatment. In such cases, the transplant needs to be carried out immediately if we do not want the patient to lose their sight permanently. As of today, there are 28 health providers that possess permissions issued by the Health Minister to carry out the corneal transplant. They can use corneas form public or private cornea banks.

> *Big challenge in accessing treatment. We should conduct about 5000 surgeries per year, while we perform about 1200. The longer the patients wait, the more invasive the transplantation is, which results in more complications and higher costs for everyone. There are mechanisms to gather cornea and incentivize gathering cornea. It should not be centralized because we need much more transplantations.*
>
> National consultant for ophthalmology with 30+ years of clinical experience

There are three DRGs for corneal transplantations: B04 - Corneal Transplant - Category I – 7302 PLN / 1699 euro; B05 - Corneal Transplant - Category II – 5355 PLN / 1246 euro; B06 - Corneal Transplant - Category III – 3949 PLN / 918 euro. The average price for all DRGs amounts to 5535 PLN/ 1288 euro. B04 comprises the following ICD 9 procedures: 13.713 Replacement lens implantation for cataract extraction (single-stage); 13.712 Toric lens implantation; 11,652 Corneal limbus transplant with allograft. B05 covers the following ICD9 procedures:11,641 Corneal hollowing graft with allograft and 11.63 Corneal hollowing transplant with autograft. B06 covers ICD9 - 11.60 Corneal transplant is not otherwise specified.

Since 2018 funding has been divided into two parts - a separate payment for the procedure (still with B04, B05, B06) and a separate payment for the cornea. The cost of the cornea needs to be documented by the healthcare provider (invoice / bill / internal bill). **This**

[7] The Health Minister announcement of December 20, 2021, https://www.gov.pl/web/zdrowie/obwieszczenie-ministra-zdrowia-z-dnia-20-grudnia-2021-r-w-sprawie-wykazu-refundowanych-lekow-srodkow-spozywczych-specjalnego-przeznaczenia-zywieniowego-oraz-wyrobow-medycznych-na-1-stycznia-2022-r Accessed April 30th, 2022.

change leads to elimination of market inequality between providers as current regulations stipulate that the cornea as a product is not reimbursed when the service provider receives the cornea free of charge from the publicly funded Tissue and Cell Bank (TCB). As result an increase in number of surgeries is expected.

The most important problem is the lack of corneas. If a patient qualified for transplantation has to wait three years for the procedure, during this time the degeneration of the cornea will progress to such an extent that it will not be possible to perform a layered transplant. It will be necessary to perform the so-called full transplant. In this case, general immunosuppression is essential, and there is a higher rate of rejection. Full transplantation is also associated with lower visual acuity and a later return to function. That's why urgent changes, like the implementation of stimulators for an increase in the number of corneas, are needed.

In Poland, the percentage of layered transplants is opposite to the global trends. In highly developed countries, 60-70 percent are layered transplants, while in in Poland they are full transplants. Increasing transplants to 2,000 corneas each year would mean reaching the acceptable level. For this, a higher supply of tissues is necessary. However, the elimination of queues is not the only benefit for the society and the health care system. Supplying more than what is required means additional educational and scientific benefits. If the supply of corneas exceeded the needs, we could train upcoming doctors in new procedures. For example, posterior layered transplantation requires the destruction of several corneas in a learning process.

CZECH REPUBLIC

Ophthalmology in the Czech Republic is a mature market with stable market shares, which reflects the general incidence and prevalence of the diseases. There are many providers and outpatient players play an important role, as do state hospitals. In general, ophthalmology services, both surgical and outpatient services, are relatively well available. The patient's choice is highly supported, so competition is an important feature in the ophthalmology market and according to the interviewed experts, this competition is the main driver for increases in quality.

Healthcare services are predominantly covered by health insurance funds. Health insurance funds (HIFs) spend 2-4% of their expenses for ophthalmology in the institutional setting. Each year, health insurance funds negotiate their reimbursement prices with providers under the surveillance of the Ministry of Health (MZ ČR). The results of the negotiations are published in the so-called Reimbursement Decree. Since 2020, Association of Ambulatory Providers of Eye Surgery (SAPOCH) plays and important role during these negotiations.

SAPOCH represents the 17 biggest ophthalmological providers with 92% share of the total one-day-surgery volume (cataracts, refractions, vitreoretinal, transplantations) in the negotiations with HIFs and has become a reliable partner in these negotiations with a mandate to negotiate the reimbursement conditions.

The negotiation process usually starts in January. The first draft of the Reimbursement Decree is issued in mid-April, according to updated HIF health plans, then it is additionally revised for hospitals, and in October the Reimbursement Decree is finalized and published to be valid for the up-coming year. During negotiations, as part of the process, there are usually 6-8 meetings from February until the end of June. In the case of disagreement between HIFs and SAPOCH, the Ministry of Health is responsible for setting the reimbursement conditions.

As a priority, the Reimbursement Decree defines the point value in CZK. This is important, because most ophthalmology procedures (the only exemption is cataract) are based on the list of procedures, which are expressed as relative point values, and each year the price of one point is negotiated.

In the negotiation process between SAPOCH and the 7 health insurance funds, there is always one health insurance fund acting as the main coordinator. Two agreements need to be negotiated at the same time. The first agreement is with Všeobecní zdravotní pojišťovna (VZP), which is the biggest health insurance fund with 60% market share. The second agreement is negotiated with the Health Insurance Association of the Czech Republic (SZP), which represents the remaining 6 HIFs with 40% market share.

Four issues are typically discussed during the negotiations: the determination of the point value, point regulation, new procedures, and bonus criteria. As a result of the negotiation process, SAPOCH and HIFs write a summary which is later transcribed into the Reimbursement Decree, under the supervision of the MZ ČR.

It is important to mention that cataracts are paid on a "package price" principle (so called OKA). The "package price" OKA is negotiated separately, and each health insurance fund negotiates separately with SAPOCH. The majority of the treatments and lenses are fully covered by the health insurance funds, but there is still place for co-payments. These may represent certain social barriers for less wealthy self-payers.

Besides Fee-for-Service (FFS), "package price" OKA, co-payments, also DRG (diagnosis related groups) as payment method is also present in the Czech system. DRG is under re-start mode and it should free the capacities of hospitals and increase their productivity. Biological treatment for AMD and DME is covered on an annual budget basis, covering all patients that receive care.

Table 1: overview of payment mechanisms linked to diagnosis

Diagnosis	Payment mechanism
Cataract	OKA package price
Glaucoma	FFS point value
Pars plana vitrectomy	FFS point value
AMD	Annual Budget
DME	Annual Budget
Corneal transplant	DRG

Source: authors

CATARACT

Cataracts are predominantly provided as outpatient care. Cataract surgeries are performed on an outpatient basis. According to the interview with one of the leading providers, the private sector dominates, because 83% of cataract surgeries are done in the private ambulatory sector as one-day surgeries. Health insurance funds pay the ophthalmological medical facilities with the so-called "package price" OKA. This package price is used by all providers doing cataract surgeries, except for one provider (Gemini – approx. 20% of all cataracts), who is paid by FFS (fee-for-service).

Annually, there are more than 140 000 cataract surgeries in the Czech Republic. In 2018, the total number of reimbursed cataracts for the Czech unique birth number was 130,902 in all 7 HIFs. Plus, we need to add approximately 11,000 cataracts for foreigners through cross-border care (paid by another member state from public resources) and self-payers (approx. 5 000-6 000). This represents a cumulative growth rate of +3% per year from 2019 to 2022,indicating a mature market. The growing number of cataracts based on data from SAPOCH confirms this in last three years (2019 – 139,000), (2020 – 131,000), (2021 – 142,000), 2022 est. 148,000. Methodologically, 2 eyes (in one patient) are 2 OKA, so 131,000 OKA in 2020 is the number of "eyes", not the number of patients. To get the number of patients, we need to divide by 1.87. So, 131 000 OKA means approximately 70 000 physical patients.

Today, the OKA package price is the main payment mechanism. There were price differences between health insurance funds, but since 2020, the package price within the same health insurance is the same for all providers who have contracted cataracts. In 2019, there were huge variations in package prices between health insurance funds (more than 47%) and even within providers contracted by the same health insurance fund (21%). This changed in 2020, when different prices were set for different packages with different lenses. And during negotiation, the structure of package was unified, and the price variations between health insurance funds were minimalized.

Competition increases quality!
Manager and owner of ophthalmology clinics, more than for 22 years in ophthalmology

Last 10 years: from FFS to package price. In 2010, VZP (largest health insurance fund) introduced by coercion the first packages for some providers for CZK 8,250. Packages had volume limitations in the form of a maximum number of operations. The rest of the providers and HIFs used FFS (fee-for-service).

It is important to underline, that the years between 2009and 2019 were a decade of a double-digit point decline (from 1.09 to 0.69 CZK / 1 point). Overall, there was a 56% decrease in OKA "package price" value. The original value of the point was 1.09 CZK (in 2009), and this dropped to a point value of 0.69 CZK (in 2019). The drop in point value affected all outpatient providers. As a result, the overall HIF spending on cataract was 1.8 billion CZK (in 2009) and fell to 1.2 billion CZK (in 2019). This indicates that during the decade of 2010 – 2019, the cataract providers lost about 603 million CZK.

Since the OKA "package price" is negotiated separately with each health insurance fund and the price is set for three types of lenses (hydrophobic, hydrophilic and thoric) there are "21 OKA package prices" that were historically quite variable, and only slowly in time there is a convergence. Only the ophthalmology clinic Gemini is paid on FFS basis, all other providers are reimbursed according to OKA "package price". Gemini organizes each service as a list of procedures with point values for each cataract Until 2020 it was more advantageous but starting from 2021 OKA is more advantageous as payment mechanism. OKA prices increased by 16% in 2020 as a result of COVID.

In 2019, the average OKA price was 9906 CZK (413 EUR), and in 2020 it was 12 017 CZK (501 EUR). **As the result of SAPOCH joining the negotiations with HIFs, the separation of lenses into 3 types (hydrophilic, hydrophobic and thoric) was introduced in 2020. The situation improved a lot due to increased reimbursements and the distribution of the three lens types (hydrophilic, hydrophobic, thoric).**

In 2020, the main increase in price (+ 21%) was reported in cataracts using thoric lenses, followed by hydrophobic lenses and hydrophilic lenses. Furthermore, the prices were adjusted for the second half of the year due to COVID-19 pandemic (+16%). These rapid increases added only in 2020 a + 421 million CZK additional annual budget for cataracts (!). Another increase in 1H and 2H 2021 brought an additional +242 mil. CZK.

Table 1: OKA reimbursement prices in CZK in VZP (60% market share)

	2010 - 2015	2016 - 2019	2020 (1H)	2020 (2H) – COVID-19 compensation	2021 (1H)	2021 - (2H) – COVID-19 compensation
Package price for hydrophilic lens	8 250	9 250	9 885	11 565	10 153	10 153
Package price for hydrophobic lens	8 250	9 250	11 230	13 139	11 508	13 004
Package price for thoric lens	8 250	9 250	14 397	16 844	14 655	14 655
Limits on production	Packages had volume limitation (max number	No volume limits	No volume limits	No volume limits	No volume limits	No volume limits

	of operations).					

Sources: VZP (2010 – 2020), SAPOCH (2022)

The unified structure of the OKA package across all 7 health insurance funds is important in price setting. In 2021, 5 of 7 HIFs used the unified package. The OKA package price includes: the operation itself, and some elements of the preoperative and postoperative care (lens calculation, autorefractometer, clinical examination and postoperative control). The operation itself is calculated as payment for all care and materials used, including implanted lenses. Lenses are included in the value of performance as directly consumed material and the medical facility that performs the operation, must guarantee that it uses only lenses that meet all criteria for quality and safety. The providers procure the lenses on their own.

The patient's choice is complicated but possible. Patient choice of lens is a complex issue. On the one hand, in terms of health insurance, since 2013 (the Constitutional Court ruling), it has been impossible to select the lens when it is paid for by public insurance. All 7 health insurance funds (HIFs) declare, that for cataracts, when they are fully paid by the HIF, there is no co-payment. In reality, this is a „grey zone ", since co-payments are not banned or legislatively regulated. Moreover, HIFs tolerate, that patients pay „co-payments", especially for aspheric, thoric or multifocal lenses and also for presbyopia correcting intra-ocular lenses (PCIOL). This second view is supported by the Constitutional Court ruling from 2013, that co-payment can be charged, when there is substantial difference in the provided care/material.

The providers can take any lens on the market (CE certificate is needed), the patient is not engaged (it is up to the doctor), e.g., some clinics use lenses from India. The choice of lens is more of a business decision with minimal quality CE certificate needed. Providers can import them themselves. It depends on the decision of the owner/manager of the clinic. For example, Gemini has its own lenses.

Access to cataracts differs, in large cities, there is a high concentration of eye clinics. In rural areas there are fewer ambulances, fewer clinics, and generally less competition. Officially, waiting times are not measured, but the estimate is about weeks in large cities and months in rural regions. With OKA "package price" as payment mechanism, the availability of cataracts is good, and the providers are not regulated compared to other specializations. There is no limit on cataract production. OKA is excluded from regulatory mechanisms, VZP pays the package price, as do all other HIFs. When providers expand their capacities, VZP pays for everything: "how much is done, so much is paid".

Patient complaints are collected, but there is no other method to measure the quality. When there are lot of complaints, VZP may contracts other providers. There are no quality parameters measured for doing OKA. The provider has a total freedom to choose which producer or importer to purchase the lens from. It only must fulfil the CE criteria. Some providers are investing into digital navigation from own resources, the patient does not pay, a significant leap in quality (new machine or update of an existing machine).

Increase of price in 2020, in line with change in the payment mechanism with the introduction of three lens types has led to changes in the structure of the lenses used.

- **share of hydrophilic lenses decreased from 60% to 50%**

- **share of hydrophobic lenses increased from 35% to 45% (this represent an important increase in quality, because hydrophobic lenses are of higher quality than hydrophilic lenses**
- **share of thoric lenses remained unchanged at 5%**

The quality criteria was applied only in one year – 2020. Quality indicators were introduced for everyone who provided cataracts in the form of OKA "package price". These quality criteria only worked for one year. There were 4 criteria, and 2% for each indicator, that is 8% in total. Now it is no longer the case. The quality was measured by rehospitalizations. It meant that the rehospitalization code could not be reported within 90 days (criterium). To meet the criteria, providers delayed the code to 91 days, so everyone complied, and it no longer made sense.

Bonus criteria are increasing the value of the point. The base is CZK 0.72 per one point, plus 0.04 CZK for lifelong learning, plus 0.04 CZK for prolonged opening hours of operation, plus 0.02 CZK for acquiring new patients. In total, this means 0.1 CZK so the provider can reach a maximum of 0.82 CZK per point – a total of up to 14 percent.

In the Czech Republic, the quality of cataracts is not controlled. Instead, some sanctions are applied (when reporting to the insurance company). Quality is definitely the question of the lens. In 2019 there was only one type of OKA package, then the quality was discussed and the package was divided into 3 types, according to the lens (hydrophilic, hydrophobic and thoric). But there is lack of revision and control. In the documentation, the provider must provide a code and the origin of the lens. It must be specified what type of lens was used.

HIFs expect only high-quality lens, but it cannot be properly checked. The choice of the lens is the responsibility of the provider (the only criterium is that the lens has to have the CE certificate). Rehospitalizations are not measured, and this has no impact on the payment mechanism. Impact only has a targeted control of examining doctors.

GLAUCOMA

In 2017, there were around 367,000 dispensarised patients with glaucoma, out of which around 10,00 underwent surgeries. People aged 65 and up account for approximately 65% of all casesThe primary clinical approach is (1) drug treatment, followed by (2) laser operations and (3) surgical approach.

Drug treatment consists of substances that reduce the production of intraocular fluid, substances affecting the outflow of intraocular fluid and osmotic substances – hyperosmotics. **In 2021, in drug treatment analogs of prostaglandin, betablockers and inhibitors of carboanhydrasis are used. In all drug groups there is at least one fully covered drug (latanoprost, timolol, dorzolamid) and there also co-payment drugs available (travoprost, certeol, brinzolamid).**

Laser operations are performed to treat angle-closure glaucoma with a laser or laser treatment of open-angle glaucoma (laser trabeculoplasty). Compared to cataracts (142,000 cases), only about 14,000 cases were surgically resolved in 2021.

Table 2 Laser iridectomy (number of points)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

Laser iridectomy	1642 points	1387 points	1389 points	1393 points	1394 points	1414 points	1415 points	1416 points	1416 points	1421 points

Eye surgeries are reimbursed from public health insurance funds if they are indicated by a specialist (ophthalmologist) as necessary, regarding the patient's health status. The payment for examinations and procedures is based on a valid list of medical services (VZP ČR, 2021). Contracting codes are 75339 trabeculectomy – the most frequently performed operation, 75337 iridectomy, 75341 cyklocryotherapy and 75335 laser surgery at the angle of the anterior chamber of the eye. All major clinics provide the surgery fully covered by health insurance. Co-payments (only for self-payers and foreigners) differ significantly – from 52 to 800 EUR.

Table 3: Point value and CZK calculation of glaucoma surgery treatments

Point value	Direct costs (in points)	personal cost (in points)	Indirect costs (in points)	total costs (in points)	Total costs in CZK
75339 – Glaucoma filtration surgery (trabeculectomy)	1 169	483	236	1 887	2 075
75337 - Iridectomy	1 086	241	118	1 446	1 590
75341 - Cyklo-cryotherapy	50	72	89	211	232
75335 - Laser surgery at the angle of the anterior chamber of the eye	240	97	118	455	500

Note: Fully reimbursed (1-point approx. 1,1 CZK)

The surgical approach is based on filtering operations – trabeculectomy, combination of trabeculectomy with trabeculotomy, cyclodialysis, cyclocryotherapy, drainage implants, and non-penetrating filtering operations

Glaucoma surgery is underfunded, with historically low reimbursements, but affordable. Glaucoma patients are increasing (doctors like to prescribe drugs - incentives from pharmaceutcal companies). It is an overdiagnosed condition, and VZP should require an OCT examination to see whether they actually have. If drugs, then only based on relevant OCT examination; otherwise should be not reimbursed.

Glaucoma treatment is paid on a point basis and has a financial limit. The limit is calculated financially, and it is not based on the number of procedures. The limit - basis is calculated on the basis of what was the payment 3 years ago (in 2022 it is 2019) divided by unique patients. Then it is multiplied by index for year 2022. Glaucoma is not reimbursed at full costs.

Glaucoma surgery is underfunded, with historically low reimbursements, but affordable.
Manager and owner of ophthalmology clinics, more than for 22 years in ophthalmology

VITRECTOMY

There were 4,300 pars plana vitrectomies in 2017. Pars Plana Vitrectomy for one eye is a fully covered procedure by health insurance funds. It has a value of 14,881 points, of which 938 points are human resources, 9733 points is material, 102 points are medicaments, 3377 points is medical equipment, and 731 points are overhead. The price of 1 point is 1,07 CZK, so the price is 15923 CZK (637 EUR). In 2011 the number of points was 14 995, in 2012 it changed to 14,570 and then no changes until 2021 (14,881 points).

In case of 23G method, the vitrectomy is fully financed by the health insurance fund. In case of 25G method, the patient co-payment is 4000 CZK (160 EUR). When there is no possibility to cover the vitrectomy from health insurance, the full payment of patient is 16,000 CZK per eye (640 EUR/eye). The access to care is adequate. When conducting vitrectomy each patient is different and complicated. It is used as a critical performance with two DRGs: (1) 02-I05 Surgical treatment of eye injuries and (2) 02-I06 Removal of the vitreous.

AMD

Aage-related macular degeneration (AMD) is treated by modern Anti-VEGF drugs. All three main Anti-VEGF drugs are available in 37 specialized centers, namely Lucentis (since 2008), Eylea (since 2013), and Beovu (since 2020). All three Anti-VEGF drugs are reimbursed by health insurance (equal amount 16 258 CZK) with a co-payment rising from 4.6% (Lucentis), to 10,3% (Eylea) and 13,3% (Beovu).

Avastin, being significantly cheaper (only 10-14% of treatment price compared to Lucentis) is not reimbursed neither in off-label indication. Patients who prefer Avastin, need to pay the full price of treatment.

In 2020, the largest health insurance (VZP – 60% market share) reported 9 407 unique AMD patients (Table 1). This is 5 and half times more, than in 2012. Total expenditures for VZP were CZK 632,7 million. Costs per individual patient is relatively stable over time and anchors around 67 000 CZK.

Table 1: Ophthalmology, so called center care (VZP – 60% market share)

	2012	2013	2014	2015	2016	2017	2018	2019	2020 (est.)
Costs in CZK million	102,1	110,8	166,0	199,0	282,7	356,2	401,8	527,3	632,7
Individual patients	1 729	1 760	2 346	2 901	4 198	5 147	6 311	7 711	9 407
Costs per individual patient	59 039	62 943	70 748	68 606	67 346	69 214	63 669	68 374	67 256

Source: VZP, 2020

In total, there are approximately 13,500 Anti-VEGF applications per year for all indications. The structure of Anti-VEGF is approximately 80% AMD and approximately 10% DME, and the rest is RO and CNO.

In 2019, according to SÚKL, the number of packages distributed to the Czech Republic of Lucentis was 20,653 and for Eylea it was 24,385. Only drug expenditures reached CZK 732,3 million, and total expenditures achieved CZK 863 million CZ with 11,685 treated patients.

Table 2: Reimbursement and co-payment of Anti-VEGF drugs

Anti-VEGF drug	Available in CZ	Reimbursed price per package (2019)	Co-payment of patient (2019)	Number of packages (2019)	Annual budget (2019)
Lucentis	2008	16 258,24 CZK (651 EUR)	757,49	20 653	335,8 million CZK (13,4 million EUR)
Eylea	2013	16 258,18 CZK (651 EUR)	1667,76	24 385	396,5 million CZK (15,9 million EUR)
Beovu*	2020	16 258,20 CZK (651 EUR)	2 156,7	-	-
Total					732,3 million CZK (29,3 million EUR)

Source of data: SUKL

Note: * data for number of packages in 2020 not available

Patient pathway follows modern diagnostic and treatment protocols. When the diagnosis of a wet form of age-related macular degeneration is determined, the treatment and OCT examination during the treatment are fully covered by the health insurance. If the patient meets all the conditions for treatment covered by the health insurance company, the attending physician will schedule biological treatment by applying anti-VEFG injections.

The first 3 applications take place at intervals of 4 weeks. Within 3 days of application, the patient visits his eye doctor for a check-up. After the third injection, a comprehensive check-up and evaluation of treatment using OCT or OCT angiography (not covered by health insurance) will take place in 4-8 weeks. With a good response to treatment, the intervals between applications are gradually extended until the condition calms down and stabilizes. If the injections prove ineffective during the treatment, treatment is not continued.

Box 1: What is OCT?

Optical coherence tomography (OCT) is a non-invasive imaging test. OCT uses light waves to take cross-section pictures of your retina. With OCT, your ophthalmologist can see each of the retina's distinctive layers. This allows your ophthalmologist to map and measure their thickness. These measurements help with diagnosis. They also provide treatment guidance for glaucoma and diseases of the retina. These retinal diseases include age-related macular degeneration (AMD) and diabetic eye disease.

Source: American Academy of Ophthalmology, 2022, https://www.aao.org/eye-health/treatments/what-is-optical-coherence-tomography

Table 3: Patient pathway in the context of payment mechanism and prices

	Health Insurance coverage		Self-payers
	Insured	Co-payment	
Initial examination for both eyes (valid 2 weeks), complex diagnostics incl. machine and doctor consultation	Fully covered	-	CZK 4 900 (Together for both eyes)
OCT angiography	Not covered	CZK 650 / 1 eye	CZK 650 / 1 eye
Intraocular injection (code 75 231)	Fully covered (reimbursement = 1278 points * 1,09 CZK = 1393 CZK)	-	CZK 17 568 / 1 eye
Applied drug (Anti-VEGF treatment)	Fully covered (reimbursement = CZK 16 258 CZK)	co-payment differs by drug, from 757 CZK to 2157 CZK	
Genetic test to assess risk of AMD	CZK 2 500		CZK 2 500

Source: own compilation based on HIF data, SUKL, expert interviews and Lexum

The biological treatment with anti-VEGF drugs can be applied only in specialized centers (37 in the Czech Republic) and only by a qualified ophthalmologist who has experience in intravitreal injections. These specialized centers can be hospitals, ophthalmo-clinics, or ambulances. There are strict conditions for opening such a center.

First, meeting conditions set by legislation (§ 90) for material, technical and personnel requirements. It defines that the center must be able to perform pars plana vitrectomy (PPV), must have an OCT, fundus camera, etc., which makes the equipment of such centers very expensive. Moreover, there are only 52 surgeons in the Czech Republic who can perform PPV, each of these surgeons does more than 100 PPV annually. For example, the surgeon must have annually performed at least 30 vitrectomies for VZP, the largest insurer.

Second, after fulfilling all the conditions, the health insurance funds may approve the contract considering the regional conditions, local and time availability (cataract 7 weeks), AMD/DME (3-5 months). According to the region and service availability, the health insurance fund will decide whether the center is needed or not. If someone (investor) wants to invest in such a center, they must first confirm with HIF whether the center is necessary or not. The center also needs recommendations from ČOS (Czech Ophthalmological Society) and ČVRS (Czech Vitreo Retinal Society). Subsequently, healthcare services relevant for the center (approx. 14 services) are contracted by health insurance funds. During the decade, there were 37 centers built and contracted in 4 waves: 12 centers in the first wave, 9 centers in the second wave, 9 centers in the third wave and 7 centers in the fourth wave.

Despite the existing 37 centers, there is still need for new centers, mainly due to capacity limits of existing centers, low willingness to redistribute patients within region to centers with free capacities and uneven distribution of budgets among existing centers.
CEO of an international chain of ophthalmological clinics

The Anti-VEGF treatment is paid on an annual budget basis, where the budget of the previous year serves as a starting point. The budget is always discussed with providers and two-three times per year it is adjusted according to the number of patients. After the center exceeds its funds, the health insurers also cover the cost. There is a great negotiating potential for the provider.

The center must contract each insurance fund separately. So, if there are 37 centers, and 7 HIFs, this makes 259 contracts for the whole Czech Republic. And a total of 259 contracts also means 259 different budgets. These budgets are renegotiated once a year. The annual budget for a center includes 4 indications (AMD, DME, Retinal Occlusion, Central Nerve Occlusion) and the related Anti-VEGF drugs (Eylea, Lucentis, Avastin is off label and rarely used – only for self-payers). If the center does not have its own pharmacy, it can buy Anti-VEGF drugs from (1) distributor with pharmacy, or from (2) hospital with an institutional pharmacy. If the center has a pharmacy, then it can purchase Anti-VEGF drugs directly.

In 2023, there will be new biosimilars of Anti-VEGF drugs. According to CZ legislation, the biosimilar needs to come with 30% price discount. This will probably mean a fast uptake of biosimilars on the market. Also, the price will fall dramatically, and this will open a new opportunity to treat more patients for the same amount of money and increase the number of doses (there should be a minimum of 6 and a maximum of 12 doses per year, in CZ it is 4,6 today).

DME

Prevalence of diabetic maculopathy (DMP) = diabetic macular edema (DME), the most common cause of decreased visual acuity, is not statistically monitored in the Czech Republic (Source: Czech Diabetological Society, Czech Ophthalmological Society – Recommendation for Management of the diabetic retinopathy, 2015). In 2017, there were 1432 cases (only photocoagulation, with no link to diagnosis).

Current DME treatment includes laser retinal treatment and pars plana vitrectomy (PPV) surgery. The basic precondition for the treatment of DME is the correct compensation of diabetes, arterial hypertension, and dyslipidemia. New treatment options for DME are intravitreal corticosteroids and vascular endothelial growth factor (VEGF) blockers. VEGF blockers used in the treatment of DME include bevacizumab and ranibizumab.

The biological treatment anti-VEGF (Lucentis, Eylea) can be applied only in a specialized center (37). Anti-VEGF is applied by a doctor - an ophthalmologist of a specialized workplace with a special contract with health insurance companies for the treatment of this type of medicinal product. Lucentis and Eylea should only be given by a qualified doctor who has experience in intravitreal injection.

AMD and DME are the main reasons for blindness in the developed world. Today,37 workplaces can produce ANTIVEGF drugs in the Czech Republic. There are barriers to entry the market – it's extremely expensive care. The clinic buys the drugs which are later reimbursed by the VZP and other health insurance funds. SUKL categorizes, VZP will give a package where it can be supported as an argument.

If you have diabetes, you should go to the ophthalmologist once a year, but the waiting period is 6 to 9 months. Diabetologists could measure the eye background so that ophthalmologists do not have to do it.

Head of the department for ambulatory payment mechanisms at the health insurance fund

Eylea is reimbursed for the treatment of visual impairment caused by diabetic macular edema in patients with DM type 1 or type 2, in whom the value of glycated hemoglobin is lower than 70 mmol/mol at the start of treatment with aflibercept.

A prerequisite for treatment is good patient compliance and an adequate diabetes background. If it is a preparation, the use of which, in view of the public interest, is expedient to concentrate in specialized workplaces according to § 15, paragraph 10 of the Act, it will be marked with the symbol "S" in the decision. Such a product is billed as a separately billed product to the health insurance company only by a specialized workplace, based on a contract concluded between it and the health insurance company.

In order to prescribe a drug according to the SÚKL, the prescribing physician's specialization is not required and the reporting limit is S - which means that the preparations are administered in accordance with the law in specialized workplaces (with a contract between the insurance company and the provider) and insurance companies bill such drugs as "ZÚLP".

CORNEA TRANSPLANTATION

In 2004, doctor Pavel Stodůlka (Gemini ophthalmological clinic) as one of the first surgeons in the world, performed an endothelial transplant using the DMEK (Descemet Membrane Endothelial Keratoplasty) method. This method is performed in the Czech Republic at only a few workplaces and at the Gemini clinic. The procedure is outpatient and does not require general anesthesia.

There are two types of human corneal transplants. The first is the so-called penetrating, when the cornea is transplanted in its entire thickness. The second type is lamellar, where only some layers are transplanted. Lamellar transplants are a modern trend because they preserve part of the original cornea, provide faster visual rehabilitation and less risk of transplant rejection.

In 2012, on 23 medical facilities, there were 465 transplantations (representing 93% of all corneas issued by the corneal tissue banks), out of which 51% were penetrating kerato-plasty, then posterior lamellar keratoplasty (45%) and anterior lamellar keratoplasty (4 %). **Acquired data confirm an increasing proportion of lamellar transplantations among all corneal keratoplasties, especially posterior lamellar keratoplasty (Studený, 2014). Today, approximately 500 transplantations are performed annually, and there are 4 corneal tissue banks (Stodůlka, 2022): faculty hospital Královské Vinohrady (since 1991), National Tissue and Cell Center (2011), Eye Bank Prague (2018) and Eye Tissue Bank Gemini (since 2022).**

Functioning Corneal Tissue Banks play an important role in high accessibility of corneal transplants.
Manager and owner of ophthalmology clinics, more than for 22 years in ophthalmology

The waiting list for the transplantation is approximately 1 year. Corneal transplants are performed only in university and large regional hospitals, or in medical facilities with highly specialized care. Corneal transplants are fully covered by health insurance. There are 2 codes for the corneal transplants:

a. code 02-I01-00 corneal transplant incl. lens surgery, 59 594 CZK (2 384 EUR),
b. code 02-I02-01 corneal transplant, 70 211 CZK (2 808 EUR)

The fully covered reimbursement includes the transplant. The price of the cornea transplant (tissue only) is 31,000 CZK.

DRG base 02-I01 includes hospitalization cases of patients with non-inflammatory corneal disease who have had a corneal transplant. At the same time, however, these patients underwent surgery for a functional lens disorder (most often due to cataracts) during the same hospitalization. DRG base 02-I02 includes hospitalization cases of patients with corneal disease who have had a corneal transplant (without lens surgery) or an amniotic membrane transplant and do not meet the definition criteria for higher priority DRG bases.

HUNGARY

The **Hungarian National Health Insurance Fund (NHIF)** as unique public purchaser ,has contracts mainly with publicly owned service providers for ambulance (out-patient), in-patient and one-day surgery care. The provision side is well structured at different levels: ambulance care, basic hospital, and progressive medical university clinic level. Since 1993, the NHIF has applied the so-called **Diagnosis Related Group payment scheme** (the Hungarian version is Homogén Betegségcsoport: HBCs) both for in-patient and one-day surgery care. For each DRG there is a special **weight number** that expresses the relative cost level as compared to the national average, and it is multiplied by the national equal **base rate**. For **out-patient care** also since 1993 it has been used the so-called German score system based on detailed list of activities calculated in scores (points), each activity code has a fix number of points. Both the ambulance score (HUF/point) value and the DRGs base rate are **predetermined as national equal tariff** announced by the Ministry of Health Affairs.

There is no generic co-payment for healthcare services in the Hungarian healthcare system, just as there is no individual patient co-insurance to the costs of medications and medical equipment. Apart from the NHIF scheme, there is a growing number of treatments financed from private sources and conducted in private facilities on performance basees for prospectively set tariffs, but there is no available data on the volume and value of this private provision in Hungary.

CATARACT

The table below shows the eligible DRGs codes names, and weight numbers. The most typical DRG of 0680 is called *Cataract surgery using the phacoemulsification method, flexible artificial lens* (weight 0.7738, the base rate is 198 thousand HUF, so the fee in the NHIF system is 153.3 thousand HUF, 414 EUR). Since 2018 a new type of DRG has been introduced: Cataract surgery by phacoemulsification with toric artificial lens (weight number: 0.9923, NHIF fee: 182.8 th HUF, 494 EUR).

Table DRGs of cataract surgery in the Hungarian National Health Insurance Scheme

DRG code	Weight number	Surgery weight	DRG name
0680	0.77379	0.37208	Cataract surgery using the phacoemulsification method, **flexible artificial lens.**

0681	0.59427	0.21223	Cataract surgery using the phacoemulsification method, flexible artificial lens **without reimbursement of the price of the artificial lens.**
0682	0.99233	0.59062	Cataract surgery by phacoemulsification, **toric lens**
0683	1.29006	0.77152	Bilateral simultaneous **cataract surgery with phacoemulsification method**

During the last decade, the annual number of cataract surgeries increased significantly in the inpatient care setting arranged by the NHIF. In 2010, the initial case number was 46.5 thousand surgeries meanwhile the annual number of cases in inpatient specialist care increased to 64,000-66,000 surgeries to 2018-2019, with the newly introduced toric lens operation reaching 4,000 cases in 2019.

Another area for performing cataract surgeries is one-day surgery: in 2010, only 21.3 thousand cataract surgeries were performed and reported in public financing, compared to 85.5 in 2019. Among all one-day ophthalmic surgeries, the proportion of cataract surgeries decreased from 92.2% in 2010 to 73.7% by 2019 indicating that other types of ophthalmology surgery had also improved.

One-day cataract surgeries were more significantly affected by COVID than the overall ophthalmology care: the decline from 2019 to 2020 was 23.4%, while in the case of all ophthalmic surgeries less than 19.6%. Unfortunately, no statistics are available on the number of surgeries performed annually in dozens of care settings across the country in expanding private health care.

For international interest, we could highlight the elaboration of a new DRG code (called *Cataract surgery using the phacoemulsification method, flexible artificial lens without reimbursement of the price of the artificial lens*) was developed from 2014 onwards on the basis of expert advice. Hospital material, hotel costs, and Human Resource costs are reimbursed by the NHIF, while the cost of a new lens implant is paid directly by the patient. The insurer pays a weight of 0.5943 for this DRG (117,700 HUF, approximately 318 EUR). The price of lens implants varies between 86 and 315,000 HUF (in EUR: 230 - 850). However, quite a few patients have used this option, with annual cases ranging from 400 to 450 in recent years (only 0.65-0.75% of all cataract surgeries). So, the total costs of this risk-sharing construction are higher than the total reimbursed costs by NHIF, better following market prices and different patient demand.

Outpatient care is financed at very reduced prices in public funding. The average score per visit is 1500 points, the value of which is between 3000 HUF and 6-8 EUR. In the cost calculations, a pre-operative and a follow-up examination were also considered as part of cataract care.

Between 2010 and 2019, the proportion of cataract cases in total ophthalmology surgeries decreased slightly from 63.9% to 60.4%, while its share of payments increased from 57.6% to 62.1%. in payment. The annual performance of ophthalmic care showed a huge decline from 2019 to 2020, by 29.3% of cases and 31.2% in payments (in nominal terms). Interestingly, in the first year of the COVID epidemic, cataract rates fell slightly to 59.3% of

all eye surgeries and 58.4% of payments, indicating a higher rate of delayed cataract surgery cases.

In order to get more experiences doctors, specialists (operators), it should be created such an environment that encourages physicians to work in well-organized centres that can comprises more thousands of surgeries a year providing appropriate conditions for getting more and more practice. - Ophthalmologist, specialist on cataract surgery, head of one-day surgery unit in a Public hospital in Budapest

To sum up, in the cataract surgery within the NHIF framework there has been a significant increase in the volume in the past 10 years, consciously reducing the waiting list and time, and also some significant improvements were made in the regulation: introducing a risk-sharing formula and later opening a new DRG with higher payment sum for operations with toric lens.' - Head of Department of financing at NHIF Administration.

Another characteristic of health the insurance financing in Hungary, which can also be used as an international best practice, is **the waiting list reduction program implemented as the initiative of the government and with additional funding**, which strengthens the role of NHIF as a service purchaser. As part of this, between 2015 and 2018, a total of 10,000 cataract surgeries were performed as part of **additional funding provided to healthcare institutions**, above the annual performance volume limit.

Meanwhile, the private health sector in ophthalmology care has undergone a similar development according to the number of service providers, however, there is no official data available on their performance in volume and effectiveness.

GLAUCOMA

The funding background for glaucoma treatment is basically the same as for the cataract treatment and surgeries described earlier. However, in the case of glaucoma, surgeries account for only a very small proportion (5-6%) of all the patients treated each year. Outpatient care and eye drops are much more important for glaucoma treatment. Glaucoma treatment does not receive as much attention as cataract treatment in the health policy, neither in terms of keeping waiting lists, nor in terms of recording and monitoring the number of patients and the number of cases per year.

Glaucoma treatment is practically everywhere in the publicly funded health care system where the National Health Insurance Fund (NHIF) funds outpatient or inpatient specialist care (the number of out-patient offices around 200, and in-patient care is around 33). No specific solutions can be mentioned either in the area of waiting lists, or in the technique of public and private financing.

In patients at ambulatory care setting (out-patient clinics, hospitals, University clinics) at an appropriate level, avoiding the worsening (exacerbation) of the disease. However, the lack of screening causes problems in Hungary, because many people with symptoms arrive to the clinic at more serious stage of Glaucoma disease.' - Ophthalmologist with long-term financing experience of the Ophthalmology Clinic of Medical University.

It is the responsibility of the public sector to provide a complex, long-term solution. Perhaps, first care might be administered at a lower progressivity level. The eye drop treatment is available for all patients. In case of high level of pain (growing pressure in the eyeball), worsening status of the disease, or urgent case requires the transfer to a higher progressivity

centre. In extreme cases there is an opportunity to use shunt or fascia lata implants in in-patient care.

Main ambulance activities in the treatment of glaucoma care: Central fusion frequency, tonometry, surface anaesthesia, laser iridotomy, measure of corneal curvature.

The prices and NHIF contribution of eye drops are regulated by a relevant Ministry order. The main active substances from the positive list are: latanoprost, brinzolamide, dorzolamide, timolo, travoprost. The drug price contribution system includes several fix payment groups, in each substance group the sum of contribution by NHIF is set at the 90% of the reference gross retail price, 10% paid by the patient as co-payment. For the more expensive medications the patient must pay proportionally higher sum. The 90% contribution rate is priority prescription by a specialist in ophthalmology.

There is relevant information available about the DRG-based payment system. In the short-term care hospitalization: DRG 02M 074C, Eye or other diseases, that includes the treatment of Glaucoma cases. The Relative Weight: 0,3873, base rate 198 th HUF, tariff is 76,7 th HUF (202 EUR), there is no co-payment in in-patient care. The yearly number has been reduced a lot during the last 10 years, from 9,4 th cases in 2010 to 4,8 th cases in 2019, during the COVID pandemic in 2020 this fell more to 3,2 th cases. Main activities in one-day surgery or in in-patient care: trabeculectomy, antiglaucomatosa, cyclokryopexia. In the one-day surgery program there is a well-known intervention: laser iridotomia (YAG laser).

The frequency of the use of laser iridotomy changed a lot between 2010 and 2019: from 1100 cases to 1450 cases (however, this number was had been reduced significantly during the first COVID year: 1014 cases in 2020).

In the one-day surgery there are two specific interventionss under the public payment scheme, but with rather low number of cases a year (50-55 cases) (Relative weight: 0,65608 (130th HUF, 360EUR) 02P 0650 Iridectomy antigalucoma and simple Iridectomy (activity code: 51334 and 51358).

Additionally, there is a special procedure in the treatment of serious glaucoma cases in which the eye drop medical therapy cannot be effective enough. **Below there are the codes of the procedures and the entitled institutions, such as all the 4 university ophthalmology clinics in Hungary**. 43. Anti-glaucoma implant / 43/a. amb. code: 01518 Antiglaucoma shunt implant / 43/b. amb. code: 01519 Antiglaucoma fascia lata implant. The entitled institutions are only the four Medical Universities for these special treatments: Debreceni Egyetem Klinikai Központ, Pécsi Tudományegyetem, Semmelweis Egyetem in Budapest, Szegedi Tudományegyetem Szent-Györgyi Albert Klinikai Központ.

There are 9 relevant ICD codes (diagnosis) of Glaucoma in the Hungarian social health insurance system: H4000 Zöldhályog gyanú (Glaucoma); H4010 Elsődleges nyílt-zugú zöldhályog (Glaucoma); H4020 Elsődleges zárt-zugú zöldhályog (Glaucoma); H4030 Szemsérülés okozta másodlagos zöldhályog (Glaucoma); H4040 Szemgyulladás okozta másodlagos zöldhályog (Glaucoma); H4050 A szem egyéb megbetegedéseihez társuló másodlagos zöldhályog (Glaucoma); H4060 Gyógyszerek okozta másodlagos zöldhályog; H4080 Egyéb zöldhályog (Glaucoma); H4090 Zöldhályog (Glaucoma) k.m.n.; Q1500 Veleszületett zöldhályog (glaucoma congenita).

The access to appropriate Glaucoma treatment, early diagnosis, right diagnosis, to get the necessary operations (iridotomy) are far from the ideal situation, or from a professionally correct protocol. This problem is partly caused by the NHIF payment regulation: Lack of appropriate examination of the patients. According to the professional rules the patient should be examined 4-6 time because of the eye presser, but the NHIF is willing to pay only one examination per 6 months.- Physician of Ophthalmology Department at Capital Hospital in Budapest.

VITRECTOMY

The funding of vitrectomy treatment is basically the same as the cataract treatment and the surgeries described earlier. Vitrectomy has three main DRGs in the Hungarian Social Health Insurance system.

DRG's code	Name of the DRGs	Relative weight	2010 cases	2019 cases	2020 cases
02P 069A	Pars plana vitrectomia (with artificial lense implant)	3.04602	885	1370	1206
02P 069B	Pars plana vitrectomia	2.72338	3918	4883	3775
02P 069C	Other vitrectomies	1.05104	623	264	193

As the base rate is still 198,000HUF, these interventions of vitrectomy are reimbursed at much higher tariffs than other kinds of ophthalmology surgeries (e.g., 3.05 RW is reimbursed by NHIF, appr. 1,650 EUR).

According to the calculation of the Controlling Department of the University of Debrecen, the DRG payment more or less can cover the occurred costs of the surgeries in the field of vitrectomy care.

In terms of the organization of vitrectomy care, we can state that the ALOS has been reduced since the beginning of the observed period from 7-9 days, while in the last years 5-6 days thanks to the effective incentive of DRG payment and improved service quality. The vitrectomy surgeries require special practice and knowledge, and in the hospitals and clinics there are specialists dedicated to these types of operations and care. The vitrectomy surgery is quite concentrated into smaller number of centers, to county hospitals and university clinics. The vitrectomy surgeries might be distinguished as being performed after a long-term deterioration of chronic conditions and in a smaller number of cases with emergency indications.

Among the total annual ophthalmology surgeries, the share of vitrectomy procedures oscillated between 7,3-5,8, **we can say that between 2008 – 2013 growth rate was quite high, while, since 2014, the growth rate had lagged far behind the whole ophthalmology sector** (the growth rate of cataract surgeries was found to be higher). Meanwhile during the COVID-19 pandemic, the drop of the vitrectomy care was much lower (20,6%) than to the 29% of total ophthalmology surgeries).

The subsequent out-patient care before, and the follow-up visits after the procedure get a similarly low rate of financing than ophthalmology as a whole (and other professions too) in

the frame of the German point activity-based financing scheme. **The average payment per visit is around 1500-2000 points, 3-4 th HUF, 8-10 EUR per visit, that cause a low incentive for the service providers to offer appropriate follow-up of the patients**.

AMD

Age-related macular degeneration (AMD) is an eye disease that can blur your central vision. It happens when aging causes damage to the macula — the part of the eye that controls sharp, straight-ahead vision. The macula is part of the retina (the light-sensitive tissue at the back of the eye). There is a growing need for this treatment thanks to the increasing life expectancy in Hungary.

Patients are first examined by fundus examination with a slit lamp. As soon as it is suspected that there is such an abnormality during an outpatient examination by any kind of out-patient service provider, the patient is immediately referred to a nearby county hospital or university clinic with the appropriate surgery infrastructure. The treatment of macular degeneration in old age is provided in all four university medical clinics and in the vast majority of ophthalmology departments of county hospitals in Hungary.

The diagnosis of AMD begins with an investigation into the so-called wet type, where injection treatment is possible. Basic AMD therapies have been going on for about 15 years, with minor innovations in the procedure and complementary drug therapies, with funding for this treatment with minor modifications. In the Clinics there is normally used the Eylea (aflibercept) or Avastin treatment.

In the case of the NHIF financing there is one DRG code in the list. Minimum and normative day is also 1 day as hospital staying.

DRG code	Weight number	DRG name
02P 0633	0,15122	Treatment of Neovascularisatio of the Age- related Macular Degeneration (Neovascularisatióval járó időskori macula degeneratio kezelése) Minimum and normative day is also 1 day

Details about these interventions according to the Ministerial regulation (9/1993 (IV.2.) Ministerial Degree, Appendix 1/A. part 10. list and code of active substances subject to batch accounting, indication areas and scope of prescribers) **the reimbursed indications**:

DRG: ***02 0633*** Treatment of Neovascularisation of the Age-related Macular Degeneration *(wet type, AMD)*

Diseases – Diagnostic codes: H3000 Focal chorioretineal inflammation (Gócos chorioretinealis gyulladás); H3010 Disseminated chorioretineal inflammation (Disszeminált chorioretinealis gyulladás); H3100 Chorioretinal scars (Chorioretineális hegek); H3130 Retinal haemorrhage and rupture (Érhártya vérzés és repedés); H3530 Yellow spot and posterior pole atrophy (Sárgafolt és hátsó pólus sorvadás);

Code and the name of drug active substances connecting to this intervention: 06029 aflibercept (Eylea); 06040 ranibizumab; 06041 verteporfin;

Interventions and activities (in one day surgery too): 12219 Photodynamic treatment of elderly macular degeneration with neovascularization; 12220 Treatment of elderly macular degeneration with neovascularization by intravitreal injection.

Other special rule: 12218 Special cases with the permission of National Health Authority (OGYI engedély alapján végzett indikáción túli kezelés)

List of institutions who are allowed to provide this kind of intervetion: apart of the above listed four Medical universities the Markusovszky Egyetemi Oktatókórház, Szombathely.

This main procedure was introduced into the publicly financed Health Insurance system in 2012. The number of cases could reach 2.6 thousand to 19.35 thousand in 2019, that dropped a little bit to 19.15 thousand cases during COVID-19 pandemic. We can state that this procedure opened a new therapeutic opportunity for the patients suffering from macular degeneration. By excluding minor procedures from the major ones, and creating a new financial product to cover their cost, this can lead to higher volumes of these minor procedures without increasing the overall cost, and consequently improve access to the AMD treatment by treating more people. This good practice was identified in Hungary.

The total cost of the therapy exceeds HUF 300,000 (800 EUR), which is why the Clinic requests individual equity support by submitting the complete patient documentation. Due to the high cost of the AMD intervention, NHIF should be asked for individual equity-based reimbursement to fund it.

Let's use the word "disastrous" to describe the situation in Hungary with regard to timely and high-quality AMD care. Many people do not receive the necessary care in time, or appear too late in the health care system, when this disease is difficult to treat. Moreover, the problem is becoming worse and worse since the number of patients is getting bigger and bigger, and the treatment of each patient takes months or years. Physician of Ophthalmology Department at Capital Hospital in Budapest.

*About the opportunities and health policy interventions we can state that here is no reason to organize population-based screening programs, but it is indispensable to draw the attention to the elderly people, and to try to reveal / detect in early phase of the wet type of macula degeneration. It is recommended to use the OCT examinations. This is a responsibility of the primary care providers, and any other specialist who observe these old people.*Physician of Ophthalmology Department at Capital Hospital in Budapest.

DME

The economic burden of the total diabetic macular edema (DME) was 43.66 billion HUF in 2018 in Hungary. The two major cost drivers were anti-VEGF injections (28.91 billion HUF) and vitrectomies (8.09 billion HUF) in Hungary; they covered to 84.7% of the total cost among people with diabetes mellitus. The diabetic retinopathy-related cost per patient was 54 691 HUF in Hungary.

	Prevalence (%), 2016	**Patient number, 2018**
Diabetic macular oedema (DME)	3,5	27 900

Prevalence was based on previously published epidemiological results. The number of patients was estimated on the basis of the 2018 population data provided by the Hungarian Central Statistical Office (HCSO).

In addition to regular ophthalmic follow-up, patients with diabetic macular oedema may require one session of macular laser treatment and 3 sessions of intravitreal anti-VEGF injections. The interventions are performed under local anaesthesia, they are considered small surgeries, but a very high level of disinfection is required to prevent infections and contamination.

At the university clinic, treatments are performed in a concentrated manner: for example, 30 people are called on a given occasion a day (twice a month), and an immediate examination is performed with an iodine drip and an intraocular pressure test (OCT: optical coherence tomography (code is 12206, see below) is a non-invasive imaging test, OCT uses light waves to take cross-section pictures of your retina) and a visual field test, and those whose condition has worsened (about 60-70%) will have surgery that day.

OENO Code	Name of the code	Description	Point
12206	Optical Coherence Tomography (OCT)	Scanning and differentiating the layers and lesions of the retina with different optical densities with the help of 1-10 micrometer LASER light, creating a 2D or 3D image from the parameters of the reflected LASER light - with the help of a computer.	1191 points (2360 HUF = 6,0 EUR)
12204	Ophthalmoscopia, binocularis, indirect method	Examination with an enlarged special device and lens can be performed with an enlarged pupil.	274 points (543 HUF = 1,4 EUR)

DME treatment requires close cooperation from diabetologists and ophthalmologists. The general opinion of both groups of doctors is that **the compliance of patients in Hungary is very low, they do not follow the general standards of diabetes, lifestyle changes, dietary standards**, so it is usually difficult to stop the development and subsequent worsening of diabetic retinopathy.

In the case of diabetes, screening should be done every year, which should be organized in the same way as it is done in the case of breast cancer and cervical cancer. Based on the central National eHealth system (ESZT) data, patients with diabetes should be invited to the county ophthalmology centers. There, wide-angle fundus cameras (it is not necessary to dilate the patient's pupil, so an ophthalmologist is not absolutely necessary, the patient will not have a glaucoma attack, because it is not necessary to dilate) must be purchased.- Head of Ophthalmology Department / Clinic at Medical University.

Detailed costs analysis of DME in the Hungarian publication look at below in Table.

Name of the OENO and DRGs codes	WHO code/DRG	Unit	Unit cost
Intravitreal anti-VEGF injections	there is no DRG in the NHIF financing	/eye	315 198 HUF/ 788 EUR

General ophthalmic check-up (Ambulance codes)	11 041; 12 130; 12 204	/patient	2 358 HUF/ 5,9 EUR
Neuroplastic laser treatment	39 110	/occasion	2 423 HUF/ 6 EUR

Source: Tóth G., Nagy Z. Zs., Németh J. Model-based economic burden of diabetic retinopathy in Hungary (*A cukorbetegség szemészeti szövődményeinek modellalapú költségterhe Magyarországon*.) Orvosi Hetilap. 2021. 162/8. p 298-305. (Hungarian)

The fundus examination should be supplemented with an OCT examination. This is already available in many places, however, NHIF does not fund this examination. OCT can also be used to examine the papilla (the extent of glaucomatous optic nerve damage can be monitored). It is worth starting the risk screening over the age of 50 in the early detection of glaucoma and diabetic retinal damage.
These screening tests should be financed by NHIF, because this "investment" pays off in the reduction of patient care costs. Currently, it is in the hands of the family doctor whether to send the patient for any ophthalmological control examination. Therefore, 25% of diabetics have never had an ophthalmological examination,25% had one more than within 2 years, and the rest either go or do not. Therefore, we frequently encounter neglected cases of patents whose vision cannot be saved or can only be slightly improved.- Head of Ophthalmology Department / Clinic at Medical University

CORNEA TRANSPLANTATION

Cornea transplants are performed in a few places in the country, mainly in university centres where appropriate professional expertise has developed. In the case of cornea transplants, an absolute external condition is the removal of the cadaver cornea and the limited number of pieces. For this purpose, the so-called cornea bank in 1993, which provides the donor for the vast majority of surgeries in Hungary, but during the COVID-19 epidemic, the number of donors dropped significantly, and because of this, the number of surgical cases as well, resulting in waiting list times of 1 year or even longer.

In the public financing there are two DRGs for cornea transplant:

DRG code	Weight number	DRG name
02P 0610	1,60515	Cornea transplant
02P 0611	1,86461	Cornea transplant with artificial lens implantation

In Hungary, in 2019 286 corneal transplants were carried out, in 2020 248, and in 2021 255, before COVID-19 pandemic this number was slightly higher.

'There is a current problem with the cornea bank, number of donors that has been worsened during the COVID-19. Further development of the cornea banking should be necessary.' - Head of Department of Ophthalmology Clinic.

SLOVAKIA

The burden of ophthalmologic diseases is quite high in Slovakia. At the age of 65+, a certain degree of lens opacity can be observed in up to 50% of the population. Up to 70% of people over the age of 75 suffer from cataracts. 20% of the population suffers from myopia, and the number of people suffering is constantly growing. 1.5-3% of the population has glaucoma.

Table 1: lens opacity in population according to age

age	Population			
	2010	2015	2020	Change 2010-2020 (V%)
60-64	303 978	366 108	360 448	19
65-69	216 900	279 414	338 863	56
70-74	169 837	190 125	247 369	45
75-79	135 810	138 022	156 518	15
80-84	93 509	96 124	100 070	7
85-89	47 701	52 128	55 013	15
90-94	10 057	17 545	20 293	102
95-,	1 881	1 974	3 491	86

Source: NCZI

The Slovak ophthalmology market is mature market with a well-developed private sector. Ophthalmology has the strongest position in one-day surgery performing some 80% of all one-day surgeries. Moreover, 91% of cataract surgeries are already performed by private clinics. In 2019, the biggest 20 private clinics had an overall turnover of EUR 36 million with a cumulative profit of almost EUR 5 million. Some key market characteristics between 2014 and 2019:

- Stable market growth with an average of 17% p.a.
- Profit margin of ophthalmology market rose from 11.8% to 13.2%
- Market fragmentation very high, Herfindahl index is very low (in 2014 = 0,076 and in 2019 = 0,083) and indicates very low market concentration and high level of competition.

Compared to other segments, ophthalmology is financially more stable, as the providers perform surgeries reimbursed both by (1) health insurance companies and by (2) clients' cash payments. The market is highly developed, and reimbursement is based on negotiations between health insurance companies and providers. There are 3 health insurance companies (VšZP, ZP Dôvera, ZP Union) and the negotiate the contracts with each ophthalmic clinic

separately. Contracts are transparent and publicly available on the websites of health insurance companies.

Ophthalmology providers also face many challenges. They have a persistent problem with a lack of top experts. Private clinics do not have the premises to teach young doctors, and the state hospitals do not have the time capacities. Eye clinics are often family run businesses. This is a very conservative society, closely connected, relations typical of "small Slovakia". The success of the clinic depends on whether it obtains a contract with health insurers or not. According to the legislation, the clinic first procures a location, staff members, and technological support before applying for a license, and finally for a contract with ZP. If the contract is not obtained by the eye clinic, it relies solely on self-payers. There is no dominant player or chain, so the market is fragmented with large number of clinics of various size.

An important role is played by the Healthcare Surveillance Authority (HCSA), which is responsible for oversight over health insurance companies and providers. HCSA is obliged to perform control and oversight over the health insurers and the providers. The HCSA report from 20.12.2022 shows, that one ophthalmic clinic (iClinic group) has very high number of complaints in last 3 years. During 2020 – 2022 there were a total of 91 patients complaints in ophthalmology and 43 were addressed to clinics grouped in iClinic. This surveillance function is important in relation to quality improvement.

The majority of services is fully or partially covered by health insurance companies, but sometimes this coverage is not sufficient. The reimbursement from health insurance companies is divided into two components: (1) payments for services performed and (2) payments for medical material, which is usually paid extra. This concept was also highlighted in the interviews, as this is a very good practice for payment mechanisms to separate the labor (human work, surgery) and the material (lens, tissue, etc.).

One-day surgeries in ophthalmology are very broad, and include a large palette of surgeries: strabismus operation, pterygia surgery - ablation and plastic surgery, conjunctival tumor surgery, eyelash tumor surgery, eyelash plastic surgery, glaucoma surgery, excimer - laser corneal surgery, transpupillary thermotherapy of retinal and corneal tumors, retinal photodynamic therapy, cataract surgery with implantation of an artificial intraocular lens, secondary implantation of an intraocular lens into the anterior chamber of the eye or into the ciliary sulcus or transscleral fixation, secondary cataract surgery and reposition of the implanted artificial intraocular lens.

Table 1: Payment mechanisms

Diagnosis	Payment mechanism
Cataract	Surgery price + lens price
Glaucoma	Drug price / Surgery price / Laser price
Pars plana vitrectomy	Surgery price
AMD	IAD + drug price
DE	IAD + drug price
Corneal transplant	Surgery price

Source: authors

The Ministry of Health decides on the lens reimbursement in the so-called categorization process with regard to cataracts, and the lenses are extra-reimbursed. The categorization process

occurs 4x a year (1.1, 1.4, 1.7 and 1.10). Typically, only new products are added to existing subgroups (CMA enough). For opening a new subgroup, a CEA or CUA is needed. The listing of lenses is free, but delisting costs 300 EUR, so out of 120 lenses in XF group, 34 items had 0 consumption in last 24 months (2020 – 2021). To improve the process, the listing payment should be introduced.

The process of setting the lens price in Slovakia consists of three steps: (1) Registration at State Institute for Drug Control (ŠUKL), (2) Price and reimbursement by the categorization commission of Ministry of Health (MOH) and (3) real reimbursement – used by health insurance companies – based on market forces and tendering (usually lower than the reimbursement defined by MOH).

Collecting precise, accurate and reliable data in Slovakia is a challenge, and the following datasets for the ophthalmology statistics were used to prepare this report:

- A12 dataset on surgery (years 2013 - 2020),
- A15 dataset on ophthalmology ambulances (years 2013 - 2020),
- J01 dataset on 1-day surgery (years 2013 - 2020),
- P02 dataset on surgery in in-patient care (years 2013 - 2020),
- T dataset on number of hospitalized patients (years 2018 - 2020),
- Z01 dataset hospitalizations by diagnosis (years 2017 - 2020).

CATARACT

The number of cataracts is rising in cycles, and the COVID-19 pandemics caused a huge 24% (!) drop between 2019/2020. The number of cataracts fell from 42,466 to 32,268 in 2020. This is the lowest number of cataracts since 2013, and since then there has been no change in the payment mechanism, which can be fully attributed to the change of consumers behavior during COVID-19.

In last ten years, we have also witnessed a dramatic decrease of waiting lists from 1 291 to 54 patients in 2020 and a minimization of the average waiting times from 88 to 18 days. The low waiting times has been confirmed also by providers, according to them, the waiting times are 1-2 months (private providers) and 6 months (state providers). It is important to underline, that since 2018 there are no financial limits on production and every cataract is paid. It is clearly visible from Table 2 that the increase in 2019 is +16% and only COVID-19 pandemics curved down the production in 2020.

Table 2: Cataract surgery with implantation of an artificial intraocular lens

Year	Number of surgeries (19+)	Hospitalizations after cataract surgeries	People waiting for treatment	Average waiting time in days
2010	24 710		1 291	
2011	22 430		1 069	
2012	23 890		2 359	88
2013	29 835	765	1 587	88

2014	33 118	130	686	
2015	34 996	37	255	
2016	39 968	93	23	
2017	35 863	1 034	88	
2018	36 639	56	30	28-56
2019	42 466	3	11	
2020	32 268	15	54	18

Source: NCZI, 2021, "dovera+union+vszp", source: www.udzs-sk.sk

Approximately 91% of all cataracts are performed on outpatient basis. The cataract treatment is organized very well, since the procedures (pre-op, surgery, post-op) are paid separately from the implant. **So, the price of the implant (material) is paid extra, and is usually fully reimbursed. This model „surgery" + „material" which works very well in cataracts should be used also in other ophthalmological procedures. Cataracts are reimbursed based on contracted price and follow the formula in Table 3.**

In payment mechanisms, separate the labor/procedure costs (human work, surgery) and the material costs (lens, tissue, etc.).
Ophthalmologist and owner of a leading ophthalmological clinic

Pre-op can be fully reimbursed by the HIC (16 EUR), or if not, the patient pays 40 EUR. The price of surgery and the lens is separated. The surgery is reimbursed around by 400 EUR from HIC. According to the providers, this is not sufficient, and could be from range 700-750 EUR. The patient does not pay this difference. Lenses are fully reimbursed for 98% of the patients, according to XF group in categorization, and these people are very satisfied with the lens chosen/recommended by the doctor. Post-op can be fully paid by the HIC (5 controls), or if paid by patients, then 2 are free, and the other 3 are paid (each 50 EUR).

According to the health insurance company, since 2019 all cataracts can be performed only as one-day surgeries (Code 1393). Price of the procedure varies according to „quality" criteria: satisfaction, regionality, rehospitalizations (not implemented yet), complexity of cases, FTE of surgeon (must be more than 0,8). These criteria form a MIN – MAX range for providers:

- Pre-op: code 60b (reimbursed 16 EUR) or paid fully by patients (40 EUR).
- Surgery: 340 EUR – 412 EUR (fully reimbursed), price is valid for 6 months (1.1-30.6 / 1.7 – 31.12). Besides this, in special cases, cataracts can be paid also as OHV (performed by hospitals, where in-patient car is needed – 96 hours,) the price here is 440 – 450 EUR.
- Lens: categorization – XF group.
- Post-op: code 62 or 63 (6,5 EUR or 7 EUR), usually 5x (according to the needs).

Table 3: Pricing and reimbursement formula in cataracts

	Pre-operation +	Surgery +	Lens +	Lens co-payment	Post-operation

Patient pathway + payment method	Usually,when not covered by HIC (16 EUR) 40 EUR paid by the patient	Usually a contracted price from HIC, around 380 – 480 EUR	Reimbursed by HIC according to categorization	According to categorizatio n	Usually paid by health insurer (5x7 EUR) or by the patients (2 controls paid by provider then 50 EUR per each control)
Example 1: Intraocular hydrophilic acrylic lens BioLine Yellow	40 EUR (paid by patients)	396 EUR (price of surgery, fully covered by HIC)	105,89 EUR (hydrophilic acrylic lens – fully covered by HIC)	0 EUR (co-payment)	150 EUR (3 controls)
Example 2: Intraocular lens posterior chamber AcrySof® IQ Restor® multifocal 2,5D	40 EUR (paid by patients)	396 EUR (price of surgery, fully covered by HIC)	145,01 EUR (multifocal lens, partial coverage by HIC)	556,79 EUR (co-payment)	150 EUR (3 controls)

Source: own research

Surgery prices are negotiated between HIC and providers - these change once a year. Surgery prices may vary between providers and health insurance companies since every provider is negotiating on its own. In 2020, for example, some providers had a price around 360 EUR, some had 396 EUR, and some even 480 EUR (mainly state-owned hospitals).

Prices the of lenses are subject to categorization and reference pricing (MoH) and can be changed every quarter. In every subgroup there is equal reimbursement for the whole sub-group, and there are lenses with no co-payment and lenses with co-payment. All categorized lenses are in the group XF (Ophthalmology), subgroup XF.2 (Lens implants and replacements). There are altogether 13 groups of lenses, the full list of categorized material is here: https://www.health.gov.sk/?zkszm.

The categorization has the following specific rules according to whether the cataract (special medical material) complies with EU criteria (EC certificate) or not. Regarding the price – the importer needs to provide 3 prices (or at least 2) out of 28 EU countries, these 3 (or at least 2) prices should be the lowest, the choice of countries depends on the importer. There are no open databases of prices of special medical material (either cataract), only two countries have open databases –the Czech Republic and Belgium. The producers (importers) protect their price information.

The categorization itself is based on CMA – cost minimization analysis:

- First step is choice of comparator (usually the most used).
- Second step for the producer is the check of the price with the CZ price and then searching for a second "suitable price" from one of the rests EU27 countries.
- Third step is an "average" from these 2 prices. Usually, it's only a few cents lower than the comparator.

Categorization process and reference pricing in XF group: Each sub-category has a subgroup maximum reimbursement limit (for example subgroup XF2.9.3 has a reimbursement limit of EUR 105,89). The reimbursement from HIC cannot be higher than this maximum limit price. All producers in a subgroup provide price proposals, and

if their proposals are lower than the subgroup limit (for example 103 EUR in subgroup XF2.9.3), then the cataract is fully covered. If the price is higher than the limit, then the difference between the price and the limit is paid by the patient. For example, in the group XF2.9.3 is a lens for 144,99 EUR and the co-payment of the patient is 39,10 EUR (144,99-105,89).

Table 4: Example of group XF2.9 and subgroup XF2.9.3: Artificial intraocular lens posterior chamber aphakic - foldable hydrophilic with square edge with yellow filter

Sub-group	**Name**	**Reimbursement from HIC (January 2021)**	**Co-payment (January 2021)**	**Reimbursement for the whole sub-group (January 2021)**
	XF2.9.3			**105,890000**
XF2.9.3	Aspherical intraocular lens Bi-Flex 677ABY	103,00	0,00	OPH
XF2.9.3	Aspherical intraocular lens Bi-Flex 677PY	103,00	0,00	OPH
XF2.9.3	Intraocular hydrophilic acrylic lens BioLine Yellow	105,89	0,00	OPH
XF2.9.3	Soft intraocular lens Q-Flex	105,89	0,00	OPH
XF2.9.3	Soft intraocular lenses	105,89	19,12	OPH
XF2.9.3	Soft intraocular lenses	105,89	39,10	OPH

Source: MoH, 2021

But this is only an "official" co-payment, the suppliers are usually providing the lenses for cheaper prices. With offering lower prices suppliers and producers have an obligation to maintain the % between the public and private financing, so lowering the price lowers the price for patients and for the insurer in the same proportion. So, the real "discount" is usually hidden as an extra bonus lens, or cashback, to maintain the high prices.

The actual HIC reimbursements are lower than the prescribed maximal prices. HICs are using market forces to tender the lenses and to review the invoices. All 3 HICs are doing this. As a result, the maximum limit defined by the MOH is relatively stable in time, and the prices are decreasing by the pressure of the HIC and the market forces. The change of maximum limit does not happen very often. Price referencing is not working at full potential, because there are no publicly accessible databases, and because the comparison is limited to only on 2 or 3 countries.

Health insurance companies are using market forces to tender the lenses … so the prices are decreasing by the pressure of the HIC and the market forces.
Representative of the Ministry of Health

The choice of lens at the provider level is a dialogue between the patient and the ophthalmologist. Basic lenses have no copayment, above the standard lenses have co-payments.

Although, when the lens is fully paid, the decision is usually made by the doctor. The patient's preferences are reflected when they co-payment for the lenses.

Table 5: Financing of cataract surgery, reimbursement prices in EUR (case of a leading private clinic with contracts to all HIC)

	2012 - 2013	2014 - 2015	2016	2017-2020
Cataract surgery	365 – 375 EUR	375 EUR	387 EUR	396
Price of the lens	60 - 145 EUR (incl. VAT)	Regulated prices	Regulated prices	Regulated prices
Comment to lens price	The price of the is reimbursed based on real (contracted) prices, but maximum to 60 EUR (hard lens), 70 EUR (soft hydrophilic lens), 110 EUR (soft hydrophobic lens), 145 EUR (soft lens with yellow filter)	The price of the lens is reimbursed based on real (contracted) prices, but maximum the amount determined by the List of Categorized Special Medical Materials of the Ministry of Health of the Slovak Republic.	The price of the lens is reimbursed based on real (contracted) prices, but maximum the amount determined by the List of Categorized Special Medical Materials of the Ministry of Health of the Slovak Republic.	The price of the lens is reimbursed based on real (contracted) prices, but maximum the amount determined by the List of Categorized Special Medical Materials of the Ministry of Health of the Slovak Republic.

Sources: private ophthalmic clinic, all HICs, 2020

GLAUCOMA

In 2020, there was around 194 thousand people with glaucoma in Slovakia, out of which 105 thousand had primary glaucoma and 89 thousand had a suspected glaucoma. The incidence of primary glaucoma is around 18 thousand annually (9 thousand suspected glaucoma).

Regarding the clinical approach, the primary approach is (1) drug treatment (around 40,000 patients annually), followed by (2) laser operations (around several hundred patients annually), or (3) surgical approach (around 2000 patients before covid-19). Between 2019 and 2020 glaucoma surgery dropped significantly from 1,912 to 983 (almost by 50%) due to COVID-19 effect.

Table 1: Glaucoma

	# people who received services for glaucoma	# people who received services for glaucoma – pharma	# people who received services for glaucoma - laser	# people who received services for glaucoma - surgery	Re-hospitalization after surgery
2010			310	834	
2011			91	725	
2012		33 827	230	556	
2013	127 498		376	594	1
2014	133 337		218	824	30

2015	137 909	39 540	100	1055	32
2016	138 153		62	1084	140
2017	132 783		62	1220	88
2018	132 600			1424	25
2019	138 192			1912	0
2020	128 101			983	0

Source: NCZI, PCG-groups,

Drug treatment is the 1st line treatment for glaucoma. It is performed by local ophthalmologist using monotherapy or fixed combinations usually completely covered by the health insurance companies. In monotherapy, the main clinical approach is Prostaglandin analogs (26%), Inhibitors of carboanhydrasis (26%), followed by Betablockers (8,5% share) and other antiglaucomatica. Fixed combinations are Betablocker + Prostglandin analogs, Betablocker + Inhibitors of carboanhydrasis, Betablocker + Sympatomimetic or Inhibitors of carboanhydrasis + Sympatomimetic.

Laser iridotomy (trabeculoplasties) is the 2nd line treatment for glaucoma. Pre-op is usually fully covered, laser is usually fully covered with 0 EUR co-payment, post-op: 1 control – co-payment for patient (50 EUR). Glaucoma laser surgery reimbursement = 250 EUR (2012) and rises to 271 EUR (2020).

Trabeculectomy (surgery) is the 3rd line treatment for glaucoma. Pre-op check-up is fully covered, surgery + implant paid by HIC, co-payments exist (120 EUR), post-op: 3 controls – can be covered by HIC, or when by private provider (2 for free, third paid = 50 EUR). Glaucoma filtration surgery reimbursement = 350 EUR (2012) and rises to 370 EUR (2020). **Usually, the waiting time for glaucoma are low and there are no limits from Health insurance companies.**

Here, the implant is not fully reimbursed. There is problem with pricing of the glaucoma implants.
Ophthalmologist and owner of a leading ophthalmological clinic

Table 2: reimbursement for laser surgery and filtration surgery (glaucoma)

	Glaucoma laser surgery	Glaucoma filtration surgery
2012	250 EUR	350 EUR
2013	260 EUR	360 EUR
2014	260 EUR	360 EUR
2015	260 EUR	360 EUR
2016	266 EUR	365 EUR
2017	271 EUR	370 EUR

2018	271 EUR	370 EUR
2019	271 EUR	370 EUR
2020	271 EUR	370 EUR
2022 (HIC Dôvera)	260 – 318 EUR	388 – 471 EUR

Source: provider contracts with health insurance companies, 2020

Table 3: Patient pathway + payment mechanism

Patient pathway + payment method	Pre-operation +	Laser/ Surgery +	Laser/Surgery co-payments +	Implant co-payment	Post-operation
Laser iridotomy (trabeculoplasties)	Usually, when not covered by HIC (16 EUR) 90 EUR paid by the patient for complex eye diagnostics	Usually a contracted price from HIC, around 260 – 318 EUR	0 EUR Self-payers 265 EUR	-	Usually paid by health insurer (5x7 EUR) or by the patients (2 controls paid by provider then 50 EUR per each control)
Trabeculectomy (surgery)	40 EUR (paid by patients)	370 EUR (Price of surgery, fully covered by HIC)	120 EUR paid by the patient	450 EUR (co-payment when there is a surgery with implant) Self-payer = 780 EUR	150 EUR (3 controls)

VITRECTOMY

There were 721 procedures to new patients (incidence) in 2020. All data and information for pars plana vitrectomy. Pars plana vitrectomy is reimbursed in two ways. (1) It can be a 1-day surgery (so called JZS) in ambulatory settings (usually lower price) or (2) or as a special reimbursement procedure (so called OHV) in in-patient setting.

The price development during the last 10 years is dependent on 2 factors: (1) health insurance company and the form of payment mechanism - JZS (1-day surgery) or OHV (in-patient setting). The price level is gradually increasing, from 770 EUR in 2012, to 826 EUR in 2021.

Table 1: Pars Plana Vitrectomy: Procedures & Reimbursement

	Procedures	Reimbursement by HIC/type
2010		
2011		
2012		770 EUR (VšZP)

2013	901	
2014	1 028	780 EUR (VšZP) 780 EUR (OHV) / 741 (JZS) in (Dôvera)
2015	1 144	780 EUR (Union, 2014, Union in 2015)
2016	1 097	800 EUR (VšZP in 2016, 2017)
2017	1 058	
2018	1 005	
2019	867	
2020	721	826 EUR (Union, 2021) 1 day surgeries Vitrectomy: Code 8728: 776 EUR – 942 EUR. Code 8729: 757 EUR – 918 EUR (Dôvera, 2021)

Source: NCZI

Only 3 private clinics have contracts (no limit), while all state hospitals have contracts. In state hospitals is compensated by hospitalization days + diagnostics to reach a break-even point. The costs of procedure are not sufficiently reimbursed. **There is no production limit if you have a contract with HIC, but vitrectomy is always co-paid**. Waiting time for vitrectomy for acute cases is adequate in state hospitals, but for non-acute cases it depends on the complexity and the severity of the case.

Vitrectomy has lots of complications (material intensive procedure), and the real costs are around 1400 EUR, so with the reimbursement form HIC around is 800 EUR, the vitrectomy is always with co-payments of patients.
Ophthalmologist and owner of a leading ophthalmological clinic

AMD

The application for approval of anti-VEGF treatment (wet form of AMD) must be accompanied by the medical documentation of all required examinations, laboratory results and measurements confirming compliance with the indication restrictions valid from 01.11.2019 and listed in the valid List of categorized drugs MZ SR.

Table 1. AMD incidence and expenditures

	number of new patients (incidence)	expenditures of HIC on dg H353 (drugs):	expenditures on hospitals on dg H353	expenditures on ambulatory care – dg H353
2010				

2011				
2012				
2013	15 730			
2014	13 841	150 000	572 000	4 700 000
2015	15 526	130 000	537 000	10 600 000
2016	15 747	120 000	529 000	14 700 000
2017	16 650			
2018	16 482			
2019	19 239			
2020	16 703			

Source: NCZI

For Ranibizumab intravitreal 1, 65 mg: AMD (wet form) treatment is covered until maximum response to treatment is achieved. So, the treatment is not continued if the patient's condition does not improve in the maintenance phase of the treatment in two consecutive applications with an interval according to the SPC, i.e. there is no reduction in the manifestations of activity demonstrated by OCT and/or FAG examination, nor an improvement in visual acuity. Treatment is restarted when the patient's follow-up shows worsening of the condition caused by AMD, provided the above criteria are met. Paid treatment is terminated when the patient's visual acuity is worse than the prescribed parameters or it is not possible to expect another treatment effect.

Based on public health insurance, a maximum of 8 doses of anti-VEGF treatment (cumulative for the drugs brolucizumab, ranibizumab and aflibercept are administered intravitreally) in one eye in the first year of treatment, and a maximum of 6 doses of anti-VEGF treatment (cumulative for the drugs brolucizumab, ranibizumab and aflibercept) are reimbursed to one eye per year in the following years.

Aflibercept intravitreal 40 mg/ml AMD and Brolucizumab intravitreal 120 mg/ml AMD have the same conditions as Ranibizumab.

Reimbursed treatment can be indicated in inpatient ophthalmic departments of hospitals and ophthalmic workplaces of one-day outpatient care. The workplace must meet the following criteria:

(1) The treatment must be performed by at least two certified doctors,

(2) The workplace has the necessary technical equipment for the diagnosis and monitoring of the wet form of VPDM, ETDRS optotype, fundus camera for color photography of the fundus and fluorescein angiography, OCT and/or Angio OCT

(3) Sterile operating room with operating microscope

(4) In case the workplace does not perform pars plana vitrectomy, it must have a contracted vitreoretinal workplace to deal with possible complications of intravitreal anti-

VEGF treatment. Covered treatment is subject to the prior approval of the health insurance company.

In Slovakia, Avastin con inf, 1x4ml/100 mg is allowed as "off-label" indication and fully covered by health insurance companies. This is based on approval of Ministry of Health, and Avastin can be used both for AMD and DME, in the case the treatment with ranibuzumab was not indicated or is not effective. The MoH approval is usually for 6 months, and 741 packages were distributed between 1.5.2021 – 31.10.2021, 850 packages were distributed between 1.4.2022 – 30.9.2022. When applying Avastin, all 4 above mentioned criteria are required.

The price consists of 2 components: (1) application of drug 107 – 129 EUR + (2) price of drug. Bevacizumab price, 1 x 16 ml = 640 EUR. Avastin price, con inf 1x4 ml/100 mg = 130 EUR. There are 10-12 hospitals who do it.

Waiting time for AMD treatment is long, usually 6 months, and with no co-payment. The approval of drugs should be faster, in Slovakia it is usually 28 days, which is a very long period, and the benefits of anti-VEGF may be much lower and it can be just „too late".
Ophthalmologist and owner of a leading ophthalmological clinic

DME

Prevalence of DME in DM1T/DM2T represents 9.5%/8.8% (source: Martinka et al, 2016). Prevalence of DME in DM1T & DM2T together = 3,11% (source: Ondrejková et al, DIARET study, 2019)

In 2010, the standard treatment was laser coagulation. Laser coagulation (code 8730) is fully covered by health insurance, when not covered, it costs around 160 EUR for self-payers. In 2014, the health insurance paid 100 EUR to providers, in 2018 the HIC reimbursed 108 EUR.

After 10 years, in 2020, the standard treatment is anti-VEGF. VšZP since 2019, approves anti-VEGF treatment with drugs containing active substances: ranibizumab aflibercept or bevacizumab. The application for approval of anti VEGF treatment (DME) must be accompanied by the medical documentation of all required examinations, laboratory results and measurements confirming compliance with the indication restrictions valid from 01.11.2019 and listed in the valid List of categorized drugs MZ SR. The fixed application regimen is 3 to 5 loading doses = intravitreal injections once a month and then, depending on the anti-VEGF molecule used, continued either once every 1 or once every 2 months until the stage where the improvement achieved does not stabilize.

Anti-VEGF drugs: Diabetes causes diabetic retinopathy, which can be treated by photocoagulation of the retina (different types of lasers available to patients – yellow, black, green). When it does not work, and the patient obtains DME, the macula cannot be operated by laser. Therefore, anti-VEGF drugs are applied under the so called IAD (intravitreal application of drugs). **IAD + anti-VEGF can be done only in specialized centers, which have contract with HICs.**

Table 1: Anti-VEFG Drugs

Active substance	Brand name	Usage:	Reimbursement

Ranibizumab	Lucentis 10 mg/ml	Intravitreal 1,65 mg	636,31 EUR
Aflibercept	Eylea 40 mg/ml	Intravitreal 40 mg/ml	668,62 EUR
Brolucizumab	Beovu, 120 mg/ml	Intravitreal 120 mg	648,55 EUR

Source: ŠUKL, 2022

Ranibizumab intravitreal 1, 65 mg DME. The preparation is covered in the treatment of visual impairment caused by diabetic macular edema according to the following criteria:

a) Treatment may be indicated in diabetics with type 1 DM or *compensated diabetics with type 2 DM, in whom the *value of glycated hemoglobin HbA1C (not older than 3 months) is lower than or equal to 8.0% /DCCT/ 64 mmol /mol /IFCC
b) Treatment may be indicated in patients with diabetic macular edema, which is the cause of deterioration of visual acuity in the range of 20/25 - 20/200, in patients with retinal thickness in the macular region, in monoculars 20/25 - 20/320
c) ≥ 400 μm or if diabetic macular edema does not respond to laser treatment and the thickness of the retina in the macular landscape is ≥ 300 μm.
d) Treatment is indicated only if the changes in the macula are not irreversible and there are no signs of accompanying macular disease.
e) Treatment is covered until maximum visual acuity is achieved, i.e. until the patient's visual acuity is stable during 3 consecutive application visits.
f) Treatment is restarted when the patient's follow-up shows worsening of the condition caused by diabetic macular edema, provided the above criteria are met.

The covered treatment will also be terminated in the following cases:

a) If after five initial applications there is no improvement of visual acuity by at least 5 ETDRS letters.

b) In case of deterioration of visual acuity by more than three lines of the ETDRS optotype.

Aflibercept intravitreal 40 mg/ml for DME have conditions the same as Ranibizumab. Covered treatment is subject to the prior approval of the health insurance company.

Waiting time AMD for AMD/DME treatment is long, it usually takes 6 months. If the provider has a contract with HIC, then there are no limits and no co-payment. **IAD costs are 107 – 129 EUR + Anti-VEGF drug and there are 10-12 hospitals who do it. Avastin is used by 1/3 of providers.**

CORNEA TRANSPLANTATION

There were 290 corneal transplantations in 2020. The procedure is called keratoplasty, can be front (code 8710A) or back (8710B), the price always includes the implant. Can be performed in JZS (1-day surgery) or OHV (in-patient setting) mode.

Table 1: Incidence & Reimbursement – HIC Dôvera

number of patients	new patients (incidence)	Front	Back	Co-payment	Self-payers
2010					
2011					

2012					
2013	195	1 300 EUR	1 500 EUR		
2014	143				
2015	269			100 EUR (VšZP, Union), 500 EUR (Dovera)	front (1 700 EUR), back (2 100 EUR).
2016	249	1 514 EUR	1 734 EUR		
2017	177	1 514 EUR	1 734 EUR		
2018	130			VšZP and Dovera = 300 EUR, Union = 900 EUR.	Since 2018 front and back same price = 2 500 EUR.
2019	173				
2020	290	2134 EUR – 2589 EUR	2134 EUR – 2589 EUR	450 EUR	2 920 EUR

Source: NCZI, health insurance companies

Pre-operative treatment, paid by HIC or the contribution by the patient is usually 100 EUR. The total cost of surgery + tissue transplant (cornea) is around 2,000 EUR. There is always a co-payment of 300 EUR by the patient for transport of cornea. Post – operative check-up: Front: 12x, 1 is for free, then 11 x 20 EUR, back: 2 years (free).

The cornea tissue comes from state hospitals but is always taken and operated by specialized private clinics (with tissue banks). The cornea management costs 2,000 EUR, so the bundled payment (2134 EUR – 2589 EUR) is not sufficient to cover the total costs. According to private providers of tissue banks the price should be between 3,500 and 4,000 EUR to cover the real costs. The main improvement would be, if the procedure and the tissue were paid separately and for real prices, and the tissue should be reimbursed as a special material (so the same logic as with cataracts).

Only the cornea management costs 2,000 EUR, so the bundled payment (2134 EUR – 2589 EUR) is not sufficient to cover the costs. The price should be between 3,500 to 4,000 EUR to cover the real costs. The main improvement would be, if the procedure and the tissue were paid separately and for real prices, and the tissue should be reimbursed as a special material.
Ophthalmologist and owner of a leading ophthalmological clinic

The surgery and the transplant are paid together as a „bundle". They should be separated to surgery and transplant, to increase price transparency and show the real prices. Moreover, there is no legislation to define cornea tissue as a special material to get appropriate funding.

Cornea transplant waiting time depends on the availability of cornea tissues (state hospitals want remuneration or free tissues instead), and is usually around 6 month – 12 months, but during COVID-19 it was more than 12 months. There are no financial limits on production.

UKRAINE

Until April 1, 2020, the financing of the treatment of ophthalmological cases in the public sector was carried out according to the fixed budget method, which was calculated considering extensive indicators of the activity of providers (full-time positions of medical personnel, number of beds, etc.).

Since this method of payment does not allow for the allocation of expenses by individual types of medical care or services provided, it is impossible to directly allocate the amount of funding for the provision of ophthalmic care to patients during this period.

The reform of the financing system in Ukraine, which began with the adoption of relevant legislation in 2018 (in particular, the Law of Ukraine "On State Financial Guarantees of Medical Services for the Population" dated October 9, 2017 No. 2168-VIII and a number of regulatory acts), concerned the creation of a customer and payer of medical services and medicines under the medical guarantee program of the National Health Service of Ukraine (NHSU), and introduction of strategic procurement and payment methods for medical service providers.

Since 2018, new payment mechanisms have been introduced at the level of primary medical care, using the capitation method, in the hospital and outpatient sectors, which provided specialized care financed on the bases of a fixed budget.

Starting from April 1, 2020, the financing reform was extended to secondary outpatient and inpatient care. Appropriate packages of medical services were developed and implemented, which included a list of medical care and medicines necessary for the provision of such services. Also, unified specifications were established for the conditions of procurement, types of tariff and base rates, the payment of which is provided by the National Health Service in accordance with a contract with the supplier.

In 2020, surgical treatment of patients with ophthalmological cases was included in the package of medical services called "Surgeries for adults and children in hospital" (regardless of the type of surgical intervention - whether it is cataract or appendicitis).

CATARACT

Cataract ranks first in Ukraine in terms of prevalence among diseases of the eyes and accessory apparatus, and remains not only one of the topical ophthalmological problems, but also an important medical and social problem. The cataract prevalence rate is 448,474 patients among the entire population aged 0-100 years (1045.3 per 100 thousand population), the incidence rate is 109,217 (257.5 per 100 thousand population). In the age group of 18-100 years and older, the prevalence of cataracts is 429,931 (1,235.5 per 100,000 population), the incidence is 109,062 (313.4 per 100,000 population) (*Medical Statistics Center of the Ministry of Health of Ukraine, 2017*).

An average of 65,883 cataract surgeries per year were performed in public and communal healthcare facilities (15.6 per 10,000 of adult population), of which 93.2% were cataract surgeries with implantation of an artificial lens (*Center of Medical Statistics of the Ministry of Health of Ukraine, 2018*). In the period 2010-2018, in the state and communal sector, cataract removal operations were provided mainly as inpatient care. The share of

surgical interventions in outpatient conditions was only 7% (4731 operations or 1.1 cataract surgeries per 10,000 adult population).

In the private sector, the situation is the opposite. In 2010, 70.4% of cataract surgeries were performed in an outpatient care level and up to 29.6% inpatient care level. The situation changed in 2020, as 92.9% of all cataract surgeries were performed on an outpatient basis and 7.1% in hospitals (*Medical Statistics Center of the Ministry of Health of Ukraine, 2018)*. As the private sector is usually paid by fee-for-service, it focuses on surgical treatment only in the outpatient care and 1-day hospitalization, compared to the public sector, which remains the practice of surgeries in hospital.

The funding mechanism was changed - initially it focused on inpatient care, providing care in hospitals. This was related to the general financial mechanisms of health care institutions at that time - according to the fixed budget method (payment per bed-day). Since 2020, there have been reforms of the health care system - changes in financing mechanisms, a transition to finance using the global budget method, and a gradual transition to finance using the method of related diagnostic related groups as C15 “Surgical treatment of glaucoma and complex surgeriess for the treatment of cataracts” (0.593 weight coefficient) and C15-01 “Surgical treatment of glaucoma and complex surgeriess for the treatment of cataracts up to 24 hours” (0.534 weight coefficient). Mechanisms and principles of financing outpatient and inpatient care also apply to cataract treatment. So, currently the emphasis in cataract treatment is shifted to outpatient care.

The situation regarding cataract treatment in the public sector has changed in the past five years: the main focus and the financial incentives have shifted to the ambulatory level of care and to "one-day" surgery. In particular, for 2022, a separate package "Surgery for adults and children within one-day hospitalization " was included in the medical guarantee program, and the new DRG C16-01 "Operations on the lens up to 24 hours" was included in the list of diagnostic and related groups (weight factor 0.458) (*NHSU, 2022*).

In the public sector, most surgeries are performed in hospitals. In 2010, 97.3% of all cataract surgeries were performed in an inpatient setting, and 2.7% were performed in an outpatient setting. There was a reorientation to provide outpatient surgery, so in 2020 the figure increased to 8% of outpatient surgery, and 92% of all cataract surgery was performed in the hospital.

Cataract care is provided as both inpatient and outpatient (including 1-day hospitalization) care within the Program of Medical Guarantees of the National Health Service of Ukraine.

Inpatient care is provided under the Package “Surgery for adults and children in hospital”.

The patient can be examined by an anaesthesiologist and receive an anaesthesia; undergo surgical procedures, laboratory tests and blood tests; electrocardiography and x-ray; ultrasound, histological or cytological examination (in case of suspicion of tumours); to receive medicines and medical products from the National List and purchased at the expense of various programs; and undergo medical rehabilitation.

Outpatient care for all nosologies is a part of the Package "Outpatient secondary (specialized) and tertiary (highly specialized) medical care for adults and children, including medical rehabilitation and dental care".

This Package includes medical services for prevention, diagnosis, monitoring, surgeries, including a 1-day hospitalization, and medical rehabilitation.

In 2022, approaches changed, coefficients for surgical intervention and stimulation of surgical interventions at the outpatient level were introduced, etc.

Also, the requirements for staff, equipment, as well as the possibility of conducting diagnostics and full treatment are included in the terms of contracts between service providers and the NHSU.

The summary table for tariffs and packages is presented below for 2020-2022.

Table. Packages and tariffs within the Program of Medical Guarantees

Year	Package	Sum* Package tariff
2020	Surgery for adults and children in hospital	4563.64 UAH / 148 EUR**
	Outpatient secondary (specialized) and tertiary (highly specialized) medical care for adults and children, including medical rehabilitation and dental care	49.43 UAH / 1.5 EUR***
2021	Surgery for adults and children in hospital	4896.79 UAH / 152 EUR**
	Outpatient secondary (specialized) and tertiary (highly specialized) medical care for adults and children, including medical rehabilitation and dental care	143.24 UAH / 4.4 EUR***
2022	Surgery for adults and children in hospital	7506.00 UAH / 196 EUR**
	Surgery for adults and children within one-day hospitalization	7506.00 UAH / 196 EUR**
	Inpatient care for adults and children without surgery	7506.00 UAH / 196 EUR**
	Prevention, diagnosis, observation, treatment and rehabilitation of patients in outpatient settings	150.00 UAH / 4.55 EUR***

Notes:

*The actual cost of medical services is calculated as the sum of the corresponding global rate, taking into account the corresponding correction coefficient of the share of the global rate application and the product of the total actual number of treated cases for each diagnostic-related group, the base rate, the actual index of the structure of cases, the budget balance factor and other coefficients, applicable in the relevant period.

**The tariff for medical services provided by the specifications as a combination of the global rate and the rate per treated case.

***The services are financed on the basis of the global budget rate per treated case, without taking into account the complexity of the treatment.

Since 2021, there has been a gradual transition to financing by the method of related diagnostic groups. To date, with the support of international donors, including the World Bank, measures have been implemented to adapt the Australian DRG system; and a system of clinical coding of treated cases is also being introduced at the level of service providers.

The table below presents the following DRG by cataract and the corresponding correction coefficients.

Year	DRG code	DRG	Weight coefficient of DRG	Package	Sum* Tariff
2021	C15	Surgical treatment of glaucoma and complex surgeries for the treatment of cataracts	0.593	Surgery for adults and children in hospital	4563.64 UAH / 148 EUR
2022	C15	Surgical treatment of glaucoma and complex surgeries for the treatment of cataracts	0.593	Surgery for adults and children in hospital	7506.00 UAH / 196 EUR
	C15-01	Surgical treatment of glaucoma and complex surgeries for the treatment of cataracts up to 24 hours	0.534	Surgery for adults and children within one-day hospitalization	7506.00 UAH / 196 EUR

*Note: The actual cost of ophthalmic medical services is variable, because the tariff does not include medicines and consumables that are purchased centrally by providers.
In 2021, the share of the applied rate for the treated case for the period from April 1, 2022, to the end of December 2022 ranged from 5% to 15%.
In 2022, it is planned that by the end of the financial year, the additional payment at the tariff (global rate) under the DRG will increase to 35%.

The patient can choose any lenses that are available on the market in Ukraine, approved by the government. Ophthalmologies/doctors decide on the use of lenses based on:

a) data from the examination of the visual organs;

b) the financial capacity of the patient;

c) the need for additional properties of the lenses for quality vision after implantation.

Lens suppliers enter the market through tender procedures. Lenses are selected for quality, price, and parameters required by the healthcare provider. Purchases take place within the framework of certain state local (regional) programs or individual health care facilities.

GLAUCOMA

About 220,000 people with glaucoma are registered in Ukraine, and about 20,000 new cases are detected annually. In the age group of 18-100 years and older, the prevalence of glaucoma is 213,223 (612.7 per 100,000 population), the incidence is 17,934 (51.5 per 100,000 population) (*Center of Medical Statistics of the Ministry of Health of Ukraine, 2017).*

Glaucoma services are provided as both inpatient and outpatient (including 1-day hospitalization) care. In the public sector, most surgeries are performed in hospitals. In the private sector, most surgeries are performed as outpatient care.

In the period between 2010 and 2017, surgical treatment of glaucoma in public and communal health care institutions was carried out mainly in inpatient settings, with an average of 5,470 operations/year (1.31 per 100,000 population).

In private institutions, assistance and surgical treatment is provided to patients with glaucoma on an outpatient basis (6,184 surgical operations/1.5 per 100,000 population) (Medical Statistics Center of the Ministry of Health of Ukraine, 2017).

According to the National Health Service, in 2021, 5,648 patients with glaucoma underwent surgical treatment, 74.2% of whom were 65 years old or older. As part of the Medical Guarantee Program, 1,595 "one-day" surgeries were performed (*NHSU, 2022).*

The main payment mechanism for both public and private glaucoma providers is by the Program of Medical Guarantees. The package price is the same for all providers who have contracted with the National Health Service of Ukraine.

Inpatient care is provided within the Program of Medical Guarantees of the NHSU under the Package "Surgery for adults and children in hospital". The package price includes medical services for prevention; examination by an anaesthesiologist and anaesthesia; surgery procedures; laboratory tests and blood tests; electrocardiography and x-ray; ultrasound, histological or cytological examination (in case of suspicion of tumours); consultations with doctors of other specialties; medicines and medical products from the National List and purchased at the expense of various programs; and medical rehabilitation.

Outpatient care for all nosologies, including glaucoma, is part of the Package "Outpatient secondary (specialized) and tertiary (highly specialized) medical care for adults and children, including medical rehabilitation and dental care" within the Program of Medical Guarantees. This package price includes medical services for prevention; diagnosis, determination of treatment methods, recommendations and patient navigation; ophthalmological examinations: ophthalmometry (keratometry), ophthalmoscopy, refractometry, dioptrimetry, perimeter of the visual field, other studies according to the needs of patients; appointment and correction of drug treatment; surgeries procedures (1-day hospitalization); medicines and medical products from the National List of Essential Medicines and purchased at the expense of various programs; and medical rehabilitation.

Table. Packages and tariffs within the Program of Medical Guarantees

Year	Package	Sum* Package tariff
2020	Surgery for adults and children in hospital	4563.64 UAH / 148 EUR**
	Outpatient secondary (specialized) and tertiary (highly specialized) medical care for adults and children, including medical rehabilitation and dental care	49.43 UAH / 1.5 EUR***
2021	Surgery for adults and children in hospital	4896.79 UAH / 152 EUR**
	Outpatient secondary (specialized) and tertiary (highly specialized) medical care for adults and children, including medical rehabilitation and dental care	143.24 UAH / 4.4 EUR***
2022	Surgery for adults and children in hospital	7506.00 UAH / 196 EUR**
	Surgery for adults and children within one-day hospitalization	7506.00 UAH / 196 EUR**

	Inpatient care for adults and children without surgery	7506.00 UAH / 196 EUR**
	Prevention, diagnosis, observation, treatment and rehabilitation of patients in outpatient settings	150.00 UAH / 4.55 EUR***

Notes:

*The actual cost of medical services is calculated as the sum of the corresponding global rate, taking into account the corresponding correction coefficient of the share of the global rate application and the product of the total actual number of treated cases for each diagnostic-related group, the base rate, the actual index of the structure of cases, the budget balance factor and other coefficients, applicable in the relevant period.

**The tariff for medical services provided by the specifications as a combination of the global rate and the rate per treated case.

***The services are financed on the basis of the global budget rate per treated case, without taking into account the complexity of the treatment.

In 2021, a payment mechanism by DRG was implemented in Ukraine. DRG and their corresponding coefficients for glaucoma are presented in a table below.

Year	DRG code	DRG	Weight coefficient of DRG	Package	Sum* Tariff
2021	C15	Surgical treatment of glaucoma and complex surgeries for the treatment of cataracts	0.593	Surgery for adults and children in hospital	4563.64 UAH / 148 EUR
2022	C15	Surgical treatment of glaucoma and complex surgeries for the treatment of cataracts	0.593	Surgery for adults and children in hospital	7506.00 UAH / 196 EUR
	C15-01	Surgical treatment of glaucoma and complex surgeries for the treatment of cataracts up to 24 hours	0.534	Surgery for adults and children within one-day hospitalization	7506.00 UAH / 196 EUR

*Note: The actual cost of ophthalmic medical services is variable, because the tariff does not include medicines and consumables that are purchased centrally by providers.

The election of medical treatment of glaucoma is made taking into account the presence of concomitant diseases of the patients, adherence to treatment, ability to fulfill the doctor's prescription. After that, the specifics of the drugs that will be used to treat this patient are determined on the bases ofmechanism of action, hypotensive effectiveness, presence/absence of preservatives, economic component.

The decision to carry out surgical intervention is made in view of the progression of the disease or a high risk of such a disease.

The cost of glaucoma treatment in private clinics in Ukraine is influenced by the following factors: the price of drugs and the duration of the prescribed course are taken into

account, and, in case of surgery, the type of intervention chosen based on the results of the examination, taking into account contraindications.

Stable prices for laser glaucoma treatment depend on the chosen technique and equipment. Surgical intervention is technologically more difficult to perform, so it is more expensive than laser therapy. Structures affected during procedures, such as the iris or trabeculae, are also taken into account. Manipulations on the ciliary body are less common, which increases the cost of the procedure.

Depending on the private clinic, the average cost of laser treatment ranges from $500 to $1,000. Surgical intervention or implantation of the Ex-PRESS device - from $1,500.

VITRECTOMY

Both in the public and in the private sector most vitrectomy surgeries are performed mostly in the outpatient care level, including 1-day hospitalization. Other private providers, who have not contracted with the National Health Service of Ukraine, are paid only by fee-for-service and not by the public sources.

The package price is the main payment mechanism. The main payment mechanism from public sources for both public and private providers (if they signed contract with the National Health Service of Ukraine) is by the Program of Medical Guarantees.

Inpatient care is provided under the Packages “Surgery for adults and children in hospital” and “Inpatient care for adults and children without surgery”.

The package price includes prevention services; examination by an anaesthesiologist and anaesthesia; surgery procedures; laboratory tests and blood tests; electrocardiography and x-ray; ultrasound, histological or cytological examination (in case of suspicion of tumours); consultations with doctors of other specialties; medicines and medical products from the National List and purchased at the expense of various programs; and medical rehabilitation.

Outpatient care of 1-day hospitalization is a part of the Package “Surgical operations for adults and children within a one-day hospitalization” of the Program of Medical Guarantees.

The package price includes medical services for prevention; examination by an anaesthesiologist and anaesthesia during diagnosis; surgery procedures (only 1-day hospitalization); laboratory tests and blood tests; surgery anesthesia; providing recommendations to the patient on further medical and rehabilitation treatment in an outpatient level and tactics of action in the development of any side effects; medicines and medical products from the National List and purchased at the expense of various programs; and hospitalization of the patient in the specialized inpatient department in case of side effects.

Outpatient care is part of the Package “Outpatient secondary (specialized) and tertiary (highly specialized) medical care for adults and children, including medical rehabilitation and dental care” within the Program of Medical Guarantees.

This package price includes medical services for prevention; diagnosis, determination of treatment methods, recommendations and patient navigation; ophthalmological examinations: ophthalmometry (keratometry), ophthalmoscopy, refractometry, dioptrimetry, perimeter of the visual field, other studies according to the needs of patients; appointment and correction of drug treatment; surgeries procedures (1-day hospitalization); medicines and

medical products from the National List of Essential Medicines and purchased at the expense of various programs; and medical rehabilitation.

Table. Packages and tariffs within the Program of Medical Guarantees

Year	Package	Sum* Package tariff
2020	Surgery for adults and children in hospital	4563.64 UAH / 148 EUR**
	Outpatient secondary (specialized) and tertiary (highly specialized) medical care for adults and children, including medical rehabilitation and dental care	49.43 UAH / 1.5 EUR***
2021	Surgery for adults and children in hospital	4896.79 UAH / 152 EUR**
	Outpatient secondary (specialized) and tertiary (highly specialized) medical care for adults and children, including medical rehabilitation and dental care	143.24 UAH / 4.4 EUR***
2022	Surgery for adults and children in hospital	7506.00 UAH / 196 EUR**
	Surgery for adults and children within a one-day hospitalization	7506.00 UAH / 196 EUR**
	Inpatient care for adults and children without surgery	7506.00 UAH / 196 EUR**
	Prevention, diagnosis, observation, treatment and rehabilitation of patients in outpatient settings	150.00 UAH / 4.55 EUR***

Notes:

*The actual cost of medical services is calculated as the sum of the corresponding global rate, taking into account the corresponding correction coefficient of the share of the global rate application and the product of the total actual number of treated cases for each diagnostic-related group, the base rate, the actual index of the structure of cases, the budget balance factor and other coefficients, applicable in the relevant period.

**The tariff for medical services provided by the specifications as a combination of the global rate and the rate per treated case.

***The services are financed on the basis of the global budget rate per treated case, without taking into account the complexity of the treatment.

The table below presents the following DRG for vitrectomy.

Year	DRG code	DRG	Weight coefficient of DRG	Package	Sum* Tariff
2021	C03	Retinal surgery	0.513	Surgery for adults and children in hospital	152 EUR
2022	C03	Retinal surgery	0.513	Surgery for adults and children in hospital	196 EUR

	C03-01	Retinal surgery within 24 hours	0.462	Surgery for adults and children within one-day hospitalization	196 EUR

*Note: The actual cost of ophthalmic medical services is variable, because the tariff does not include medicines and consumables that are purchased centrally by providers. The services are financed on the basis of the global budget rate per treated case, without taking into account the complexity of the treatment.

AMD

Statistical information on the prevalence and incidence of ADM has not been collected since 2018, as the Order of the Ministry of Health of Ukraine №801802 dated 04.10.2018 abolished reporting form № 12 "Report on the number of diseases registered in patients".

Similarly, no statistics are kept on AMD, since this disease is not a case of treatment in the hospital or 1-day hospitalization, but is treated mainly at the outpatient level and the patient is provided with only supportive therapy.

In Ukraine, such therapy options include maintenance with dietary supplements, corticosteroids, additional special injections (e.g., anti-VEGF), and variations of laser coagulation, but these medicines or procedures are not covered by the state program of "Affordable Medicines", because they are expensive. Patients usually purchase medicines out of pocket; although there may occasionally be local programs that can purchase a certain amount of VEGF. Also, supportive therapy may include the use of eye drops, and injections "under the eyes", but these methods of treatment currently have no effect or have extremely low effectiveness in the treatment of ADM.

DME

DME is provided mostly at an outpatient care level. In the public and private sector, most surgeries are performed in outpatient care (including 1-day hospitalization). Other private providers, who have not contracted with the National Health Service of Ukraine, are paid only by fee-for-service and not by the public sources. From 2010 to 2017, approximately, 9000 cases were registered for DME each year.

The main payment mechanism from public sources for both public and private providers is by the Program of Medical Guarantees.

Inpatient care is provided within the Program of Medical Guarantees of the National Health Service of Ukraine under the Package “Surgery for adults and children in hospital”.

Outpatient care of 1-day hospitalization is a part of the Package “Surgical operations for adults and children as a one-day hospitalization” of the Program of Medical Guarantees.

Diagnostic-related groups of DME are presented below in the table.

Year	DRG code	DRG	Weight coefficient of DRG	Package	Sum* Tariff
2021	C03	Retinal surgery	0.513	Surgery for adults and children in hospital	152 EUR

2022	C03	Retinal surgery	0.513	Surgery for adults and children in hospital	196 EUR
	C03-01	Retinal surgery within 24 hours	0.462	Surgery for adults and children within one-day hospitalization	196 EUR

*Note: The actual cost of ophthalmic medical services is variable, because the tariff does not include medicines and consumables that are purchased centrally by providers. The services are financed on the basis of the global budget rate per treated case, without taking into account the complexity of the treatment.

CORNEA TRANSPLANTATION

Corneal transplantation is a complex surgery which is performed in Ukraine only in specialized institutions. The issue of transplantation is subject to very complex and strict legal requirements in Ukraine. Even though since 2018 the procedure for organ transplantation at the legislative level has become a bit simplified, corneal transplantation is rarely performed by public providers as public programs, as Program of Medical Guarantees, usually cannot cover all treatment costs, or there are very long (unofficial) waiting lists for surgery.

Similarly, corneal transplantation from a postmortem donor has not been carried out for almost 20 years, but was resumed in September 2021.

The package price is the main payment mechanism since 2020. The main payment mechanism from public sources for both public and private providers (if they signed contract with the the National Health Service of Ukraine) is by the Program of Medical Guarantees:

From April 1, 2020, to April 1, 2021 - payment of medical service providers is carried out through a single purchaser - the National Health Service of Ukraine under the Program of Medical Guarantees paid from public sources to all levels of healthcare.

From April 1, 2021, to 2022 – vitrectomy services are paid from both public sources by "mixed method": the global budget (85%-95%) + payment for the relevant DRG (5%-15%). The share of the global rate and the treated rate is determined annually by the government.

The package price is the same for all providers who have contracted with the National Health Service of Ukraine.

Inpatient care is provided within the Program of Medical Guarantees of the National Health Service of Ukraine under the Package "Surgery for adults and children in hospital". The package price includes prevention services; examination by an anaesthesiologist and anaesthesia; surgery procedures; laboratory tests and blood tests; electrocardiography and x-ray; ultrasound, histological or cytological examination (in case of suspicion of tumours); consultations with doctors of other specialties; medicines and medical products from the National List and purchased at the expense of various programs; and medical rehabilitation.

Outpatient care of 1-day hospitalization is a part of the Package "Surgical operations for adults and children as a one-day hospitalization" of the Program of Medical Guarantees. The package price includes medical services for prevention; examination by an anaesthesiologist and anaesthesia during diagnosis; surgery procedures (only 1-day hospitalization); laboratory tests and blood tests; surgery anesthesia; providing recommendations to the patient on further medical and rehabilitation treatment at outpatient level, and tactics of action in the development of any side effects; drugs and medical products from the National List and purchased at the

expense of various programs; and, in case of side effects, hospitalization of the patient in the specialized inpatient department.

The table below presents the following DRG for cornea transplantation.

Year	DRG code	DRG	Weight coefficient of DRG	Package	Sum* Tariff
2021	C04	Surgery on the cornea, sclera and conjunctiva	1.247	Surgery for adults and children in hospital	152 EUR
2022	C04	Surgery on the cornea, sclera and conjunctiva	1.247	Surgery for adults and children in hospital	196 EUR
	C04-01	Surgery on the cornea, sclera and conjunctiva within 24 hours	1.122	Surgery for adults and children within one-day hospitalization	196 EUR

*Note: The actual cost of ophthalmic medical services is variable, because the tariff does not include medicines and consumables that are purchased centrally by providers. The services are financed on the basis of the global budget rate per treated case, without taking into account the complexity of the treatment.

CONCLUSIONS & RECOMMENDATIONS

The descriptions of the health care delivery and financing of ophthalmology services in in the Czech Republic, Hungary, Poland, Slovakia and Ukraine have led us to the conclusion that there are significant differences across the countries. These differences exist despite the fact that the Visegrad Group countries have implemented DRG-based systems for hospital care. The comparison of practices in each country allowed us to identify these differences and define good practices in treatments for cataract, glaucoma, AMD, DME, cornea transplantations and vitrectomy. By good practices we understand actions that health systems have taken to ensure healthcare provision at the level corresponding to the health needs (volumes) or aim to increase the quality of care in the treatments within the scope of research. These practices can be summarized in the following table:

Good practice	Increase volumes	Increase quality
Cataract	No financial limit (HU, PL, CZ, SK) Decrease in DRG payment in case of low share of one-day treatment (PL) The structure of cataract package was unified and the price variations between health insurance funds were minimalized (CZ)	Quality indicators reported with DRG (PL) Different package prices for lens types (CZ, PL) Separate payment for lens (HU, SK) Reference pricing in lenses + using market forces (SK) Quality criteria (SK)
Glaucoma	Reimbursement of a wide range of pharmaceuticals (HU, PL, CZ, SK)	Dedicated centres for surgeries (HU)
AMD	Financial products for outpatient treatment (PL) Avastin “off-label” allowed (SK)	Introduction of financial products for evaluation of achieved outcomes (PL) Each injection paid separately by TPP (HU, PL, CZ, SK) The biological treatment anti-VEGF can be applied only in a specialized centre (CZ, SK, PL)
DME	Wide coverage of diagnostics for DME (HU, CZ, SK) Avastin “off-label” allowed (SK) Financial products for outpatient treatment (PL)	Specialized centres to carry out treatments (CZ, SK, PL) Each injection paid separately (PL, CZ, SK)
Cornea transplantations	Separate payments for medical procedure and for cornea introduced to cover the cost of procuring cornea from commercial cell& tissue banks if they are not receiving cornea from the public cell& tissue banks (PL) Functioning tissue banks to have sufficient transplants (CZ, HU) DRG price covering full treatment (CZ, HU, PL)	Specialized centres to carry out treatments (PL, HU, CZ, SK)
Vitrectomy	No production limit (SK)	Specialized centres with dedicated specialists to carry out vitrectomies (HU)

Financing schemes, especially constructs of financial products can influence the number of treatments. Financial incentives can lead to increase volumes of healthcare services. Our analysis shows that there is no good practice in financing that will result in increasing access to all ophthalmology services. They vary not only between countries but also between diseases.

Cataract is, and will continue to be in near future, the most frequent treatment provided in ophthalmology care. As our populations are aging, ensuring access to treat this disease when needed will become essential. The major difference identified during our research pertains to the treatment scheme. In the Czech Republic, Slovakia and Hungary cataract surgeries can be financed within the ambulatory care, while in Poland only in hospital care.. This contributes only to the higher costs of care. The mechanism of a financial penalty, which includes a 10% decrease in DRG price in case of one-day treatment lower than 80%, leads to a sharp increase in short hospitalizations. With 98% of daily cases, Poland does not differ much from the ambulatory treatment scheme provided in the Czech Republic, Slovakia, and Hungary. The main barrier to treatment is the limitation (imposed on healthcare providers by third-party payers) on the number of cataract surgeries that can be performed. No limits on volumes were allowed in Poland, Hungary, the Czech Republic and Slovakia to treat patients without unnecessary delay, and in some cases (Poland, Slovakia) reduced significantly the waiting time.

The second disease explored by the project team members in each country was glaucoma. During our team discussions and interviews with healthcare providers we discovered that glaucoma is mostly treated with the use of pharmacotherapy. Therefore, it was essential to ensure that patients with glaucoma had access a wide range of medications that correspond to the wide variety of the clinical conditions of the patients diagnosed with glaucoma. The wide list of reimbursed drugs allows to match the treatment with health needs while being affordable for patients (Poland, Hungary, Czech Republic, Slovakia). In the Czech Republic access to pharmacotherapy is more limited, but there is a co-payment allowed, making it a lower barrier for the patient than full coverage of price.

AMD was another disease that was analysed. Increasing access to health care can be achieved by adjusting the financial product to the complexity of the procedure. The greatest shift in volumes was observed in Poland, where introduction of a so called “the drug program” allowed the gradual transition from inpatient hospitalizations to outpatient care – this program is defined as an ambulatory treatment provided by hospital so it realised capacity resources in hospitals, leading to a sharp increase in the number of people treated.

When analysing financial mechanisms for treatment for DME, a wide coverage of diagnostics in Hungary stood up as good practices for both increasing access and quality of care, respectively. Regarding DME, the following diagnostic services are financed: detailed anamnesis and basic examination: eye movement examination, digital eye pressure estimation, slit lamp examination, subjective determination of refraction, ophthalmoscopy, blood pressure, blood lipids, gonioscopy, fluorescein angiography, OCT optical coherence tomography. We can also find a comparable set of examinations in Poland. Financing medical services when it is feasible for outpatient care is a good practice that can have an impact on the number of treatments. In Poland, the introduction of a so called drug program for DME as outpatient treatment (realized by high quality hospitals) lead to increased patient access.

Highly complicated procedures, and procedures performed with relatively low frequency should be subject to centralisation (i.e. performed only in high-quality health centres). In ophthalmology, such procedure is cornea transplantation. Acquiring organs, tissues and cells for these procedure are the top barriers to access. Functioning tissue banks that organise sufficient transplants is the key of success to cover the demand for treatment. The other thing is payment mechanisms. If the cost of cornea is the same for all providers, it is crucial that DRG cover the whole cost of the cornea and the cost of the medical procedure, as in the Czech Republic and in Hungary. In Poland there are tissue banks financed form public sources (i.e. the cornea is given for free to the provider), and also tissue banks that don't receive public financing, so the cost of cornea has to be covered by the healthcare provider. Separating the payments for cornea from the payments for transplantations was an important step towards increasing access to this service by covering costs for those health providers that procure cornea from commercial cell and tissue banks, if they do not receive cornea from the public ones. Such financial incentives were implemented in Poland.

Financing schemes can also influence the quality of treatment. In this type of action, some incentives were identified the same for several types of ophthalmological diseases. The most common were procedures to centralise care in high-quality healthcare centres. This was a case for glaucoma surgery and vitrectomy in Hungary, AMD and DME in Poland and Czech Republic, cornea transplant in Hungary and Poland.

For cataract treatment it was stated that separate financing for lenses, should be pointed as a good practice to increase the quality of treatment, like in Slovakia, as this makes it the most flexible way of matching to patient needs. The semi-good practice, such as co-payment for lense, or price indicators in case of using more expensive lenses (as in Poland or Hungary or the Czech Republic) seems not to have so much influence on quality increase. Measuring quality indicators while providing healthcare services, and making these indicators publicly available result in better healthcare outcomes. In Poland, such indicators were added to the DRG scheme. When reporting cataract DRG, healthcare providers are obligated to report assessment of surgeries. Especially vision impairment measurement before and after surgery appeared to be a patient-choice sensitive indicator.

Another good practice that we identified was to treat more complicated cases in specialized centres that have proper resources to conduct surgeries. Such conditions were implemented in Hungary where there is a special procedure in the treatment of serious glaucoma cases in which the eye drop medical therapy is not effective enough. The entitled institutions to provide such therapy are only the four Medical Universities: Debreceni Egyetem Klinikai Központ, Pécsi Tudományegyetem, Semmelweis Egyetem in Budapest, Szegedi Tudományegyetem Szent-Györgyi Albert Klinikai Központ.

A good practice for AMD and DME influencing quality is defining detailed conditions that can be fulfilled only the best providers. Such action is taken in Poland, where only those hospitals eligible for the drug program (conditions set separately for AMD and DME) can provide injections for AMD and DME. Also, in Czech Republic the biological treatment anti-VEGF can be applied only in a specialized centre (there are only 37 in the country).

Definition of financial products can also influence the quality of treatment . The most important practices identified by our research team were: payment for each injection separately and financial products for evaluation of achieved outcomes. Payment for each injection imposes

elasticity for treatment condition for each patient. It is implemented in Poland and Hungary for AMD, and in Poland for DME. In Poland, the quality of care was also assured via new financial products to cover the cost of evaluating the achieved health outcomes.

Another good practice with financing scheme for AMD was identified in the Czech Republic, where the lines of treatment were adjusted to the clinical conditions, and linked directly to the health outcomes.

Finally, for vitrectomy – the medical procedure that can be used while treating many eye diseases, the team identified only one good practice across the Visegrad Group countries: assigned specialist centres that carry out these procedures in Hungary.

ROOM FOR IMPROVEMENT

Room for improvement for cataract treatment in case of Poland can be the possibility to co-finance lenses, which would increase patients' choice. In the case of the Czech Republic, we can see improvement in setting a quality control system in form of a pre-defined system and a systematic tool for quality assessment. The topic of quality is closely connected with importance of categorizing the lenses at the Ministry – the health system level. The whole quality control should be in line with revision control. In Slovakia listing payments should be introduced, and an international database for price cross-country comparison should be established.

Room for improvement for Glaucoma treatment in Poland means to establish incentives for highly specialized surgeries, and to ensure an adequate number of surgeons with the skills required to treat complicated patients or to conduct complicated glaucoma surgeries. At the same time, increased screening and early detection of glaucoma is needed. In the case of the Czech Republic more attention should be paid to under financing glaucoma, while more addressed guidelines should be required and implemented (OCT examination). In Slovakia the price of the implant is not fully reimbursed. There is also some problem with the pricing of glaucoma implants.

Room for improvement for Vitrectomy treatment in Poland is in financial products do not reflect the difference in costs (which is caused, among other factors, by the length of the operation resulting from the complexity of the case = the need for different products for ICD-10, for example). The indicator that was intended to lead to the centralization of treatments is set at a high level, which discourages the centres from trying to get patients from the region. Production is negatively impacted by limiting the number of services that are funded by the National Health Fund,; prices(tariffs) are increasing, and the total hospital funding is fixed. In the Czech Republic highly individualized approach is needed, due to its complexity, because Vitrectomy is complicated, and each patient is different. In Slovakia, there should be a revision of reimbursement, because the costs of procedure are not sufficiently reimbursed.

Room for improvement for AMD treatment in Poland includes options for monitoring or evaluation of patient medical data, in order to avoid the risk of unnecessary doses (injections). Scenarios with different criteria for both providers and patient enrolment, as well as including other drugs to be reimbursed also need further consideration to continue efforts to improve access to AMD treatment. In the Czech Republic it is important to treat more patients and to enforce Avastin to be used as "Off-label" indication. In Slovakia the treatment approval

is usually 28 days, what is very long and the benefits of anti-VEGF may be much lower and it can be just „too late".

Room for improvement for DME treatment in Poland should be in early detection of deterioration or even predictive analytics could be used to assess the risk of DME among patients. This can prevent avoidable costs, such as unnecessary hospitalizations and social costs – as young people in productive age would not lose their vision or take sick leaves (unnecessary cost for the social security system). The options to apply artificial intelligence should be considered for this purpose as pilot studies bring on results suggesting bot clinical and cost-effectiveness. In the Czech Republic they should work on waiting times also diabetologists could measure the eye background so that ophthalmologists do not have to do it. A prerequisite for treatment is good patient compliance and adequate diabetes background. In Slovakia Avastin could be used even more as it is now.

Room for improvement for corneal transplant in Poland is that there is actually a shortage of cornea – more patients need them than the available numbers in the cell or tissue banks (both commercial and publicly funded ones). There are no financial incentives for extracting or facilitating the extraction of cornea. To consider - competition for cornea among providers to get a cornea from the publicly funded bank is not a good idea. In Slovakia it is important to reconsider the reimbursement because the bundled payment is not sufficient to cover the costs. The main improvement would be, if the procedure and tissue were paid separately and for real prices and the tissue should be categorized as special material. It should be separated to surgery (pre-op, post-op) and the transplant, to increase price transparency and increase the reimbursement. There is no legislation to define cornea tissue as special material to get appropriate funding.

RESULTS FROM UKRAINE

Ophthalmic surgery in Ukraine is performed at a high level, except that there is very little corneal surgeries. In general, everything is performed on the most modern equipment and according to modern standards. Nevertheless, the organization and financing of healthcare in Ukraine still need improvement in some areas so that patients can have access to quality services and treatment.

The results of interviews with key stakeholders among doctors, ophthalmic surgeons, managers of health care facilities and the National Health Service revealed that the respondents generally support all the good practices identified by the partner countries. Since the implementation of the DRG system and the corresponding financing mechanisms are just being implemented in Ukraine, clinicians do not yet see how these good practices can be adapted to our health care system, but they see the possibility of applying them at further stages of the system's development. Although managers have a more current understanding of how good practices can be applied and whether they are good for the system.

Cataract. The analysis of good practices in the Visegrad countries and the expert opinions showed that the best practices for Ukraine as increase volumes indicators are separate payment for lenses and reference pricing in lenses used to treat cataract. Not all government programs can currently cover all cataract treatment costs, so there are currently co-payments for certain services: *Not all services are fully covered by the Program of Medical Guarantees. Now, some of cataract patients are covered by local budget programs. The Program of Medical Guarantees covers examinations, consultations, that is, more at the level of primary medical*

care. There is a local program "Health of Kyivans", which has been operating for several years, but it operates more or less steadily To date, it fully covers all consumables: lenses, knives, and medicines for surgery (ophthalmologist-microsurgeon, the head of the department of public hospital); *For people of working age, we try to offer multifocal lenses, which are more expensive, because we want these people to be able to see, work, etc. For the elderly, cheaper lenses for a price of between 3,000 to 4,000 UAH are provided, but this is without consumables, but everything is individual. The Program of Medical Guarantees is intended for the 20% of the population who cannot afford surgery and can wait for the bureaucratic purchase of lenses and everything else, especially where you need to act quickly, is the private sector.* (ophthalmologist-surgeon, professor at the medical university, a WHO expert).

Although these experts were in favour of having no financial limitation on the treatment of cataracts, but taking into account the realities that exist in Ukraine, they acknowledged that it is currently impossible to cover all treatment costs from the state budget, and there therefore, there will be limitations for the patients. They consider separate payment or even co-payment for standard or more individual (rare) lenses as good practice to adopt: *Yes, it is necessary, and currently, the entire private structure works like this, that is, the way it works in the world, that is, international experience and the algorithm and patient paths are used. As for state clinics, where there is a strong school, and international standards are supported, they try, but at the legislative level it is difficult to overcome this system and bureaucracy, because there is a struggle with patients, the social approach of these patients, etc., it is difficult to implement now* (ophthalmologist-microsurgeon, the head of the department of public hospital) and *Co-payment of course. These are very rare lenses, so only co-payment or even full payment for lenses, because the state cannot cover all lenses, especially such individual ones* (ophthalmologist-surgeon, professor at the medical university, a WHO expert). Also, an expert manager of the state government sector added that the plans for 2023-2024 include a review of the pricing and allocation of individual services or medical products, for which the patient will have to pay separately: *Right now, we are preparing a more detailed list, which will, in a sense, deconstruct the general services in order to understand that we cannot now fully pay for PMG. These services will be included in a separate Cabinet of Ministries Decree, and will be supplemented with a list of paid services. It will be clearly understood what the state pays for, and what it absolutely does not cover* (representative of the top management of the National Health Service of Ukraine).

Different package prices for three lens types as a good practice was not supported by an expert in microsurgery who mentioned that *(..)due to the high specificity, a very small percentage of toric and aniridia lenses are used, some fractions of a percent, so no, it is better to cover commonly used lenses. The specificity of lenses for these patients is very high, there are very few of them, and these lenses are no longer for pathologies, but more like "cosmetic" ones. These lenses are very specific, sometimes even individual, and their production can be more expensive than the expected social result, so I don't think that covering from the budget is appropriate to these types of lenses.*

None of the experts was able to answer about good practice as quality indicators reported with DRG, because DRG financing mechanisms are just being implemented in Ukraine, and experts, especially clinicians, do not understand how it might look in the context of Ukraine.

The issue of good practice with decrease in DRG payment in case of low share of one-day treatment was also difficult for the experts, because two funding mechanisms are currently being implemented, one-day treatment under PMG, and the DRG funding system: *Currently, all ophthalmology is carried out in outpatient settings, or it is one- day surgery. In rare cases, the patient may be hospitalized. I do not know how it could be related with DGR soon. It is hard to say currently* (medical doctor, ophthalmologist-surgeon); *In our clinic, all help in ophthalmology is mainly provided on an outpatient basis. Although there are beds in the hospital for complex cases and surgery. I cannot say anything about DRG in this case, I`m not sure whether we need such a practice at the moment* (medical doctor, the director of the consultative and diagnostic centre in public hospital) and *Currently, all surgical interventions in ophthalmology take place at the outpatient level, regardless of whether it is the private or public sector. This is mostly a one-day surgery. Now, we do have a separate tariff for a one-day surgery within PMG. I do not think we need something else for the near future* (ophthalmologist-microsurgeon, the head of the department of public hospital).

The experts cannot form an opinion regarding good practices, such as when the price variations between health insurance funds are minimized, because a different financing system operates in Ukraine, and the insurance of certain cases depends more on the insurance company's own decision than in other countries, and these companies decide what they cover and what they do not.

Glaucoma. Unequivocal support from the ophthalmological community was received for the good practice of increasing volumes to maximize the expansion of the National List of medications (both original medicines and generics) for the treatment of glaucoma. Experts from Ukraine also consider that *it is necessary to expand the "Affordable Medicines" reimbursement program and add absolutely all medicines of various classes used for the treatment of glaucoma, at least for pensioners* (ophthalmologist-microsurgeon, the head of the department of public hospital). This is justified by the fact that *these medicines are expensive, not all patients can afford to pay them, so they stop treatment or opt for cheaper drugs, and as a consequence we have many blind people who are unable to work* (ophthalmologist-surgeon, professor at the medical university, a WHO expert) and (..)*glaucoma is a terrible disease, because it leads to blindness, which is then a burden of disability, and a burden on the state. Patients must be provided with all medications, without additional payments* (medical doctor, ophthalmologist-surgeon).

In contrast, experts do not believe that increase quality indicator as performing glaucoma surgery in dedicated centres will be able to improve the quality. According to expert, *We already have such an indicator as "visual acuity" in all clinics. This is a clinical indicator; we do not have quality indicators in financing. That is how should we implement these indicators: indicators of surgery, or an indicator of health quality?! You can't play with the indicators like that now, so there's no need currently in this good practice, first you need to develop a legal context for this* (ophthalmologist-microsurgeon, the head of the department of public hospital).

AMD and DME. Of all the good practices found by partners in the treatment of ADM and DME, the experts supported the good practice of the wide coverage of diagnostics for DME: *Screening programs are needed, because these are the diseases that, in suppressed stages, can carry a social burden for the state and increase disability due to blindness. We have*

international standards of treatment, including following the rules of primary diagnosis, but perhaps the government and the Ministry of Health should pay more attention to screenings and diagnostics (medical doctor, ophthalmologist-surgeon); *Primary prevention is usually more expensive than treatment. It is very expensive for us, we will not cover it from the state budget, but good screening or diagnostic programs are possible* (ophthalmologist-surgeon, professor at the medical university, a WHO expert), as well as *(..)We used to have a dispensary for patients. And in general, the international practice provides for screenings. Currently, patients with diabetes from the moment of detection have control examinations by an ophthalmologist, because diabetes always affects the eye, after 5 years of the onset of diabetes there are some visual disturbances. There are examinations, but the patients themselves do not know that they have diabetes or macular dystrophy and simply do not go for examinations, they may even go blind. I'm in favour of screenings and all diagnostics, that's how it should be, there are always ophthalmologists in endocrinology centres, and there must be appropriate personnel who can conduct such screenings* (ophthalmologist-microsurgeon, the head of the department of public hospital).

Experts currently do not support good practices such as treating ADM and DME, including biological treatment anti-VEGF in specialized centres and paying for each injection separately. The reason for not supporting these practices is the current misunderstanding of how it can be implemented organizationally and financially, taking into account the legal framework of the Program of Medical Guarantees and the existing structure of health institutions. An ophthalmologist-surgeon and WHO expert acknowledged that *"it would not be advisable to implement them because the conditions in ordinary clinics fully satisfy the conditions and possibilities for conducting high-quality surgeries and treatment. Another issue is what exactly the state covers, unfortunately, not everything".* Also, a medical doctor, the director of the consultative and diagnostic centre in public hospital, added the following *"I don't think it should be done. Firstly, it is difficult to divide the services for the treatment of these diseases into different institutions, and secondly, why bring the treatment of these diseases up to the level of specialized institutions".* The same opinion is held by an ophthalmologist-microsurgeon, the head of the department of public hospital: *"I believe that this is currently difficult to implement in the conditions that we have".*

The issue of introducing financial products for evaluating the achieved results, in particular for outpatient treatment, turned out to be difficult for experts. The reasons for ambiguous answers are that the system of financing health facilities is currently in transit to payment according to the DRG, as well as the fact that it is difficult for clinicians to operate with concepts such as financial products for evaluation of outcomes. Such issues should be considered and approved more strategically at the government level. So, at the moment it is difficult to say whether this can become a good practice for Ukraine.

The issue of permission to use Avastin "off-label" was not discussed with experts from Ukraine during the interviews.

Cornea transplantation. Since transplantation is performed only in specialized centres, in Dnipro, Odesa and Kyiv, and *"Transplantation is carried out only by specialized clinics, that is, at the tertiary level, in Dnipro and Odesa, possibly in Kyiv, because there are adequate conditions, and for many different reasons. Transplantation should be carried out only in specialized institutions"* (medical doctor, ophthalmologist-surgeon); *"Transplantation is*

already performed in specialized centres, it cannot be otherwise, because the patient must be prepared by all standards" (ophthalmologist-microsurgeon, the head of the department of public hospital).

However, at the legislative level, there is currently no permission in Ukraine to take corneas from commercial cell and tissue banks; therefore, experts cannot answer regarding good practices as covering the cost of procuring cornea from commercial cell & tissue banks and functioning tissue banks to have sufficient transplants. There is permission to use only state banks, and to carry out transplantation from a posthumous donor: *In general, we can say that such transplantation is prohibited in our country, because there are no relevant laws for the purchase of corneal tissue from a cell and tissue bank. The functioning of tissue banks to have sufficient transplants is a good practice, but Ukraine must first develop a legislative framework and all the conditions for conducting high-quality corneal transplantation* (ophthalmologist-microsurgeon, the head of the department of public hospital). This opinion is shared by another expert: *We have not received permission to use commercial or European corneal banks, we are not legally allowed to do so. In general, yes, the practice is good, because our banks of corneas are of low quality* (medical doctor, ophthalmologist-surgeon).

None of the experts can answer whether DRG price can fully cover treatment, as the Ukrainian health care system is in transition to DRG pricing. However, the representative of the top management of the National Health Service of Ukraine, acknowledged that *cornea transplantation is currently not included in a separate package of the Program of Medical Guarantees, because such surgery is still very difficult to cover fully. However, it may be carried out in specialized centres within the "Surgery for adults and children in hospital" package, as it is a high-tech surgery. This package covers all examinations, surgery, and partially the consumables.*

Vitrectomy. Since vitrectomy is a higher-class surgery, it accordingly requires special equipment and qualified personnel. During the interviews with experts, it was revealed that it would be a good practice for Ukraine to perform vitrectomy surgery in specialized institutions to increase quality, also it would provide greater opportunities. However, experts doubt that such good practice will improve now the quality of vitrectomy services. It is commented as follows: P*ractice is good, but how do you now imagine doing it? In our country, everything is regulated by certain laws and decrees. I think, this is not an urgent matter at this time* (ophthalmologist-surgeon, professor at the medical university, a WHO expert); *No, I don't think so at the moment. If you correctly follow the regulations and rules of the NHSU, then quality will be maintained in everything* (medical doctor, the director of the consultative and diagnostic centre in public hospital).

Also, the majority of clinical experts noted as a good experience from Hungary the change in the weight of the coefficients of DRGs, depending on the complexity of the case and the type of vitrectomy: *It is necessary to increase the coefficients for all nosologies, depending on the complicated cases written in the approved protocols and standards. Maybe then we will somehow come up with the amount to cover basic services or consumables* (ophthalmologist-surgeon, professor at the medical university, a WHO expert), as well as *(..)Let's start with the fact that, in principle, everything and all coefficients in ophthalmology need to be revised, I am telling you from a practical point of view. I absolutely support this approach, especially*

increasing the coefficients depending on the complexity of the case (ophthalmologist-microsurgeon, the head of the department of public hospital).

However, managers have a different vision regarding this practice, namely *(..)I believe that it is not necessary to apply different coefficients for vitrectomy, because it only confuses registrars and doctors, and it is certainly not necessary at all. Better to treat pathological changes of the vitreous body, and retina using vitrectomy in general to raise the coefficient* (medical doctor, the director of the consultative and diagnostic centre in public hospital) and (..)*When the coder correctly applies electronic medical records and the same coefficients, within the framework of PMG, up to UAH 120,000 is obtained for the treatment of burns or other injuries. Similarly, in the framework of surgical interventions on the eyes, it can be the same* (representative of the top management of the National Health Service of Ukraine).

STAKEHOLDERS SELECTED FOR IN-DEPTH INTERVIEWS

Country	Respondent 1	Respondent 2	Respondent 3	Respondent 4	Respondent 5
Poland	The owner of an ambulatory care facility with 20+ years in managing the facility and handling contracts with the National Health Fund	Medical doctor, with 10+ years of experience, specialist in refractive surgery, conducts cataract surgeries in a public hospital and private facilities.	A National Health Fund representative, with 20 years of experience in financing healthcare from public sources.	Medical consultant for ophthalmology with 30 years of experience in ophthalmic procedures, experience in both private and public facilities	Medical doctor with 20+ years of clinical experience in regional a public hospital
Czech Republic	Managing ophthalmology clinics for 22 years, since 2008 he is a owner of ophthalmology clinics in CZ and SK.	Payment mechanisms specialist for ambulatory sector in health insurance fund (9 years), last 5 years as leader of the ambulatory payment mechanisms department	Drug reimbursement specialist in health insurance funds	CEO of international chain of ophthalmologic clinics	DRG expert, 8 years at National Institute for Health Statistics
Slovakia	Owner of a leading ophthalmologic clinic	Reimbursement specialist in a privately owned health insurance company	Drug Reimbursement specialist at the Ministry of Health of the Slovak Republic	Medical devices reimbursement specialist at the Ministry of Health of the Slovak Republic	Data Analyst at the National Centre for Healthcare Information
Hungary	Ophthalmologists with laser surgery and wide range of treatment and financing experience of the Ophthalmology Clinic at University of Debrecen	Medical doctor of Ophthalmology Department at Capital Hospital in Budapest with 8 year international practice	Ophalmologist, specialist on cataract surgery, head of one-day surgery unit in a Public hospital in Budapest	Medical doctor and Head of Ophthalmology Department / Clinic at Semmelweis University, leading ophth. laser surgeon in Hungary	Head of Department of financing, and Reimbursement at National Health Insurance Fund Administration (NHIFA)
Ukraine	Medical doctor, ophthalmologist-surgeon at a private clinic, with the 20+ years in conducting ophthalmology surgeries in a public hospital and private facilities.	Medical doctor, ophthalmologist-surgeon with 30+ years of experience in ophthalmic procedures, experience in both private and public facilities. Professor of the department of ophthalmology of the medical university. A WHO expert.	Medical doctor, ophthalmologist-microsurgeon with the 20+ years in conducting ophthalmology surgeries in public hospitals. The head of the department of public hospital.	Medical doctor. The director of the consultative and diagnostic centre in public hospital.	The representative of the top management of the National Health Service of Ukraine with 20+ years of management experience in public and government institutions.

REFERENCES

American Academy of Ophthalmology, 2022, https://www.aao.org/eye-health/treatments/what-is-optical-coherence-tomography. Accessed April 30th, 2022

Caruso G., Osburn J., Wolfensberger W. (2011). The Concept of "Best Practice": A brief overview of its meanings, scope, uses, and shortcomings. International Journal of Disability Development and Education, 58(3), 213-222. doi:10.1080/1034912X.2011.598387

Gain, P., Jullienne, R., He, Z., Aldossary, M., Acquart, S., Cognasse, F., & Thuret, G. (2016). Global Survey of Corneal Transplantation and Eye Banking. JAMA ophthalmology, 134(2), 167–173. https://doi.org/10.1001/jamaophthalmol.2015.4776. Accessed April 30th, 2022

Guide for Documenting and Sharing "Best Practices" in Health Programs. (2008). World Health Organization, Regional Office for Africa Brazzaville.

The Health Minister announcement of December 20, 2021, https://www.gov.pl/web/zdrowie/obwieszczenie-ministra-zdrowia-z-dnia-20-grudnia-2021-r-w-sprawie-wykazu-refundowanych-lekow-srodkow-spozywczych-specjalnego-przeznaczenia-zywieniowego-oraz-wyrobow-medycznych-na-1-stycznia-2022-r Accessed April 30th, 2022

The Health Care Surveillance Authority; https://www.udzs-sk.sk https://www.udzs-sk.sk/en/abouth-the-hcsa/

Medical Statistics Center of the Ministry of Health of Ukraine, 2017. Available by URL: http://medstat.gov.ua/ukr/statdan.html, accessed in April 30th, 2022

Medical Statistics Center of the Ministry of Health of Ukraine, 2018. Available by URL: http://medstat.gov.ua/ukr/statdan.html, accessed in April 30th, 2022

National Health Service of Ukraine, 2022. https://nszu.gov.ua/ , accessed in April 30th, 2022

The National Health Fund Database, accessed in April 30th, 2022

The National Health Fund in Slovakia https://www.health.gov.sk/?zkszm, , accessed in April 30th, 2022

The Ordinance No, 136/2021/DGL of the President of the National Health Fund of July 27, 2021

The Ordinance No. 25/2018/DGL of the President of the National Health Fund of March 21, 2018.

The Ordinance No, 136/2021/DGL of the President of the National Health Fund of July 27, 2021.

Ondrejková, M., Jackuliak, P., Martinka, E., Mokáň, M., Foley, J., Fabkova, J., Gecík, K., Tvrda, I., Helbich, M., & Gajdosova, M. (2019). Prevalence and epidemiological characteristics of patients with diabetic retinopathy in Slovakia: 12-month results from the DIARET SK study.

Perleth M, Jakubowski E, Busse R. (2001). What is 'best practice' in health care? State of the art and perspectives in improving the effectiveness and efficiency of the European health care

systems. Health Policy, 56(3), 235-50. doi: 10.1016/s0168-8510(00)00138-x. PMID: 11399348.

Press release about the drug program https://diabetyk.org.pl/dme-nowy-program-lekowy-wynosi-polske-na-swiatowy-poziom/ Accessed April 30th, 2022

Resnikoff, S., Pascolini, D., Etya'ale, D., Kocur, I., Pararajasegaram, R., Pokharel, G. P., & Mariotti, S. P. (2004). Global data on visual impairment in the year 2002. Bulletin of the World Health Organization, 82(11), 844–851.

David Skyrme Associates (2008). Best Practices in Best Practices. Available: www.skyrme.com/kshop/ kguides.htm , accessed in April 30th, 2022

Tóth G., Nagy Z. Zs., Németh J. Model-based economic burden of diabetic retinopathy in Hungary (*A cukorbetegség szemészeti szövődményeinek modellalapú költségterhe Magyarországon*.) Orvosi Hetilap. 2021. 162/8. p 298-305

World Health Organization. World report on vision. Geneva 2019.