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The dynamics of the volume and structure of demand of the population for high-tech ophthalmological care

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To assess the demand of the population for high technological ophthalmologic care. Materials from the Clinic of the Azerbaijan Medical University have been used. Indications for high-tech ophthalmological care were determined by the method of expert evaluation of highly qualified ophthalmologists. The demand of patients of the clinic for high-tech ophthalmological care was 9.5±0.4% (95% confidence interval 8.7-10.3%). During the 2018-2022 years, the volume of the demand increased from 5.6±0.7 to 14.1±1.2% (p=0.01). The demand of contingent patients with eye pathologies for high-tech ophthalmological care dynamically grows mainly due to the need for endoviral surgery.

Keywords: *Eye diseases, volume of demand, structure dynamics, high-tech ophthalmological care*

INTRODUCTION

Wide opportunities for the diagnosis and treatment of diseases in all fields of medicine, especially in ophthalmology have been created depending on scientific and technical progress. A new level of specialized ophthalmological care – high-tech ophthalmological care (HTOC) system is one of the perspective fields of healthcare (Bass and Sherman 2004; Mets et al., 2012; Kraus et al., 2021). HTOC is developed especially during the last 20 years in former Soviet states. In the Russian Federation, expensive medical services are attributed to high-tech medical services and people are not fully provided with these services. That's why high technological medical services are provided on basis of quotas set at the expense of the health insurance account. The social and economic situation in regions of the Russian Federation extremely differs from each other and the planned volumes and structures of HTOC are different (Tereshchenko et al., 2018; Tsipyashchuk et al., 2017). Nearly 70% of HTOC provided to the population in the region Kaluga of the Russian Federation consists of transpupillary, micro-invasive energetic optic-reconstructive surgery related to vitreoretinal pathologies (Tereshchenko et al., 2018). Most of the HTOC (44.6%) in the Saratov region of the country is related to cataract phacoemulsification surgery resulting in intraocular lens implantation. In this case, the share of vitreoretinal surgery in HTOC is 13.9 (Tsipyashchuk et al., 2017). The World Health Organization recommends to all countries prepare strategic plans for the development of HTOC (World Health Organization, 2022). In most countries' material, technical and personnel potential for HTOC is created on basis of Medical Universities and Scientific-Research Institutes (Egorov, 2019; Egorov, 2019). The optimal conditions for HTOC in the state healthcare system of the Republic of Azerbaijan are available in the National Ophthalmological Center named after Z.Aliyeva and in the Surgical Clinic of the Medical University. The experience of these institutions allows us to scientifically justify the medical and organizational problems of HTOC.

The purpose of the study was to assess the demand of the population for high technological ophthalmologic care.

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MATERIALS AND METHODS

The scientific research work was conducted in the Department of Ophthalmology of the Teaching-Surgery Clinic of the Azerbaijan Medical University. The patient undergoing surgical treatment at the clinic was an observation object of the study. The object of observation of the society as a whole was formed by a randomized method by the selection of one among every five numbers of the outpatient directory. According to the nosologic forms creating the need for HTOC (complicated glaucoma; diseases of the cornea, crystal and vitreous body; proliferative diabetic retinopathy combined with eye diseases: retinal detachment with tearing; complicated cataract; complicated eye injuries; Complicated corneal ulcer; corneal clouding and scarring; complications of previously performed optical-reconstructive operations) groups with the similar number of patients (100 patients in each group) have been detected. The number of patients in each group ensures that the margin error of expected results (tm) is less than 5%.

The need of patients for HTOC was detected by an expert assessment of experienced doctors of the clinic. The statistical processing of the results was done by statistical methods of qualitative features with the help of the "data analysis" envelope of the Excel program on a personal computer. Differences between groups were assessed by the χ^2 test (Sabirziyanova et al., 2021).

RESULTS AND DISCUSSION

The achieved results on the demand of the population for HTOC connected with eye diseases are given in Table 1.

As seen in the table, 9.5±0.4% of patients who applied to the Ophthalmology Department of the Medical University for Surgical Treatment (95% confidence interval 8.7-10.3%) need HTOC. The volume on demand ranges within the narrow interval depending on nosologic form: low rate demand (2.4±0.7%; 95% confidence interval 1.1-3.7%) is characteristic of chorioretinal inflammation, retinoschisis, retinal cyst, occlusion of retinal vessels, proliferative retinopathy, diseases of the vitreous body that occur together with degeneration of the posterior arc and macula. The high level of demand on HTOC (15.6±1.6%; 95% confidence interval 12.4-18.8%) was detected among patients with diagnosed crystal, vitreous body diseases, secondary glaucoma, a patient diagnosed with proliferative diabetic retinopathy with macular damage.

Table 1. The frequency of HTOC demand depending on the nosological form of eye diseases

Nosological forms causing HTOC demand		N	n	The frequency of HTOC demand %	95% confidence interval
Glaucoma is complicated by high intraocular pressure		500	32	6.4±1.1	4.2 – 8.5
Associated with chorioretinal inflammation, retinoschisis, retinal cyst, retinal vessel occlusion, proliferative retinopathy, posterior arc and macular degeneration, vitreous hemorrhage	crystal diseases	500	41	8.2±1.2	5.8 – 10.6
	corneal diseases	500	18	3.6±0.8	2.0 – 5.2
	vitreous diseases	500	12	2.4±0.7	1.1 – 3.7
Crystal and vitreous diseases, secondary glaucoma, proliferative diabetic retinopathy with macular compensation		500	78	15.6±1.6	12.4 – 18.8
Retinal tears are complicated by diseases of the cornea, lens, retina, and vessels		500	61	12.2±1.5	9.3 – 15.1
Cataracts complicated by glaucoma, vitreous, retinal and choroidal diseases		500	70	14.0±1.6	11.0 – 17.0
Crystal and vitreous diseases, ophthalmological hypertension, eye injuries complicated by orbital fracture		500	27	5.4±1.0	3.4 – 7.4
Corneal clouding and scarring		500	62	12.4±1.5	9.5 – 15.3
Complications of previously performed optical reconstructive operations		500	74	14.8±1.6	11.7 – 17.9
Total		5000	475	9.5±0.4	8.7 – 10.3

Note: *N- the number of expert assessments; n – patients who need HTOC;*

Table 2. Dynamics of the frequency of HTOC demand during 2018-2022 years (%)

Nosological forms causing HTOC demand		2018	2019	2020	2021	2022	P≤
Glaucoma complicated by increased intraocular pressure		2±1.4	4±1.9	7±2.6	9±2.9	10±3.1	0.05
Associated with chorioretinal inflammation, retinoschisis, retinal cyst, retinal vessel occlusion, proliferative retinopathy, posterior arc and macular degeneration, vitreous hemorrhage	crystal diseases	5±2.1	6±2.3	9±2.9	9±2.9	12±3.3	0,05
	corneal diseases	2±1.4	3±1.7	4±1.9	4±1.9	5±2.1	0,08
	vitreous diseases	2±1.4	2±1.4	2±1.4	3±1.7	3±1.7	0,12
Crystal and vitreous diseases, secondary glaucoma, proliferative diabetic retinopathy with macular compensation		11±3.1	14±3.5	16±3.7	17±3.8	20±4.3	0.01
Retinal tears are complicated by diseases of the cornea, lens, retina, and vessels		6±2.3	8±2.7	11±3.2	16±3.8	20±4.3	0.01
Cataracts complicated by glaucoma, vitreous, retinal and choroidal diseases		8±2.7	10±3.0	13±3.4	18±4.0	21±4.3	0.01
Crystal and vitreous diseases, ophthalmological hypertension, eye injuries complicated by orbital fracture		3±1.7	4±1.9	5±2.1	7±2.6	8±2.7	0.06
Corneal clouding and scarring		7±2.5	8±2.7	9±2.8	17±3.9	21±4.4	0.01
Complications of previously performed optical reconstructive operations		10±3.0	12±3.2	14±3.5	17±3.9	21±4.3	0.05
Total		5.6±0.7	7.1±0.8	9±0.9	11.7±1.1	14.1±1.2	0.01

High frequency of demand on HTOC is characteristic for patients applied with diagnosed complications of previously performed optical-reconstructive operations (14.8±1.6%; confidence interval 11.7-17.9%), cataract complicated by glaucoma, diseases of the vitreous body, retina and blood vessels (14.0±1.6%; 95% confidence interval 11.0-17.0%).

HTOC demand is on a high level among patients with diagnosed retinal detachment with tearing alongside diseases of the cornea, lens, retina and choroid (12.2±1.5%; 95% confidence interval 9.3-15.1%), corneal clouding and scarring (12.4±1.5%; confidence interval 9.5-15.3%).

The demand for HTOC of patients with crystal pathologies (8.2±1.2%; 95% confidence interval 5.8-10.6%) that appear together with chorioretinal inflammation, retinoschisis, retinal cyst, retinal vessel occlusion, proliferative retinopathy, posterior arc and macular degeneration, iris hemorrhage is more for 2-3 times in comparison with patients with corneal diseases (3.6±0.8%; 95% confidence interval 2.0-5.2%) and vitreous body diseases (2.4±0.7%; 95% confidence interval).

Thus, the HTOC demand is not stable and undergoes a significant change depending on the nosological forms of eye diseases, their comorbidity (polymorbidity) degree.

Information about the frequency of HTOC demand of patients applied to the clinic during the 2018-2019 years is given in Table 2.

HTOC demand of patients during 5 years of observation increased from 5.6±0.7% (95% confidence interval 4.2–7.0%) to 14.1±1.2% (95% confidence interval 11.7-16.5%) (p=0.01). The increasing trend is linear, the approximation of the regression equation describing the dynamics (y=2.16x+ 3.02; x-calendar years) is very high (determination coefficient R2=0.9881). A similar trend was typical for common variants of all distinguished nosological forms. The frequency increase rate of the demand for HTOC during the five-year observation period (the ratio of the indicators of 2022 and 2018) is mostly typical for patients diagnosed with complicated glaucoma (5 times), corneal clouding and scarring (3 times). A relatively low rate of increase was observed according to HTOC frequency related to cornea diseases within chorioretinal vessel occlusion, proliferative retinopathy, posterior arc and macular degeneration, vitreous hemorrhage (2.0±1.4% in 2018, 5±2.1% in 2022; p=0.08).

Thus, the demand of the patients applied to the clinic for treatment during 2018-2022 years for HTOC changes with different dynamics depending on the nosological form and variants of polymorbidity, growth rate is typical for all pathologies.

Based on the recommendations of experts to

meet the demand for HTOC special weights of the necessary operations are arranged correspondingly: treatment of vitreoretinal pathologies with transpupillary, energetic optical-reconstructive microinvasive, 23-25G endovitreal surgery (44.2%), glaucoma (6.7%) and corneal diseases (14.7%) with microinvasive energetic optical reconstructive and laser surgery complex treatment, other operations (34.4%).

There is limited information about HTOC in the literature. 23-27G of transpupillary, energetic optical-reconstructive microinvasive endovitreal surgery treated vitreoretinal pathologies (69.66%) occupied the first place among the types of HTOC provided in the Kaluga Branch of the Russian Eye Microsurgery complex, the specific share of other surgeries was between 0.22-11.34% (Tereshchenko, 2018). In the clinic of Saratov Medical University, the specific share of these types of surgeries was 78.5 and 21.5%, respectively (Tsipyashchuk et al., 2017). In the Khabarovsk branch (Egorov 2019), these indicators were 44.2 and 55.8%. As can be seen, the division of the population demand for HTOC according to the type of surgical operations is different.

The volume of the demand for HTOC tends to increase according to the results of all studies (Tereshchenko, 2018; Tsipyashchuk et al., 2017; Egorov 2019; Egorov, 2019; Glantz 1999). The volume of HTOC provided to the population during 2016-2021 years increased in Tatarstan 1.7 times (Sabirziyanova, 2021), 3/5 times in Khabarovsk during 2006-2010 years (Egorov, 2019), and 2.5 times during 2018-2022 in our observations. The general trend in these results is clearly observed dynamic growth of population demand.

So, the obtained information about the demand of the population for HTOC generally agrees with the information given in the literature, although they have different characteristics according to their quantitative characteristics (structure and dynamics of demand-forming pathologies and necessary surgical operations).

CONCLUSIONS

1. 9.5±0.4% of patients who should undergo surgical treatment of eye diseases need high-tech ophthalmological care.
2. The frequency of demand for high-tech ophthalmological care depends on nosological forms of eye diseases: 15.6±1.6% of patients with chorioretinal inflammation, retinoschisis and retinal cyst, retinal vessel occlusion, proliferative retinopathy, proliferative diabetic retinopathies co-occurring with vitreous diseases co-occurring with degeneration of the posterior arc and macular need high-tech ophthalmological care
3. The specific share of those demanding high-tech ophthalmological care among patients requiring surgical treatment for eye diseases during the 2018-2020 years increased from 5.6±0.7% to 14.1±1.2%.

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