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ASSESSING RETINOBLASTOMA AWARENESS ACROSS PRIMARY HEALTH CARE PHYSICIANS

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Abstract

Objective. To assess the level of awareness of retinoblastoma among primary health care (PHC) physicians, identify areas of insufficient knowledge, compare the awareness of general practitioners (GPs) and pediatricians, and determine strategies to improve awareness.

Materials and methods. A cross-sectional online survey was conducted from January to February 2025. The study involved 90 PHC physicians (49 GPs and 41 pediatricians). The questionnaire included 18 questions on clinical suspicion, diagnosis, referral pathways, and treatment of retinoblastoma. Statistical analysis was performed using SPSS software.

Results. Most respondents were aware of retinoblastoma (81.6% of GPs and 92.7% of pediatricians). However, clinical experience with the disease was limited (20.4% of GPs and 31.7% of pediatricians). Pediatricians were more likely to encounter suspected retinoblastoma cases (51.2% vs. 26.5%, p=0.024) and refer children with a family history of the disease to an ophthalmologist (87.8% vs. 69.4%, p=0.032). The "white pupil" reflex was known to 90.2% of pediatricians and 63.3% of GPs (p=0.003). Only 14.3% of GPs and 34.7% of pediatricians were aware of modern organ-sparing treatments (p=0.027).

Conclusions. The study revealed an insufficient level of awareness of retinoblastoma among PHC physicians, particularly among GPs. To improve early diagnosis of retinoblastoma, it is recommended to implement mandatory continuing medical education courses for physicians, with an emphasis on rare pediatric oncological diseases. Additionally, public awareness campaigns and media outreach are recommended to increase clinical suspicion. These measures also contribute to achieving Sustainable Development Goal 3 (SDG 3), which aims to reduce child mortality and ensure universal health.

Keywords: *retinoblastoma, SDG 3, early diagnosis, primary health care, awareness, pediatricians, general practitioners.*

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Резюме

ОЦЕНКА ИНФОРМИРОВАННОСТИ ВРАЧЕЙ ПЕРВИЧНОЙ МЕДИКО-САНИТАРНОЙ ПОМОЩИ О РЕТИНОБЛАСТОМЕ

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Цель. Оценить уровень информированности врачей ПМСП о ретинобластоме, выявить области недостаточной осведомленности, сравнить осведомленность врачей общей практики (ВОП) и педиатров, а также определить стратегии повышения осведомленности.

Материалы и методы. Проведено поперечное исследование в форме онлайн-опроса с января по февраль 2025 года. Участвовали 90 врачей ПМСП (49 ВОП и 41 педиатр). Опросник включал 18 вопросов по клинической настороженности, диагностике, маршрутизации и лечению ретинобластомы. Статистическая обработка осуществлялась в программе SPSS.

Результаты. Большинство респондентов знали о ретинобластоме (81,6% ВОП и 92,7% педиатров). Однако клинический опыт был ограничен (20,4% ВОП и 31,7% педиатров). Педиатры чаще сталкивались с подозрениями на ретинобластому (51,2% против 26,5%, p=0,024) и направляли детей с отягощенным анамнезом к офтальмологу

(87,8% против 69,4%, p-0,032). Симптом «белого свечения» зрачка был известен 90,2% педиатров и 63,3% ВОП (p=0,003). Только 14,3% ВОП и 34,7% педиатров знали о современных органосохраняющих методах лечения (p=0,027).

Выводы. Выявлен недостаточный уровень информированности о ретинобластоме среди врачей ПМСП, особенно среди ВОП. В целях улучшения ранней диагностики ретинобластомы рекомендуется внедрить обязательные курсы повышения квалификации для врачей с акцентом на редкие онкологические заболевания у детей. Дополнительно рекомендуется усилить информационную работу через просветительские кампании и медиа для повышения настороженности. Эти меры также способствуют достижению Цели устойчивого развития 3 (ЦУР 3), направленной на снижение детской смертности и обеспечение всеобщего здоровья.

Ключевые слова: *ретинобластома, ЦУР 3, ранняя диагностика, первичная медико-санитарная помощь, информированность, педиатры, врачи общей практики.*

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Түйіндеме

БАСТАПҚЫ МЕДИЦИНАЛЫҚ-САНИТАРИЯЛЫҚ КӨМЕК ДӘРІГЕРЛЕРІНІҢ РЕТИНОБЛАСТОМА ЖӨНІНДЕГІ ХАБАРДАРЛЫҒЫН БАҒАЛАУ

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Кіріспе: Қазіргі тамырлы хирургияда қолқа-мықын сегментінің (ҚМС) окклюзиялық зақымдануы ең өзекті мәселелердің бірі. ҚМС окклюзиясын анықтау атеросклеротикалық процестің ауырлығы мен таралуын, демек, басқа артериялық бассейндерде біріктірілген окклюзиялық зақымданулардың үлкен ықтималдығын көрсетеді деген жалпы қабылданған пікір. Осыған байланысты өмірлік маңызды мүшелердің – жүрек пен мидың артериялық арнасының зақымдануы ерекше маңызды.

Зерттеудің мақсаты. Өмірлік маңызды мүшелер тарапынан асқынулардың болжаушыларын түзетумен және түзетусіз ҚМС окклюзиялық зақымдануларын жедел емдеу нәтижелеріне салыстырмалы талдау жүргізу, олардың тиімділігін бағалау.

Материалдар мен Әдістері: Зерттеу дизайны-проспективті рандомизацияланбаған клиникалық бақылау. Талдауға 2018-2024 жылдары "СМУ КеАҚ " университеттік госпиталінің жүрек-қан тамырлары хирургиясы бөлімінде ота жасалған қолқа-мықын сегментінің (ҚМС) окклюзиялық зақымдануы бар 143 пациент енгізілді. Қолданылатын тактикаға байланысты науқастар екі топқа бөлінеді: 1-ші топ (N = 64) — коронарлық және каротид артерияларының зақымдануын алдын ала түзетусіз, жамбас бассейнінің реваскуляризациясынсыз және бүйрек жеткіліксіздігін емдеусіз ҚМС-не шұғыл реконструктивтік араласулар жасалған науқастар. 2-ші топ (N = 79) — көрсетілімдер болған кезде алдын ала жүрек және цереброваскулярлық патологияны түзету, жамбас артерияларын реваскуляризациялау және негізгі ота алдында бүйрек қызметін тұрақтандыру орындалған науқастар.

Нәтижелер: ерте операциядан кейінгі (30 күндік) кезеңде асқынулар бірінші топтағы пациенттердің 43,8%-тіркелген және 10,1 % — екіншісінде (p = 0,0002) тіркелді. Жүйелік асқынулар (миокард инфарктісі, ми қан айнылымының жедел бұзылысы, көп мүшелік жеткіліксіздік) бірінші топта жиі байқалды (p < 0,01). 30 күндік өлім бірінші топтағы 12% - дан екінші топтағы 2,5% - ға дейін төмендеді. 5 жылдық кезеңде асқынулардың жалпы жиілігі 11,5% - ға қарсы 40,7 % құрады (p = 0,0003). Каплан-Майердің жиынтық өмір сүру деңгейі бірінші топта 80%-ға, ал екінші топта 95% - ға жетті, айырмашылықтар статистикалық маңызды (Log-Rank p = 0,029).

Қорытынды: бұл тактиканы енгізу емдеудің тікелей нәтижелерін жақсартып қана қоймай, науқастардың қашықтықтан өмір сүруін едәуір арттырды. Өмірлік маңызды органдардың функционалдық бұзылыстарын түзетуге және тамырлы араласулардың кезеңділігін оңтайландыруға бағытталған кешенді операция алдындағы дайындық тиімділігі дәлелденді және ауыр қатар жүретін патологиясы бар науқастарда қолқа-мықын сегментінің окклюзиясын емдеудің қауіпсіз және клиникалық негізделген әдісі ретінде ұсынылуы мүмкін.

Түйін сөздер*: қолқа-мықын сегментінің окклюзиясы, асқынулар, өлім, өмір сүру.*

Дәйексөз үшін:

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Background

Retinoblastoma is a highly aggressive malignant neoplasm of the retina that primarily affects children under the age of 5. Approximately 8,000 new cases are diagnosed globally each year [7]. The incidence and survival rates vary depending on the region, the quality of healthcare, and the availability of early diagnosis [10, 15, 18, 22, 23]. Early diagnostic procedures are crucial for successful treatment and improving patient survival. This objective aligns with the United Nations Sustainable Development Goal 3 (SDG 3), which includes a focus on reducing preventable mortality in children under 5 through timely access to effective healthcare. The age at diagnosis is a key prognostic factor: children diagnosed with retinoblastoma before the age of one have better survival rates compared to older children [5, 13].

However, late diagnosis remains a serious problem, especially in countries with insufficient medical awareness and limited access to ophthalmological care [9]. In Central Asian countries, for example, advanced stages (T3 and T4) accounted for 60% of cases [12]. In the Republic of Kazakhstan, advanced stages made up 86% of cases in the early 2000s [3].

Primary healthcare (PHC) physicians play a key role in the early detection of retinoblastoma, as they are often the first to see these patients. Their level of awareness of the symptoms and diagnostic methods can significantly influence the timely referral of patients to specialists, and consequently, the chances of preserving the child's vision and life [14]. Research shows that a lack of knowledge among PHC physicians is one of the main barriers to early detection [20]. Specifically, the importance of skills in performing pediatric eye exams and taking a patient history is highlighted, as early detection can lead to up to 95% survival [19]. Studies emphasize that PHC physicians are key figures in the retinoblastoma diagnostic process and should be trained to recognize symptoms such as leukocoria and strabismus [6]. Improving the awareness of retinoblastoma signs among PHC physicians is a necessary condition for early diagnosis and effective treatment.

The objective of this study is to assess the level of awareness of retinoblastoma among PHC physicians, identify areas of insufficient knowledge, compare the awareness of general practitioners (GPs) and pediatricians, and determine strategies to improve awareness. Ultimately, these efforts should contribute to early diagnosis and improved treatment outcomes for patients.

Materials and methods

A cross-sectional survey was conducted among primary health care (PHC) physicians from January to February 2025. General practitioners (GPs) and pediatricians participated in the study. Participants were recruited through professional groups on messenger and social media.

The questionnaire was developed by the research team, peer-reviewed by specialists with experience working with retinoblastoma patients, and approved by the local ethics committee of the Asfendiyarov Kazakh National Medical University (IRB00011496), protocol No. 21 (157) of November 1, 2024.

The questionnaire included 18 questions designed for a comprehensive assessment of PHC physicians' awareness of retinoblastoma. It contained both general questions about retinoblastoma awareness and more specific questions about clinical experience, suspicion, and knowledge of disease diagnosis and treatment. Specifically, the survey included the following sections:

*General Awareness***:** Knowledge of retinoblastoma as a malignant tumor of the retina, its hereditary nature, understanding of the seriousness of the disease, and the level of confidence in their own knowledge.

*Practical Experience***:** Experience with retinoblastoma patients in clinical practice, frequency of encountering suspected cases, and management of children from families with a history of the disease.

*Clinical Suspicion***:** Respondents' knowledge of retinoblastoma symptoms such as leukocoria (white pupil reflex), strabismus; understanding that the glow can be noticed in a flash photograph; and the practice of performing ophthalmoscopy and referring for additional examinations.

Knowledge of Patient Management and Referral: Information about modern organ-sparing treatments and patient referral pathways when retinoblastoma is suspected.

The survey was conducted using a Google Form in both Kazakh and Russian languages. Participation in the study was voluntary and anonymous. Informed consent was placed at the beginning of the questionnaire, and completing the survey was considered confirmation of consent to participate. A total of 115 questionnaires were registered, of which 90 were included in the analysis as 25 contained incomplete data.

Statistical analysis was performed using SPSS software. Descriptive statistics and comparative analysis methods were used to evaluate the differences in retinoblastoma knowledge between physician groups (GPs and pediatricians). The significance of differences was determined using the χ^2 test for categorical variables and Student's t-test for quantitative data. A p-value of <0.05 was considered statistically significant.

Results

Table 1 presents the sociodemographic characteristics of the respondents. The study included 49 GPs and 41 pediatricians. Most respondents were female (91.8% of GPs and 85.4% of pediatricians). The age group under 40 predominated in both samples (69.4% of GPs and 61% of pediatricians). 42.9% of GPs and 61% of pediatricians had more than 10 years of work experience, while more GPs had less than 5 years of experience (22.4% vs. 9.8% of pediatricians). GPs were almost evenly distributed between urban and rural areas (51% and 49%), while most pediatricians worked in cities (70.7%).

Table 2 provides a comparative analysis of the survey results regarding GPs' and pediatricians' awareness of retinoblastoma.

General Awareness. The study shows that the vast majority of respondents, regardless of their specialization, are aware of retinoblastoma as a malignant neoplasm of the retina in children: 81.6% of GPs and 92.7% of pediatricians ($p>0.05$).

Regarding the level of confidence in their knowledge about retinoblastoma (on a scale of 1 to 5), both groups showed moderate levels of confidence. The most common answer among GPs was a score of "3" (38.3%), indicating

an average level of awareness. However, more than a quarter of GPs (26.5%) admitted to being completely unsure of their knowledge (a score of "1"), which is concerning. The distribution of answers among pediatricians was more balanced: a score of "3" was also the most common (41.5%), but the proportion of those who chose a low level of confidence ("1") was significantly smaller, at only 7.3%. At the same time, 34.1% of pediatricians rated their confidence level as "2" (p>0.05).

Table 1.

Socio-demographic characteristics of respondents.

Characteristic	Value	GPs (N =49)		Pediatricians (N =41)	
		N	%	N	%
Age	≤ 40 years	34	69,4	25	61
	41–60 years	13	26,5	14	34,1
	> 60 years	2	4,1	2	4,9
Sex	Male	4	8,2	6	14,6
	Female	45	91,8	35	85,4
Work experience	< 5 years	11	22,4	4	9,8
	5–10 years	17	34,7	12	29,3
	> 10 years	21	42,9	25	61
Place of residence	Urban	25	51	29	70,7
	Rural	24	49	12	29,3
Place of work	Hospital	1	2	12	29,3
	Polyclinic	43	87,8	21	51,2
	Private clinic	5	10,2	8	19,5

Table 2.

Awareness, clinical experience, and management tactics of retinoblastoma among general practitioners and pediatricians.

Question / Response	GPs (N=49)		Pediatricians (N=41)		p value
	N	%	N	%	
1	2	3	4	5	6
Do you know about the disease retinoblastoma — a malignant tumor of the retina in children?					
Yes	40	81,6	38	92,7	p>0,05
No	9	18,4	3	7,3	
Have you encountered retinoblastoma during your practice or studies?					
Yes	10	20,4	13	31,7	p>0,05
No	39	79,6	28	68,3	
How often do you encounter suspected cases of retinoblastoma in your practice?					
Rarely	13	26,5	21	51,2	p=0,024
Never	36	73,5	19	46,3	
Often	0	0	1	2,4	
Do you consider retinoblastoma a serious pediatric condition?					
Yes	44	89,8	40	97,6	p>0,05
No	1	2	1	2,4	
Unsure	4	8,2	0	0	
How confident are you in your knowledge of retinoblastoma? (1 = not confident, 5 = fully confident)					
1	13	26,5	3	7,3	p>0,05
2	7	14,3	14	34,1	
3	19	38,3	17	41,5	
4	7	14,3	4	9,8	
5	3	6,1	3	7,3	
Do you know that retinoblastoma is a hereditary disease?					
Yes	24	49	24	58,5	p>0,05
No	25	51	17	41,5	
Do you refer to an ophthalmologist a child born in a family with a history of retinoblastoma (parents, siblings)?					
Yes	34	69,4	36	87,8	p=0,032
No	15	30,6	5	12,2	
Do you think you have sufficient information about modern diagnostic and treatment methods for retinoblastoma?					
Yes	9	18,4	10	24,4	p>0,05
No	19	38,8	14	34,1	
Rather yes	5	10,2	9	22,0	
Rather no	16	32,7	8	19,5	

Continuation of Table 2.

1	2	3	4	5	6
How often do you examine a child born in a family with retinoblastoma?					
Once a month	5	10,2	6	14,6	p>0,05
Once every 3 months	7	14,3	10	24,4	
Once every 6 months	4	8,2	2	4,9	
Once a year	6	12,2	3	7,3	
When symptomatic	16	32,7	12	29,3	
Not at all	11	22,4	8	19,5	
Which signs of retinoblastoma do you know?					
Leukocoria	30	61,2	37	90,2	p>0,05
Strabismus	17	34,7	13	31,7	
Exophthalmos	3	6,1	9	21,9	
Others	17	34,7	4	9,8	
Have you heard of the retinoblastoma symptom “white pupillary reflex”?					
Yes	31	63,3	37	90,2	p=0,003
No	18	33,7	4	9,8	
Do you know that strabismus can be a symptom of retinoblastoma?					
Yes	24	49	27	65,9	p>0,05
No	25	51	14	34,1	
Do you perform wide-pupil ophthalmoscopy in all children with strabismus?					
Yes	8	16,3	13	31,7	p>0,05
No	41	83,7	28	68,3	
Do you know that a pupillary reflex can be noticed in flash photography?					
Yes	27	55,1	31	75,6	p>0,05
No	22	44,9	10	24,4	
Do you refer for ocular ultrasound in suspected retinoblastoma?					
Yes	29	59,2	32	78,0	p>0,05
No	20	40,8	9	22,0	
Do you refer for MRI or CT of the brain in suspected retinoblastoma?					
Yes	30	61,2	27	65,9	p>0,05
No	19	38,8	14	34,1	
Are you familiar with modern organ-preserving methods for retinoblastoma treatment?					
Yes	7	14,3	14	34,1	p=0,027
No	42	85,7	27	65,9	
Where do you refer patients in suspected retinoblastoma?					
NCPDCH (National Center for Maternal and Child Health)	6	12,2	3	7,3	p>0,05
KazRIEB (Kazakh Research Institute of Eye Diseases)	27	55,1	31	75,6	
Oncologist	9	18,4	6	14,6	
Other	7	14,3	1	2,4	

The analysis of knowledge regarding the hereditary nature of the disease showed that this aspect remains insufficiently known in both professional groups: 49% of GPs and 58.5% of pediatricians (p>0.05). However, in practice, pediatricians are more likely than GPs to refer children from families with a history of retinoblastoma to an ophthalmologist (87.8% vs. 69.4%, p=0.032), which can be explained by greater clinical suspicion among pediatricians.

Regarding confidence in their knowledge of modern diagnostic and treatment methods for retinoblastoma, both groups demonstrated low confidence: over 70% of GPs and over 50% of pediatricians (p>0.05). This confirms the need for regular knowledge updates and specialized training.

Practical Experience. Clinical experience with retinoblastoma patients was limited. Only 20.4% of GPs and 31.7% of pediatricians reported such cases in their professional practice (p>0.05), which highlights the rarity of the disease and the potential difficulty of its timely detection. It is interesting to note that the frequency of retinoblastoma suspicion in daily practice differed significantly between the two groups. Among pediatricians, 51.2% noted that they periodically encounter suspicious symptoms, while among GPs, this figure was 26.5% (p=0.024). This statistically significant difference may be due to better awareness of pediatric eye disease symptoms among pediatricians. At the same time, the vast majority of physicians recognize the seriousness of this pathology (89.8% and 97.6%, p>0.05).

Clinical Suspicion. The retinoblastoma symptom of leukocoria or the "white pupil" reflex, which is one of the key signs of retinoblastoma, is more known to pediatricians (90.2%) than to GPs (63.3%) (p=0.003), a statistically significant difference. Awareness of strabismus as a possible symptom of retinoblastoma is lower in both groups but higher among pediatricians (49% of GPs vs. 65.9% of pediatricians, p>0.05), and also requires improvement. Knowledge of the possibility of detecting leukocoria with a flash photograph was also higher among pediatricians (75.6%) compared to GPs (55.2%), although the difference was not statistically significant (p>0.05).

Knowledge of Patient Management and Referral. In cases of suspected retinoblastoma, the primary diagnostic referrals are eye ultrasound and brain MRI/CT. These methods are recognized as fundamental in the diagnostic algorithm. The majority of physicians in both specialties refer for these types of examinations when retinoblastoma is suspected, but the percentages are higher among pediatricians. 78% of pediatricians and 59.2% of GPs refer for eye ultrasound ($p>0.05$), and 65.9% of pediatricians and 61.2% of GPs refer for brain MRI/CT ($p>0.05$), which may confirm better knowledge of retinoblastoma diagnostics among pediatricians.

The question regarding awareness of modern organ-sparing treatments for retinoblastoma is particularly noteworthy. A generally low level of awareness was found, which is lower among GPs than among pediatricians (14.3% and 34.1%, respectively, $p=0.027$), indicating a serious knowledge gap, especially among general practitioners.

An analysis of preferred specialists for referral showed that 64% choose the Kazakh Research Institute of Eye Diseases as the priority institution, 10% choose the Scientific Center for Pediatrics and Pediatric Surgery, 17% choose an oncologist, and 9% choose other options ($p>0.05$)

Discussion

This study reveals the level of awareness of retinoblastoma, a malignant retinal tumor primarily affecting young children, among primary healthcare (PHC) physicians. It is crucial to emphasize that GPs and pediatricians are often the first to encounter patients exhibiting initial signs of the disease. Therefore, their knowledge of early retinoblastoma symptoms plays a pivotal role in timely detection. With sufficient knowledge and clinical suspicion among PHC physicians, it is possible to significantly increase the rate of early referrals to an ophthalmologist and, consequently, improve the disease prognosis.

Our research indicates that a significant portion of physicians struggle to recognize key symptoms and determine the appropriate next steps for patient management. This is a serious concern, as timely diagnosis and referral to an ophthalmologist are critical at this stage. These difficulties are consistent with other studies showing low awareness of retinoblastoma and other rare diseases among physicians in many countries [8, 24].

The experience of countries with high retinoblastoma diagnosis rates demonstrates that comprehensive strategies aimed at improving physician awareness and the availability of early screening can significantly enhance treatment outcomes. Educational programs, especially when combined with telemedicine, have proven effective. For example, a centralized diagnosis and remote consultation program in Jordan substantially reduced mortality and increased eye preservation rates in children with retinoblastoma [24]. Similarly, the implementation of national guidelines for retinoblastoma diagnosis in the UK, which included mandatory red reflex testing during pediatric examinations, significantly reduced the proportion of cases detected at late stages [11]. Furthermore, the integration of digital technologies opens new possibilities for telemedicine screening and patient monitoring in areas with limited access to ophthalmologists, expanding population coverage and accelerating the diagnostic process [25].

A key finding of our study is the low level of knowledge among surveyed physicians regarding modern retinoblastoma treatment methods. This is a significant concern, given that treatment approaches have evolved considerably. While enucleation was previously the standard of care in most cases, indications for this radical procedure have narrowed. The priority now is on organ-sparing methods that aim to preserve not only the eye but also the patient's vision. In Kazakhstan, methods such as intra-arterial chemotherapy, laser transpupillary thermotherapy, cryotherapy, and intravitreal chemotherapy have been successfully implemented [1, 2]. Modern research confirms the high efficacy of these methods, with intra-arterial chemotherapy achieving over 95% eye preservation [4].

The low awareness of modern treatment approaches among PHC physicians points to a serious gap in the continuous medical education system. Updating educational programs, integrating current clinical guidelines, and conducting targeted training on contemporary retinoblastoma diagnostics and treatment are essential steps to improve the situation. This can significantly improve patient outcomes through timely referral to specialized care.

Another key finding was that pediatricians demonstrated better awareness of retinoblastoma compared to general practitioners. In the past, Kazakhstan reformed its medical education system by closing pediatric faculties, which led to a reduction in specialists with a focused background in childhood diseases. Studies show that children initially examined by pediatricians receive an oncology diagnosis significantly faster than those seen by general practitioners [21].

This is linked to a pediatrician's specialized knowledge and experience with children, whereas GPs are generally less familiar with the age-specific clinical manifestations of pediatric tumors, which can lead to diagnostic delays [17].

The closure of pediatric faculties may have negatively impacted the early diagnosis and treatment of rare childhood diseases, including retinoblastoma. Restoring specialized pediatrician training appears to be a justified step to improve the quality of medical care for children.

The study's limitations include a low response rate from some regions of Kazakhstan, which may affect the representativeness of the sample and limit the generalizability of the results. Specifically, the insufficient number of responses from certain regions prevented a full comparative analysis of physician awareness based on geography, and consequently, the identification of regional differences in knowledge of symptoms, diagnosis, and treatment approaches for retinoblastoma.

Furthermore, the study was based solely on a survey, which carries the risk of subjective assessments and socially desirable responses. Surveys also do not allow for the evaluation of a physician's practical skills or their actual behavior when faced with a patient with suspected retinoblastoma.

Future research could focus on increasing the survey's reach and ensuring a more uniform distribution across regions. Another promising direction is to correlate

knowledge levels with actual patient clinical outcomes and to evaluate the effectiveness of educational interventions and reforms in the medical education system.

Conclusion

The findings of this study confirm that the level of awareness of retinoblastoma among primary healthcare (PHC) physicians remains insufficient, both in recognizing early symptoms and in knowledge of modern treatment methods. This represents a significant barrier to the timely diagnosis of a disease that is critically important for preserving a child's vision and life. The comparative analysis also showed that pediatricians are significantly better informed about retinoblastoma than general practitioners, which highlights the importance of specialized training in pediatrics.

Given the identified challenges, it is advisable to revise the educational programs for continuing medical education courses for PHC physicians to include topics on retinoblastoma. Special attention should also be given to the training of undergraduate and postgraduate students, by strengthening modules on rare oncological diseases and restoring specialized pediatric training.

Furthermore, an important strategy is to intensify public awareness campaigns. This can be achieved through publications in non-medical media, appearances in mass media, social networks, and educational campaigns during International Retinoblastoma Awareness Week.

These comprehensive measures, we believe, are capable of significantly improving the diagnosis and timely treatment of retinoblastoma, reducing the number of advanced cases, and consequently, decreasing the rates of disability and mortality among children. These efforts will contribute to achieving SDG 3, which aims to reduce preventable child mortality and ensure universal health and well-being.

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