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Knowledge and Practice of Family Physicians Working in a Province in Turkey Regarding Newborn Screening

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Abstract

Background: The main purpose of newborn screening is to prevent possible health problems by early identification of affected infants. In this descriptive-cross-sectional study, the aim was to determine the knowledge levels and practices of family physicians regarding newborn screening programs.

Methods: The questionnaire form, which examines the demographic characteristics of family physicians, their practices within the scope of the newborn screening programs, and the need to train family physicians and families was applied to 462 family physicians working in selected districts (87% of the total population). In the analysis of the data, Chi-square, Mann-Whitney U and Kruskal-Wallis tests were used together with descriptive statistics.

Results: The rate of performing newborn follow-up examinations by family physicians was 56.5%, the rate of evaluation of developmental hip dysplasia was 56.3%, and the rate of performing eye and hearing examinations was 29% and 20.6%, respectively. The most common reasons for not performing a screening examination were; no admission because the relevant examination was made by a pediatrician (61.3%), no evaluation of developmental hip dysplasia by the family physician because the relevant examination was performed by an orthopedist/radiology specialist (70.3%), no eye examination because the relevant examination was performed by an ophthalmologist (71.4%), no hearing examination because the related examination was performed by an otolaryngologist (64%). When evaluated according to the scoring system, the knowledge level of family physicians was low in all examinations in general.

Conclusions: In conclusion, family physicians have limited knowledge about newborn follow-up examinations; examinations required by family physicians within the scope of newborn screening programs are not adequately performed. For a better-quality primary care service, regular and up-to-date training should be given to family physicians about newborn examinations, and only the newborns who have been evaluated by family physicians and need further examination should be directed to the relevant specialist.

What is Already Known on this Topic: Newborn screening programs vary by country. Early detection and timely intervention of some congenital, metabolic, endocrine, hematological and genetic conditions with newborn screening lead to significant reductions in mortality and morbidity.

What this Study Adds: Recognizing the knowledge and practice gaps of family physicians is the first step to a solution.

How this Study Might Affect Research, Practice or Policy: Sharing the study results with family physicians and health managers will guide effective planning and implementation.

Keywords: Family Medicine; Neonatal Follow-Up Examination; Developmental Hip Dysplasia; Neonatal Eye Examination; Neonatal Hearing Screening

Background

Screening tests are a set of medical procedures performed in order to reveal the condition or possibility of having a certain asymptomatic disease. Health care providers recognize that early detection of a life-threatening disease for which there is an effective treatment is a positive action [1]. Newborn screening is a public health action consisting of screening, diagnosis, management, development and education. The main purpose of newborn screening is to prevent possible health problems by early identification of affected infants. In undiagnosed children, mental retardation and serious health problems (including death) may occur [2]. Early detection and timely intervention of some congenital, metabolic, endocrine, hematological and genetic conditions lead to significant reductions in mortality and morbidity [3].

Newborn screening programs vary from country to country. Newborn screening programs in Turkey started with the Phenylketonuria Screening Program in 1987 and was carried out all over the country in 1993. Congenital hypothyroidism screening was added in 2006, Biotinidase enzyme deficiency in 2008, and finally Cystic Fibrosis screening was added in January 2015. As of 2017, studies on Congenital Adrenal Hyperplasia screening have begun in pilot provinces and it is planned to be extended throughout the country [4]. Since 2010, newborns have also been screened for developmental hip dysplasia in the scope of early diagnosis and treatment program [5]. The newborn hearing screening program has been carried out since 2008, starting from the hospital where the birth takes place [6].

Primary health care services in Turkey are provided by family physicians. Family physicians are obliged to perform follow-ups of the population under their care. Neonatal follow-up is among these duties [7]. Taking heel prick blood and examining newborns are the responsibility of family physicians. However, families can go to the second and third levels without consulting a primary care physician. In our country, a family physician is a family medicine specialist or a specialist physician or physician who has received the training prescribed by the Ministry of Health [8]. Accordingly, all general practitioners who graduate from the Faculty of Medicine can work as family physicians. In addition, those who complete the specialization entered through a national exam can work as family physicians by obtaining the title of family medicine specialist.

The expansion of parameters in screening programs, especially in the last 50 years - primarily in the last 15 years - demonstrates that screening programs are expanding rapidly and will expand to include rare diseases and diseases that are poorly understood in the near future. For this reason, health planners and practitioners specifically should have sufficient information about the current situation and follow the developments closely [9]. This study was planned to determine the level of knowledge and practices of family physicians in Gaziantep, Turkey, who provide services in primary care, and are expected to be the closest services to families, regarding newborn screening programs.

Materials and Methods

The descriptive-cross-sectional study has been conducted among family physicians working in the central districts of a city. At the time of the study, the number of family physicians working in the selected districts was 530. Since it was planned to reach all family physicians working in the districts, no sample was selected. Family physicians were interviewed at Family Health Centers. The questionnaire prepared by a literature review and considering child and adolescent monitoring protocols of the Ministry of Health. Furthermore, it saved newborn screening knowledge and practices and participants' demographic information. The questionnaire was applied through face-to-face interviewing method. A total of 462 (87%) family physicians participated in the study. Prior to the study, research permission was obtained from Gaziantep Provincial Health Directorate with the approval number 87825162-774.99 on October 9, 2020. In addition, ethical approval was obtained from Gaziantep University Clinical Research Ethics Committee with the approval number 2020/63 on March 18, 2020.

To determine their level of knowledge, family physicians were asked about the practices that they are required to do, and those they are not required to do, within the scope of the newborn follow-up control examination. One point was given for each correct answer to the parameters. The lowest score for the newborn follow-up examination was 1, the highest score was 19; the lowest score for the developmental hip dysplasia examination was 1, the highest score was 12; the lowest score for the eye examination was 1, the highest score was 5; and the lowest score for the hearing screening was 1, the highest score was 6. The obtained data were analyzed using SPSS (Statistical Package for the Social Science) version 22. In the analysis of the data, alongside descriptive statistics, Chi-square, Mann-Whitney U and Kruskal-Wallis tests were used. Further analysis was performed for the significant associations found with Chi-square and Kruskal-Wallis tests. For the categorical variables, numbers and percentages; for the numerical variables, mean ± standard deviation, lowest and highest values were presented. A p value of $p<0.05$ was considered statistically significant.

Results

462 family physicians participated in our study, 63% (n=291) of the participants were male; 94.4% (n=436) were general practitioners; and 50.9% (n=235) had been working as family physicians since the introduction of the family medicine system (Table 1). The average age of the family physicians participating in the study was 42.87 ± 9.87 years (Minimum=26, Maximum=72). The average duration of work as a Family Physician was 7.32±3.34 years (minimum=1, maximum=10 years). The average number of registered persons to a family physician was 3689 ± 578 (minimum 100 (newly assigned physician), maximum 4009), and the average number of admissions to the clinic in 2019 was 9850 ± 3895 (minimum 500, maximum 24000, n=347). The rate of newborn follow-up examination by family physicians was 56.5% (n=261); the rate of examination of developmental hip dysplasia was 56.3% (n=134); the rate of eye examination was 29% (n=255); and the rate of hearing screening was 20.6% (n=95) (Table 2). As the reasons for not performing a newborn follow-up examination, 61.3% of the family physicians stated that families did not inquire about a screening examination because they took their babies to a pediatrician for examination. 70.3% of family physicians who did not examine developmental hip dysplasia, 71.4% of family physicians who did not do eye examination; 64% of the family physicians who did not perform a hearing assessment stated that they did not perform an examination because they thought that the examination was performed by the relevant specialist physician (Table 3).

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Table 1: Socio-Demographic Characteristics of Family Physicians.

Socio-Demographic	Characteristics	Number (n)	Percentage (%)
Age (years)	26-34	129	27.9
	35-44	113	24.5
	45-54	164	35.5
	55 and above	56	12.1
Gender	Man	291	63
	Woman	171	37
Specialty	Family Physician Specialist	26	5.6
	General practitioner	436	94.4
Duration of work as a Family Physician	10 years	235	50.9
	9 years and below	227	49.1
Total		462	100

Table 2: The percentages of performing different neonatal screening examinations by family physicians.

Examination Type	Yes		No		Sometimes		Total	
	n	%	n	%	n	%	n	%
General neonatal follow-up examination	261	56.5	106	22.9	95	20.6	462	100
Developmental hip dysplasia	260	56.3	152	32.9	50	10.8	462	100
Eye examination	134	29	252	54.5	76	16.5	462	100
Hearing screening	95	20.6	313	67.7	54	11.7	462	100

Table 3: Reasons given for why family physicians did not perform a newborn screening examination.

Type of the screening examination	Reasons	n*	%*
General neonatal follow-up examination	No admission by families because the newborn is examined by a pediatrician	65	61.3
	My allied health personnel do the examination	39	36.7
	The Family Health Center (FHC) is not adequately equipped for the examination	18	16.9
Developmental hip dysplasia	The examination is done by orthopedist/radiology Specialist	107	70.3
	The examination is done by pediatrician	49	32.2
	My allied health personnel do the examination	14	9.2
Eye examination	The examination is done by ophthalmologist	180	71.4
	The examination is done by pediatrician	75	29.7
	My allied health personnel do the examination	16	6.3
Hearing screening	The examination is done by otorhinolaryngologist	201	64
	The examination is done by pediatrician	101	32.2
	My allied health personnel do the examination	12	3.8

*Since the participants marked more than one answer, the number of answers for not doing the examination was more than the number of people who answered 'no' to the relevant examination. Other answers that have been stated but did not have a sufficient number for grouping were excluded from the table. When the most and least frequently performed newborn screening examinations were evaluated, it was seen that family physicians do not frequently evaluate hearing and vision in the follow-up; there are shortcomings in the examinations that should be done within the scope of the newborn's eye and hearing screening (e.g., examination of eyes for the presence of infection, the mother's history of infections during pregnancy are not well questioned), as well as questioning risk factors for developmental hip dysplasia (Table 4).

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Table 4: The Most and least frequently performed examinations by family physicians in newborn screening examinations.

General Neonatal Follow-Ups						
Examination/Evaluation	Done		Not done		Total	
	n	%	N	%	n	%
Newborn Head Circumference Measurement	352	98.9	4	1.1	356	100
Newborn Height Measurement	350	98.3	6	1.7	356	100
Newborn Weight Measurement	349	98	7	2	356	100
Newborn Hearing Examination	168	47.2	188	52.8	356	100
Newborn Eye Examination	129	36.2	227	63.8	356	100
Developmental Hip Dysplasia						
Examination/Evaluation	Done		Not done		Total	
	n	%	N	%	n	%
General Physical Examination	298	96.1	12	3.9	310	100
Pili Asymmetry	284	91.6	26	8.4	310	100
Questioning Risk Factors	192	61.9	118	38.1	310	100
Eye Examination						
Examination/Evaluation	Done		Not done		Total	
	n	%	N	%	n	%
Light Reflex	194	92.4	16	7.6	210	100
Asymmetry in the Eyes	194	92.4	16	7.6	210	100
Infection in the Eyes	131	62.4	79	37.6	210	100
Hearing Screening						
Examination/Evaluation	Done		Not done		Total	
	n	%	N	%	n	%
Response to Sound	137	91.9	12	8.1	149	100
Family History Inquiry	129	86.6	20	13.4	149	100
Maternal Infection history during Pregnancy	93	62.4	56	37.6	149	100

When the follow-up time of the developmental dysplasia evaluation was asked, it was found that only 34.8% (n=108) of the family physicians who stated that they performed the related examination performed the follow-up within an appropriate time frame. When family physicians were asked about the ideal time to do the heel prick test for neonatal metabolic screening, it was found that only 47.4% (n=219) of family physicians answered, '48 hours after feeding', which is the correct answer. When evaluating the status of newborn follow-up examinations by the age of family physicians; It was found that family physicians in the 26-34 age group performed fewer newborn follow-up examinations (statistically significant), newborn developmental hip dysplasia evaluation, and newborn eye examination (Table 5).

There was no significant difference among different age groups of family physicians in terms of the score they obtained based on the relevant parameters used to evaluate the newborn follow-up examination, eye and hearing examination. In terms of developmental hip dysplasia, it was found that family physicians in the 35-44 age group had statistically significantly higher information (Table 6). When family physicians were asked about their knowledge of newborn screening programs, 62.3% (n=288) of family physicians stated that they had knowledge but not a sufficient amount. Among the age groups, 72.1% of family physicians in the 26-34 age group (n=93) noted that they had insufficient information, and these differences were statistically significant. Regarding the need for training on newborn screening programs, 83.8% (n=373) of family physicians stated that they needed training. Family physicians who stated that they needed training the most were in the 26-34 age group, and this difference was statistically significant. Although there was no statistically significant difference according to age groups, 87% (n=339) of family physicians stated that they would participate in a training program if training was provided. While 61% (n=238) of the participants preferred in-person training, no statistically significant difference was found according to age groups. On the other hand, while 61% (n=238) of the participants stated that they did not want online education, 44.9% (n=53) of family physicians in the 26-34 age group stated that they preferred online education, and this difference was statistically significant (Table 7).

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Table 5: The status of newborn follow-up examinations by the age of family physicians.

Age Groups		Status of Performing General Neonatal Follow-Up Examination								p
	Yes		No		Sometimes		Total			
	n	%	n	%	n	%	n	%		
Age (Year)	26-34	58	45	43	33.3	28	21.7	129	0.021	
	35-44	66	58.4	21	18.6	26	23	113	100	
	45-54	102	62.2	29	17.7	33	20.1	164	100	
	55 and above	35	62.5	13	23.2	8	14.3	56	100	
Total		261	56.5	106	22.9	95	20.6	462	100	
Age Groups		**Status of Performing Examination for Developmental Hip Dysplasia**								0.009
	Yes		**No**		**Sometimes**		**Total**			
	n	%	n	%	n	%	n	%		
Age (Year)	26-34	56	43.4	53	41.1	20	15.5	129	100	
	35-44	61	54	38	33.6	14	12.4	113	100	
	45-54	108	65.9	44	26.8	12	7.3	164	100	
	55 and above	35	62.5	17	30.4	4	7.1	56	100	
Total		260	56.3	152	32.9	50	10.8	462	100	
Age Groups		**Status of Performing Eye Examination**								0.006
	Yes		**No**		**Sometimes**		**Total**			
	n	%	n	%	n	%	n	%		
Age (Year)	26-34	25	19.4	84	65.1	20	15.5	129	100	
	35-44	31	27.4	57	50.4	25	22.1	113	100	
	45-54	56	34.1	80	48.8	28	17.1	164	100	
	55 and above	22	39.3	31	55.4	3	5.4	56	100	
Total		134	29	252	54.5	76	16.5	462	100	
Age Groups		**Status of Performing Hearing Examination**								0.285
	Yes		**No**		**Sometimes**		**Total**			
	n	%	n	%	n	%	n	%		
Age (Year)	26-34	22	17.1	89	69	18	14	129	100	
	35-44	19	16.8	82	72.6	12	10.6	113	100	
	45-54	43	26.2	101	61.6	20	12.2	164	100	
	55 and above	11th	19.6	41	73.2	4	7.1	56	100	
Total		95	20.6	313	67.7	54	11.7	462	100	

Table 6: Family Physicians' Newborn Screening Examination Scores by Age Groups.

Newborn First Follow-up Examination Evaluation Score		Score Mean ± Standard Deviation	Overall Average	p
Age (Year)	26-34	13.38 ± 1.64	13.46 ± 1.63	0.593
	35-44	13.41 ± 1.54		
	45-54	13.59 ± 1.59		
	55 years and older	13.34 ± 1.93		
Newborn Developmental Hip Dysplasia Examination Evaluation Score		**Mean Score ± Standard Deviation**	**Overall Average**	**p**
Age (Year)	26-34	8.65 ± 2.65	8.57 ± 2.7	0.005
	35-44	9.41 ± 2.48		
	45-54	8.19 ±2.74		
	55 years and older	7.94 ± 2.79		

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Newborn Eye Examination Evaluation Score		Mean Score ± Standard Deviation	Overall Average	p
Age (Year)	26-34	4.28 ± 0.72	4.16 ± 0.8	0.148
	35-44	4.30 ± 0.73		
	45-54	4.00 ± 0.87		
	55 years and older	4.16 ± 0.74		
Newborn Hearing Examination Evaluation Score		**Mean Score ± Standard Deviation**	**Overall Average**	**p**
Age (Year)	26-34	4.28 ± 0.72	4.34 ± 1.13	0.117
	35-44	4.30 ± 0.73		
	45-54	4.00 ± 0.87		
	55 years and older	4.16 ± 0.74		

Table 7: The knowledge status of family physicians regarding the Newborn Screening Programs and training needed by age groups.

Socio-Demographic characteristics		Knowledge Status about the Newborn Screening Program								p
	I have very little knowledge		I have knowledge but not enough		I have enough knowledge		Total			
	n	%	n	%	n	%	n	%		
Age (Year)	26-34	11th	8.5	93	72.1	25	19.4	129	0.003	
	35-44	3	2.7	67	59.3	43	38.1	113	100	
	45-54	9	5.5	89	54.3	66	40.2	164	100	
	55 and above	3	5.4	39	69.6	14	25	56	100	
Total		26	5.6	288	62.3	148	32.1	462		
		Need for training on the Newborn Screening Program								
	Needs		**Doesn't Need**		**Total**					
	n	%	n	%	n		%			
Age (Year)	26-34	116	91.3	11th	8.7	127		100		0.01
	35-44	82	77.4	24	22.6	106		100		
	45-54	125	80.1	31	19.9	156		100		
	55 and above	50	89.3	6	10.7	56		100		
Total		373	83.8	72	16.2	445		100		
		Wish to participate in the Newborn Screening Program Training								
	I Will Participate		**I will Not Participate**		**I will Participate if it is Obligatory**		**Total**			
	n	%	n	%	n	%	n	%		
Age (Year)	26-34	109	92.4	one	0.8	8	6.8	118	100	0.111
	35-44	76	85.4	2	2.2	11th	12.4	89	100	
	45-54	112	84.2	0	0	21	15.8	133	100	
	55 and above	42	84	2	4	6	12	50	100	
Total		339	87	5	1,2	46	11.8	390	100	

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		Newborn Screening Program, online Training						
	Yes		No		Total			
	n	%	n	%	n		%	
Age (Year)	26-34	53	44.9	65	55.1	118	100	0.044
	35-44	37	41.6	52	58.4	89	100	
	45-54	51	38.3	82	61.7	133	100	
	55 and above	11th	22	39	78	50	100	
Total		152	39	238	61	390	100	
		Newborn Screening Program, In-Person Training						
	Yes		No		Total			
	n	%	n	%	n		%	
Age (Year)	26-34	67	56.8	51	43.2	118	100	0.064
	35-44	54	60.7	35	39.3	89	100	
	45-54	78	58.6	55	41.4	133	100	
	55 and above	39	78	11th	22	50	100	
Total		238	61	152	39	390	100	

Discussion

In this study, which was conducted to determine the knowledge and practices of family physicians working in districts of Gaziantep, about the newborn screening programs, 462 family physicians participated. The participation rate was 87%. Reasons for not participating in the study were having COVID-19 infection during the study period, being on administrative leave, high workload due to increased patient admissions to family health centers because of the COVID-19 pandemic. The average age of the family physicians participating in the study was 42.87 ± 9.87 years. 63% of the participants were male and 37% were female. In a study conducted in Malatya that measured the level of knowledge of family physicians about Cystic Fibrosis, which is screened during the newborn period, similar to our study, the median age was 42 years and 65% of the participants were male [10].

The average registered population for a family physician was 3689. According to the family medicine legislation, population assignment planning should be done in a way that there is one family doctor per 2000 people [7]. The high number of registered patients per physician may lead to an increase in outpatient admissions and, accordingly, a decrease in the time required for preventive services. Of the participants, 56.5% stated that they performed a newborn screening examination, 56.3% performed a developmental hip dysplasia examination, 29% performed an eye examination, and 20.6% performed a hearing assessment. 53.2% of the family physicians stated that families did not seek a screening examination because they took their babies to a pediatrician for examination. 63% of family physicians who did not examine developmental hip dysplasia, 66.4% of family physicians who did not perform an eye examination; 64% of the family physicians who did not perform a hearing assessment stated that they did not perform an examination because they thought that the examination was performed by the relevant specialist physician. According to the Health Statistics Yearbook 2019, the rate of fully followed-up infants was 91.7% [11]. Despite the higher rates in the Health Statistics Yearbook, the rate of newborn examinations by family physicians was low in our study and family physicians thought that infants were assessed by relevant specialist physicians. Although it seems to be a positive result that newborn examinations are performed by specialist physicians, it means that the follow-ups that should be performed by family physicians are not carried out and therefore social follow-up is not possible.

Even if the number of examinations is sufficient, the lack of knowledge of family physicians about newborn screening examinations raises questions about the quality of newborn assessments, and it stands out as an important issue that needs to be emphasized. In the current system, despite the fact that family physicians are obliged to carry out newborn screening examinations, their lack of knowledge may lead to avoidance of risk and, as a result, to direct them to specialists or allow allied health personnel to do the examinations. This may result in inadequate delivery of primary health care services. It was found that infant's head circumference measurements (98.9%), height measurements (98.3%) and weight measurement (98.0%) are performed at a high rate in the newborn follow-up examinations; but hearing (47.2%) and eye examinations (36.2%) are performed at a low rate. Despite the high rate of evaluation of general follow-up parameters by family physicians, the low rates of especially eye and hearing examinations may mean that births are generally performed in hospitals and evaluations are made in hospitals by specialist physicians, therefore family physicians rely on the assessment of specialist physicians.

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When the participants' assessment of developmental hip dysplasia was examined, it was found that 34.8% of the participants made the assessment at the right time. When the knowledge of the participants about screening of the newborn metabolic diseases was evaluated, it was determined that 47.4% of the participants knew the heel prick test time correctly. The mean scores of examinations performed by family physicians in newborn screening programs were also found to be low. These findings support the idea that family physicians do not have sufficient knowledge about the newborn screening program. Family physicians should have sufficient knowledge about newborn screening programs. With sufficient information, necessary screenings can be done in a healthy way and families can be given sufficient information about the diseases that may transpire after screening [12]. In general, the rate of not performing examinations was found to be high among family physicians in the 26-34 age group in all examinations. It was also found that a higher number of physicians in the 26-34 age group stated that they needed training for newborn screening programs. The higher rate of participants in the 26-34 age group stating that they need training may be due to the fact that they started working for family medicine without adequate training. The fact that 86.9% of the participants stated that they would participate in a training -if provided- may mean that the lack of knowledge is also known by most of the family physicians, and that continuous training is required, especially in the early periods of starting the job.

In a study evaluating the knowledge levels and training preferences of families, screening service providers, and screening service professionals, found knowledge levels to be low in all three groups, and no difference was found between training preferences [13]. In our study, when the participants were asked about the type of training that they would prefer, it was determined that although the majority of the participants preferred in-person education, it was found that the participants in the 26-34 age group preferred online education. As different preferences were determined in our study, taking the preferences of family physicians in training planning and providing training in line with these preferences could be an important factor in achieving training needs. In our study, it was found that being a family medicine specialist did not make a significant difference in general newborn follow-up examinations, developmental hip dysplasia examination, and eye and hearing examinations. Although the low number of family medicine specialists in our study restricts generalization of the results, it can be concluded that preventive medicine practices in the current system cannot be done adequately due to the family medicine system's emphasis on curative services, and that family medicine specialists cannot fully apply the specialty training they have received in the field.

Conclusions and Recommendations

In the current family medicine system in Turkey, family physicians have an important role in newborn screening. Any examination that is overlooked or not performed for any reason may cause delays in diagnosis. As a result, since babies start treatment late, they may encounter serious health problems and even deaths may occur. This situation also leads to serious economic consequences. According to the findings we obtained in our study; it was found that there are knowledge limitations among family physicians about newborn screening examinations, and family physicians assume that screening examinations are performed by their allied health personnel or specialist physicians. In this respect, it is thought that providing training to family physicians and allied health personnel, taking the opinions of family physicians regarding the way of training, and conducting specialist physician examinations only by family physician referral - except in emergencies - will increase the success of preventive services in the long run.

Limitations

Not being able to reach all family physicians due to the Covid-19 pandemic, considering the working time of the physicians as the time they work in family health centers.

Strengths

Although there are studies specific to newborn screening examinations, there is no study that includes all examinations and there is no study that describes the status of newborn screenings in the family medicine system in Turkey. Our study covers the above-mentioned situations.

Declarations

Ethics approval and consent to participate: Ethical approval was obtained from Gaziantep University Clinical Research Ethics Committee and research permission was obtained from Gaziantep Provincial Health Directorate. In addition, consent was obtained from each participant.

Consent for Publication

All authors accept all conditions and publication rights.

Availability of Data and Materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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