Özgün Çalışma / Original Article

Ankara Eğt. Arş. Hast. Derg., 2023 ; 56(3) : 141-145
DOI: 10.20492/aeahtd.1240217

Evaluation of Well Child Check Ups and Check Up of Children with Chronic Diseases in the COVID- 19 Pandemic

Covid-19 Pandemisinde Sağlıklı Çocuk Takibi ve Kronik Hastalıklı Çocukların Takiplerinin Değerlendirilmesi

Gulsum OZEN[1], Dilek SARICA[1]

ABSTRACT

AIM: Pandemic disrupted health care access in many centers all around the world. The CDC recommended seperating pandemic and non-pandemic hospitals, prioritizing emergency visits, postponing elective operations, and, where possible, converting outpatient visits to telehealth calls. During this period, there were disruptions in well-child checkups and routine childhood vaccinations werall over the world. We aimed to evaluate the impact of pandemic on the routine immunization schedule, neonatal screening program, chronic disease follow ups, and outpatient clinic visits.

MATERIAL AND METHOD: In total, 401 children in the routine immunization period and their parents were included in this study. Outpatient visit features and compliance with the childhood vaccination, neonatal screening programs before and during the pandemic were asked.

RESULTS: Compared to 2021, there was a significant increase in both the number of patients with upper respiratory tract infection symptomsand the hospital admissions of these patients in 2022. While the rates of hospital admissions increased in 2022 in those with diarrhea, almost all of the patients with lower respiratory tract infection symptoms stated that they applied to the hospital in both periods. It was observed that routine vaccination and newborn screening programs were carried out successfully during the pandemic process in Turkey. It was found that chronic disease follow-ups of children were interrupted in 2021.

CONCLUSION: This study has shown how the 3 major components of health system (outpatient clinic visits, well child check-ups and chronic disease follow-ups) were affected at different times of the pandemic in Turkey. Successful management in childhood vaccinations and neonatal screening program should also be ensured in chronic disease follow-up bythe separation of pandemic and non-pandemic hospitals. Determining the strengths and weaknesses of strategies implemented in health system during the pandemicperiod will guide the measures to be taken for similar situations that may occur in the future.

Keywords: COVID-19, Pandemic, Vaccination, Neonatal screening, Outpatient visits.

ÖZET

AMAÇ: Pandemi dünya çapında birçok merkezde sağlık hizmetlerine erişimi sekteye uğratmıştır. CDC, pandemi hastaneleri ile diğer hastaneleri ayırarak, doktorların acil başvurulara öncelik vermesini, elektif ameliyatları ertelemesini ve mümkünse ayaktan hasta muayenelerini tele-sağlık çağrılarına dönüştürmelerini tavsiye etmiştir. Bu süreçte dünyada sağlam çocuk takiplerinde ve rutin çocukluk çağı aşılamasında aksamalar yaşandı. Bu çalışma ile pandeminin rutin bağışıklama takvimi, yenidoğan tarama programı, kronik hastalık takipleri ve polikliniğe ziyaretlerine etkisini değerlendirmeyi amaçladık.

GEREÇ VE YÖNTEM: Çalışmaya rutin aşılamaçağındakitoplam 401 çocuk ve ebeveynleri dahil edildi. Pandemi öncesi ve sırasında polikliniğe başvuru özellikleri ile çocukluk çağı aşılama, yenidoğan tarama programına uyumları sorgulandı.

BULGULAR: 2021 yılına kıyasla 2022'de hem üst solunum yolu enfeksiyonu semptomu gösteren hasta sayısında hem de bu hastaların hastaneye başvurularında anlamlı artış saptandı. 2022 yılında ishal semptomu olanlarda hastaneye başvuru oranları artarken alt solunum yolu enfeksiyonu semptomu olan hastaların ise tamamına yakını her iki dönemde de hastaneye başvurduklarını belirttiler. Türkiye'de pandemi sürecinde rutin aşılama ve yenidoğan tarama programlarının başarıyla yürütüldüğü görüldü. Çocukların kronik hastalık takiplerine 2021 yılında ara verildiği öğrenildi.

SONUÇ: Bu çalışma, Türkiye'de pandeminin farklı dönemlerinde sağlık sisteminin 3 ana bileşeninin (poliklinik ziyaretleri, sağlıklı çocuk kontrolleri ve kronik hastalık takipleri) nasıl etkilendiğini göstermiştir. Çocukluk çağı aşılamalarında ve neonatal tarama programlarındaki başarılı yönetim, kronik hastalık takibinde de pandemi ve non- pandemik hastaneler ayrılarak sağlanmalıdır. Pandemi sürecinde sağlık sisteminde uygulanan stratejilerin güçlü ve zayıf yönlerini belirlemek, gelecekte oluşabilecek benzer durumlar için alınacak önlemler konusunda yol gösterici olacaktır.

Anahtar kelimeler: COVID-19, Pandemi, Aşılama, Yenidoğan taramaları, Poliklinik başvuruları

[1] Health Science University, Ankara Ataturk Sanatoryum Training and Research Hospital, Department of Pediatrics, Ankara, Turkiye

Makale geliş tarihi / Submitted: Ocak 2023 / January 2023

Makale kabul tarihi / Accepted: Eylül 2023 / September 2023

Sorumlu Yazar / Corresponding Author:
Gulsum OZEN
Adres: Health Science University, Ankara Ataturk Sanatoryum Training and Research Hospital, Department of Pediatrics, Ankara, Turkiye
Phone: +90 505 6294666
E-mail: ozen_gulsum@hotmail.com
ORCID: 0000-0002-9049-2875

Yazar bilgileri:
Dilek SARICA: drdilekcoban@yahoo.com.tr, ORCID: 0000-0002-7671-3010

INTRODUCTION

A pandemic is a global epidemic of an infectious disease which spreads across countries or more than one continent and can cause economic, social, and political disruptions by greatly increasing morbidity and mortality. It affects a substantial number of individuals.[1] A novel coronavirus –SARS Coronavirus 2- which causes severe acute respiratory syndrome was seen in December 2019 in China. By January 2023, it affected more than 660 million people and more than 6.7 million among them died.[2] No treatments or vaccines were available at the initial period of pandemic. So that, containment measures were taken such as closing schools, shops and museums, lockdown, stay-at-home orders, determinating international flights, closing border gates, postponing all kinds of meetings/activities, limit contact with others, work from home if possible and curfews at several geographical levels which have disrupted healthcare systems.[3]

The pandemic disrupted health care access in many centers in the world. Centers for Disease Control and Prevention (CDC) recommended separating pandemic and non-pandemic hospitals, doctors prioritized emergency visits, postponing elective operations and, where possible, converting outpatient visits to telehealth calls.[4]Well-child checkups were canceled and vaccination was interrupted in the USA, European countries, Turkey, the region of South-East Asia and among others.[5-8]The number of outpatient pediatric visits in Turkey decreased dramatically after the first case was reported in March 2020.[9] This could be a problem especially for patients with chronic diseases who require constant medical attention and close follow-ups. Health professionals were concerned about the follow-up of these patients, whose underlying chronic conditions increase the severity of COVID-19 and the risk of disruption of critical life-saving services such as routine immunization schedule.

Routine childhood immunization program is cost- effective, safe and effective way to prevent infectious diseases and reduce morbidity and mortality. It is also associated with higher education, cognitive and economic outcomes in further life. However immunization rates have dropped dangerously and this situation puts millions of children at risk for infectious and other life-threatening diseases during pandemic. World Health Organization (WHO) has released routine immunization guidance aimed at prioritizing routine immunization services in response to the pandemic and mitigating the impact of COVID-19 on the control of other vaccine-preventable diseases. Despite the recommendations of the American Academy of Pediatrics (AAP), WHO to continue routine vaccination schedules and the worldwide efforts to maintain essential services, fear of being infected by coronavirus and infecting loved ones caused negligence of non-COVID-19 patients. However, vaccine-preventable diseases are seen more as the collateral damage of COVID-19 pandemic.[10] It can create a perfect storm for a new health crisis.

We aimed to evaluate the impact of the pandemic on the routine immunization schedule, neonatal screening program and chronic disease follow ups. Outpatient visits were evaluated and compared how they were affected in the early and late times of COVID-19 pandemic.

MATERIAL AND METHOD

We conducted this cross-sectional study in which the questionnaire was administered face to face in pediatric outpatient clinic. Data collection tool was delivered to individuals between October- December 2021 and these participants were called again in December 2022. The forms in which socio-demographic and other data were filled out completely by the authors.

In total, 401 children in the routine immunization period (ages between 0-12 years old) and their parents were included in this study.

The questionnaire began with basic patient demographics related to gender, age, gestational age, types of family structure and educational status of child and mother. We also extracted history of chronic disease, compliance with newborn follow-up programs such as newborn hearing screening, neonatal screening for developmental dysplasia, neonatal eye screening and heel prick test. Questions were related to history of children, families, relatives being infected with COVID-19, having a disease before and during pandemic, whether they were examined for these diseases during the pandemic period, compliance with the routine immunization schedule during and before COVID-19 pandemic, where children were vaccinated, and the history of missed vaccines and catch-up vaccination. All participants were called in December 2022 and asked to have any disease in last 3 months and applied to outpatient clinics for these complaints. The patients with chronic diseases were also asked whether they had been checked for this disease in the last year.

We compared the differences before and in the early times of the pandemic in the proportion of patients receiving timely vaccine administration, delayed vaccine administration or no immunization for childhood disease. We also estimated the differences between the reasons for admission to the hospital before, during and after the pandemic.

Our data were analyzed using IBM SPSS (Statistical Package for Social Sciences) Statistics 22. Chi-square was used to check the differences in frequencies of categorical groups. Kolmogorov-Smirnov test was used for normality of data distribution. Two independent groups were compared by using Mann–Whitney U test with no normal distribution. Independent Samples T-Test was performed to compare the averages of two independent groups with normal distribution. Correlation evaluation of non-normally distributed values was performed by Spearman correlation, and of normally-distributed values was performed by Pearson correlation. Statistical significance was accepted if p-value of <0.05 ($P < .05$).

This study was approved by the Research Ethics Committee of Kecioren Training and Research Hospital (E. Kurul – 2012-KAEK-15/2403, 26/10/2021) and was conducted according to the Declaration of Helsinki.

RESULTS

The total number of children, aged younger than 12 years, was 401. Of the 401 patients represented in this study, 269 (67.1%) were preschool, 27 (6.7%) in kindergarten and 105 (26.2%) in elemantary-middle school during the 2021- 2022 academic year. Sociodemographic characteristics of participants were shown in Table 1.

Table1: Sociode mographic characteristics, n(%)

Variables		p value
Age , years*	4.38± 3.38	
Gender		0.251
Girl	189 (47.1%)	
Boy	212 (52.9%)	
Gestational age		**<0.001**
Preterm	57 (14.2%)	
Term	344 (85.8%)	
Family type		**<0.001**
Nuclear	321 (80%)	
Large	80 (20%)	
COVID-19 history in family		**<0.001**
None	247 (61.6%)	
Only child	0	
Child+parents	80 (20%)	
Only parents	74 (18.4%)	
COVID-19 history in relatives		**<0.001**
Yes	311 (77.6%)	
No	90 (22.4%)	
School grade		**<0.001**
Preschool	269 (67.1%)	
Kindergarten	27(6.7%)	
School	105 (26.2%)	
Chronic disease		**<0.001**
Yes	103 (25.7%)	
No	298 (74.3%)	
Disease during pandemic		**<0.001**
Yes	248 (61.8%)	
No	153 (38.2%)	
Number of days being outside in a week (Children)*	0.84 ±1.29	**<0.001**
Never	233 (58.1%)	
1 day	68 (17%)	
2 days	67 (16.7%)	
≥3 days	33 (8.1%)	
Number of days being outside in a week (Mothers)*	2 ±1.99	**<0.001**
Never	111 (27.7%)	
1 day	103 (25.7 %)	
2 days	63 (15.7%)	
≥3 days	124 (30.9%)	

*(Mean ± SD)

In the early times of pandemic, 58.1% of children never went outside. While this rate was 27.7% for mothers, 30.9% of them went out of the house more than 3 times a week. A significant difference was found between the number of days being outside in a week of children and mothers (p<0.001). However, the presence of COVID-19 (+) cases in family members was not associated with the situation of children (p=0.295) or mothers (p=0.183) going out. Similarly, the presence of COVID-19 (+) cases in the immediate vicinity was not associated with the situation of children (p=0.412) or mothers (p=0.645) going out.

One hundred three patients had chronic diseases, the majority of which were asthma and other allergic diseases (26%), hypothyroidism (12%), epilepsy (9%) and anemia (7%). While 36.9 % of them applied to the hospital for routine control of this disease in 2021, this rate was found to be 90.3 % in 2022. (p=0.012)

Table 2: Impact of pandemic on outpatient visits for acute and chronic diseases (2021- 2022) , n (%)

	Outpatient visit in 2021		p value	Outpatient visit in 2022		p value	Control of chronic disease, 2021X2022
	Yes	No		Yes	No		
Chronic disease							
Yes (103)	38 (36.9)	65 (63.1)	0.443	93 (90.3)	10(9.7)	**<0.001**	**0.012**
Disease durign pandemic (2021-2022)							
Yes (249- 299)	179(72)	70(28)	**<0.001**	269(90)	30(10)	**<0.001**	
Upper Resp. Tract Inf. (109- 207)	56 (51)	53(49)	0.924	181(87)	26(13)	**<0.001**	
Lower Resp. Tract Inf. (54- 49)	52(96)	2(4)	**<0.001**	49(100)	0(0)	**<0.001**	
Acute Gastroenteritis (18- 17)	11(61)	7(39)	0.346	13(76)	4(24)	**0.029**	
Ohers (68- 26)	60 (88)	8(12)	**<0.001**	26(100)	0(0)	**<0.001**	
No (152-102)							

Table 2 shows the differences in the rates of symptoms of common childhood diseases such as upper respiratory tract infections (URTI), lower respiratory tract infections (LRTI), acute gastroenteritis (AGE) and other diseases, and the rates of admission to hospital with these complaints in the early times of pandemic and in the last 3 months of 2022.

While there was no significant proportional difference in terms of lower respiratory tract infection acute gastroenteritisin both time periods, the frequency of upper respiratory tract infection increased nearly 2 times in 2022. In 2021, 28% of the patients with upper respiratory tract infection symptoms and 39% of the patients with acute gastroenteritis symptoms reported that they did not apply to any health institution. In 2022, these rates decreased to 10% for URTI and 24% for AGE. Almost all patients with LRTI symptoms visited the outpatient clinics in both years.

Compliance of parents of 155 infantsborn in pandemic period, with Neonatal Screening Programs during pandemic was shown in

Table 3: Neonatal Screening Program during pandemic, n (%)

Heel prick test	155 (100)
Hip USG (developmental dysplasia)	155 (100)
Newborn Eye Screening	155 (100)
Neonatal Hearing Screening	151 (97.4)

Except 4 infants who did not have neonatal hearing screening during the pandemic period, all neonatal screening programs continued to be implemented without interruption during the pandemic period.

All but one of the parents had their children routine childhood vaccinations on time before and during the pandemic. One child had vaccinated but he did not get it on time in both before and during pandemic. Most of the children had their vaccinations done in family health centers (95.8%) before pandemic. 12 of 17 children who were vaccinated at the hospital before pandemic, reported that they started to get vaccinated in family health centers during the pandemic. During the pandemic period, only 5 children (1.2%) continued to be vaccinated at the hospital. The rate of administration of rotavirus and meningococcalvaccines which are not included in the routine childhood immunization program was 10.2%

Table 4: Impact of COVID-19 pandemic on vaccination outcomes, n (%)

	Before Pandemic	During Pandemic
Routine Childhood Vaccination		
Yes	400 (99.7)	400 (99.7)
No	1 (0.3)	1 (0.3)
Place of Vaccination		
Family health center	383 (95.8%)	395 (98.5)
Hospital	17 (4.2.)	5 (1.2)
Time of Vaccination		
On time	399 (99.5)	399 (99.5)
Delayed	1 (0.2)	1 (0.2)
Non-routine vaccinations (Rotavirus, meningococcus)		
Yes	41 (10.2)	
No	360 (89.8)	

DISCUSSION

Routine childhood immunization is one of the most easy apply, cost effective, and safest intervention method at controlling numerous childhood diseases. It is vital to be applied timely to maximize protection from vaccine-preventable diseases, particularly for diseases such as measles for which a high coverage is required to prevent outbreaks. Turkey's childhood immunization program is comprised of diphtheria, pertussis, tetanus, polio, invasive Haemophilus influenzae type b, measles, mumps, rubella, tuberculosis, chickenpox, hepatitis A, hepatitis B and Streptococcus pneumoniae.[11] However there is not enough number of studies which show the effect of COVID-19 pandemic on routine immunization program in children in Turkey.

In Turkey, face-to-face education was terminated in schools and online education was started on March 16, 2020. This situation lasted 540 days. With the introduction of online education, the rate of children leaving the home has decreased significantly. Also, the goverment decided to keep especially children, in lockdown many times. Our study also showed that the duration of children going out of the house decreased to 0.84 (±1.29) days during the pandemic, and a large proportion of them (58.1 %) never went out. It was important so that children, called silent super-spreaders, would not to be infected and infect others.[12]

According to the health systems information provided by over 90% of countries to the WHO, the rate of disruptions in essential healthcare programs was 33% in the first quarter of 2021 and this rate increased to almost 50% in the last quarter of 2021.[13] There has been a serious decrease particularly in vaccination rates in many countries. WHO and United Nations Children's Fund (UNICEF) announced that the number of children without routine vaccinations increased by 3.7 million in 2020 compared to the previous year. It was stated that 17 million children were not vaccinated at all in 2020. WHO declared a 28-year reduction in global coverage for tetanus-diphtheria and pertussis (TDaP) vaccine.[14] For example, 23 million children did not complete the third dose of DPT3(diphtheria, pertussis, and tetanus) in 2020. This figure was more than 3.7 million in 2019.[15]WHO has advised that routine immunization services should continue to aim for high population immunity.[16] Countries will require immunization recovery plans/ catch-up programs with innovative approaches to delivery that maintain physical distancing requirements. A study form Japan showed that the decline in vaccine doses administered in all cities started as early as the COVID-19 emergency.[17] Similar situations occurred in the United Kingdom (UK). Two key milestones in the routine childhood immunization program, Hexavalent vaccine and MMR vaccine, counts were compared in weeks 1-17 2019 and 2020 in UK by McDonald et al. The results showed that hexavalent vaccination was 6.7% lower; MMR vaccination was 19.8 % lower than the same periods in 2019.[18] The increase in the rate of measles cases after the Ebola outbreak is a good example to evaluate the long-term effects of the decrease in vaccination rates during the pandemic. The Ebola outbreak in 2014-2015 caused significant disruption of the health service delivery in Africa and vaccination rates against measles decreased more than 25% compared to previous years. The studies showed that measles incidence increased and the mean age of measles cases decreased. Although a strong vaccination catch up program, measles incidence had remained higher compared to the pre-Ebola period for 2 years.[19]

The situation was different in Turkey, which carries out important studies on childhood vaccines. Childhood vaccination coverage in Turkey is routinely monitored but more timely monitoring is required during the disruption of a pandemic. Rates of receiving the third dose of the 5-combined vaccine (diphtheria, pertussis, tetanus, polio, haemophylus influenza B) reached 98 % in 2018, 99 % in 2019 and 98 % in 2020. Vaccination rates in the last 10 years have been over 95 percent.[20] Our data also show that there has been no disruption in the pandemic process regarding vaccination. Routine childhood vaccination was applied at a rate of 99.7% and on time both before and during the pandemic, almost all of which were held in family health centers. These data show that despite the closure of schools, booster shots of childhood vaccines which were applied in classrooms, continue to be applied successfully.

Since it is not included in the routine childhood immunization program in Turkey, the rate of rotavirus and meningococcalvaccines is still low. In a study the incidence of rotavirus vaccination was found 7% in 2014.[21] In our study, the rate of non-routine vaccination was consistent with the results of this study (10.2 %). Healthcare professions can inform parents about the importance of rotavirus and meningococcal vaccines that are not routinely administered during routine vaccinations practice.

Physical- social distancing protocols have caused communication gap between health care workers' and families. Weekly visits to different departments dropped below the expected number during the early phase of the pandemic. The most notable among these departments was pediatrics. One study showed that pediatrics was the department where weekly visits decreased the most, with a decrease of 24% compared to expected numbers. Physical medicine & rehabilitation, Pulmonology and Otolaryngology followed Pediatrics with 11% reduction of weekly visits. Moreover, compared to baseline outpatient visits between March 1-7, the biggest change in the average number of outpatient visits between weeks 10-52 of 2020 was in Pediatrics with 27% decrease. After September 2020, while the visit volumes for older adults remained more stable, on the contrary, the age group where the volume decreased the most was the children aged between 0-5.[22]Beginning in March 2020, the COVID-19 pandemic dramatically declined the healthcare services, especially delivery of outpatient care and elective surgeries month by month in Turkey, too. The total number od visits per phsician was 5055 in 2019 and 3505 in 2020 according to the data of Turkish Statistical Institute (TURKSTAT).[23]Our data showed that while only 36.9% of pediatric age group patients with chronic diseases were checked up in 2021, the rate of control of chronic diseases reached the pre-pandemic period by increasing to 90.3% in 2022. It is thought that the increase in the number of people who have acquired passive or active immunity against the COVID-19, the lower rates of severe disease in the newly emerged variants and the relaxation of pandemic restrictions cause this proportional change.

In the early stages of pandemic, while most of the patients with the symptoms of URTI and AGE hesitate to apply to the hospital. But despite that, the rate of applying to the hospital was significantly higher for those with LRTI and other disease symptoms compared to those who did not (p=0.000). In the late times of pandemic, it was observed that the number of patients with URTI symptoms increased and there was a large change in the rate of admission to hospital of these patients.

All of the patterns of transmission of viruses really slowed down from shutdown with preventive measures such as masking. However, there was a serious flu season in 2022 and doctors around the world were raising the alarm about hospitals being overwhelmed this season. Intermingling of different viruses including influenza, SARS-CoV-2, and RSV worsened the situation in hospitals. Influenza and RSV activity was high and were driving a significant number of visits to emergency departments. The weekly rate of influenza-associated hospitalization observed in the week between November 26- December 3, 2022 was the third highest peak weekly rate observed during all seasons going back to 2010-2011.[24]Among persons aged <65 years, hospitalization rates per 100 000 population were highest among children aged 0-4 years (70.2). The reported numbers of influenza-associated pediatric deaths were 1 in 2020-2021 season, 44 in 2021-2022 season and 74 during the 2022-2023 season to CDC.[24] We think that there has been such a large increase in the rate of hospital admissions of patients with LRTI symptoms due to both the tightening of the pandemic measures and the decrease in people's fears, hesitations about this issue and this bad flu season.

This study has some limitations. As with any convenience sample of providers, the patterns we observe may not be representative of all organizations nationally or regionally. Therefore, multicenter studies with larger participants may be needed. However, this study is important due to showing how 3 major component of health system; outpatient clinic visits, routine childhood immunization and neonatal screening program, were effected by COVID-19 in the different times of pandemic.

CONCLUSION

It was shown how the COVID-19 pandemic affected the outpatient clinic visits and well child check ups. Thanks to Turkey's strong health policy, there is no such thing as the spread of diseases that can be prevented by vaccines which could cause a bigger disaster besides the pandemic. Especially in family health centers, it was observed that vaccination applications COVID-19 pandemic can disrupt the health system, especially with the disruption of chronic disease follow-ups. Therefore, our work calls for a policy response to maintain basic care for chronic diseases during pandemics. At least, it can be aimed to use the telemedicine system more effectively, to carry out regular follow-ups of these patients under social isolation measures and calling them for hospital visits when necessary can prevent possible complications due to chronic conditions. Determining the strengths and weaknesses of the strategies implemented in the health system during the pandemic period will guide the measures to be taken for similar situations that may occur in the future.

Author contributions

Conceptualization, G.O. and D.S; methodology, G.O; formal analysis, G.O.; investigation, G.O.; resources, G.O. and D.S; data curation, G.O. and D.S; writing—Original draft preparation, G.O.; writing—Review and editing, G.O. and D.S. All authors have read and agreed to the published version of the manuscript.. GO is the guarantor of the paper.

Informed consent was obtained from all individual participants included in the study.

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to institutional policy.

This research received no external funding.

Acknowledgements

We wish to express our profound appreciation to Prof Dr Medine Aysin TASAR who doesn't hesitate to offer her support in the discussion of the present paper. We thank Prof. Dr. Dario Iafusco and Carmine Bianco, who checked the study for English language rules.

Authors have no conflict of interest to declare.

REFERENCES

1. Madhav N, Oppenheim B, Gallivan M, Mulembakani P, Rubin E, Wolfe N. Pandemics: Risks, Impacts, and Mitigation. In: Jamison DT, Gelband H, Horton S, et al., eds. Disease Control Priorities: Improving Health and Reducing Poverty. 3rd ed. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; November 27, 2017.

2. WHO Coronavirus (COVID-19) Dashboard. Global Situation. Available at: https://COVID19.who.int/. (Accessed January 20, 2023).

3. Ozen G, Zanfardino A, Ozen G, Acan B, Piscopo A, Casaburo F, et al. Comparison of emotional approaches of medical doctors against COVID-19 pandemic: Eastern and Western Mediterranean countries. Int J Clin Pract. 2021;75(12):e14973. doi:10.1111/ijcp.14973

4. Centers for Disease Control and Prevention. Interim Guidance for routine and ınfluenza ımmunization services during the COVID-19 pandemic. Available at: https://www.cdc.gov/vaccines/pandemic-guidance/index.html. Published 2020. Updated June 20, 2021. (Accessed January 20, 2023).

5. Bramer CA, Kimmins LM, Swanson R, Kuo J, Vranesich P, Jacques-Carroll LA, et al. Decline in child vaccination coverage during the COVID-19 pandemic - Michigan Care Improvement Registry, May 2016-May 2020. Am J Transplant. 2020;20(7):1930-1. doi:10.1111/ajt.16112

6. Buonsenso D, Cinicola B, Kallon MN, Iodice F. Child healthcare and ımmunizations in Sub-Saharan Africa during the COVID-19 pandemic. Front Pediatr. 2020;8:517. doi:10.3389/fped.2020.00517

7. MacDonald NE, Comeau JL, Dubé È, Bucci LM. COVID-19 and missed routine immunizations: designing for effective catch-up in Canada. Can J Public Health. 2020;111(4):469-472. doi:10.17269/s41997-020-00385-4

8. Harris RC, Chen Y, Côte P, Ardillon A, Nievera MC, Ong-Lim A, et al. Impact of COVID-19 on routine immunisation in South-East Asia and Western Pacific: Disruptions and solutions. Lancet Reg Health West Pac. 2021;10:100140. doi:10.1016/j.lanwpc.2021.100140.

9. Erdogan SS, Gur TF, Dogan B. Assessment of children and adolescent presenting to the dermatology outpatient clinic in Turkey during the coronavirus disease-2019 pandemic. North Clin Istanb. 2021;8(4):340-344. doi:10.14744/nci.2020.90836

10. Mehrotra A, Chernew M, Linetsky D, Hatch H, Cutler D. The Impact of the COVID-19 Pandemic on Outpatient Visits: A Rebound Emerges. To the Point (blog); Commonwealth Fund, May 19, 2020. doi:10.26099/ds9e-jm36.

11. Şimşek Orhon F. Genişletilmiş Bağışıklama Programına Her Yönüyle Bakış. Osmangazi Tıp Dergisi. 2020; 6-14.

12. Yonker LM, Neilan AM, Bartsch Y, Patel AB, Regan J, Arya P, et al. Pediatric severe acute respiratory syndrome Coronavirus 2 (SARS-CoV-2): Clinical presentation, ınfectivity, and immune responses. J Pediatr. 2020;227:45-52.e5. doi:10.1016/j.

13. Third Round of The Global Pulse Survey on Continuity of Essential Health Services During the COVID-19 Pandemic: November–December 2021. WHO/2019-nCoV/EHS_continuity/survey/2022.1. World Health Organization, Geneva 2022. (Accessed January 20, 2023).

14. World Health Organization. WHO and UNICEF warn of a decline in vaccinations during COVID-19 (2020). Available at: https://www.who.int/news/item/15-07-2020-who-and-unicef-warn-of-a-decline-in-vaccinations-during-COVID 19pandemic. (Accessed January 20, 2023).

15. COVID-19 pandemic leads to major backsliding on childhood vaccinations, new WHO, UNICEF data shows; 2022. Available at: https://www.who. int/news/item/15-07-2021-COVID-19-pandemic-leads-to-major-backsliding-on-childhood-vaccinations-new-who-unicef-data-shows. (Accessed January 20, 2023).

16. World Health Organization Regional Office for Europe (WHO/Europe). Guidance on routine immunization services during COVID-19 pandemic in the WHO European Region, 20 March 2020. Copenhagen: WHO/ Europe; 2020. Available at: https://apps.who.int/iris/handle/10665/334123 (Accessed January 20, 2023).

17. Aizawa Y, Katsuta T, Sakiyama H, Tanaka-Taya K, Moriuchi H, Saitoh A. Changes in childhood vaccination during the coronavirus disease 2019 pandemic in Japan. Vaccine. 2021;39(29):4006-12. doi:10.1016/j.vaccine.2021.05.050.

18. McDonald HI, Tessier E, White JM,Woodruff M, Knowles C, Bates C, et al. Early impact of the coronavirus disease (COVID-19) pandemic and physical distancing measures on routine childhood vaccinations in England, January to April 2020. Euro Surveill. 2020;25(19):2000848. doi:10.2807/1560-7917.ES.2020.25.19.2000848.

19. Masresha BG, Luce R Jr, Weldegebriel G, Katsande R, Gasasira A, Mihigo R. The impact of a prolonged ebola outbreak on measles elimination activities in Guinea, Liberia and Sierra Leone, 2014-2015. Pan Afr Med J. 2020;35:8. doi:10.11604/pamj.supp.2020.35.1.19059.

20. Başaran B, Soytutan Çağlar I, Aygun A, Ozdemir TA, Kulali B. Health Statistics Yearbook 2019. General Directorate of Health Information Systems, Ministry of Health, Ankara, 2021. ISBN: 978-975-590-793-2

21. Kaçmaz Ersü N, Ersü A, Öztürk YK, Helvacı M, Öngel K. Gastroenterit tanısı ile hastanede yatan çocukların özellikleri ve ebeveynlerin rotavirüs aşısı hakkındaki bilgi düzeyleri. İzmir Dr. Behçet Uz Çocuk Hastanesi Dergisi. 2016;6(3):203- 8.

22. Mehrotra A Chernew M Linetsky D, Hatch H, Cutler DM, Schneider EC. The impact of COVID-19 on outpatient visits in 2020: Visits remained stable, despite a late surge in cases. Commonwealth Fund; February 22, 2021. Available at: 10.26099/bvhf-e411 . (Accessed January 20, 2022).

23. Sağlık Harcamaları İstatistikleri, 2021. Available at: https://data.tuik.gov.tr/Kategori/GetKategori?p=Saglik-ve-Sosyal-Koruma-101. (Accessed January 20, 2023).

24. Centers for Disease Control and Prevention, The Influenza Hospitalization Surveillance Network (FluSurv-NET), Available at: https://www.cdc.gov/flu/weekly/influenza-hospitalization-surveillance.htm. (Accessed January 20, 2023).