



Cesarean section rates in Turkey 2018-2023: Overview of national data by using Robson ten group classification system

Türkiye’de sezaryen oranları 2018-2023; Robson on grup sınıflandırma sistemini kullanarak ulusal verilere genel bakış

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Abstract

Objective: Cesarean section (CS) rates continue to rise globally because of various factors. Medically unnecessary cesarean operations have no benefit to the mother or child’s health. Since the World Health Organization (WHO) has determined that the acceptable CS rate should not be more than 10-15%, it also stated the use of a classification system to compare different patient groups and facilities. Turkey has the highest CS rates globally and has been rising over the years. This study aims to assess CS rates between 2018 and 2023 using National Health Data and to analyze them according to the Robson classification system and WHO reference values to discuss possible measures against increasing rates.

Materials and Methods: In this study, we assessed the rates of CSs between 2018 and 2023; the CS rate including all 5-years and analysis of CS rates for each Robson group as advocated by WHO. Also, another assessment was done of the facilities where the CSs were applied (Public, private, or university hospitals).

Results: The total number of births recorded between 2018 and 2023 was 6.161.976. The overall CS rate was 57.55%. The number of total CS operations was 3.546.049. The primary CS rate was 28.83% (N:1.776.503). Significant differences were observed between the public and private centers for each Robson group.

Conclusion: The CS rates of Groups 1-4 are obviously higher than expected. The CSs of these groups cumulatively affect the rates of other groups. Nulliparous women have CSs mostly in private hospitals. There is a need for improvements in the health system in this regard for better maternal and child health.

Keywords: Turkey, cesarean section rate, delivery, Robson, WHO

Öz

Amaç: Sezaryen oranları, çeşitli faktörler nedeniyle tüm dünyada artmaya devam etmektedir. Tıbbi açıdan gerekli olmayan sezaryen operasyonlarının anne ve yenidoğan sağlığına anlamlı bir faydası olmadığı bilinmektedir. Dünya Sağlık Örgütü (DSÖ) kabul edilebilir sezaryen oranının %10-15’i geçmemesi gerektiğini belirlediğinden, farklı hasta gruplarını ve sağlık tesislerini karşılaştırmak için bir sınıflandırma sisteminin kullanılması gerektiğini de vurgulamıştır. Türkiye, dünya çapında en yüksek sezaryen oranlarına sahiptir ve bu oranlar yıllar içinde artmaya devam etmektedir. Bu çalışma, Ulusal Sağlık verilerini kullanarak 2018-2023 yılları arasındaki sezaryen oranlarını değerlendirmeyi ve artan oranlara karşı olası önlemleri tartışmak için Robson sınıflandırma sistemi ve DSÖ referans değerlerine göre analiz etmeyi amaçlamaktadır.

PRECIS: Total and primary CS rates between 2018-2023 were 57.55, 28.83% respectively and Robson Groups 1-4 groups constituted 58% of cesarean sections.

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Gereç ve Yöntemler: Bu çalışmada 2018 ile 2023 yılları arasındaki sezaryen oranlarını değerlendirdik; 5 yılın tamamını içeren sezaryen oranı ve DSÖ tarafından önerilmiş olan On Gruplu Robson sınıflama sistemi kullanılarak her bir grup için sezaryen oranlarının analizi ve ayrıca, sezaryenlerin uygulandığı tesislerin (Kamu, özel veya üniversite hastaneleri) oranlarının da değerlendirmesi ve analizi yapılmıştır.

Bulgular: 2018-2023 yılları arasında kaydedilen toplam doğum sayısı 6.161.976 olarak gerçekleşmiştir. Genel olarak sezaryen oranı %57,55 idi. Toplam sezaryen operasyon sayısı 3.546.049 olarak gerçekleşmiştir. Primer sezaryen oranı %28,83 (N:1,776,503) idi. Her bir Robson grubu için kamu ve özel merkezler arasında önemli farklılıklar olduğu ve özel hastanelerde sezaryen oranlarının kamu hastanelerinden belirgin olarak yüksek olduğu gözlemlendi.

Sonuç: Grup 1-4'ün sezaryen oranları açıkça beklenenden daha yüksektir. Bu grupların sezaryen olmas kümülatif olarak diğer grupların oranlarını da belirgin olarak etkilemektedir. Nullipar kadınların sezaryenleri çoğunlukla özel hastanelerde gerçekleştirilmektedir. Anne ve çocuk sağlığının geliştirilmesi için sağlık sisteminde bu konuda iyileştirmelere ihtiyaç vardır.

Anahtar Kelimeler: Türkiye, sezaryen oranı, doğum, Robson, DSÖ

Introduction

The cesarean section (CS) is an operative mode of delivery that can be lifesaving for the mother and fetus under certain circumstances. However, as it is an operation itself; contains various risks and possible complications that may be encountered. CS rates continue to rise globally, especially in middle- and high-income countries during the last few decades⁽¹⁾. This increase has been attributed to various factors that may vary across most countries⁽¹⁻³⁾. When medically necessary, CS effectively prevents perinatal mortality and morbidity. However, in cases where CS is not necessary, there is no evidence showing the benefit of CS for the mother or child. In recent years, governments and clinicians have expressed concerns about the increasing number of cesarean deliveries and the potential negative consequences of CS for maternal and child health⁽⁴⁾. In addition, the cost is an important factor for equitable access to resources in improving maternal and newborn health, and cesarean deliveries pose a serious financial burden, especially on overburdened and often weak health systems, as they require more expenditure.

Since the World Health Organization (WHO) has determined the acceptable CS rate should not be more than 10-15% there has been a necessity for a classification system of cesareans to analyze and make proper comparisons between countries or even different hospitals or healthcare systems⁽⁵⁾. The most challenging part in defining the optimum cesarean rate is the lack of a reliable and internationally accepted classification system to produce standardized data in providing a tool that can be used to compare populations at any level and to investigate the increasing trend of cesarean rates. In 2001, the system proposed by Robson⁽⁶⁾ stratified women according to their obstetric characteristics so that comparisons can be made with fewer confounding factors. This system classifies women independently into ten different groups based on five basic birth characteristics. This classification is simple, reliable, reproducible, clinically significant, and prospective in every woman presenting for delivery. Allows the comparison and analysis of CS rates within and between groups⁽⁷⁾. To control and provide acceptable rates for CS globally, the WHO made a statement regarding the use of the Robson classification as a global reporting tool for CS rates^(7,8). Moreover, in 2013, a cross-sectional study; "The WHO Multicountry Survey on Maternal

and Newborn Health" was published, implementing data from 29 countries to settle reference values for CS rates that are globally applicable. Based on WHO MCS, another study was conducted to create mathematical modeling for reference value generation for the health facilities of each country^(9,10).

Unfortunately, Turkey has the highest CS rates globally and has been rising over the years since the last decade⁽¹¹⁾. This study aims to assess CS rates between 2018 and 2023 using National Health Data and to analyze them according to the Robson classification system and WHO reference values to discuss possible measures against increasing rates.

Materials and Methods

The Ministry of Health in Turkey has been analyzing CS rates since 2014 through the electronic registration system. The system takes information from the hospitals' electronic automation system, which includes data on obstetric outcomes, Robson classification, and birth certificates from the state (public), private, and university hospitals all over Turkey. Robson's woman-based totally inclusive and mutually exclusive 10-group classification employs simple clinical obstetrical parameters (parity, previous CS, gestational age, the onset of labor, fetal presentation, and number of fetuses). In the present study, we assessed the rates of CS delivery for each year between 2018 and 2023; the CS rate including all 5-years, and analysis of CS rates for each Robson group as advocated by WHO. We aimed to evaluate the contribution of each Robson group to the CS rate and calculate how much deviation there is from the global reference values prescribed by the WHO. Also, another assessment was done of the facilities where the CSs were applied (public, private, or university hospitals); therefore, it would be important to reveal the contribution of different kinds of stakeholders and to shed light on solution suggestions for reducing the CS rates. This cohort has been undertaken by the Ministry of Health through a specific circular. Data collection permission was granted from the Ministry of Health.

Statistical Analysis

We performed the statistical analysis with the Statistical Package for Social Sciences (SPSS 26.0 IBM SPSS Inc., Chicago, IL) program. Demographic data are presented as numbers with percentages (%). To determine the statistical difference between

categorical data (Robson group cesarean rates among facilities), we used the Pearson chi-square test and presented the crude odds ratio. Risk ratio/relative risk was also calculated for a more detailed presentation. Statistical significance of the p-value accepted as $p < 0.05$ at 95% confidence interval.

Results

The total number of births recorded between May 2018 and June 2023 was 6.161.976. The overall CS rate between 2018 and June 2023 was 57.55 %. The number of total CS operations performed was 3.546.049. The primary CS rate was 28.83%, which means that 1.776.503 primary CSs were performed during this period. According to the WHO MCS population reference calculation, the number of CSs and primary CS operations were expected as 1.833.116 and 754.039 respectively⁽¹⁰⁾. However, in our country, the number of applied CSs was approximately twice the value.

Robson Classification of the CSs

The classification of the CS numbers according to the Robson Classification System is shown in Table 1. Robson groups 1,2,3 and 4 comprised 58.4% of all CSs. Another analysis of the CSs shows the rates disaggregated according to the health facilities (public, university, and private hospitals) where CSs are performed (Table 2). Also, the risk ratios and odds ratios for having a CS based on the health facility are detailed in Table 2. This analysis revealed the risk of having CS in a group of patients with similar characteristics when applied to a different kind of health facility. Table 3 shows pairwise comparisons of centers for each Robson group in terms of CS rates (Public vs. University, public vs private, and private vs university).

When the centers were compared with each other, significant differences were observed in each Robson group, especially between the public and private centers.

When Robson group 1 was examined from this viewpoint, it was seen that the CS rate was significantly higher than the reference values according to WHO. The total risk ratio was calculated as 5.80. Among this group, admission to a private hospital was associated with significantly higher cesarean rates. Examination of Robson group 2 revealed that the CS rate was found to be higher compared to the reference values of WHO. In this group, the highest risk rate for CS was found in university hospitals. It was observed that the total risk ratio was 8.18. The highest risk of having CS was found to be 33.43 in private hospitals. In university-based hospitals, the risk ratio is 23.23; and the odds ratio was calculated as 33.15.

In the Robson 4 group, while public hospitals showed compatible results with the reference values, a 6.34 risk ratio was calculated in university hospitals (odds ratio: 7.27). In the Robson 5 group, the CS rate was again significantly higher than the reference values. 97.9% of the women who had a previous CS had a repeat CS operation.

CS rates in the Robson 6,7,8,9 groups were consistent with the expected reference values. Women with a breach presentation (Groups 6 and 7); underwent CS with percentages of 97.6% and 95.2%, respectively. CS rates of Robson group 10 in all three kinds of health facilities were also significantly higher than the WHO reference values.

Table 3 shows pairwise comparisons of centers for each Robson group in terms of CS rates (Public vs University, public vs private, and private vs university). When the centers were compared with each other, significant differences were

Table 1. Number of cesarean (CS) deliveries according to Robson Classification

Robson Group		Number of Cesarean Sections	WHO MCS*	Total Number of Deliveries
1	Nulliparous, single, cephalic, 37 weeks, spontaneous labor	823.300	143.500	1.500.000
2	Nulliparous, single, cephalic, 37 weeks, induction, or CS before labor	107.600	68.500	217.000
3	Multiparous, (exclude previous CS), single, cephalic 25 032/224 300 Public 32.5 Public 6.9 2.8 37-week spontaneous labor	244.700	29.900	1.700.000
4	Multiparous, (exclude previous CS), single, cephalic, 24 720/67 088 Public 7.9 Public 26.3 2.8 37 weeks, induction or CS before labor	37.000	23.400	200.900
5	Previous CS single cephalic 37 weeks	1.400.000	867.300	1.400.000
6	All nulliparous breeches	151.200	154.700	154.900
7	All multiparous breeches (including previous CS)	146.600	151.300	153.800
8	All multiple pregnancies (including previous CS)	183.900	109.500	199.400
9	All abnormal lies ((including previous CS)	96.900	98.500	100.400
10	All single, cephalic, <36 weeks (including previous CS)	353.500	159.200	534.100
	Total	3.546049	1.833.116	6.161.976

* Global reference for CS rates from WHO Multi-Country Survey (MCS)

Table 2. The number of CS operations/number of women delivered, size of the group (%), CS rate (%), and contribution of each group to CS (%) according to Robson and distribution according to different types of Health Facilities

Robson group	Number of cs/ number of women delivered	Healthcare Facilities	CS rate (%) ^a of each institution in each Robson level	RDG CS rate of each institution	Risk ratio (CS rate/RDG CS Rate) ^b	Odds ratio with CI (CS rate/ RDG CS rate)	Patient percentage (%) ^c among Robson score	Patient percentage (%) ^c in all CS patients
1	191763/601438	Public	31.88	9.77	3.26*	4.32 (4.27-4.36)	39.82	24.51
	33446/56413	University	59.29	9.22	6.43*	14.93 (14.45-15.42)	3.74	
	614209/863852	Private	71.10	9.35	7.60*	23.85 (23.65-24.05)	57.19	
	832281/1510372	Total	55.10	9.50	5.80*	11.69 (11.62-11.76)		
2	35224/105959	Public	33.24	31.90	1.04*	1.06 (1.04-1.08)	48.33	3.52
	6468/7961	University	81.25	31.67	2.57*	9.34 (8.68-10.06)	3.67	
	66701/104560	Private	63.79	31.21	2.04*	3.88 (3.81-3.95)	48.18	
	107575/217012	Total	49.57	31.55	1.57*	2.13 (2.10-2.15)		
3	117822/1206909	Public	9.76	2.15	4.54*	4.92 (4.86-4.99)	72.27	27.10
	16021/51860	University	30.89	1.33	23.23*	33,15 (30,68-35,82)	3.11	
	112505/420736	Private	26.74	0.80	33.43*	4.20 (4.14-4.25)	25.19	
	244659/1669923	Total	14.65	1.79	8.18*	9.41 (9.30-9.53)		
4	15853/128474	Public	12.34	12.34	1.00**	-	63.96	3.26
	2211/4062	University	54.43	8.59	6.34*	7.27 (6.53-8.10)	2.02	
	19100/69290	Private	27.57	10.50	2.63*	3.24 (3.15-3.34)	34.49	
	36969/200877	Total	18.40	11.63	1.58*	1.71 (1.68-1.74)		
5	655305/673265	Public	97.33	60.52	1.61*	23.80 (23.43-24.20)	47.37	23.06
	74827/75773	University	98.75	60.71	1.63*	51.19 (47.93-54.67)	5.33	
	671757/681699	Private	98.54	61.54	1.60*	42.22 (41.37-43.01)	47.97	
	1392478/1421180	Total	97.98	61.03	1.61*	30.98 (30.60-31.36)		
6	32240/34177	Public	94.33	99.92	0.94*	0.013 (0.009-0.002)	22.07	2.51
	6144/6524	University	94.18	100	0.94*	0.001 (0.0001-0.0198)	4.21	
	114117/115470	Private	98.83	99.86	0.99*	0.118 (0.100-0.139)	74.55	
	151235/154889	Total	97.64	99.88	0.98*	0.050 (0.043-0.058)		

Table 2. continued

Robson group	Number of cs/ number of women delivered	Healthcare Facilities	CS rate (%) ^a of each institution in each Robson level	RDG CS rate of each institution	Risk ratio (CS rate/RDG CS Rate) ^b	Odds ratio with CI (CS rate/ RDG CS rate)	Patient percentage (%) ^c among Robson score	Patient percentage (%) ^c in all CS patients
7	47014/52142	Public	90.17	99.12	0.91*	0.081 (0.074-0.090)	33.90	2.50
	8498/9059	University	93.81	99.28	0.94*	0.109 (0.084-0.142)	5.89	
	91946/93567	Private	98.27	97.82	1.00*	1.26 (1.18-1.35)	60.82	
	146557/153832	Total	95.27	98.34	0.97*	0.340 (0.325-0.356)		
8	64342/74666	Public	86.17	55.21	1.56*	5.05 (4.92-5.18)	37.45	3.24
	183886/199394	University	93.82	57.52	1.63*	8.75 (8.59-8.92)	10.36	
	101535/105517	Private	96.23	54.19	1.78*	21.55 (20.83-22.30)	52.92	
	183886/199394	Total	92.22	54.91	1.68*	9.74 (9.56-9.92)		
9	26853/29878	Public	89.88	97.96	0.92*	0.185 (0.169-0.202)	29.75	1.63
	3472/3528	University	98.41	99.77	0.99*	0.141 (0.067-0.296)	3.51	
	67193/67609	Private	99.38	98.05	1.01*	3.21 (2.87-3.59)	67.33	
	96948/100416	Total	96.55	98.08	0.98	0.547 (0.517-0.579)		
10	142593/271070	Public	52.60	30.36	1.73	2.54 (2.51-2.57)	50.75	8.67
	353461/534081	University	78.46	30.43	2.58	4.47 (4.44-4.51)	9.30	
	174909/217547	Private	80.40	28.99	2.77	10,05 (9.90-10.19)	40,73	
	353461/534081	Total	66.18	29.80	2.22	4.61 (4.57-4.65)		
All groups	1329009/3177978	Public	41.82	25.99	1.61	2.05 (2.04-2.05)	21.6	100
	209438/285509	University	73.36	35.18	2.09	5.07 (5.02-5.13)	3.4	
	2033972/2739847	Private	74.23	34.20	2.17	5.54 (5.52-5.56)	33.0	
	3546049/6161976	Total	57.55	27.75	2.07	35.29 (35.22-35.37)	57.5	

CI: Confidence Interval, *: Row percentage, ^b: Pearson chi-square test was used, ^c: Column percentage, *Significant at level <0.001, **p=0

observed in each Robson group, especially between the public and private centers.

Discussion

This study is the largest cohort study conducted in Turkey to date, which constitutes the National Data of the 5-year period.

Data from more than 6 million deliveries and more than hundreds of healthcare facilities are analyzed and categorized according to the Robson classification system. The overall and primary CS rates between 2018 and June 2023 were 57.55% and 28.83%, respectively. When analyzed according to the ten groups of Robson, it was found that Groups 1-4 constituted

Table 3. Analysis of differences in CS rates between healthcare facilities

Robson group	Public vs University ^a		Public vs Private ^a		Private ^a vs University	
	Risk ratio	Odds ratio ^b (CI)	Risk ratio	Odds ratio ^b (CI)	Risk ratio	Odds ratio ^b (CI)
1	1.86	3.11 (3.06-3.17)*	2.23	5.26 (5.22-5.29)*	1.20	1.69 (1.66-1.72)*
2	2.44	8.70 (8.21-9.22)*	1.92	3.54 (3.47-3.60)*	0.79	0.407 (0.384-0.431)*
3	3.16	4.13 (4.05-4.21)*	2.74	3.37 (3.34-3.40)*	0.87	0.816 (0.800-0.833)*
4	4.41	8.49 (7.96-9.05)*	2.23	2.70 (2.64-2.77)*	0.51	0.319 (0.299-0.340)*
5	1.01	2.17 (2.03-2.31)*	1.01	1.85 (1.80-1.90)*	1.00	0.854 (0.799-0.913)*
6	1.00	0.971 (0.867-1.09)*	1.05	5.06 (4.72-5.44)*	1.05	5.22 (4.64-5.86)*
7	1.04	1.65 (1.51-1.80)*	1.09	6.19 (5.84-6.55)*	1.05	3.74 (3.39-4.13)*
8	1.09	2.43 (2.29-2.59)*	1.12	2.44 (2.29-2.59)*	1.03	4.09 (3.94-4.25)*
9	1.09	1.68 (1.58-1.79)*	1.11	10.64 (9.52-11.90)*	1.01	1.68 (1.58-1.79)*
10	1.49	3.28 (3.21-3.36)*	1.53	3.70 (3.65-3.74)*	1.02	1.13 (1.10-1.15)*
Total	1.75	3.83 (3.80-3.86)*	1.78	4.01 (4.00-4.02)*	1.01	1.05 (1.04-1.06)*

CI: Confidence interval, ^a: Reference category, ^b: Pearson chi-square test was used, *Significant at level <0.001

58.4% of all CSs. These four groups represent women who are more than 37 weeks pregnant without any previous CSs and have no presentation anomalies that make them proper candidates for vaginal delivery. However, more than half of this population has had primary CS with various indications. According to WHO reference values, almost two-thirds of these women should not have had a CS⁽¹⁰⁾. According to the available records, it is not possible to determine whether the cause of these CSs is due to an indicative situation that occurred during labor or the preference of the patient or the physician.

Our analysis determined significant differences between different healthcare facilities regarding CS rates. We presented this difference as risk ratio and odds ratio, which clearly revealed that admission to a private hospital is associated with the possibility of a CS more than either university or public hospitals on its own. This finding is compatible with the previous study by Eyi et al.⁽¹²⁾. In their study, they analyzed CS rates for 2017 over the National Health Record System and found overall CS rates as 51.2%. The CS rate in private hospitals was 70.6%, which was higher than that in university and public hospitals. This finding may actually be related to

some CS cases applied upon maternal request. As previously mentioned, increasing childbearing age, fear of childbirth, and sexual concerns may affect women's preferences on the mode of delivery^(13,14). The debate continues about whether the mother has the right to request CS. Several guidelines still advocate that CS should be applied under certain medical circumstances related directly to the health of the mother or fetus, but some support the woman's right to decide^(14,15).

Perhaps the most predictable of these findings is the increasing number and so the rate of women with previous CSs (Group 5). It is inevitable that the increase in the numbers in groups 1-4 will create serious accumulation in group 5 over the years. Women who had at least one CS (group 5) accounted for more than a quarter of all CSs. These women seem to be inevitably going through CS as the rate among them is 97.9%. Vaginal birth after CS seems to have a very low rate of 2.1%, which is clearly lower than in other countries as the rate of VBAC is approximately 10% in the USA⁽¹⁶⁾, rising to 45-55% in Finland, Sweden and Netherlands⁽¹⁷⁾. In the literature, evidence-based data support VBAC as a safe procedure that is applicable to many women under certain circumstances. However, there are

still several concerns on both the patient and clinician sides⁽¹⁸⁾. Knowing that encouraging VBAC may be one of the important strategies on the way to reducing CS rates; it is not so easy to achieve the goal until all the question marks are clear⁽¹⁸⁾. The decision process of women should be held professionally, including proper guidance and clarity about safety information. For the clinician, healthcare organizational support, teamwork ability, and clarification of the issue in the legislation system for medicolegal concerns are all truly important in reducing anxiety^(19,20).

As mentioned before, Turkey is a country with the highest CS rates. South American countries are the others with almost similar rates. In Brazil the overall CS rate was reported as 55.8%, and Group 5 had the highest contribution to the total numbers⁽²¹⁾. The same group in another paper stated that the high number of lawsuits and medicolegal issues prompted doctors to adopt a defensive approach while managing obstetric patients and as a result do more CSs⁽²²⁾. This may be attributable to our country as well. In the USA, the overall CS rate was 31.6%, having the highest contribution from Group 5⁽²³⁾.

The main strength of this study is being conducted on the largest population to date regarding overall CS rates and their Robson classification in Turkey. The previous reviews of National Data contained one-year projections⁽¹²⁾. Besides, of course, it is not free from some limitations. Working on big data has several challenges, as it is hard to get every single detail needed. National data come from more than one thousand facilities, and it is sometimes hard to standardize the recording ability and clarity. Despite all the difficulties, high numbers of patients allow researchers to reach better conclusions and make better comments on the big picture of a certain issue⁽²⁴⁾.

Conclusion

The use of the Robson classification system while recording and reporting the CSs provides a global tool to improve perspectives for reducing the rates. Based on the National Data from Turkey, there are groups that deserve to act. Groups 1-2 represent (Nulliparous, single, cephalic, 37 weeks, spontaneous labor/induction) favorable candidates for vaginal delivery, and probably are the population that will get the easiest response to various initiatives. Moreover, there were significant differences between healthcare facilities, especially private hospitals. This issue is of concern because of the financial burden of unnecessary CSs on the healthcare system. Several implementations have been investigated by different publications, these are worth discussing and can be adapted to the social and demographic characteristics of each country and inserted into the system.

Ethics

Ethics Committee Approval: Not necessary.

Informed Consent: Informed consent was obtained from all participants.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Concept: M.M.U., S.B., M.G.G., Design: S.B., T.A.E., Data Collection or Processing: M.M.U., T.A.E., M.G.G., Analysis or Interpretation: S.B., M.G.G., Literature Search: S.B., T.A.E., M.G.G., Writing: M.M.U., T.A.E.

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