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EPIDEMIOLOGIC CHARACTERISTICS OF FACIAL NERVE DISEASES IN A METROPOLIS ACCORDING TO THE UNIFIED MEDICAL CITY SYSTEMS

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ABSTRACT. Treatment of patients with diseases of the facial nerve (FN) is an important medical and social problem. It is highly relevant, but there are no recent epidemiological data on the prevalence of movement disorders in the facial area. An analysis of the epidemiological characteristics of facial nerve diseases is presented. The study conducted was based on the data taken from the Unified Medical Information and Analytical System (UMIAS) for 2019–2021. Cases of the first visit of a patient with a disease code group G51 were analyzed. 95% of the registered population of the metropolis is connected to the electronic system of the local polyclinics , therefore the number of patients with diseases of the facial nerve was counted per 100,000 attached population for each nosological unit separately in two categories — adults and children. The incidence of the idiopathic form of facial neuropathy in the adult population is 15.5 people per 100,000, symptomatic forms — 13.7, clonic hemifacial spasm — 1.2, Ramsay Hunt syndrome — 0.6, Rossolim–Malkersson–Rosenthal syndrome — 0.1. The incidence of the facial myokymia is 0.7 people per 100,000 population. The median age of adult patients was 40–50 years, women prevailed. The incidence among children and adolescents of the idiopathic form of facial nerve neuropathy is 9.6 people per 100,000, symptomatic forms — 11.8, Ramsay Hunt syndrome — 0.2. The median age in the group of children and adolescents varied depending on the pathology form from 8 to 16 years; no differences associated with gender were defined. An analysis of the epidemiology of FN diseases in Moscow for 2019–2021 was carried out. This became possible after the implementation of the UMIAS system. The UMIAS system opens up the possibility of obtaining reliable epidemiological data and can be offered as a single centralized mechanism for collecting and managing data.

KEYWORDS: facial nerve, facial nerve neuropathy, Bell's palsy, Ramsay Hunt syndrome, Rossolim–Malkersson–Rosenthal syndrome, hemifacial spasm, facial myokymia

ЭПИДЕМИОЛОГИЯ ЗАБОЛЕВАНИЙ ЛИЦЕВОГО НЕРВА В МЕГАПОЛИСЕ ПО ДАННЫМ ЕДИНОЙ МЕДИЦИНСКОЙ СИСТЕМЫ ГОРОДА

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РЕЗЮМЕ. Помощь пациентам с заболеваниями лицевого нерва (ЛН) является важной медико-социальной задачей. Несмотря на высокую актуальность, современные эпидемиологические данные о распространенности двигательных расстройств в области лица отсутствуют. Цель работы — проведение анализа эпидемиологических характеристик заболеваний ЛН в г. Москве. Исследование проведено по данным Единой медицинской информационно-аналитической системы (далее — ЕМИАС) за 2019–2021 гг. Учитывали случаи первичного обращения пациента с кодом заболевания группы G51. К городским поликлиникам прикреплено 95% зарегистрированного населения мегаполиса, поэтому расчет количества пациентов с заболеваниями лицевого нерва производили на 100 000 прикрепленного населения по каждой нозологической единице отдельно в двух категориях — взрослые и дети. Заболеваемость взрослого населения идиопатической формой нейропатии лицевого нерва составляет 15,5 человек на 100 000 населения, симптоматическими формами нейропатии лицевого нерва — 13,7, клоническим гемифациальным спазмом — 1,2, синдромом Рамсея Ханта — 0,6, синдромом Россолимо–Мелькерссона–Розенталя — 0,1. С лицевой миокимией обращаются 0,7 человек на 100 000 населения. Медиана возраста взрослых пациентов составила 40–50 лет, преобладали женщины. Заболеваемость среди детей и подростков идиопатической формой нейропатии лицевого нерва составляет 9,6 человек на 100 000 населения, симптоматическими формами нейропатии лицевого нерва — 11,8, синдромом Рамсея Ханта — 0,2. Медиана возраста в группе детей и подростков варьировала в зависимости от патологии от 8 до 16 лет, статистически достоверных различий по полу не выявлено. Впервые представлен анализ эпидемиологических характеристик заболеваний ЛН за 2019–2021 гг., что стало возможным благодаря внедрению системы ЕМИАС. Система ЕМИАС открывает возможности получения достоверных эпидемиологических данных и может быть предложена как единый централизованный механизм сбора и управления данными.

КЛЮЧЕВЫЕ СЛОВА: лицевой нерв, нейропатия лицевого нерва, невропатия лицевого нерва, паралич Белла, синдром Рамсея Ханта, синдром Россолимо–Мелькерссона–Розенталя, клонический гемифациальный спазм, лицевая миокимия

INTRODUCTION

Facial distortion in people causes dramatic thoughts up to suicidal thoughts, leads to social disadaptation, and isolation. Therefore, medical care for patients with facial nerve (FN) damage of various genesis is an important medical and social problem [1–4]. Diseases associated with facial nerve damage are classified in a separate group of the International Classification of Diseases (ICD-10) with codes G51.0-G51.9 [5].

Facial nerve neuropathy (FNN) is characterized by degenerative changes in the FN, clinically manifested by the development of facial asymmetry due to unilateral paresis and/or plegia of mimic muscles, restriction of eye closure, lacrimation or dryness of the eye, possible taste and hearing disorders [6]. The idiopathic form of FNN (Bell's palsy, ICD-10 code G51.0) resolves in 60–70% of cases with restoration of FN [7, 8]. In the remaining patients, the consequences in the form of facial asymmetry remain and complications develop, which may progress over time, such as hypertonicity of mimic muscles up to the onset of pain syndrome, synkinesis, and others. The presented epidemiological data on the incidence of FNN are contradictory. The figures vary from 8 to 32 cases per 100,000 people per year, with an equal frequency of development among men and women, mainly at the age of 40–60 years. It should be noted that authors find patterns of disease development associated with seasonality (autumn) or weather conditions (temperature change), comorbid background (diabetes mellitus) [9–13].

Some FN diseases are listed in separate ICD-10 codes. Ramsay Hunt syndrome (G51.1) is a herpetic lesion of the patellar node, characterized by FNN with pain and skin rashes; the incidence is about 12% of all FNN [14, 15]. Rossolimo–Melkersson–Rosenthal syndrome (G51.2) is a genetic disorder characterized by FNN combined with swelling of the lips and tongue folding, the incidence is 0.8% of all FNN [16].

Hemifacial spasm (HFS) (G51.3) is manifested by chronic paroxysmal painless involuntary unilateral tonic or clonic contractions of facial muscles, including at rest. It may be primary (because of the compression of the nerve root by one of the vessels) and secondary (trauma, organic lesions of the brain stem, parotid gland tumors, etc.); the cause of development determines the tactics of treatment. In HFS condition of mimic muscles worsens over time, their weakness progresses, tone increases (the pain syndrome appears), asymmetry worsens. The incidence is 14.5 per 100,000 women and 7.4 per 100,000 men [17].

Other disorders of facial nerve (G51.8) include trauma, complications of surgical, cosmetic, and dental interventions, neurological diseases, infections, and metabolic disorders [18, 19]. In such cases, the percentage of unfavorable outcomes is significantly higher [20]. In clinical situations when the cause of FNN is not completely clear, the diagnosis of "Disorder of facial nerve, unspecified" (G51.9) is established. All of the above conditions require diagnosis and timely treatment, up to surgical treatment. Patients need to be monitored, as their clinical situation may get worse.

Facial myokymia (G51.4) — recurrent unilateral self-limiting, low-amplitude, pulsating twitching in one of the facial muscles (more often the circular muscle of the eye), occurring due to physical or emotional overstrain, caffeine consumption, etc., resolved independently after removal of the unfavorable factor. Healthy people of young age suffer, statistics are unknown [21–23]. In most cases, facial myokymia is not a disease. The condition is benign, but requires observation, as any involuntary movement may be the debut of one of the FN diseases.

In childhood, the idiopathic form of FNN predominates among facial nerve lesions. The incidence among persons under 10 years of age is 2.7 per 100,000 persons per year, among persons from 10 to 20 years of age it is 10.1. Moreover, the authors note a better response to prednisolone therapy and a better prognosis for recovery of nerve function in childhood [24].

Despite the high relevance of the problem of facial movement disorders, current epidemiological data on their prevalence are insufficient.

The way to obtain reliable epidemiological data is one of the important tasks of the health care system. For more than ten years Moscow has been following the path of digitalization of the healthcare system. During this time, a unified digital environment has been created, which is the basis for the development of a system of medical services for citizens and doctors. At present, medical organizations of the public health care system of Moscow are united by the Unified Medical Information and Analytical System (hereinafter — UMIAS) into a single

digital space for storage, analysis, exchange of clinical and diagnostic data between medical workers and patients.

AIM

The aim is to analyze the epidemiological characteristics of FN diseases in Moscow (morbidity, gender and age structure).

MATERIALS AND METHODS

The present study was conducted according to the data of UMIAS Moscow in dynamics for 2019–2021 years. Cases of primary treatment of a patient with ICD-10 disease code G51 were taken into account. Patients were divided into two age groups: adults and children/adolescents, as well as into groups by ICD-10 code G51.0-G51.9 (Table 1).

Next, we obtained data on the total number of attached populations to health care facilities in Moscow according to the UMIAS system for 2019, 2020 and 2021 and calculated the statistical indicator of morbidity per 100,000 population of the corresponding age group: the number of new cases relative to the attached population for each year for each disease in both groups. The sex and the age structure were then presented for each disease associated.

Statistical methods

Statistical hypothesis testing was performed using IBM SPSS 23.00 program. Descriptive statistics is given in the form of: absolute (n) and relative values (%), medians (Me), lower [C25] and upper [C75] quartiles. The data were checked for normality of distribution using the Shapiro-Wilk test. Nonparametric comparison criteria were used to compare two groups: Mann–Whitney (U) and chi-square test (χ^2). The $p \leq 0.05$ was taken as the level of statistical significance.

Terminology

Prevalence is a statistical indicator that estimates all existing cases per year per 100,000 population (in the relevant age group); morbidity considers only new cases [25].

Children and adolescents are persons under 18 years of age; adults are persons over 18 years of age.

RESULTS

According to the Federal Service for State Statistics (Rosstat), the number of permanent population in Moscow averages about 12.6 million people per year [26]. About 95% of them are registered in the UMIAS system (Table 2).

Accordingly, morbidity was calculated for the population attached to UMIAS — the number of new cases per 100,000 people per year, for each disease separately in two categories — both adults and children (Table 3).

Among FN diseases in adults, idiopathic neuropathy predominated, followed by symptomatic forms of other established and unidentified genesis, and hemifacial spasm. Ramsay Hunt syndrome and Rossolimo–Melkersson–Rosenthal syndrome have been recorded less frequently. Idiopathic and symptomatic forms of FNN predominate in childhood.

Table 1

International Classification of Diseases 10th Revision — Facial nerve disorders

Таблица 1

Группа заболеваний Международной классификации болезней-10 — Поражения лицевого нерва

Код МКБ-10 / Code ICD-10	Диагноз / Disease
G51.0	Паралич Белла / Bells palsy
G51.1	Воспаление узла коленца лицевого нерва (синдром Рамсея Ханта) / Geniculate ganglionitis (Ramsay Hunt syndrome)
G51.2	Синдром Россолимо–Мелькерссона–Розенталя / Rossolim–Malkersson–Rosenthal syndrome
G51.3	Клонический гемифациальный спазм / Clonic hemifacial spasm
G51.4	Лицевая миокимия / Facial myokymia
G51.8	Другие поражения лицевого нерва / Other disorders of facial nerve
G51.9	Поражение лицевого нерва неуточненное / Disorder of facial nerve, unspecified

Table 2

Average number of residents permanently residing in Moscow, as well as those related to EMIAS, dynamics for 2019–2021

Таблица 2

Средняя численность постоянно проживающего населения в г. Москве, а также прикрепленных к ЕМИАС, динамика за 2019–2021 гг.

Население (г. Москва) / Population (Moscow)		Количество человек в год / People per year, n		
		2019	2020	2021
Средняя численность постоянно проживающих / The average number of permanent residents		12 646 679	12 666 565	12 645 258
Зарегистрированные в ЕМИАС / Related to EMIAS	Всего / Total	11 927 033	12 095 161	11 879 863
	Взрослые / Adults	9 792 486	9 922 312	9 678 572
	Дети / Children	2 134 547	2 172 849	2 201 291

Table 3

Number of initial cases of patients with facial nerve disorders and morbidity among "adults and children/adolescents" in Moscow, dynamics for 2019–2021

Таблица 3

Количество первичных случаев обращения пациентов с патологией лицевого нерва и заболеваемость в возрастных категориях «взрослые и дети/подростки», динамика за 2019–2021 гг. в г. Москве

Возрастная группа / Age group	Диагноз / Diagnosis	Количество первичных случаев / Number of initial cases, n			Заболеваемость / Morbidity, n *		
		2019	2020	2021	2019	2020	2021
Взрослые / Adults	G51.0	1 519	1 281	1 465	15,5	12,9	15,1
	G51.1	58	33	28	0,6	0,3	0,3
	G51.2	7	4	5	0,1	0,0	0,1
	G51.3	116	59	64	1,2	0,6	0,7
	G51.4	65	48	65	0,7	0,5	0,7
	G51.8	806	470	525	8,2	4,7	5,4
	G51.9	536	261	315	5,5	2,6	3,3
Дети и подростки / Children and adolescents	G51.0	205	213	221	9,6	9,8	10,0
	G51.1	4	3	2	0,2	0,1	0,1
	G51.2	0	1	0	0,0	0,0	0,0
	G51.3	0	0	1	0,0	0,0	0,0
	G51.4	2	1	6	0,1	0,0	0,3
	G51.8	154	73	90	7,2	3,4	4,1
	G51.9	99	29	40	4,6	1,3	1,8

* Number of initial cases per 100,000 population.

* Количество первичных случаев на 100 000 населения.

It should be taken into account that in 2020 there was a significant decrease in the number of new cases of FNN, which is associated with a change in standard polyclinic work at the primary level in the context of the pandemic of a new coronavirus infection and self-isolation of patients. According to the graph (Fig. 1), there is a "levelling" of the situation by 2021. However, it is reasonable to consider the epidemiology of the FN disease group through 2019. Decreased patient registration may be a risk factor for worse patient recovery and the development of more complications.

The median age of adult patients with idiopathic (G51.0) and symptomatic (G51.8, G51.9) forms of FNN was 51 years (Table 4). The hypothesis of statistically significant differences in the age distribution of these groups was not confirmed (U=6532731.5, p=0.798). In cases of idiopathic FNN (diagnosis G51.0) the ratio of men and women was equal to 46 and 54% respectively, in cases of symptomatic FNN

(G51.8, G51.9) women prevailed 2 times and more (38% men, 62% women). The hypothesis that there were statistically significant differences in the distribution of these groups by sex was confirmed (χ^2=47.89, p <0.0001).

The age of patients with clonic hemifacial spasm (G51.3) was older compared with patients with facial neuropathy (63 vs 51 years). Women were significantly more predominant in this group (78% vs 22%, χ^2=54.11, p <0.001).

The age of patients with facial myokymia (G51.4) was younger compared with patients with facial neuropathy (42 vs 51 years). Female patients were also predominant (80% vs. 20%, χ^2=46.12, p <0.001).

Patients with Ramsay Hunt syndrome (G51.1) were of the same age as patients with facial neuropathy (49 vs 51 years) and were predominantly female (67 vs 33%, χ^2=8.25, p =0.005), while those with Rossolimo–Melkersson–Rosenthal syndrome (G51.2) were slightly younger (43 vs 51 years) but also predominantly female (69 vs 31%, χ^2=1.4, p=0.23).

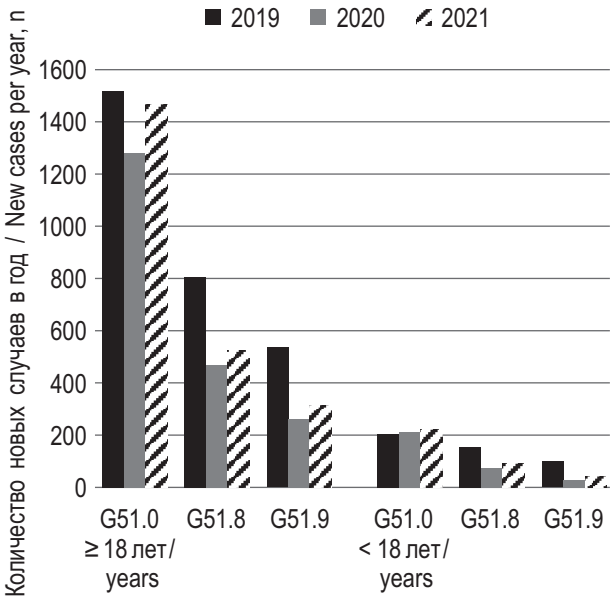

Fig. 1. Incidence dynamics of idiopathic facial paralysis (G51.0), other disorders of facial nerve (G51.8) and unspecified disorders of facial nerve (G51.9) in Moscow for 2019–2021 among the age groups "Adults" and "Children and adolescents under 18"

Рис. 1. Динамика заболеваемости идиопатической нейропатией лицевого нерва (G51.0), другими поражениями лицевого нерва (G51.8) и неуточненными поражениями лицевого нерва (G51.9) в г. Москва за период 2019–2021 гг. в возрастных группах «Взрослые» и «Дети и подростки до 18 лет»

The median age in the group of children and adolescents (less than 18 years) was 10 years, the ratio of boys and girls was 48 and 52%, respectively, and no statistically significant differences in the disease groups were found.

DISCUSSION

Knowledge of epidemiological characteristics of diseases allows not only to identify their social and economic significance and their place in the structure of general pathology of the population, but also to determine the causes and conditions of pathology development, to carry out dynamic control, to carry out prevention (including the development of complications in the event that has already occurred), to predict the need for medical care and its amount.

In the introduction of the article, a review of scientific literature with available epidemiological data on each disease was briefly presented. Firstly, the dates of publication of articles with available statistics more than 10 years ago are noteworthy. Secondly, all studies are foreign. Thirdly, the rates vary considerably. For example, the incidence of FNN varies from 8 to 32 cases per 100,000 people per year. Such an inaccuracy is inadmissible for solving the issues of organizing medical care for this category of patients and making calculations. In our study, we clarified these values, including FNN — 15.5 cases for adults and 9.6 cases for children.

The original aim of the study was to obtain and analyze epidemiological data. However, not all indicators can be obtained at present. That is why we consider it expedient to discuss the process of obtaining data and the problems we encountered, since this experience can be extrapolated to studies of other pathologies already now, and with a few changes in the technical part — to significantly expand the possibilities and supplement the data.

A detailed comparison of patients by sex, as well as the comparison of adults with children in this sample is not of scientific or practical importance. For example, women predominated among adult patients. But we cannot claim that the incidence is higher in women and operate with this fact. Perhaps women were more likely to seek medical help, since the diseases are mostly non-life threatening, but distort the face. It is of interest how to obtain exactly reliable epidemiological data in modern realities.

Table 4

Age-gender characteristics of facial nerve disorders

Таблица 4

Гендерно-возрастная характеристика заболеваний лицевого нерва

Возрастная группа / Age group	Диагноз / Diagnosis	Возраст/ Age, Me [C25; C75]	Мужчины / Males, n (%)	Женщины / Females, n (%)
Взрослые / Adults	G51.0	51.0 [36.0, 64.0]	1965 (46)	2300 (54)
	G51.1	49.0 [37.5, 61.5]	39 (33)*	80 (67)*
	G51.2	43.0 [35.0, 55.2]	5 (31)	11 (69)
	G51.3	63.0 [53.0, 71.0]	52 (22)*	187 (78)*
	G51.4	42.0 [32.0, 53.8]	36 (20)*	142 (80)*
	G51.8	51.0 [36.0, 65.0]	698 (38)*	1145 (62)*
	G51.9	50.0 [36.0, 63.0]	470 (38)*	766 (62)*
Дети и подростки / Children and adolescents	G51.0	12.0 [7.0, 15.0]	299 (47)	340 (53)
	G51.1	13.0 [10.0, 14.0]	5 (56)	4 (44)
	G51.2	10.0 [10.0, 10.0]	1	0
	G51.3	0.0 [0.0, 0.0]	1	0
	G51.4	16.0 [10.0, 16.0]	5 (56)	4 (44)
	G51.8	8.0 [3.0, 13.5]	158 (47)	181 (53)
	G51.9	9.0 [4.0, 14.0]	134 (54)	116 (46)

* Statistically significant differences were revealed in the distribution of these groups by gender in comparison with G51.0. G51.0.
* Выявлены статистически значимые различия в распределении указанных групп по полу в сравнении с G51.0.

First of all, we faced the question of what sample to calculate the data on. The morbidity rate is calculated by the number of new cases per 100,000 population. Table 2 shows that the number of the population of Moscow and the number of the population registered in the UMIAS system differ. However, about 95% of the registered population of the metropolis are registered in the electronic system. We decided to count morbidity by the number of new cases relative to all registered persons. We calculated the number of patients with the disease per 100,000 registered population.

In the estimation of epidemiological characteristics, it is necessary to take into account that some patients may have been excluded because their main diagnosis was different — trauma, otitis media, infection. In this case, the FN lesion could have been considered by the doctor, for example, as a legitimate symptom, an unwanted complication and not coded according to ICD-10. Thus, in cases of symptomatic forms of FNN (G51.8 and G51.9), it is reasonable to present the morbidity as “at least X cases per 100,000 population”.

It is important that the UMIAS information system is already functioning. Currently, it is possible to track the number of visits of each patient and assess the condition at a particular visit. However, we have received a high variability of filling in unstructured fields, so it is quite labor-intensive to reliably present the causes of the disease, structure, qualitative characteristic of disease outcomes. Now it is necessary to standardize the maintenance of the attributes that are most important for doctors in terms of diagnosis and treatment of patients with facial movement disorders. Thus, at present, after receiving the UMIAS data, we can talk about trends and take measures aimed at improving the quality of information, in particular, the introduction of unified approaches to the collection, processing, storage of textual, unstructured data, which will allow us to develop standards for electronic documentation of this nosology.

In order to organize the possibility of using all fields of electronic medical records, including textual, unstructured fields, both in outpatient and inpatient facilities, it is advisable to ensure the introduction in UMIAS of a standard for filling in certain textual, unstructured fields that are important for making medical decisions, in particular for tracking the development of diseases in patients with facial movement disorders. Every year there are new possibilities

of diagnostic search, types of conservative and surgical treatment. We can notify patients about it and invite them for a treatment.

Diseases associated with FN lesions are socially important and require additional attention. It is possible to create a register of this pathology using the ICD-10 code, but the system will work only if it is registered. It is also necessary to ensure data connectivity between different medical organizations by introducing a standard for filling in certain text attributes. The standard is a kind of dictionary and algorithm depending on the stage of the disease course (prompts for filling in forms for doctors). By developing and implementing such standards, it will be possible to obtain analytical conclusions in real time (an automatic processing of database data).

CONCLUSION

For the first time, a modern analysis of the epidemiological characteristics of FN diseases (ICD-10 disease group with the code G51) for 2019–2021 is presented. It became possible because of the introduction of the UMIAS system in Moscow.

The UMIAS system opens up opportunities for obtaining epidemiological data and can be proposed as a single centralized mechanism for their collection and management. However, for making medical decisions, data from unstructured, text fields are also needed, which requires the introduction of standards for filling them in.

The development of a standard for filling in electronic medical records for the "facial nerve" profile will make it possible to create a register of patients with movement disorders in the facial area already now and to receive data from all patients in real time.

ADDITIONAL INFORMATION

Author contribution. Thereby, all authors made a substantial contribution to the conception of the study, acquisition, analysis, interpretation of data for the work, drafting and revising the article, final approval of the version to be published and agree to be accountable for all aspects of the study.

Competing interests. The authors declare that they have no competing interests.

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Consent for publication. Written consent was obtained from the patient for publication of relevant medical information within the manuscript.

ДОПОЛНИТЕЛЬНАЯ ИНФОРМАЦИЯ

Вклад авторов. Все авторы внесли существенный вклад в разработку концепции, проведение исследования и подготовку статьи, прочли и одобрили финальную версию перед публикацией.

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Источник финансирования. Авторы заявляют об отсутствии внешнего финансирования при проведении исследования.

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