# GEORGIAN MEDICAL NEWS

ISSN 1512-0112

NO 12 (369) Декабрь 2025

ТБИЛИСИ - NEW YORK


ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

**GEORGIAN MEDICAL NEWS**

Monthly Georgia-US joint scientific journal published both in electronic and paper formats of the Agency of Medical Information of the Georgian Association of Business Press. Published since 1994. Distributed in NIS, EU and USA.

**GMN: Georgian Medical News** is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

**GMN: Медицинские новости Грузии -** ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

**GMN: Georgian Medical News –** საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

**WEBSITE**

www.geomednews.com

## К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

**При нарушении указанных правил статьи не рассматриваются**.

## REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

**Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.**

## ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

*GEORGIAN MEDICAL NEWS*
*NO 12 (369) 2025*

*Содержание:*

# CASE REPORT OF INFLUENZA A (H1N1) PDM 09 STRAIN / KARAGANDA/ 06/2022 IN A CHILD AGED 3 YEARS

**Begaidarova R.Kh[1]*, Alshynbekova G.K[1], Kadyrova I.A[2], Alshimbayeva Z.Ye[1], Nassakayeva G.Ye[1], ZolotaryovaO.A[1], Omarova G.M[1].**

*[1]Department of Infectious Diseases and Phthisiatry, Non-profit Joint Stock Company "Karaganda Medical University", 100008, Republic of Kazakhstan, Karaganda, Gogol str. 40.*

*[2]Research Laboratory of the Institute of Life Sciences of the Karaganda Medical University, 100008, Republic of Kazakhstan, Karaganda, Gogol Street, 40.*

## Abstract.

The article presents epidemiological data characterizing the development of the influenza A epidemic in Kazakhstan. The rates of increase and decrease of influenza morbidity are shown. During most of the COVID-19 pandemic (2020-2022), influenza circulation in Kazakhstan and neighbouring Russia declined, but then returned with higher transmission rates in autumn 2022.

While H3N2 strains dominated the 2022-2023 season as a whole, in autumn 2022, A/H1N1 pdm09 strains dominated in Russia.

B December 2022 г. we detected the strain /Karaganda/ 06/2022 (H1N1) pdm09 in the nasopharyngeal swab of a patient (age=3 years, 3 months, sex=male) admitted to the Infectious Disease Centre of the Regional Clinical Hospital of Karaganda city with clinical symptoms of respiratory disease. A detailed description of this clinical case in a child is given.

**Key words.** Children, influenza A(H1N1) pdm09, genomic strain/Karaganda/ 06/2022 (H1N1) pdm09 clinic, principles of therapy.

## Introduction.

Influenza is an acute, severe illness caused by a viral infection. The influenza virus is included in the group of acute respiratory viral infections (ARVI), but due to the severity of the course, it is usually considered separately. Influenza affects the upper respiratory tract, trachea, bronchi and sometimes the lungs, causing runny nose, cough, toxicity; the disease can lead to serious complications and even death. The flu is most dangerous for those whose bodies are weakened. Children, the elderly and people with chronic illnesses are particularly vulnerable to influenza [1]. In European Union (EU) countries, the burden of most frequent infections in terms of disability and premature mortality (disability-adjusted life years (DALYs)) is twice that 32 other infectious diseases. Influenza ranks 4th on this list [2].

The Global Report on Infection Prevention and Control, (WHO 23 May 2022), showed that appropriate infection prevention and control measures can reduce the risk of healthcare-associated infections by 70% [3].

The 2022/2023 influenza season was marked by a return of influenza virus activity to near pre-pandemic levels. The 2022/2023 influenza season was marked by a return of influenza virus activity to near pre-pandemic levels in the EU/EEA (European Economic Area).

This season was characterised by an earlier onset of the seasonal epidemic and an earlier peak of positivity compared to the four previous seasons. The percentage of positive samples peaked at 42% in week 51 of 2022, then declined to week 4 in 2023 when it reached 22% positivity, and then rose again to hover around 28% positivity between week 5 and 12/2023 [2,3].

Influenza A(H3N2)-dominated influenza viruses dominated primary care samples, but there was higher circulation of A(H1N1)pdm09 (from week 50 of 2022) and type B viruses (from week 2 of 2023). In non-signalling samples, A(H3N2) was dominant over A(H1N1)pdm09 viruses.

Influenza type A and type B viruses were detected in hospitalised patients in ICU (Intensive Care Unit) and other wards, with influenza type A being the predominant type. Influenza A-type viruses were the predominant type among patients with SARS.

Interim results suggest a ≥27% reduction in influenza A - ≥27% and B -

≥50% among influenza A and B vaccine recipients of all ages, respectively, during the 2022-2023 influenza season [2,3].

**Purpose of the work:** clinical and epidemiological analysis of the influenza and acute respiratory viral infection season for 2022/2023, we give a description of a clinical case of a sick child with influenza.

## Materials and Methods.

**Study Design:** This study consisted of two components: (1) analysis of epidemiological data on influenza and acute respiratory viral infections (ARVI) in Kazakhstan for the 2020–2023 period, and (2) clinical and virological investigation of a hospitalized child with influenza A(H1N1)pdm09 infection.

**Sources of epidemiological data:**

Epidemiological statistics presented in Figures 1-4 were obtained from open national surveillance reports of the Sanitary and Epidemiological Control Committee of the Ministry of Health of the Republic of Kazakhstan, weekly influenza surveillance bulletins, and the public datasets of the European Centre for Disease Prevention and Control (ECDC). Data for the Russian Federation were extracted from national influenza monitoring summaries to provide regional context.

These datasets included routinely collected indicators of ARVI and influenza activity, aggregated by health facilities throughout the country as part of mandatory state epidemiological reporting.

**Period of data collection:**

The epidemiological data covered the period from January 2018 to April 2023, depending on the figure:

- Population morbidity and age structure (2018–2022),
- Etiological structure of ARVI (September 2022),

• Circulation of respiratory viruses (October 2022–April 2023),
• Regional distribution of confirmed influenza cases (3 November 2022).

All datasets correspond to the WHO-defined influenza surveillance seasons (October–April), unless otherwise specified.

**Population groups:**

**Surveillance data included:**

• The general population of Kazakhstan,
• Stratified subgroups (children <14 years old and pregnant women),
• Regional distributions,
• Laboratory-confirmed influenza and ARVI cases.

No personally identifiable information was included, as all data were aggregated at the population level.

**Analytical methods:**

Descriptive epidemiological methods were used. Incidence rates, proportional distribution of detected pathogens, and weekly positivity trends were extracted from official surveillance tables.

**Laboratory diagnostic methods:**

Nasopharyngeal swab (NPS) samples were processed according to standard diagnostic procedures. RNA was extracted using the MagMAX™ Viral/Pathogen Kit (Thermo Fisher Scientific, USA). Real-time PCR detection was performed with TaqPath™ 1-Step RT-qPCR, CG (Thermo Fisher Scientific, USA), targeting Influenza A/H3N2, A/H1N1pdm09, Influenza B, and other common respiratory pathogens. A cycle threshold (Ct) value of <28 was interpreted as a positive result.

**Clinical and virological investigation:**

The influenza A/Karaganda/06/2022 (H1N1)pdm09 strain was isolated during routine PCR testing of inpatients at the Infectious Disease Centre of the Regional Clinical Hospital of Karaganda. Clinical management followed the national clinical protocol "Influenza and acute upper respiratory tract infections in children" (Protocol No. 32, 10 November 2017).

Whole-genome sequencing of the isolate and comparative phylogenetic analysis were performed as previously described in the Kazakhstan national sequencing study.

The study was approved by the Bioethics Commission of Karaganda Medical University (protocol No. 12, approval No. 45 dated 06 April 2020).

## Results.

Epidemiological Context of Influenza in Kazakhstan (2022-2023). Influenza is an important cause of global morbidity, epidemiological data characterising the development of influenza epidemic in Kazakhstan are given. The rates of increase and decrease of influenza morbidity are shown. During most of the COVID-19 pandemic (2020-2022), influenza circulation in Kazakhstan and neighbouring Russia declined [4-7], but then returned with higher transmission rates in the autumn of 2022 [8]. While H3N2 strains dominated the 2022-2023 season overall, A/H1N1 pdm09 strains dominated in Russia in autumn 2022 [8,9].

Despite the generally accepted terms of epidemiological season of influenza and acute respiratory viral infections according to WHO (World Health Organization) (October-April) for the city of Astana for the season 2022-2023, there was a sharp rise in morbidity since September [3].

During the period from October 2022 to April 2023, the etiological structure of respiratory infections was dominated by metapneumovirus, which accounted for the largest proportion of detected pathogens (34%). Influenza viruses also contributed substantially: influenza A(H1N1) was identified in 17% of cases, while influenza B represented 13%. Rhinovirus (10%) and parainfluenza viruses (3%) were detected less frequently.

Other respiratory pathogens were identified in smaller proportions, including adenovirus (4%), bocavirus (2%), and RSV (respiratory syncytial virus) (2.5%). Mixed infections involving two or more viruses were observed in approximately 2% of cases. In addition, 2% of specimens were SARI (severe acute respiratory infections) smear positive, and a small proportion of tests yielded negative results.

Overall, these findings indicate a diverse viral landscape during the epidemic season, with a clear predominance of metapneumovirus and influenza viruses. A total of 521 laboratory-confirmed cases of influenza were registered in 2022. laboratory-confirmed cases of influenza were registered: Kyzylorda region - 128 cases, Zhetisu region - 84 cases, Aktobe region - 69, Almaty city - 60, Karaganda region - 41, Astana city - 38, Akmola region - 26, Kostanay region - 15, Zhambyl region - 19, Mangistau region - 13, Pavlodar and Atyrau regions - 7 cases each, West-Kazakhstan region - 6, North-Kazakhstan region - 4, East-Kazakhstan region - 2, Abay region - 2 [3].

Of the 521 laboratory-confirmed cases of influenza and acute respiratory viral infections, 179 were children under 14 years of age and 106 were pregnant women.

The circulation of non-influenza respiratory viruses accounted for 21.1% of detected pathogens. Rhinovirus was identified most frequently (93 cases), followed by respiratory syncytial virus (RSV, 77 cases), parainfluenza viruses (31 cases), coronaviruses (20 cases), adenoviruses (17 cases), bocaviruses (10 cases), and metapneumovirus (6 cases) [2,3].

The danger of influenza in children is underestimated. The incidence can reach 30-40%, which is 3-4 times higher than in adults. The highest incidence of influenza is among primary and secondary school children - up to 54% (according to US data). Children secrete the virus longer than adults, which makes them the main source of infectious agents [10].

In children 6-12 months of age, the rate of hospitalisation is almost 6 times higher than in children 2-4 years of age and 12 times higher than in children 5-17 years of age. 50 per cent of sick children need medical care, and 90 per cent of sick children take medicines. Prescription of antibiotics .is increased by 10-30% [11-14].

Complications occur in 18-40% of children who have had influenza. Children under 5 years of age with comorbidities have a 2-4 times higher risk of complications from influenza than healthy children of the same age. Viral or bacterial pneumonia are the most serious complications. Bronchitis, otitis media are the most common. Complications from nervous, cardiovascular

systems or exacerbations of chronic diseases are common. A previous influenza illness was detected 12 times more often in children diagnosed with severe pneumonia [15-18].

## Case Report.

Here is a description of a clinical case of a sick child with influenza.

The child T. 3 y. 3 months (date of birth 09.09.2019.) is admitted to the clinic of the infectious disease centre of regional clinical hospital of Karaganda city13.12.2022 at 14:39 with complaints of increased body temperature up to 39.6℃, convulsions 2 times, with loss of consciousness, blue face, lethargy, nasal congestion.

**Past medical history:** According to the mother, the child has been ill since 05 am today, the disease began with a rise in temperature to 38.6℃, there were tonic-clonic convulsions, short-term up to 10-15 seconds, with loss of consciousness, blueing of the lips, face. An ambulance was called, Kushilevsky's mixture was administered, hospitalisation was refused. At 09 a.m. the child's temperature rose again to febrile digits, it was brought down with ibufen. At 13 o'clock, the temperature rose again to 39.6℃, seizures occurred, in connection with which an ambulance was called, he was taken to the emergency room of the Regional Clinical Hospital, Infectious Disease Center, hospitalised in the profile 9 department with the diagnosis of acute respiratory viral infections.

**Life history:** Child from 2 pregnancies, 1 delivery. Course of pregnancy: physiological, natural delivery at 39 weeks. The child is premature, birth weight 3540 grams, height 55 cm.

She was put to the breast immediately, the period of stay in the maternity hospital was 3 days, the umbilical cord fell off on the 4th day. No diseases in the newborn period (up to 28 days).

The child is breastfed, complementary food since 6 months of age. Prevention of rickets, anaemia was carried out: the child received vitamin. Vaccination status only in the maternity hospital: hepatitis B. Vaccination status: refusal of vaccination.

**Past illnesses:** at 1 year 4 months there were febrile convulsions, chicken pox, infrequent acute respiratory viral infections. There were no traumas and surgeries. She has been registered with a neurologist since 1 year 4 months.

There's no heredity.

**Epidemiological anamnesis:** Contact with infectious patients or individuals suspected of having COVID-19 was denied.

Lives in a well-equipped apartment and observes personal hygiene rules. Had contact with the father, who had an acute respiratory viral infection (ARVI).

**Allergological history:** unremarkable.

Objective data: General condition of average severity due to intoxication syndrome, catarrhal symptoms are noted.

T 39.1℃ at the time of examination. Consciousness is clear. Feeling disturbed, lethargic, drowsy. At the examination he woke up, painfully irritable, no convulsions. Appetite is reduced, drinks fluids willingly. No vomiting. The physique is correct. Nutrition is satisfactory.

The skin is pale, clean from rashes. Periorbital and perioral cyanosis are absent. There is no cyanosis of the oral mucosa and tongue. Extremities are hot to the touch, capillary filling rate: less than 3 sec.

Visible mucous membranes are moist, clean. Eyes are not sunken. Skin folds are spread immediately. Peripheral lymph nodes are not enlarged, painless, mobile. Musculoskeletal system without visible deformity.

Breathing through the nose is difficult, without discharge, no cough. There is bright hyperaemia in the pharynx, tonsils are loose, no plaque.

Breathing without retraction and participation of auxiliary muscles, no dyspnoea. In the lungs at percussion pulmonary sound, at auscultation breathing is rigid, no rales are heard.

Heart tones are loud, rhythm is correct, no heart murmurs.

The abdomen on palpation is soft, painless, without bloating. The liver and spleen are within the age norm. Urination is free, painless. Stools are not examined.

Meningeal symptoms are negative, no focal symptoms.

**Laboratory diagnostic tests:**

In the general blood test:13.12.2022. COE - 17.0mm/h (17mm/h).

General blood analysis on analyser with differentiation of 3 classes of cells haemoglobin (HGB) in blood - 99 g/l; red blood cells (RBC) in blood - 3.60 /l; white blood cells in blood - 5.90 /l; haematocrit (HCT) in blood - 30%; platelets (PLT) in blood - 201/l.

13.12.2022. Detection of COVID-19 virus RNA from biological material by polymerase chain reaction (PCR)-negative.

(RNA of the COVID-19 virus)-negative.

13.12.2022. Urinalysis: relative density (specific gravity) of urine - 1012.00; urine colour - light yellow; urine transparency - transparent; protein in urine - 0.00 g/l; glucose in urine - 0.000 mmol/l; leukocytes in urine - 1.000 p/zp; squamous epithelium in urine - 2.000 p/zp; ketone bodies in urine - 0 mmol/l.

13.12.2022. In nasopharyngeal swab - found strain / Karaganda/06/2022(H1N1) pdm 09.

**Treatment provided:**

**Diet: 13. Regimen: 2b - ward (Prescribed medication):**

1. Magnesium sulphate (25% ml. Solution for injection) (3ml v/m)+ Novocaine (5ml.Solution 0.5%) (1.5ml v/m) -1 time- 3 days.
2. Diclogen (75mg/3ml. Solution for injection) (05ml v/m) -1 time- 2 days.
3. Regid K (18.9g. Powder for preparation of solution for oral administration) (7g.Gargle)- 3 times a day- 3 days.
4. Sodium chloride (09% 200ml. Infusion solution) (1ml - intranasally) - 2 times a day - 3 days.
5. Paracetamol (500 mg. Tablets) (250 mg orally) - 2 times a day - 2 days.
6. Ibuprofen (400mg. film-coated tablets) (200mg orally) - once a day - 3 days. **Final diagnosis:** Influenza, typical, moderately severe form. PCR dated 13.12.2022, strain / Karaganda /06/2022(H1N1) pdm 09.

As shown in Figure 4 and Table 1, the isolated strain A/ Karaganda/06/2022 (H1N1)pdm09 is most closely related (>99% nucleotide similarity) to A/H1N 1 strains from North America and China [9,19].

The complete genome sequence of A/Karaganda /06/ 2022 (H1N1) virus is available from Gen Bank under access numbers accessPP407268.

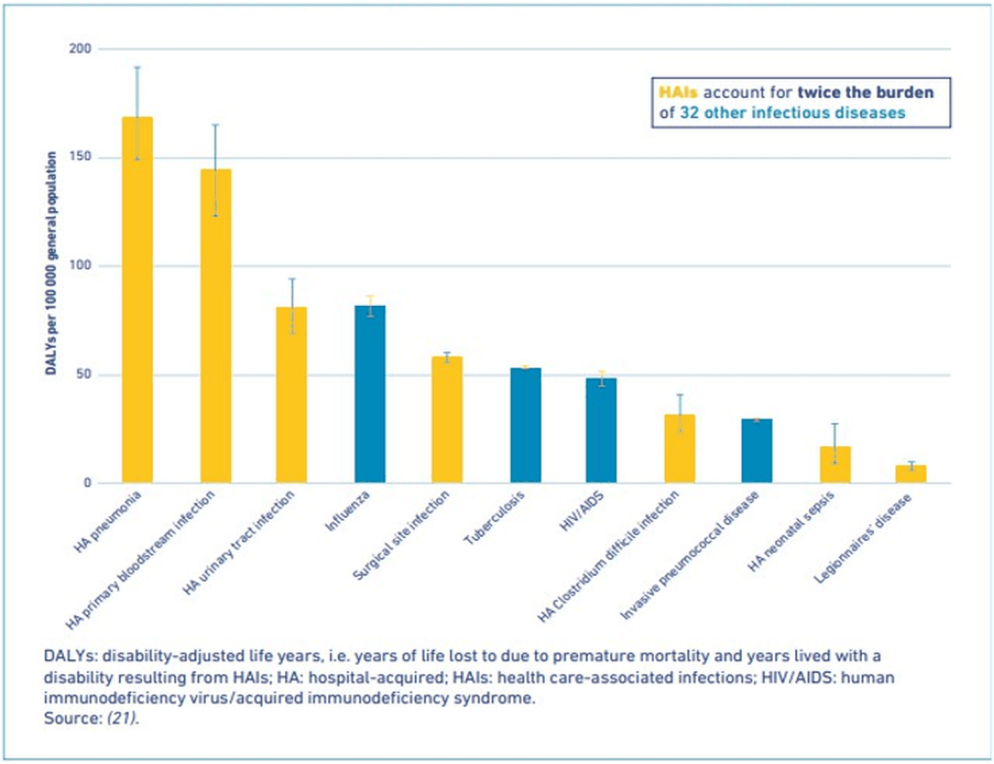



***Figure 1.*** *Comparing the burden of HAIs with other infectious diseases in EU/EEA (2011-2012).*

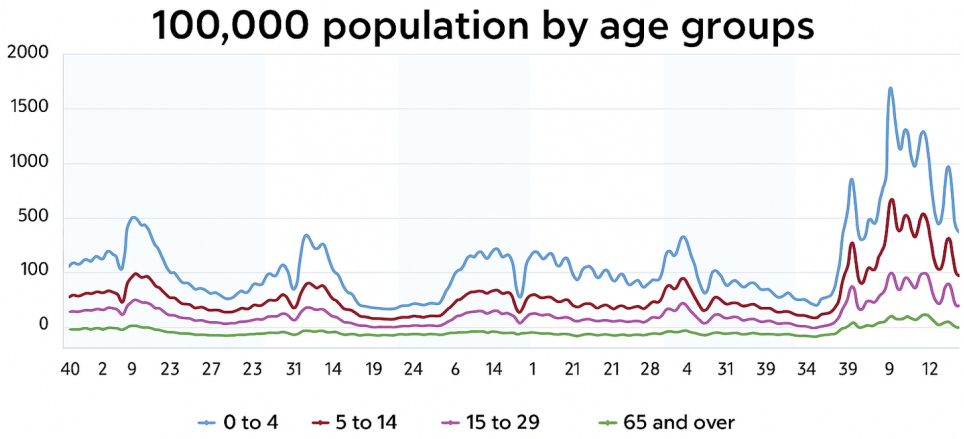



***Figure 2.*** *Age structure of the population morbidity rate of ARVI (Acute Respiratory Viral Infection) and influenza in the Republic of Kazakhstan for 2018-2022.*

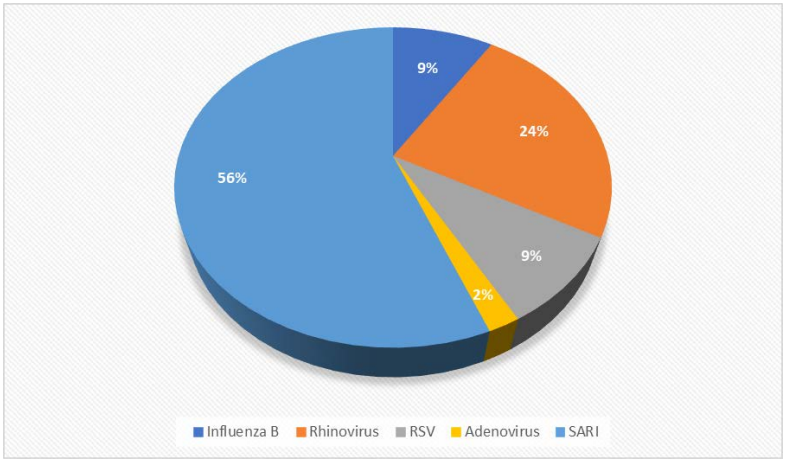
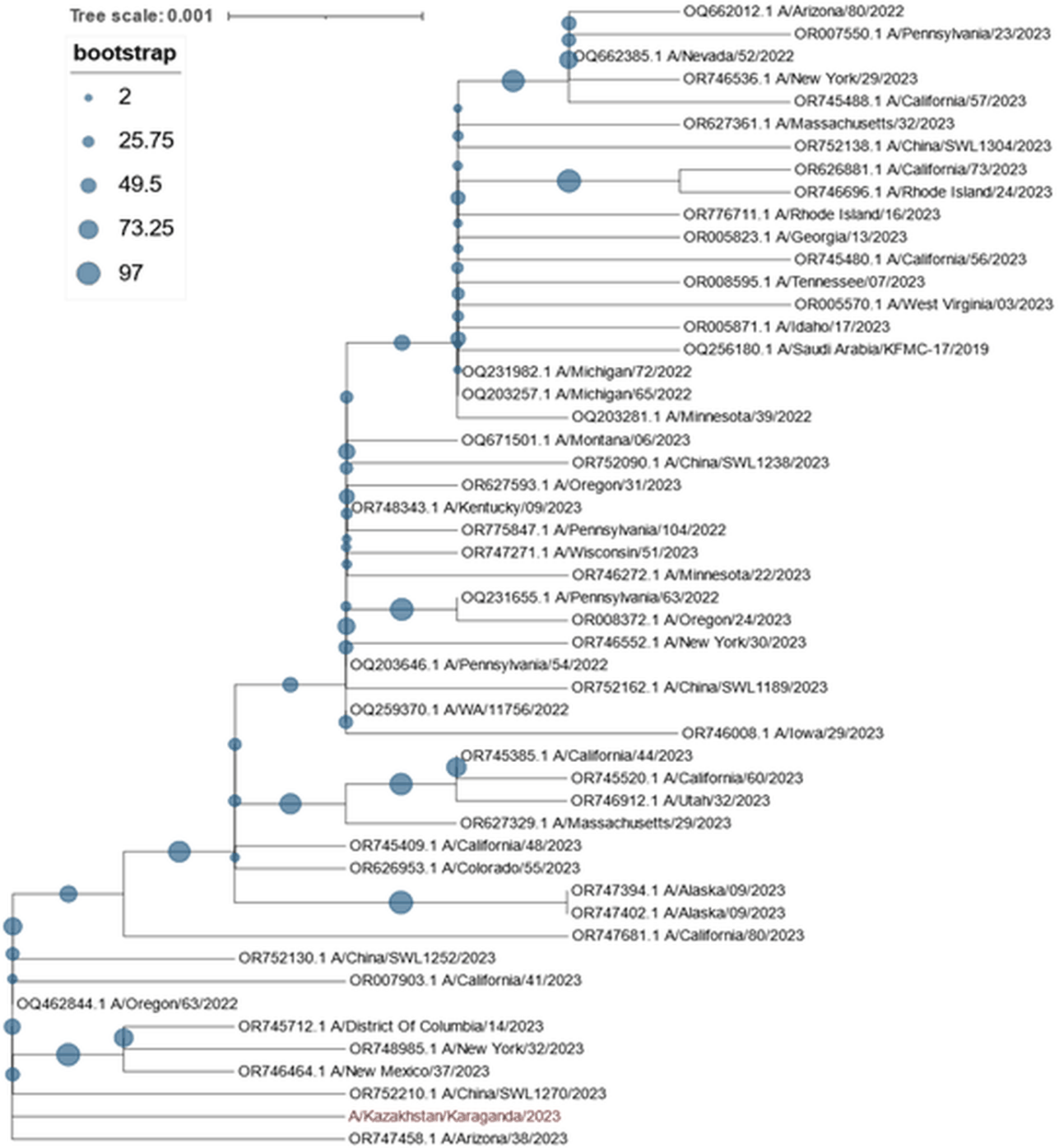



***Figure 3.*** *Epidemiological structure of ARVI as of September 2022.*

A)


Tree scale: 0.001
bootstrap
2
25.75
49.5
73.25
97
OQ662012.1 A/Arizona/80/2022
OR007550.1 A/Pennsylvania/23/2023
OQ662385.1 A/Nevada/52/2022
OR746536.1 A/New York/29/2023
OR745488.1 A/California/57/2023
OR627361.1 A/Massachusetts/32/2023
OR752138.1 A/China/SWL1304/2023
OR626881.1 A/California/73/2023
OR746696.1 A/Rhode Island/24/2023
OR776711.1 A/Rhode Island/16/2023
OR005823.1 A/Georgia/13/2023
OR745480.1 A/California/56/2023
OR008595.1 A/Tennessee/07/2023
OR005570.1 A/West Virginia/03/2023
OR005871.1 A/Idaho/17/2023
OQ256180.1 A/Saudi Arabia/KFMC-17/2019
OQ231982.1 A/Michigan/72/2022
OQ203257.1 A/Michigan/65/2022
OQ203281.1 A/Minnesota/39/2022
OQ671501.1 A/Montana/06/2023
OR752090.1 A/China/SWL1238/2023
OR627593.1 A/Oregon/31/2023
OR748343.1 A/Kentucky/09/2023
OR775847.1 A/Pennsylvania/104/2022
OR747271.1 A/Wisconsin/51/2023
OR746272.1 A/Minnesota/22/2023
OQ231655.1 A/Pennsylvania/63/2022
OR008372.1 A/Oregon/24/2023
OR746552.1 A/New York/30/2023
OQ203646.1 A/Pennsylvania/54/2022
OR752162.1 A/China/SWL1189/2023
OQ259370.1 A/WA/11756/2022
OR746008.1 A/Iowa/29/2023
OR745385.1 A/California/44/2023
OR745520.1 A/California/60/2023
OR746912.1 A/Utah/32/2023
OR627329.1 A/Massachusetts/29/2023
OR745409.1 A/California/48/2023
OR626953.1 A/Colorado/55/2023
OR747394.1 A/Alaska/09/2023
OR747402.1 A/Alaska/09/2023
OR747681.1 A/California/80/2023
OR752130.1 A/China/SWL1252/2023
OR007903.1 A/California/41/2023
OQ462844.1 A/Oregon/63/2022
OR745712.1 A/District Of Columbia/14/2023
OR748985.1 A/New York/32/2023
OR746464.1 A/New Mexico/37/2023
OR752210.1 A/China/SWL1270/2023
A/Kazakhstan/Karaganda/2023
OR747458.1 A/Arizona/38/2023

B)

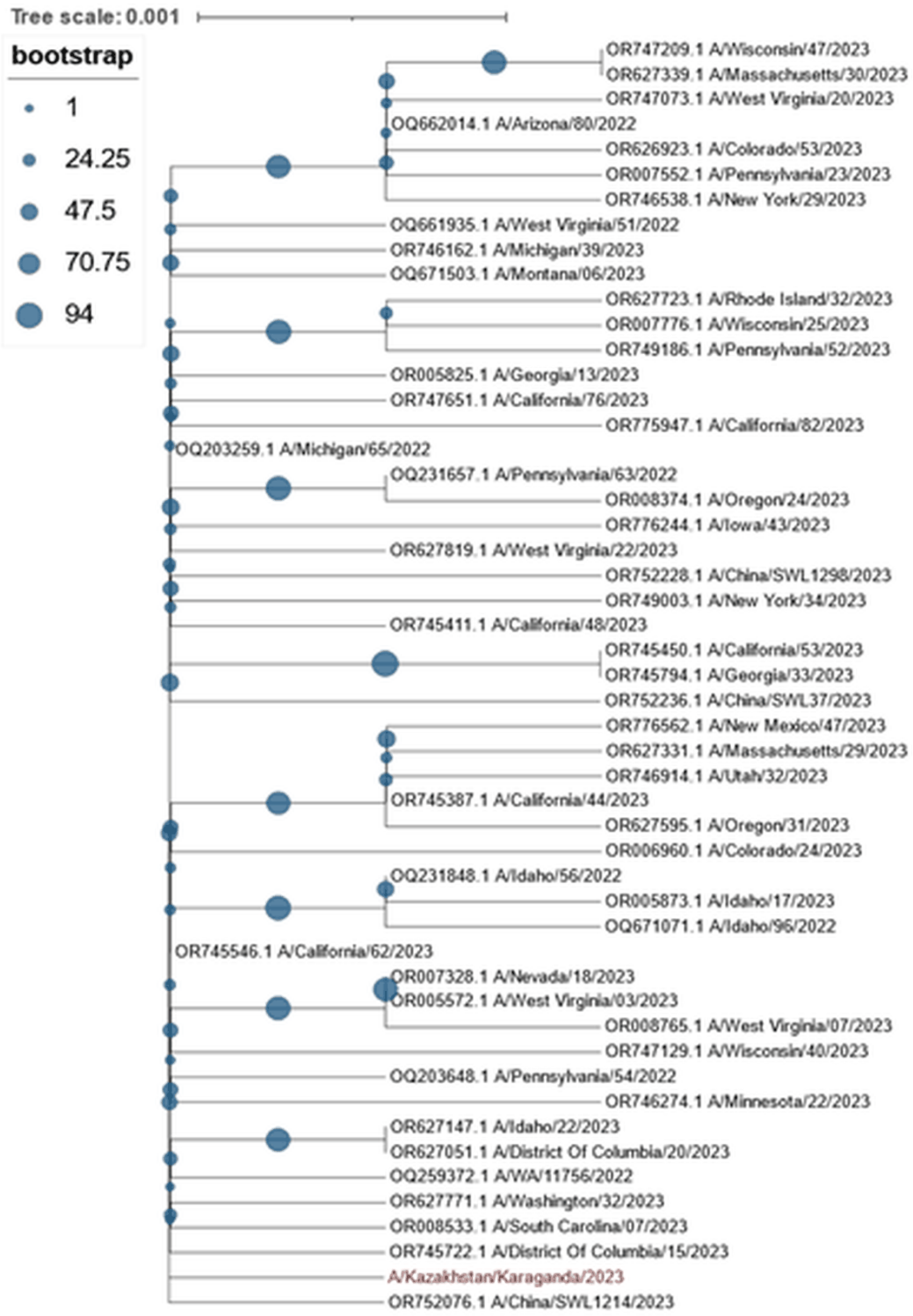



***Figure 4.*** *Maximum likelihood tree showing the relationship between haemagglutinin (A) and neuraminidase (B) genes of selected influenza A/H1N1 strains (n=51). The strain A/Karaganda 06/2022 (H1N1) pdm09 is highlighted in red. The trees are constructed using 1000 bootstrap replicas.*

***Table 1.*** *Comparison of nucleotide sequences of all genes of Kazakhstan Influenza A strain with genetically closest strains in Gen Bank.*

| Geniliseg ment | Size (nucleoti des) | Content GC (%) | Most of the Closely Related Stuff | Identity with the most closely related strain at the nucleotide level | Cover | Access to GenBan k # |
|---|---|---|---|---|---|---|
| PB2 | 2333 | 44.1% | A/Minnesota/39/202 2(H1N1) | 99.91% | 99% | OQ203278.1 |
| PB1 | 2332 | 41.0% | A/Oregon/63/2022(H 1N1) | 99.87% | 99% | OQ462842.1 |
| PA | 2233 | 42.5% | A/California/41/2023 (H1N1) | 99.91% | 98% | OR007902.1 |
| HA | 1752 | 40.8% | A/Oregon/63/2022(H 1N1) | 99.83% | 100% | OQ462844.1 |
| NP | 1565 | 45.2% | A/Michigan/65/2022(H1N1) | 99.94% | 98% | OQ203258.1 |
| NA | 1433 | 41.5% | A/Michigan/65/2022(H1N1) | 99.93% | 100% | OQ203259.1 |
| M | 1020 | 46.0% | A/Human/New York/PV42740/2022 (H1N1) | 99.80% | 100% | OP433198.1 |
| NEP | 890 | 42.5% | A/Human/New York /PV20745/2021 (H1N1) | 99.78% | 100% | ON531176.1 |

(https://www.ncbi.nlm.nih.gov/nuccore/PP407268.1) -P407275 (https://www.ncbi.nlm.nih.gov/nuccore/PP407275.1).The raw sequence reads have been deposited under access number PRJNA1162313 in Bio Project [8].

## Discussion.

The resurgence of influenza activity in Kazakhstan during the 2022–2023 season provides an important epidemiological context for interpreting the presented clinical case. After a significant decline in influenza circulation during the COVID-19 pandemic, influenza A viruses re-emerged with higher transmission intensity in autumn 2022, mirroring trends observed in neighbouring Russia, where A(H1N1) pdm09 strains became predominant during that period [4-8]. Although Kazakhstan reported a predominance of A(H3N2) viruses overall, the identification of the A/Karaganda/06/2022 (H1N1)pdm09 strain in a hospitalized child indicates localized circulation of this subtype. This case therefore contributes valuable evidence supporting the re-establishment of A(H1N1) pdm09 activity in the region, demonstrating that viral diversity extended beyond the patterns captured by national surveillance.

Clinically, this case highlights several important considerations for influenza in pediatric patients. The child presented with febrile convulsions and transient loss of consciousness—manifestations commonly associated with toxic encephalopathy during influenza infection [10-13]. A history of previous febrile seizures likely increased neurological susceptibility, which is consistent with data indicating that children with pre-existing neurological vulnerabilities experience more severe neurological manifestations during influenza [15,18]. The absence of routine influenza vaccination may also have contributed to disease severity, as vaccination remains the most effective measure for reducing complications, hospitalization, and influenza-associated neurological outcomes in young children [1,11,12]. Taken together, these clinical features underscore that even a moderately severe course of A(H1N1)pdm09 infection can present with neurologic symptoms in vulnerable unvaccinated children.

A notable aspect of this case is the therapeutic strategy. Despite a PCR-confirmed diagnosis of influenza A(H1N1)pdm09, the patient received only symptomatic treatment—including antipyretic, anticonvulsant, and supportive therapy—without administration of antiviral medication such as oseltamivir. Current international and national pediatric guidelines recommend early antiviral therapy for children presenting with moderate-to-severe influenza, suspected encephalopathy, or neurological manifestations, as antiviral treatment is associated with reduced duration of illness and a decreased risk of complications [1]. In this context, withholding antiviral therapy warrants careful consideration. Although the child showed favorable clinical improvement, this decision may not reflect optimal evidence-based practice and highlights the need for ongoing efforts to ensure adherence to recommended treatment protocols in pediatric influenza.

From a virological perspective, the genomic analysis of A/Karaganda/06/2022 (H1N1)pdm09 offers valuable insight into viral evolution in Central Asia. According to Table 1, the strain demonstrated >99% nucleotide identity with contemporary influenza A(H1N1)pdm09 strains circulating in North America and China [8,9,19]. This high level of similarity suggests conserved pathogenicity and indicates that the virus remains closely related to globally prevalent A(H1N1)pdm09 lineages. Such genomic compatibility is also relevant for vaccination strategies: the close relationship to vaccine reference strains implies that existing vaccines likely retained protective potential against this isolate, emphasizing the importance of improving vaccination coverage. Although the table does not report mutations associated with antiviral resistance, routine monitoring for neuraminidase and polymerase gene mutations remains essential, as resistance can rapidly emerge and influence treatment decisions, particularly in pediatric populations [5,7,16].

In summary, the clinical case of A/Karaganda/06/2022 (H1N1) pdm09 illustrates key intersections between epidemiological trends, clinical vulnerability, therapeutic decision-making, and viral genomics. The case reinforces the importance of vaccination, early antiviral therapy in children with neurological manifestations, and continuous genomic surveillance to guide public health responses in Kazakhstan.

## Conclusion.

1. During most of the COVID-19 pandemic (2020-2022), influenza circulation in Kazakhstan and neighbouring Russia declined, but then returned with higher transmission rates in autumn 2022.

2. While H3N2 strains dominated the 2022-2023 season as a whole, in autumn 2022 strains A/H1N1 pdm09 predominated in Russia, but data for Kazakhstan for this period are not available.

3. In December 2022, we identified the /Karaganda/06/2022 (H1N1)pdm09 strain in a nasopharyngeal swab obtained from a hospitalized patient (age: 3 years 3 months, male) presenting with clinical symptoms of a respiratory infection.

4. In the presented clinical case, postpandemic influenza A/H1N1pdm 09 in the patient proceeded in a moderately severe form, due to symptoms of toxic encephalopathy: hyperthermic, convulsive syndrome, with short-term loss of consciousness, moderate catarrhal symptoms. Positive dynamics was noted against the background of anti-edema, anti-inflammatory and symptomatic therapy.

5. Influenza: a clinically and epidemiologically underestimated disease. Vaccination is the most effective method of preventing influenza and its complications and reducing economic damage to the state.

## Authors' contributions.

**R.Kh. Begaidarova:** Research concept and design, text writing, statistical processing, editing.

**G.K. Alshynbekova:** Analyses of case histories, editing.

**R.H. Begaidarova:** Writing, statistical processing, editing.

**G.Ye. Nassakayeva, G.M. Omarova, I.A. Kadyrova:** Collection and processing of material, design of the article.

**Z.E. Alshimbayeva, O.A. Zolotaryova:** Collection and processing of material, design of the article.

## Conflict of Interest.

No conflict of interest declared.

## REFERENCES


1. Committee on Infectious Diseases. Recommendations for the prevention and control of influenza in children, 2021–2022. Pediatrics. 2021;148:e2021053745.

2. Baesheva DA. Course of influenza and acute respiratory viral infections in children at the present stage. In: Proceedings of the III Kazakhstan Congress of Infectious Disease Specialists with International Participation; Astana, Kazakhstan. 2023.

3. European Centre for Disease Prevention and Control. Seasonal influenza: annual epidemiological report for 2022–2023. https://www.ecdc.europa.eu/en/publications-data/seasonal-influenza-annual-epidemiological-report-2022.2023.

4. Malyshev NA, Bazarova MV, Karetkina GN, et al. Features of pandemic influenza A(H1N1)pdm09. Infect Dis. 2013;2:13-19.

5. Shao W, Li X, Goraya MU, et al. Evolution of influenza A virus by mutations and reassortment. Int J Mol Sci. 2017;18:1650.

6. Minney-Smith CA, Selvey LA, Levy A, et al. Postpandemic influenza A/H1N1pdm09 is associated with worse outcomes than A/H3N2 and other respiratory viruses in adult hospitalisations. Epidemiol Infect. 2019;147:e310.

7. Lin YP, Gregory V, Bennett M, et al. Recent changes among human influenza viruses. Virus Res. 2004;103:47-52.

8. Pulit-Penaloza JA, Brock N, Jones J, et al. Pathogenesis and transmission of seasonal human influenza viruses and swine influenza A(H1) viruses in a ferret model. Emerg Microbes Infect. 2022;11:1452-1459.

9. Egorov S, Kadyrova I, Korshukov I, et al. Application of MALDI-MS and machine learning to detect SARS-CoV-2 and non-SARS-CoV-2 respiratory infections. medRxiv. 2023.

10. World Health Organization (WHO). Influenza (Seasonal). Fact sheet. http://www.who.int/mediacentre/factsheets/fs211/en/.

11. Paules C, Subbarao K. Influenza. Lancet. 2017;390:697-708.

12. Nair H, Brooks WA, Katz M, et al. Global burden of respiratory infections due to seasonal influenza in young children: a systematic review and meta-analysis. Lancet. 2011;378:1917-1930.

13. Munoz F. Influenza virus infection in infancy and early childhood. Pediatr Respir Rev. 2003;4:99-104.

14. Begaidarova RH, Baesheva DA, KulzhanovaShA, et al. Modern approaches to treatment and prevention of influenza and acute respiratory viral infections using the interferon inducer Kagocel. Medicine and Ecology. 2021;3:5-19.

15. Paules C, Subbarao K. Influenza. Lancet. 2017;390:697-708.

16. Xie H. Genome-wide analysis of influenza virus evolution. Sci Rep. 2015;5:15279.

17. Kim YM. Influenza epidemiology and prevention. J Korean Med Sci. 2020;35:e45.

18. Li SG, Liang H, Chen YW, et al. Death in children with influenza A(H3N2) virus infection-associated encephalopathy: two case reports. J Int Med Res. 2023;51:1-9.

19. Letunic I, Bork P. Interactive Tree of Life (iTOL) v5: online tool for visualization and annotation of phylogenetic trees. Nucleic Acids Res. 2021;49:W293-W296.

20. Sarsenov R, Babenko D, Kamalova D, et al. Complete genome sequence of a human influenza A(H1N1) virus detected in Kazakhstan in the fall of 2022. MicrobiolResourAnnounc. 2025;14:e0104024.