

The History of Child Neurology in Iran: From Ancient Times to the Present

Mahmoud Mohammadi, MD 

Pediatric and Adolescence Multidisciplinary Epilepsy Research Center (PAMERC), Children's Medical Center of Pediatric Excellence, Tehran University of Medical Sciences (TUMS), Tehran, Iran.

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ABSTRACT

Objectives: To describe the historical development of child neurology in Iran, from early Persian–Islamic medical concepts of neurological disease to contemporary subspecialty practice, education, research, and service delivery.

Materials & Methods: This narrative historical review synthesized accessible peer-reviewed publications, institutional histories, university and hospital documents, professional-society resources, and publicly available records concerning Persian medical scholarship, medical education, pediatric hospitals, subspecialty training, neonatal care, epilepsy services, newborn screening, and neurogenetics in Iran. When historical dates or attributions were inconsistent, they were interpreted cautiously and reported as approximate or unspecified.

Results: Early Persian and Islamic medical traditions, including the works associated with Rhazes, Avicenna, and Jorjani, documented observations relevant to seizures, paralysis, developmental disorders, and cranial nerve function, although child neurology was not yet a distinct specialty. Modern development was facilitated by nineteenth-century educational reform, especially Dar al-Funun, followed by the establishment of pediatric teaching and referral hospitals, including Bahrami Children's Hospital, Children's Medical Center, and Mofid Children's Hospital. Integration of medical education and health services after 1985 strengthened specialty training and referral systems. Contemporary child neurology includes structured two-year subspecialty training, pediatric clinical neurophysiology and epilepsy fellowship programs, long-term video-electroencephalography monitoring, epilepsy monitoring units, neonatal intensive care expansion, newborn screening for congenital hypothyroidism and phenylketonuria, neurogenetic resources such as Iranome, dedicated research centers, and an indexed specialty journal. Persistent challenges include uneven regional access, economic constraints, sanctions-related procurement barriers, and workforce migration.

Conclusion: Child neurology in Iran has evolved from descriptive neurological knowledge embedded in Persian–Islamic medicine into a hospital-based, research-oriented pediatric subspecialty. Future progress depends on retaining the specialist workforce, strengthening provincial referral pathways, expanding registries and genomic capacity, and improving resilience of clinical and research infrastructure.

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Overview

Child neurology in Iran can be seen as a fascinating convergence of three significant influences: first, a rich Persian-Islamic medical tradition that offers detailed insights into conditions like seizures, paralysis,

developmental delays, and cranial nerve issues; second, the evolution of medical education and healthcare facilities during the 19th and 20th centuries; and third, the merging of medical education with the national health system post-1985, which enhanced

Corresponding Author:

Mahmoud Mohammadi
Email: mahmoh365@yahoo.com



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subspecialty training, referral networks, and research capabilities.(1)

The pre-modern record does not align with what we think of as "child neurology" today. Instead, it provides a foundational understanding, especially regarding epilepsy and neurobehavioral syndromes, documented in significant Persian and Arabic medical texts and passed down through later academic traditions.(2)

Pediatric neurology began to carve out its unique clinical identity mainly in the late 20th century, alongside the rise of children's referral hospitals, organized residency and subspecialty programs, as well as national scientific societies and journals. One of the most notable aspects of today's world is how important large pediatric hospitals linked to universities have become in Tehran. At the same time, there's a growing trend of spreading training and specialized services to other provinces through an expanding network of medical universities. (3)

Some important clinical and research achievements that have been shared in publicly available sources include: the formal establishment of pediatric subspecialty training durations, such as a 2-year pediatric neurology training program at a prominent university; Furthermore, distributed to more teaching hospitals affiliated with medical universities across the countries; and the development of another fellowship of pediatric clinical neurophysiology and epilepsy at the Tehran University of Medical Sciences (TUMS). The development of research infrastructure in pediatric neurology and the launch of an English-language specialty journal that is indexed in major databases; the nationwide growth of neonatal intensive care and neonatology fellowship training; ongoing improvements to newborn screening programmes for conditions like congenital hypothyroidism and phenylketonuria; the creation of national reference genomic resources; and advancements in epilepsy diagnostics, including long-term video-EEG monitoring, development of epilepsy monitoring units (EMUs), and centres for pediatric epilepsy surgery. (3)

The journey we have embarked on has been shaped by various factors, including conflicts that have sometimes restricted us, economic ups and downs, international sanctions affecting our resource procurement and financial management, and persistent workforce challenges, like the movement of clinicians and the growing inclination of trainees to seek opportunities abroad. (4)

Introduction

This in-depth historical analysis is crafted from the perspective of experienced pediatric neurologists, aiming to offer useful information to pediatric-

neurology readers while maintaining a strong commitment to historical accuracy. The guiding principle here is a humble approach: when documentation lacks consistency, dates and attributions are labelled as "unspecified" unless backed by recognizable sources. Connecting pre-modern medical literature with modern institutional history is crucial; the former sheds light on clinical concepts, while the latter outlines specialty boundaries, training pathways, and service delivery. (5)

The story unfolds in a timeline that is often seen in medical-history editorials: starting with earlier traditions from ancient and medieval times, moving through the modernization brought by Qajar-era reforms, then to the establishment of institutions in the mid to late 20th century, followed by a reorganization of systems after the 1979 revolution, particularly the integration of health and medical education after 1985, and finally touching on current practices and research. (6)

Chronological Historical Overview

Notable figures across eras

The table below is intentionally selective: it centres individuals whose contributions are

- Well-documented in accessible sources, and
- plausibly connected to neurological disease in children and adolescents through clinical description, institutional development, training, or research infrastructure.

Ancient Persian medicine and pre-specialty neurological observation

The medical landscape of Persia before Islam is often described as a blend of practical experience and religious beliefs. Contemporary historical reviews highlight that there were terms and observations related to neurology, but these were integrated into a wider medical and religious context rather than being recognized as a separate field. (5)

A common focal point in academic histories is "Gondishapur" (also rendered Jundishapur), characterized as a pioneering medical centre and educational hub during the Sassanian era. Although the ability to apply "neurology" to this period is somewhat restricted, it is evident that the role of an institutional setting for sharing knowledge is significant and often mentioned in contemporary historical studies. (12)

Looking at it from a pediatric neurology angle, it is not so much about saying that "child

neurology existed," but rather that physicians have been able to observe clear neurological issues in children, like convulsions, moments of lost awareness, motor weakness, and developmental disabilities, long before the field defined its current scope.

Table 1: Notable figures across eras

Notable Figure	Era	Historically defensible relevance to child neurology
Ibn Sina (Avicenna)	Medieval Islamic period	The significant medical synthesis encompassed neurological disorders and is frequently referenced in historical reviews of neurology, addressing conditions like paralysis, tremor, and meningitis. Contemporary scholarship particularly focuses on epilepsy and convulsions within his body of work. (5)
Muhammad ibn Zakariya al-Razi (Rhazes)	Medieval Islamic period	Frequently characterized in modern scholarly reviews as foundational to pediatrics (including childhood diseases) within Islamic medicine, provides an intellectual bridge to later approaches to seizures and systemic illness in children. (7)
Seyyed Esmail Jorjani	Medieval Islamic period	A respected Persian physician, recognized in peer-reviewed historical studies for creating a detailed medical encyclopedia in Persian. Recent studies highlight his significant innovations and thorough anatomical descriptions, such as those of cranial nerves, which are important for understanding neurological localization. (8)
Zakhireye Khwarazmshahi	Medieval Islamic period	Recognized in Iranian library records as an important Persian medical text written by Jorjani, this work acts as a vital source of clinical descriptions in Persian, which later historians explore for insights into neurological concepts.
Mirza Taqi Khan Amir Kabir (1805-1852)	Qajar modernizing era	Deeply connected to the establishment of the modern polytechnic institution (Dar al-Funun) that sparked a transformation in science and medicine through translation; played a crucial role in paving the way for future specialties.(6)
Dr. Hassan Ahari (1922-1950)	Mid-late 20th century	Recognized for proposing and promoting the establishment of a significant pediatric referral hospital, serving as a key centre for pediatric subspecialties, including neurology in the future.(9)
Dr. Mohammad Gharib (1909-1975)	Mid-late 20th century	Recognized in the histories of institutions as a key individual in the development of modern pediatrics and in establishing a significant pediatric centre, which paved the way for subspecialty pediatrics, including the future of child neurology. (9)
Professor Jalal Barimani (1930-2012)	Late 20th century	Recognized in contemporary historical reviews for playing a key role in the formation of a national neurology association in 1991, this was a significant foundation from which pediatric neurology later emerged. (5)
Professor Mohammad Ghofrani (1938-2025)	Late 20th-early 21st century	Recognized as a pioneer in Iranian pediatric neurology, he established a national child- neurology society and a research centre dedicated to the field, while also serving as secretary of a national board structure that significantly influenced training and professional identity.(10)
Dr Parvaneh Karimzadeh	Contemporary	Recognized in Iranian journal metadata as the Editor-in-Chief of a significant specialty journal; has contributions in peer-reviewed literature associated with a pediatric neurology research centre, showcasing the growth of academic child neurology. (11)
Dr Mahmoud Mohammadi	Contemporary	Recognized on a prominent university platform as founder, leader, and educator in pediatric clinical neurophysiology and epilepsy, highlighting a specific area of expertise within pediatric neurology, along with established course frameworks. (2)

Medieval Islamic period and the Persian medical canon

The medieval period, frequently referred to as the Islamic Golden Age in academic discussions, showcases the clearest, text-based insights into neurological classification. During this time, Persian scholars contributed significantly by writing in both

Arabic and Persian, blending Greco-Roman medical knowledge with their own clinical experiences. Contemporary examinations of the history of neurology in Iran often highlight the rich neurological insights found in medieval Persian scholarship.

In this collection, Avicenna’s work is often seen as holding valuable insights into neurology, with epilepsy being a notably explored topic. Recent academic

discussions on Avicenna's medicine thoughtfully explore epilepsy, creating a connection between

historical insights and today's clinical classifications, while acknowledging that perfect alignment in medical categories is elusive. (13)

Rhazes is also recognized in scholarly work as a key figure in pediatrics during medieval medicine, with a thorough examination of childhood diseases. This work is important for child neurology not just because it identifies the subspecialty but because it integrates neurological symptom clusters within a clinical approach that focuses on the child. (7)

Jorjani, who wrote in Persian and is linked to an extensive medical encyclopedia, is frequently mentioned in scholarly historical articles. The study of his work goes beyond just general medicine, delving into anatomical and physiological details that are important for understanding neurological localization. This includes discussions about cranial nerves found in medieval Persian literature. The documentation from Iranian libraries highlights the importance and cultural significance of his Persian encyclopedia. (8)

Qajar and the modernization of medical education

Today's pediatric neurology calls for contemporary institutions: consistent curricula, hospitals serving as training grounds, and professional certification. The modernization program during the Qajar era, especially with the founding of Dar al-Funun in 1851, is often recognized as a significant turning point. It marked a shift from primarily manuscript-based knowledge sharing to a more dynamic approach that included translation, laboratory work, and education connected to hospitals. (6)

This period marks the beginning of what we now understand as specialty formation in pediatric care. It is a crucial time that lays the groundwork for the development of subspecialty pediatrics, ultimately paving the way for pediatric neurology to emerge. This also lays the groundwork for future university-based medicine, which will serve as the foundation for pediatric referral hospitals and subspecialty boards. (14)

Twentieth-century institutionalization of pediatrics and hospital-based subspecialization

During the early to mid-20th century, pediatrics emerged as a recognized and essential field, laying the groundwork for the development of child neurology. In Iranian institutional histories, we see the rise of specialized pediatric hospitals that serve as important

places for both clinical care and education. For instance, Bahrami Children's Hospital was established in 1955 and subsequently became part of the University of Tehran as a teaching hospital, highlighting the growth of pediatric care during that era. (15)

A major turning point for pediatric subspecialization was the establishment of a national pediatric referral hospital. The official history of Children's Medical Centre shares that the idea for its construction emerged in 1337 SH (1958–1959) after a study trip that included a visit to the Montreal Children Hospital. It highlights the generous support from philanthropic and governmental organizations that helped bring the project to life. The hospital officially opened its doors in 1347 SH (1968–1969) and has since grown to include various pediatric subspecialties, such as neurology and pediatric neurosurgery. (9)

Mofid Children's Hospital is another important institution, noted on its official university-affiliated site as having been built and opened in 1353 SH (1974–1975). It was later handed over to the Ministry of Health and Medical Education and, in 1365 SH (1986–1987), came under the care of its associated medical university (National University or Shahid Beheshti University of the Medical Sciences). This hospital eventually gains recognition for its expertise in pediatric subspecialty care and research, particularly in the field of pediatric neurology. (16)

At last, the journey of pediatrics towards professional recognition is captured in the historical narrative of the Iranian Pediatric Society, which traces its roots back to 1335 SH (1956–1957) and positions itself as a dedicated scientific organization. These societies, though not the same as subspecialty boards, contribute significantly to the stability of educational and scientific communities. (17)

Post-1979 revolution developments and post-1985 system integration

The period after 1979 saw a number of important policy changes that shaped the structure of various systems. From an educational systems perspective, one of the most important events is the establishment of the Ministry of Health and Medical Education, created by parliamentary law on the first of October, 1985. This was done with the clear goal of bringing together health, treatment, and medical education functions under a single ministry. (18)

The international medical education scholarship regarding Iran highlights that the new ministry started its operations in 1986, and that the integration of medical education with health services took place through a gradual process. This integration is often presented as a way to enhance training capacity and

ensure education meets national health needs, creating a supportive environment for future growth in subspecialties, such as pediatric neurology. (14)

Contemporary practice and research

Today, child neurology in Iran is marked by three key elements: busy tertiary pediatric hospitals, structured subspecialty training programs, and research institutes and journals that support academic work.

The first subspecialty training program was established in 1988 at Mofid Children's Hospital, which is affiliated with Shahid Beheshti University of Medical Sciences (SUMS).

The Pediatric Clinical Neurophysiology and Epilepsy discipline received approval for fellowship training in September 2011 from the Ministry of Health and Medical Education. Since then, it has been training

The capacity of neonatology at the system level plays an important role in neonatal neurology and neurodevelopmental outcomes. A historical account of neonatal medicine in Iran highlights the start of a neonatology fellowship in 1986, leading to the expansion of NICUs across the country. These developments directly impact the management of neonatal seizures and the outcomes associated with hypoxic-ischemic injury, prematurity, and metabolic diseases. (21)

In the fields of genetics and neurogenetics, the creation of national genomic reference resources is highlighted by Iranome, which has shared population-specific exome data from various Iranian ethnic groups. This foundational work aids in understanding variants related to epileptic encephalopathies, neurometabolic disorders, and neurodevelopmental syndromes. (22)

In the realm of preventive child neurohealth, Iran has made substantial progress with its national newborn screening programs. The screening for congenital hypothyroidism began in 2004 and expanded nationally thereafter, while phenylketonuria screening started in 2006 and was scaled up later. These initiatives are crucial for preventing intellectual disabilities and neurodevelopmental impairments. (23)

Key Developments, Institutions, and Milestones

Comparative table of landmark institutions and infrastructures

The table below highlights a select group of institutions that have consistently been recognized as key players in pediatric subspecialty care, particularly in the field of child neurology.

fellows, primarily chosen from university staff and pediatric neurologists, at the Children's Medical Centre of Excellence.

In epilepsy, contemporary diagnostic and presurgical evaluation techniques are backed by much research published in the field. (20)

An important instance of how research becomes institutionalized is the Research Institute for Children's Health, which was formed in 2016–2017 by bringing together several pediatric research centres. The child neurology research centre is noted to have received principled approval in 2007–2008, with a governing council of pediatric neurology subspecialists overseeing project reviews. An English-language quarterly pediatric- neurology journal started publishing in (Khordad) May–June 2006, and it later gained a recognized scientific rating and was indexed in PubMed. (19)

Training pathways and professional formation

When considering specialty identity, there are three key processes that play a crucial role:

(1) a clearly defined training duration; (2) a specific clinical foundation; and (3) a structured examination or board system. University documents that are available to the public offer some insight into the first two.

A table provided by the university outlines the approved durations for various specialties, indicating that pediatrics spans 3 years. This highlights the essential groundwork from which pediatric subspecialties develop. (24)

The university has given a separate chart outlining the durations for pediatric subspecialties, which clearly shows that pediatric neurology lasts two years and is tied to the Children's Medical Centre as the official training facility. (3). Other recognized centres for training fellows include Mofid Children's Hospital and five other university teaching hospitals across the country.

The development of pediatric neurology in Iran is closely associated with both memorial and institutional resources, emphasizing a focus on governance and community building. Notices from the university and hospital highlight, the late Dr. Mohammad Ghofrani as the founder of the national child neurology society and the child neurology research centre, as well as the secretary of the child neurology board structure. This portrayal links his personal leadership to the credentials of the institutions he represents.

A fellowship in Pediatric Clinical Neurophysiology and Epilepsy was subsequently established at the Children's Medical Centre of Excellence, which is affiliated with Tehran University of Medical Sciences.

In 2015, a new research centre was established at the Tehran University of Medical Sciences, known as the Pediatric and Adolescent Multidisciplinary

Epilepsy Research Centre (PAMERC). This centre is dedicated to advancing research in the field of pediatric epilepsy.

Table 2: Comparative table of landmark institutions and infrastructures

Institution or infrastructure	Documented origin or key dates	Documented role in pediatric subspecialization/child neurology
Children’s Medical Center of Excellence	There was a plan for the establishment of 1337 SH between 1958 and 1959. The official opening is noted as 1347 SH during the years 1968 to 1969 in the Persian institutional history. However, the English-language institutional page mentions that it was “founded in 1968,” while another English page states that the official inauguration took place in November 1969. This suggests some minor differences in the dates reported across different languages in publicly available summaries. (9)	Described as a national pediatric referral hospital with expansion to multiple subspecialties, explicitly including neurology and pediatric neurosurgery in its historical account. (9)
Mofid Children’s Hospital	Opened in 1353 SH (1974–1975); later connected with the national ministry and, subsequently, its medical university coverage (1365 SH / 1986–1987). (16)	A leading pediatric tertiary centre that also serves as the foundation for the pediatric research institute infrastructure mentioned below. (19)
Bahrami Children’s Hospital	Established in 1955, it became a teaching hospital at the University of Tehran in 1958, as noted on an English page affiliated with the university. (15)	The early pediatric teaching site plays a vital role within the university system in the capital, helping to create a pathway that eventually leads to subspecialization. (15)
Research Institute for Children’s Health and the child neurology research centre	A research institute was set up following policy approval in 1395 SH (2016–2017); the child neurology research centre has received principled approval in 1386 SH (2007–2008) with documented formal governance structure. (19)	Documents an organized research council of pediatric neurology subspecialists, systematic project review, and association with an English-language pediatric-neurology journal indexed in PubMed. (31)
Pediatric and Adolescent Multidisciplinary Epilepsy Center (PAMERC)	Has received principal approval in 2024 and officially began in 2025, connected with Tehran University of Medical Sciences (TUMS)	An important research branch institute on pediatric and adolescent epilepsy

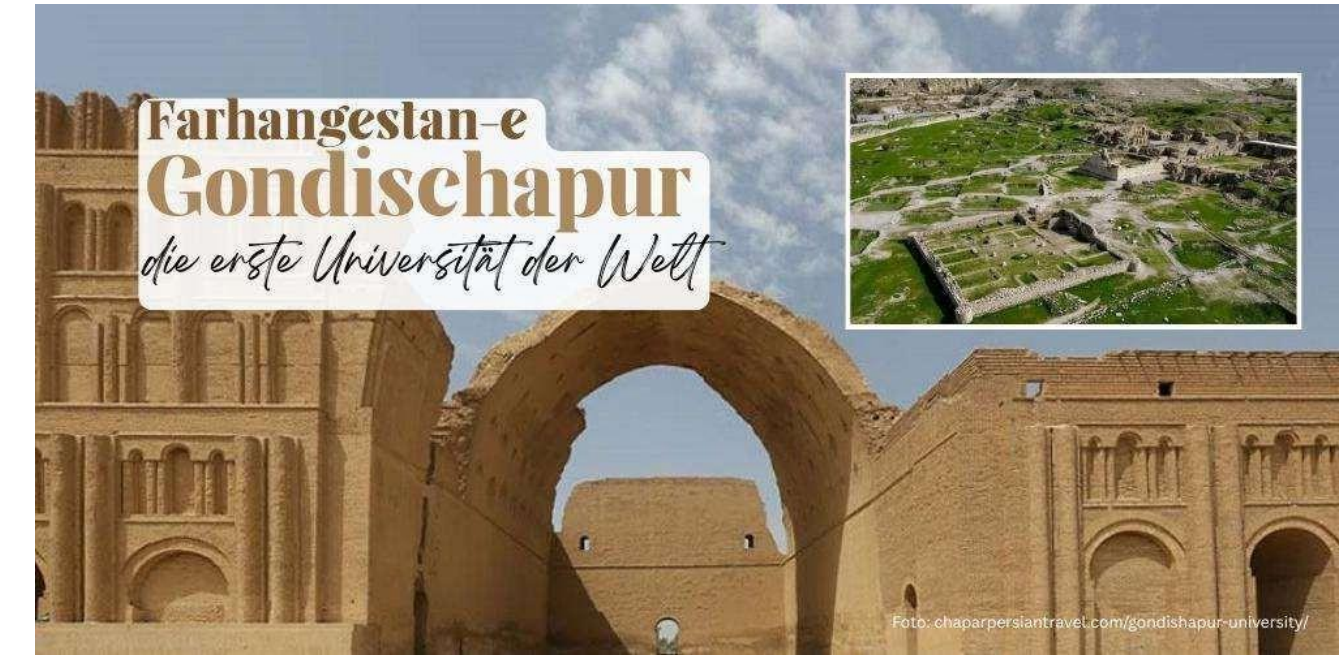


Fig 1: Jondishapur University from the Sassanid Era

Major clinical and research milestones by domain

Epilepsy has served as a central condition around which both service capacity and technological advancements have developed. Alongside the advancements in diagnostic techniques, such as video-EEG monitoring, observed in published pediatric cohorts,

dietary therapies emerge as a significant area of development. A historical review of dietary therapies for epilepsy in Iran highlights a ketosis-based program implemented at Mofid from 1989 to 1999, illustrating how subsequent expansions were influenced by the growth of knowledge and resources over time.

Numerous recent publications have emerged in the field of pediatric clinical neurophysiology and epilepsy, contributed by PAMERC and the Clinical Neurophysiology and Epilepsy Monitoring Unit at the Children’s Medical Centre, which is affiliated with Tehran University of Medical Sciences. (25,26)

The foundational framework for neonatal neurology consists of the Neonatal Intensive Care Unit (NICU) and the specialized field of neonatology. The historical narrative indicating that the inaugural neonatology fellowship commenced in 1986, and detailing the subsequent proliferation of NICUs, holds significant implications for the recognition of seizures, the use of EEGs, the management of hypoxic-ischemic injuries, and the follow- up of neurodevelopmental outcomes, even in instances where pediatric neurology was not explicitly identified as the specialty during those decades. (21)

Neurogenetics and neurometabolic disorders have evolved where the makeup of populations meets the capabilities of our labs. A commonly used national exome reference dataset, known as Iranome, offers a valuable resource for understanding variant frequencies specific to the population. This is crucial for interpreting potential pathogenic variants in recessive neurodevelopmental disorders, especially in contexts where consanguinity rates are acknowledged in genetic studies. (22)

Prevention is now a key part of child neurohealth, especially through screening. The start and expansion of screening for congenital hypothyroidism and phenylketonuria are often highlighted in public health discussions and neonatal screening literature as important national initiatives. (23)

Ultimately, a field really comes into its own when it has a reliable journal and a solid framework for conferences. The pediatric-neurology journal linked to the SBMU pediatric research institute is noted for being indexed in PubMed. It serves as an official publication for the child neurology research centre, and conference listings highlight ongoing national pediatric neurology congresses with indexed proceedings. (19)

Timeline table of selected milestones

Dates are stated in Gregorian with Solar Hijri Shamsi in parentheses when that is the form provided by Iranian institutional sources.

Table 3: Major clinical and research milestones by domain

Approximate date	Milestone	Why it matters for child neurology
Sassanian era (date unspecified)	The medical centre at Gondishapur, also known as Jundishapur, is recognized as an important early centre for structured medical education. (12)	It sets the stage for a long- standing tradition of medicine rooted in institutions, paving the way for the development of various specialties in the future.
11th–12th centuries	Persian scholars provided detailed descriptions of neurology in important medical texts, with Jorjani’s Persian encyclopedia being recognized in both peer- reviewed historical studies and Iranian bibliographic records. (8)	Develops clinical resources in Persian that later historians understand as including important neurological classifications related to children, such as seizures, paralysis, and concepts of cranial nerves.
1851	Dar al-Funun was established and is seen as a key turning point in the modernization of higher education and science in Iran. (6)	Starts the process of updating institutions, which eventually leads to the establishment of medical schools and hospitals that can train specialists in various fields.
1955	Bahrami Children’s Hospital was established and eventually evolved into a teaching hospital. (15)	Early pediatric hospital-based training infrastructure.
1958–1959 (1337 SH)	Proposal for Children’s Medical Center construction recorded in institutional history. (9)	Establishes a clear intention for a national pediatric referral hospital.

1968–1969 (1347 SH)	The opening of the Children’s Medical Centre is noted in Persian history, with English pages providing a summary of its founding and inauguration around 1968– 1969. (9)	Enables pediatric subspecialty wards, later including neurology and pediatric neurosurgery. (9)
1974–1975 (1353 SH)	Mofid Children’s Hospital established/opened.	Expands tertiary pediatric bed capacity and later hosts research infrastructure relevant to pediatric neurology.
1985 (1364 SH)	Parliamentary law establishes the Ministry of Health and Medical Education.	Structural integration of education and health services accelerates training scale-up and specialty governance.
1986	First neonatology fellowship program begins; NICU growth accelerates thereafter. (21)	Foundational for neonatal seizure care and neurodevelopmental outcomes.
2004–2006	CH screening reported as starting in 2004; PKU screening reported as starting in 2006. (23)	Moves pediatric neurodisability prevention into national programmatic practice.
2006 (1385 SH)	Pediatric neurology specialty journal begins publication (per SBMU pediatric research institute description).	Signals academic consolidation and an outlet for national clinical research.
2007–2008 (1386 SH)	Child neurology research center receives principled approval; formal governance described.	Institutionalizes research pipeline and oversight, advancing the field beyond service provision.
2007–2012	Neurophysiology and Epilepsy program was established and operated as a unique field at the Children’s Medical Centre, which is affiliated with Tehran University of Medical Sciences.	Represents modern neurodiagnostics for refractory epilepsy and presurgical evaluation.
2019	Iranome exome resource published.	Strengthens neurogenetic interpretation in epilepsy and neurodevelopmental disorders.
2024	The Pediatric and Adolescent Multidisciplinary Epilepsy Research Centre (PAMERC) was established in connection with Tehran University of Medical Centre.	Establishes a structured approach to research and oversight, pushing the field forward beyond just providing services.

Challenges and Structural Constraints

To truly understand the history of child neurology in Iran, we need to look at both the advancements in clinical practice and the challenges that influence the development of services and academic resources.

International sanctions and imposed wars are often associated in peer-reviewed and global health sources with challenges in acquiring medicines and medical devices, as well as issues with banking and financial transactions and supply chains, even when there are supposed humanitarian exemptions on paper. Studies in global health journals and regional health organizations highlight real challenges in access and system efficiency.

These issues likely impact neurology, particularly in terms of the availability of antiseizure medications, immunotherapies, genetic testing supplies, neuroimaging upkeep, and neurophysiology tools. (4)

The ups and downs of the economy, along with rising prices and sanctions, are affecting hospital

budgets, staff morale, and the ability to maintain ongoing research programs. Many reports suggest that the result is not just a straightforward “collapse,” but rather a situation of ongoing stress: frequent shortages, delays, and uneven access to new technologies in different provinces. (27)

The challenges we are facing with workforce limitations, particularly the movement of clinicians and scientists, are becoming increasingly evident. Commentaries and studies show that more and more physicians and nurses are choosing to emigrate. Additionally, many residents express a strong desire to migrate, as highlighted in various multi-centre surveys. In the field of child neurology, which relies heavily on skilled professionals and is usually found in urban areas, this situation poses a risk to both access to services and the ongoing support for academic mentorship. (28)

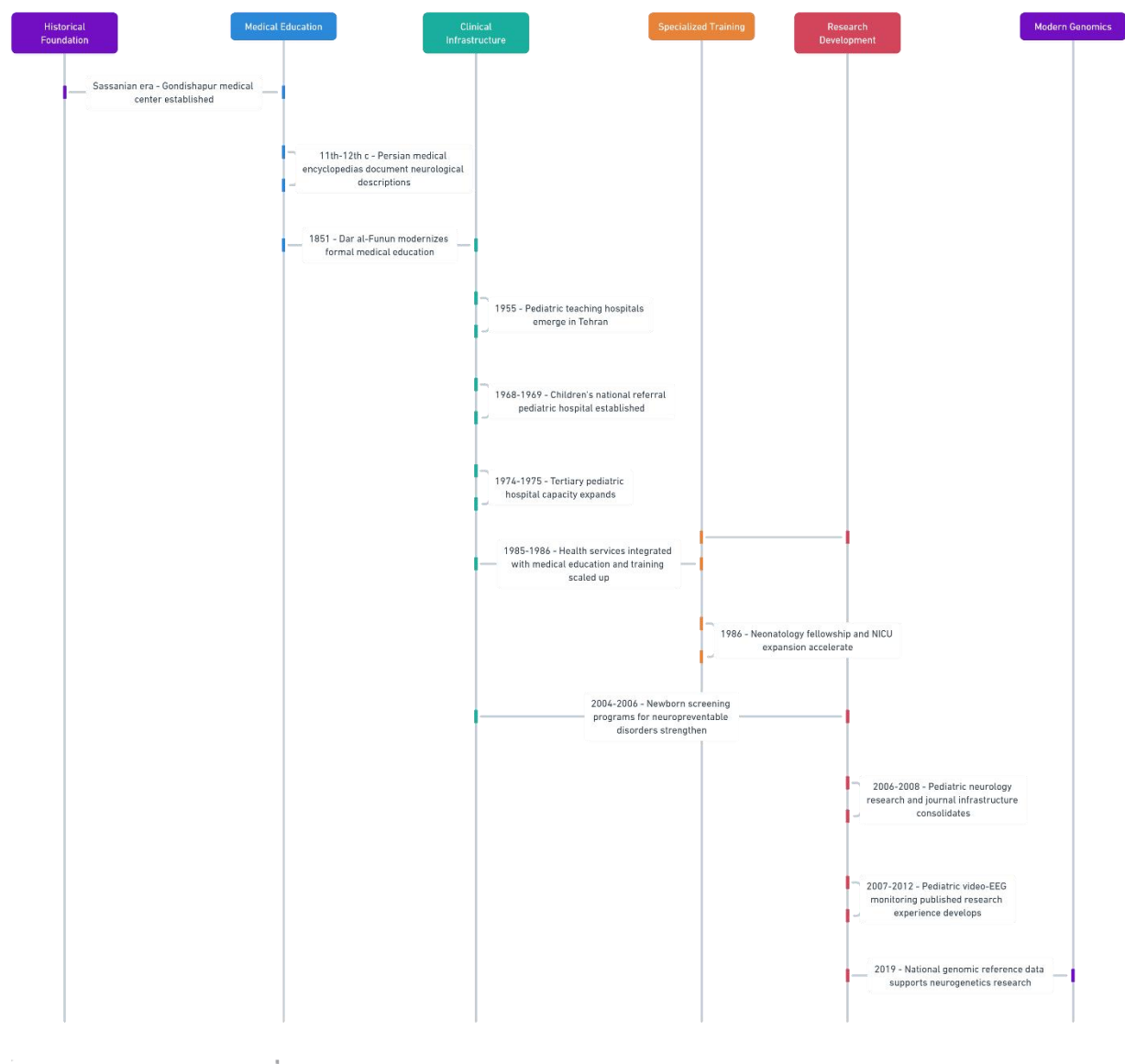


Figure 2: Mermaid Flowchart Revealing Major Historical Milestones

Geopolitical shocks, particularly the recent war and ongoing regional insecurity, have had a significant impact on medical infrastructure. For pediatric hospitals, these challenges manifest in both direct physical damage, as seen in at least one documented case, and indirect effects such as resource diversion and limited international collaboration. (15)

Conclusion and Future Directions

Over the years, Iranian child neurology has transformed significantly. It has grown from being a part of general medicine, focused on descriptive

neurology, to becoming a specialized field that thrives in hospitals and is equipped for research.

There are two patterns that really catch the eye. First, it is important to recognize that institutions are just as significant as individuals. The establishment of national pediatric referral hospitals in various provinces across the country, along with the subsequent formal integration of education and health services at the ministry level, laid the groundwork for the growth of subspecialties. This progress is evident today in the defined training durations, the presence of research centres, and the indexing of a specialty journal.



Fig 3: This text is a section titled "Kitab al-Qarabadin," which translates to a pharmacopoeia or a book regarding the composition of medicines.

Furthermore, understanding diseases has really fueled the growth of our capabilities. Epilepsy services, including dietary therapy programs, EEG/video-EEG monitoring, and presurgical evaluation, play a crucial role in advancing care and support. Neonatal medicine and newborn screening play a crucial role in prevention and development.

Neurogenetics, supported by genomic references tailored to specific populations, is playing a growing role in how we diagnose and provide guidance for complex neurodevelopmental disorders.

The future paths that align best with what we have observed so far are more practical than idealistic:

Keeping our workforce strong and engaged is probably going to be the biggest challenge we face. Tackling migration challenges and enhancing training conditions is not just an afterthought; it is a vital approach for ensuring access in a field that relies heavily on skilled professionals. (28)

We should consider regionalization and equity as important measures of quality. The major pediatric centres in Tehran will continue to play a crucial role, but we need to focus on ensuring that everyone has

reliable access to epilepsy diagnostics, neurodevelopmental assessments, and neurogenetic counselling in the provinces. It's important that referral pathways are established that don't rely on personal connections. (29)

The advancement of research will rely more and more on registries, data platforms that can be reproduced, and reliable laboratory supply chains. We already have a path from getting approval at research centres to having our pediatric neurology work published on PubMed. The next step is to expand our multicenter registries for conditions like epilepsy, neurometabolic diseases, and neurodevelopmental disorders, and to connect them with genomic resources and screening programs. (19)

Ultimately, a trustworthy roadmap needs to be mindful of sanctions and wars. By fostering resilience through a variety of procurement options, encouraging local manufacturing when possible, and forming international scientific collaborations that prioritize transparency and shared data can help mitigate the ongoing challenges highlighted in global health studies. (4)

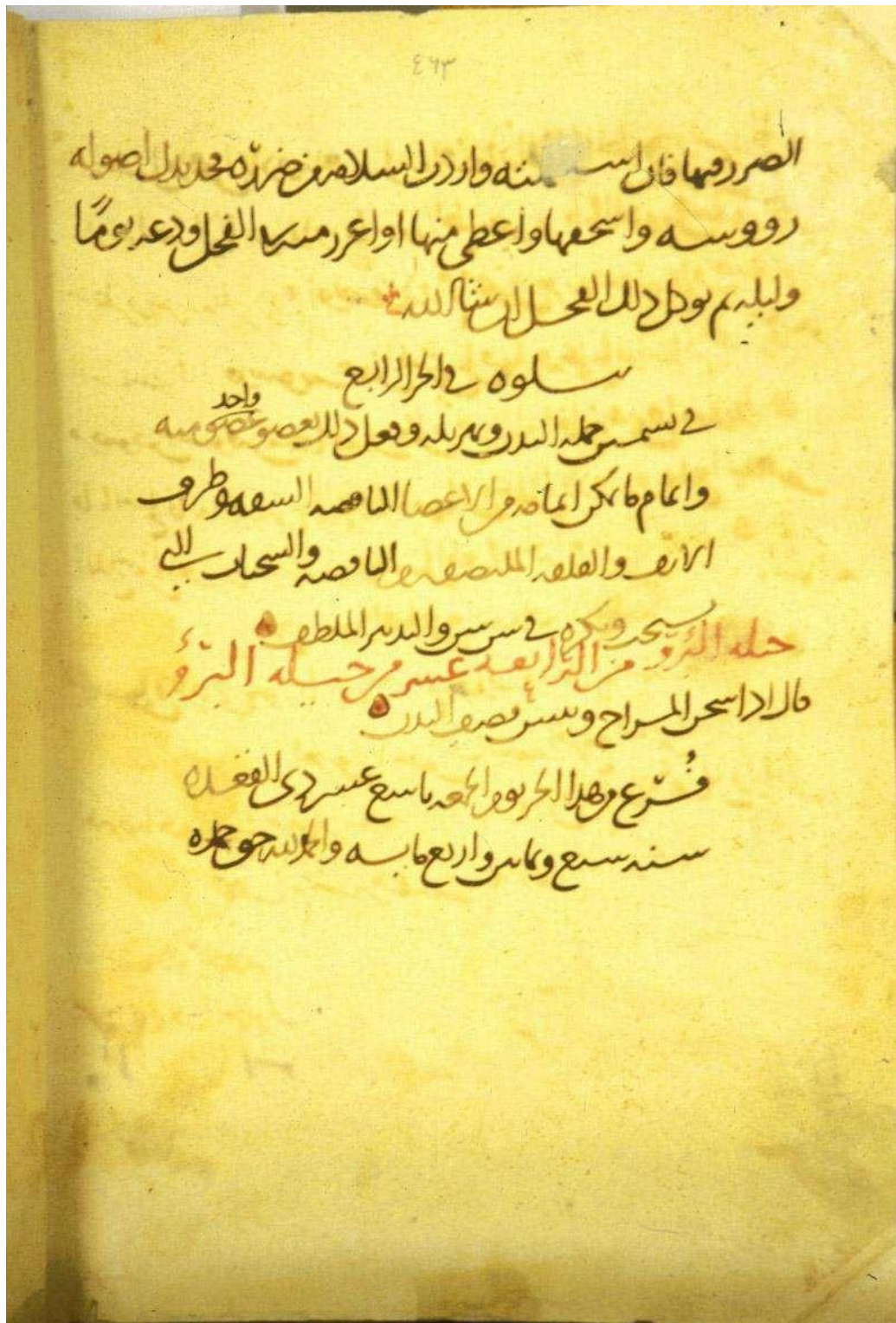


Fig 4: This image is of the oldest surviving manuscript of Kitāb al-Hāwī fī al-Ṭibb (The Comprehensive Book on Medicine) by the Persian scholar Muhammad ibn Zakariyā al-Rāzī (Rhazes). The manuscript, likely transcribed by a student in Baghdad, deals with gastro- intestinal diseases and is dated to 1094



Fig 5: Children's Medical Centre of Excellence

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Author's Contribution

Dr. Mahmoud Mohammadi confirms being the sole contributor to this review article. He was responsible

for all stages, including literature search, study selection, data extraction, synthesis of findings, manuscript writing, revision, and submission.

Conflict of interest

None declare

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