History of Medicine in Iran

A History of Neonatal Medicine in Iran

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Abstract

Neonatal medicine was officially initiated in the United States of America in 1973, and in the same year, the American Board of Pediatrics held the first subspecialty examination in the field of neonatal-perinatal medicine. The first Newborn Intensive Care Unit (NICU) in Tehran began its work with great efforts of Prof. Hadi Samaee at Ali-Asghar Children's Hospital, approved by the Ministry of Health as the first standard center for training neonatologists. Hence, the first neonatology fellowship program began in 1986 and two years later (1988) its graduate started work at Ali-Asghar Children's Hospital.

Afterwards, more NICUs were built all over the country and equipped gradually. The Iranian Association of Neonatology and Perinatology were founded in 1998 and 2003, respectively. These two scientific associations jointly made recommendations to health officials to develop consistent educational programs for neonatal and maternal health promotion in Iran. Regionalization of maternal-neonatal health services was also another recommendation which has now been presented to the Ministry of Health as a national program to promote neonatal and maternal health status.

Thanks to the measures taken so far over the last few years, the index of neonatal mortality has declined from 26 per 1,000 live births in 1990 to 11 per 1,000 live births in 2012.

Keywords: History of medicine, intensive care units, Iran, neonatal, neonatology

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Introduction

Pediatrics was developed in France and Germany out of sheer necessity to pay serious attention to child health in the late 17th and the 18th centuries. Neonatal medicine originally dates back to the nineteenth century, and a large number of scholars and physicians made great efforts in this regard. Arvo Ylppo, Joseph De Lee, John Lind, Richard Day, William Liley, Joseph Barcroft, Clement Smith, and Henry Gordon are just a few examples of these great scholars and physicians. Margaret Williams was the famous physician who specifically began her work in the field of neonatology. While neonatology was officially developed in the USA in 1973,[1] the first fellowship examination of neonatal-perinatal medicine was held by the American Board of Pediatrics two years later (1975).[2,3] The developing trend of this subspecialty in the world is summarized in Table 1.

Neonatal medicine in Iran

Pediatric medicine in Iran has been recognized as a specialty for more than 50 years, but neonatal-perinatal medicine is still in the first decades of its life and has been flourishing and much publicized in the last 20 years. Before the Islamic Revolution of Iran (1979), neonatal medicine was practiced under the category of pediatrics. Eminent professors such as Prof. Mohammad Gharib, founder of modern pediatrics in Iran, paid serious attention to neonatal medicine along with pediatrics.

Modern neonatal medicine, after the Islamic Revolution of Iran, owes its advancement to Prof. Seyed Alireza Marandi, neonatologist and Health Minister of that time, even though outstanding professors including Dr. Nosrat-ollah Razi (Tehran University of Medical Sciences), Dr. Mohammad Reza Sedaghatian (Shiraz University of Medical Sciences), Dr. Nosrat Lotfi (Mashhad University of Medical Sciences), Dr. Iraj Haghshenas (Isfahan University of Medical Sciences), Dr. Ahmad Ghane Basiri (Tehran University of Medical Sciences), Dr. Shahin Behjati (Tehran University of Medical Sciences), Dr. Ahmad Madani (Shiraz University of Medical Sciences), Dr. Sedigheh Ghaemi (Isfahan University of Medical Sciences), Dr. Zia Eslami (Yazd University of Medical Sciences), Dr. Naser Rahbar (Tehran University of Medical Sciences) and Dr. Alimohammad Movafagh (Tehran University of Medical Sciences) greatly served the neonatal wards of Iranian universities. Prof. Seyed Alireza Marandi seriously focused on improving health indices in Iran including mortality rate in children, neonatal mortality rate and mortality rate in pregnancy. He also highlighted the health-oriented approach in developing policies and health programs at the Ministry of Health such as increasing vaccination coverage for children and pregnant mothers, promotion of breast feeding, supply of safe drinking water and sanitation in rural and urban areas by health networks, and initiation of pregnancy care programs in these networks. All these efforts resulted in significant development of indicators/indices in a short period of time.

Meanwhile, it is noteworthy that development of this field in medicine, to be introduced and approved as an independent subspecialty by the Iranian Ministry of Health, largely owes its existence to tireless efforts of four prominent professors, namely Prof. Alireza Marandi (Shahid Beheshti University of Medical Sciences), Prof. Hadi Samaee (Iran University of Medical Sciences),

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Table 1. Development of neonatal-perinatal medicine in the world.

Year	Event
1835	First known incubator for the imperial foundling hospital in St. Petersburg[2]
1898	First premature infant incubator station in the United States[4]
1922	First transport incubator for neonates[5]
1934	First dedicated transport vehicle for neonates[6]
1938	Design of modern infant incubator (prototype of Isolette) [4]
1945	Publication of the first American textbook of neonatology: The Physiology of the Newborn Infant[4]
1948	First organized neonatal transport program in the United States [6]
1948	First use of the term "perinatal"[7]
1952	Apgar score [4,8]
1953	Description of natural history of respiratory distress syndrome (RDS)[7]
1953	Invention of high-frequency oscillatory ventilation (HFOV) [7]
1958	First description of light effect on bilirubin levels[9]
1958	First description of RDS as a specific pathological entity under the name of hyaline membrane disease (HMD) [10]
1959	Description of surfactant deficiency as the cause of RDS [4,10]
1960	First use of terms "neonatologist" and "neonatology" in a textbook[11]
1963	First successful ventilation of a preterm infant with HMD [12]
1965	First newborn intensive care unit (NICU) at Yale-New Haven Hospital [4]
1967	First helicopter transport of neonates[6]
1968	First published report of total intravenous nutrition of a newborn[13]
1971	Use of continuous positive airway pressure (CPAP) for RDS[14]
1972	Routine use of air transportation for neonates[6]
1972	Intermittent mandatory ventilation (IMV) for RDS[15]
1974	Perinatology subspecialty certification begins[16]
1975	Neonatology subspecialty certification begins[17]
1976	Publication of reference manual for regionalization[18]
1978	Kangaroo mother care (KMC) started[19]
1979	Description of surfactant as the treatment of RDS[7]
1981	Use of HFOV in neonates with RDS[20]
1983	American Academy of Pediatrics (AAP) and American Congress of Obstetricians and Gynecologists (ACOG) publish Guidelines in Perinatal Care[21]
1987	AAP and American Heart Association (AHA) developed the Neonatal Resuscitation Program (NRP)[22]
1990	FDA approval of surfactant therapy for RDS[23]
1998	Recommendations for ROP screening were published [24]
1998	First head cooling in a pilot randomized control trial [25]
2004	AAP defined neonatal levels of care[26]
2006	FDA approval of cool cap (http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/2006/ucm108813.htm)

Figure 1. From left to right, Prof. S.H. Fakhrayee (born in 1948), neonatologist, fellowship trained from Washington University in St. Louis, Missouri, United States; Prof. S.A.R. Marandi (born in 1939), neonatologist (American Board certified in 1977), fellowship trained from Wright State University, Dayton, Ohio, USA; Prof. H. Samaee (born in 1940), neonatologist, fellowship trained from Medical University of South Carolina; Prof. M.R. Sedaghatian (born in 1938), neonatologist, fellowship trained from University of McGill University, Montreal, Canada and University of Arizona, Phoenix, Arizona, USA; and Prof. Z. Panjevani (born in 1945), neonatologist, fellowship trained from University of Massachusetts.

Prof. Seyed Hossein Fakhrayee (Shahid Beheshti University of Medical Sciences) and Prof. Zahra Panjevani (Mashad University of Medical Sciences) (Figure 1). Ultimately, the board of neonatology was formed in 1985.

Evolution of neonatology in Iran

1. Establishment of NICU and training neonatologists

The neonatology study program was first compiled in 1985 and revised in 2010. The duration of this subspecialty training program is two years and fellows of neonatology are selected from pediatricians taking part in a nationwide examination and Objective Structured Clinical Exams (OSCE). During these two years of training, physicians learn how to manage high-risk neonates from labor to the neonatal ward, NICU and follow-up after discharge. They also learn to follow up the health of normal neonates.[27] As mentioned before, neonatal wards had been established before the Islamic Revolution of Iran in some hospitals around the country

including Children's Medical Center, Mofid Children's Hospital, Ali-Asghar Children's Hospital in Tehran and Namazi Hospital in Shiraz, and they all had served neonates and even critically ill patients, yet a standard NICU did not exist.

According to the interviews conducted for this review, although some neonatologists such as Prof. M. Sedaghatian, Prof. H. Sardari Zadeh and Prof. H. Samaee had been working in neonatal wards since the early 1970s, set-up and establishment of the NICU took place a decade later. In 1973, Prof. M. Sedaghatian equipped three rooms in the pediatric ward with ventilators for infants in need of mechanical ventilation, dedicating these rooms to advanced neonatal care.[28] Furthermore, the NICU of Ali-Asghar Children's Hospital, affiliated to Iran University of Medical Sciences, was set-up by Prof. H. Samaee in 1975.

A measure taken in the late 1970s, immediately before the Islamic Revolution in Iran, was the invitation of two neonatologists, Dr. Rao (from India) and Dr. Montaya (from Argentina), by Namazi Hospital in Shiraz to lecture and perform research in this area.[28]

Ultimately, the NICU of Ali-Asghar Children's Hospital after being equipped and standardized, was approved as a standard NICU by the Ministry of Health and introduced as the first standard center for training neonatologists in 1985. It is undeniable that Prof. H. Samaee paved the way for the survival of premature neonates who died before that. In 1988, the Iranian Board of Neonatal-Perinatal Medicine was established by Professors S.A.R. Marandi, H. Samaee, and S. H. Fakhrayee. The first fellow of neonatal-perinatal medicine, Dr. Abdollah Arab Mohammad Hosseini, was admitted to Iran University of Medical Sciences in 1986 and began his training there. He graduated in 1988 and began working at Ali-Asghar Children's Hospital afterwards.

After establishment of an NICU at Mofid Children's Hospital in 1982 (by Prof. S. H. Fakhrayee), a neonatology fellowship program was approved by Shahid Beheshti University of Medical Sciences in 1988. Subsequently, Prof. Fakhrayee and Prof. Marandi began to train neonatology fellows. Mashad University of Medical Sciences admitted neonatology fellows who were trained by Prof. Z. Panjevani at Ghaem Hospital in 1987. Then, neonatology departments of Shiraz, Kerman and Babol universities of medical sciences started to offer neonatology fellowship in 2000, which was followed by other medical universities including Tehran University of Medical Sciences (2004), Isfahan University of Medical Sciences (2006) and Tabriz University of Medical Sciences (2009).

Undoubtedly, the presence of skillful and expert nursing staff is one of the most important elements of success in NICUs. Nurses have an irreplaceable role in survival of low birth weight and critically ill neonates. Caring for patients unable to communicate pain, who inevitably cry to make nurses aware of any existing problems, requires great accuracy and expertise. On the other hand, encountering disturbed parents whose most pleasant event in life has turned into a bitter experience despite their expectations, makes nursing a laborious and difficult job. Despite all difficulties, many nurses have been trained throughout the years to care for patients in NICUs, and despite insufficient number of nurses, they have devoted themselves whole-heartedly to compensating for any existing shortages. Most nurses have also taken on the role of a social worker in addition to their main job. Although it is not possible to focus on the history of neonatal nursing in this article, it is necessary to acknowledge their remarkable role in set-up and establishment of NICUs. However, master's degree of NICU nursing has been launched in five universities of medical sciences: Tehran, Iran, Shahid Beheshti, Babol, and Kerman. Four groups of nursing students have been admitted in this major so far.

After establishment of NICUs and training of large numbers of neonatologists, the Iranian Association of Neonatology was founded in 1998. Members of this association put forth efforts to provide appropriate academic consultation services in order to promote neonatal health via further collaboration between neonatologists, gynecologists and perinatologists. Therefore, the Association of Perinatology (consisting of neonatologists, perinatologists, and gynecologists) was founded in 2003 and started training fellows of perinatology (2006) selected from gynecologists. Currently, there are 200 neonatologists working in all provinces of the country and the presence of perinatologists is gradually increasing. According to a report issued by the Neonatal Health Office, Family Health Office of the Ministry of Health, the number of NICU beds all over the country reached above 1,973 in 2011, while this figure did not exceed 100 beds in 1996. Due to great efforts of these two scientific associations, consistent educational programs have been provided and presented to health officials, medical universities, visual media, press and different personnel of the healthcare system including obstetricians, nurses, pediatricians, gynecologists and neonatologists in order to promote maternal and neonatal health. Regionalization of maternal-neonatal health services is one of the recommendations made by these two associations to be implemented in the form of a national plan. This project has been piloted in East Azerbaijan provinces with great support from Dr. M. Heidar Zadeh and in Kerman by Dr. P. Nik Nafs, results of which, despite presence of financial problems, have been satisfactory. The project is expected to be approved by the Islamic Assembly to be publicly implemented throughout the country.

2. Neonatal resuscitation

Publicizing neonatal resuscitation training at birth is one of the most important measures taken to promote neonatal health. Although the process of resuscitation is very simple and even operating room (OR) personnel can be trained to perform important and essential steps, cerebral/brain damage and even death can result if resuscitation is delayed or done incorrectly. Dr. Abdol Rasoul Akbarian, a gynecologist (Iran University of Medical Sciences), presented the *American Textbook of Neonatal Resuscitation*[29] for the first time to the Ministry of Health. The national committee of neonatal resuscitation was founded in 1997 with its membership consisting of an anesthesiologist (Dr. Seyed Sajad Razavi from Shahid Beheshti University of Medical Sciences) and a gynecologist (Dr. Abdol Rasoul Akbarian from Iran University of Medical Sciences) along with neonatologists. In addition, the first national workshop was held in Tehran in January 1997. Some of the pioneers of neonatal medicine who have conducted workshops in Iran are as follows: Dr. Pedram Nik Nafs (Kerman University of Medical Sciences), Dr. Mohammad Heidar Zadeh (Tabriz University of Medical Sciences), Dr. Ahmad Madani and Dr. Narjes Pishva (Shiraz University of Medical Sciences), Dr. Mohammad Kazemian and Dr. Seyed Abolfazl Afjeh, Dr. Fatemeh Mahta Basir (Shahid Beheshti University of Medical Sciences), Dr. Firouzeh Nili, Dr. Elaheh Amini and Dr. Maliheh Kadivar (Tehran University of Medical Sciences) and Dr. Parisa Mohagheghi, , Gholam-Ali Mamouri (Mashhad University of Medical Sciences) and Dr. Nastaran Khosravi (Iran University of Medical Sciences). These prominent figures have strived to train thousands of OR and neonatal ward personnel, pediatricians, gynecologists and also residents of these majors in hundreds of national workshops.

3. The first incubator for neonates and the first Iranian phototherapy unit

Maintaining neonatal body temperature is one of the challenges of neonatal care, and hypothermia is a common problem in neonates, which is even more common and severe in unwell or premature neonates. Therefore, special types of incubators are used to take care of ill or premature neonates. The first Iranian incubator for neonatal care was made in 1982 by Tosan manufacturing company (Tosan Co., Tehran, Iran), ordered by Dr. Samaee. However, it had some faults which were resolved by Dr. Samaee, Dr. Marandi and Dr. Fakhrayee. Later, this Iranian-made incubator was commonly used, and some Iranian manufacturers began to produce more incubators. Before these incubators, some Japanese, European and American incubators had been used. According to an unpublished study,[30] only 3% of neonatal wards were equipped with an incubator in the 1950s, whereas this figure dramatically surged to 100% in the 80s, during which time Tosan manufacturing company began to produce incubators and phototherapy units.

These devices are the most essential equipment needed in all neonatal wards, useful in treatment of hyperbilirubinemia. The most basic type of these units simply had two or four fluorescent lamps, but gradually more advanced ones were designed and built; double phototherapy unit can provide radiation from above and below (supine and prone position) in order to reduce jaundice treatment time. Moreover, Mr. Zia-edin Nik Nafs introduced home phototherapy units which were produced in Kerman in 1987.

4. Neonatal mechanical ventilation

Once the first modern NICU was set-up in 1985, the first American neonatal ventilator was purchased by Dr. Samaee. Although adult mechanical ventilation at that time was very common, placing low birth weight and premature neonates under this kind of ventilation and also training nurses on how to use the machines were stressful and difficult. Different types of mechanical ventilation machines with novel methods of ventilation were widely used in modern NICUs, and High Frequency Oscillation (HFO) was first used in Mofid Children's Hospital in 1995. Dr. Nili, fellow of neonatology at the time, piloted this device on ten patients, results of which are explained in her thesis.[31] Subsequently, HFO was used in Ali-Asghar Hospital in 2003. Due to development of neonatal mechanical ventilation machines and use of modern methods such as assist-control and synchronized intermittent mandatory ventilation (SIMV) and pressure support ventilation (PSV) in treatment of neonatal respiratory failure, HFO became less and less popular in Iran. Since the population of neonatologists who take care of high risk neonates is insufficient, considerable numbers of pediatricians often help neonatologists to manage ventilated neonates. Therefore, a number of neonatologists, supervised by Dr. P. Mohagheghi, began to study the textbook of *Neonatal Mechanical Ventilation* published in 2008[32] in order to promote pediatrician knowledge and awareness in this regard.

5. Total Parenteral Nutrition (TPN)

Neonatal Total Parenteral Nutrition in Iran began in the first NICU in 1985, which played an important part in survival of premature neonates, yet TPN administration was not standard. In fact, some amount of hypertonic glucose, intralipid and aminofusion were separately administered due to shortages in the country which continued from 1985 to 2011. Currently, standard TPN is possible only in a few NICUs due to financial problems, lack of intravenous vitamins and minerals and absence of clinical pharmacologists on site.

6. Surfactant therapy

Respiratory Distress Syndrome (RDS), generally, is one of the most important causes of neonatal mortality, particularly in premature neonates. RDS is due to premature lungs and lack of surfactant in the lungs. Hence, neonates have to undergo mechanical ventilation as a common treatment and receive surfactant (synthetic, natural or semi-synthetic) via the tracheal tube. The Irish type of surfactant (ALEC), which was synthetic, was administered for RDS neonates admitted to Ali-Asghar Hospital in 1995 and 1996. Although this type of surfactant, in practice, produced good results in neonates with RDS (increased survival rates with its use compared to its lack of use), it also led to several complications such as pneumothorax and pulmonary hemorrhage. Interestingly, a considerable number of neonates did not respond to this type of therapy. One year later (1997), 15 vials of semi-synthetic surfactant were imported from the American pharmaceutical company "Exosurf," ordered by Prof. Samaee, and first administered in Ali-Asghar Hospital. It demonstrated significantly better results in comparison with its synthetic type. Later on, other types of surfactant were widely used in NICUs all over the country. It is notable that the first report on clinical trial of surfactant therapy in Iran was published in the Tehran University Medical Journal in 1999 (Dr. Fatemeh Sadat Nayeri).[33]

7. Management of Retinopathy of Prematurity (ROP)

ROP may lead to blindness in severe cases alongside other medical problems. Visual impairment became more dominant in premature neonates who had survived thanks to improved neonatal care. Since ROP has become the most prevalent cause of blindness in children, though preventable, premature neonatal vision screening has been recognized as a vital issue. Management of ROP was initiated by two ophthalmologists named Dr. Shahsavari and Dr. Mir Hassan Naghibi when NICUs were first established in Iran. However, systematic and consistent assessment and screening of patients with ROP-induced visual impairment was carried out at Farabi Hospital by Dr. R. Karkhaneh and his team,[34] followed by Dr. M. M. Parvaresh and his team[35] at Hazrat-e-Rasoul Hospital. The "Screening of ROP" program, which managed to prevent blindness in thousands of children, was widely implemented in all neonatal wards throughout the country by the Ministry of Health in 2013.

8. Assessment of neurocerebral development in neonates

Full-term, high risk and premature neonates are prone to complications and neuro-cerebral /neurologic disabilities induced by several factors including asphyxia at birth and cerebral hemorrhage (intraventricular hemorrhage). Therefore, follow-up of neurologic development and timely intervention to resolve any issues is of paramount importance. Some healthcare centers such as Ghaem Hospital in Mashad started to pay serious attention to neurologic development in the early 1990s, but the first center for assessment of neurologic development in neonates was officially established in Imam Khomeini Hospital, affiliated with Tehran University of Medical Sciences in 2007. In this clinic, NICU discharged neonates undergo a two-year follow-up for neurologic development, and parents receive training to stimulate neural development in

their children. Currently, all neonatology fellowship centers run this clinic. A program known as "follow-up of high risk infants discharged from NICUs" has been developed by the Ministry of Health in collaboration with Tabriz University of Medical Sciences through a pilot study which was completed at the same university in April 2014. This program is to be implemented nationwide.

9. Transportation of ill or unwell neonates

Method of patient transport to the NICU plays a crucial role in survival of unwell and premature neonates. Neonates may be hypothermic during transport. Different studies show that hypothermia significantly increases mortality rate in low birth weight neonates (<1500 g).[36] This is why it is believed that intrauterine transfer (before birth) is the best alternative. In other words, the pregnant mother is transferred to a center providing premature neonatal care. Yet, a significant number of neonates are still born in hospitals not equipped to provide suitable care. In these conditions, the neonate has to be appropriately transported to another hospital with premature neonatal care. The first transport system was developed by Dr. Yadollah Zahed Pasha in Babol in 2004. Later, "Maternal and Neonatal Emergency Transport Service (MANETS)" was developed in Kerman by Dr. P. Nik Nafs, executive director of regionalization of maternal-neonatal services in 2012. This transfer system was equipped with seven ambulances and it is still fully functional. Unfortunately, there is no comprehensive transport system in the country yet, which is one of the important challenges of neonatal medicine in Iran.

10. Kangaroo Mother Care (KMC)

This technique, which is used in preterm/premature neonatal care, was first practiced in Colombia. A method of continuously holding a preterm neonate to the chest, involving skin-to-skin contact improves survival of neonates with threat of death due to no access to an incubator.[37] Later on, the benefits of KMC were revealed, and it was practiced as the standard method even in high socioeconomic status and developed countries. Dr. Khalil Farivar introduced KMC for the first time in Iran in 2000 by showing a dubbed educational video clip provided by Dr. Burgman. Dr. Mashallah Ershad Manesh, a general practitioner in Tabriz, translated the WHO handbook of KMC in 2004 and began to practice this method. Two years later (2006), KMC was applied by Dr. Ashraf Mohammad Zadeh at Imam Reza Hospital of Mashad University of Medical Sciences and Dr. Mohammad Heidar Zadeh at the Al-Zahra Hospital neonatal ward (the second level of neonatal care) in Tabriz. Consequently, this technique of preterm neonatal care was employed in 2006 by Dr. Fatemeh Nayeri at the neonatal ward of the Vali-Asr Hospital [the third level of neonatal care (NICU)] at the Imam Khomeini Hospital Complex. Later, Neonatal Health Office of the Ministry of Health began to teach this method nationwide, and finally all specific care centers and NICUs were officially required by Dr. M.V. Dastjerdi, the Health Minister at the time (2012), to implement this program. This program entitled, "developmental care package in NICU", inspired by another program known as "Newborn Individualized Developmental Care and Assessment Program (NIDCAP)" developed by Dr. H. Als, was promoted in 2013.[38]

11. Neonatal screening

The importance of neonatal disease screening to prevent the complications of such diseases is on the same level as that of vaccination for prevention of complications of infectious diseases in infants. Neonatal screening permits early identification of infants with metabolic, endocrine, genetic, and hematologic diseases, making quick treatment possible and preventing dissipation of human and financial resources. In 2004, neonatal screening (for hypothyroidism, phenylketonuria, and G6PD) was carried out as a pilot program, and in 2005, the program became nationwide. In order to ensure increased scientificity and correct implementation, the program benefited not only from the knowledge of Iranian scientists and scholars from the National Scientific Committee and the Provincial Scientific Advisory Committee, but also from the experience of consultants from the International Society of Newborn Screening (ISNS) and the Newborn Screening Department of the International Atomic Energy Agency (IAEA). In 2010, a cost-effectiveness analysis of the program was conducted which justified the project.[39]

12. Cool cap

Cool cap is used to treat neonates with asphyxia to prevent neurologic defects and cerebral palsy to a great extent. Cool cap was first used by Dr. M. Heidar Zadeh and Dr. Abdollah Janat Doust at Al-Zahra Hospital of Tabriz University of Medical Sciences in 2009.

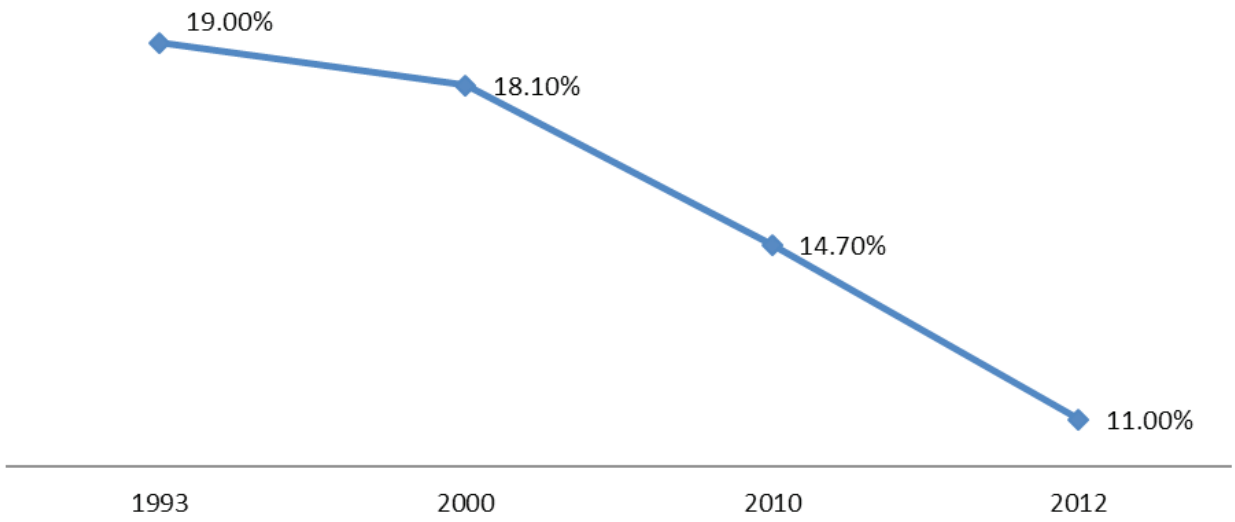
13. Establishment of neonatal research centers and neonatology journals:

With the development in both quantity and quality of educational and therapeutic measures in the area of neonatal medicine, the requirement for advancement in research and domestic evidence-based guidelines became more evident. Thus, the Neonatal Research Center affiliated with the Mashad University of Medical Sciences was established in Imam Reza Hospital in 2006. Following closely after, in 2008, the Shahid Beheshti University of Medical Sciences founded the Neonatal Health Research Center in Mofid Hospital. In 2009, the Maternal, Fetal, and Neonatal Research Center and in 2010, the Breastfeeding Research Center were instituted in Vali-e Asr Hospital by Tehran University of Medical Sciences. In this way, national scholarly productivity increased with the publication of hundreds of new academic articles. With the efforts of the neonatologists of Mashad University of Medical Sciences and the support of Neonatologist Association of Iran in 2010, the first journal of neonatal diseases in Iran entitled Iranian Journal of Neonatology (indexed in Scopus) was launched.

Conclusion

Given the measures taken over time, the mortality rate of pregnant mothers (MMR) has significantly dropped from 120 per 100,000 live births in 1990 to 21 per 100,000 live births in 2010,[40] reaching the Millennium Development Target. Also, the rate of mortality in infants and children under five years of age has considerably declined from 61 per 1,000 live births in 1990 to 25 per 1,000 live births in 2011. Besides, neonatal mortality index has decreased from 26 per 1,000 live births in 1990 to 11 per 1,000 live births in 2012.[41] Graph 1 shows the trend of neonatal mortality rate in Iran. This figure is expected to reach less than 10 per 1,000 live births by 2022 through nationwide development of a perinatal regionalization system.

It is clear that in the years after the Islamic Revolution in Iran, with the support of the national health system, neonatologists



Graph 1. Neonatal Mortality Rate in Iran.

have been able to reduce mortality rates. Moreover, using various measures, such as workshops for neonatal resuscitation and reutilization of ophthalmoscopy for preterm infants, they have improved the quality of care for infants. Now that Iran is achieving the Millennium Development Goals, we hope that with greater support from the health officials of the nation, the quality of care for infants will increase day after day.

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