

Comparing the Hospital Costs of the Neonates Admitted to NICU of Amirkola Children's Hospital Before and After the Implementation of the Health Sector Reform in Iran

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ABSTRACT

Background: The cost-effective strategies are of paramount importance in the improvement of neonatal health services. Regarding this, the present study aimed to evaluate the health sector reform of the Islamic Republic of Iran and its impact on hospital costs related to the admission of neonates in Amirkola Children's Hospital.

Methods: This observational analytic study was conducted in 2015 to evaluate the hospital records of all neonates admitted to Amirkola Children's Hospital during late 2013 (before the implementation of health sector reform in Iran) and late 2014 (after the implementation of this reform).

Results: According to the results, the number of the neonates admitted to this center has increased by 11% after reform. Furthermore, the mean total hospital cost and share of insurance organizations have elevated by 2.2 and 2.5 fold, respectively. Mean of the cost paid by the patients has reached to 2.7 million Rials, which has had a 33% decrease, compared to that of the pre-reform stage. Additionally, 5.8% of the total expenditures related to neonatal inpatient cares were paid out-of-pocket.

Conclusion: As the findings of the present study indicated, the health sector reform in Iran has increased the rate of neonatal admission and decreased the amount of direct payment by the people.

Keywords: Children's hospital, Health sector reform, Neonatal care, Out-of-pocket payment

Introduction

The reduction of child mortality rate is the 4th Millennium Development Goal (1). This objective has been emphasized in Post-2015 Development Agenda as "good health and well-being for all age-groups" (2). Considering this goal, the cost-effective strategies improving the access to neonatal health services should be implemented in different countries worldwide. The newborns need more attention in the first 28 days of life; accordingly, the delivery of proper and standardized cares would facilitate and improve their growth and development (3-5). Proper neonatal healthcare has a great influence on their subsequent physical and mental health (6).

Therefore, the care of this population and reduction of neonatal mortality are considered as

the most important developmental programs in many countries (7, 8). Neonatal mortality rate (NMR) has a wide variation in different countries due to the effect of different political, social, economic, environmental, and cultural factors on this indicator (9).

Healthcare financing varies in different parts of the world based on the resources of each country. Healthcare services may be funded by public tax, special tax, health insurance, or out-of-pocket payment (10). The healthcare system, which mostly entails the health resources financed with tax and pre-payment (before occurring disease) are more equitable. On the other hand, the system, which requires more direct payment by the patients would be more unfair.

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Inequity in healthcare financing can cause undesirable effects, such as increase in the number of the households imposed with catastrophic expenditures and the individuals falling below the poverty line due to inability to pay health costs (11-13). Out-of-pocket payment includes any cost directly paid for service delivery by the patients outside the insurance schemes. This cost will not be refunded with the insurance organizations or government. This payment is one of the important indicators, which should be notified in health policymaking and planning (14).

The Ministry of Health and Medical Education in the Islamic Republic of Iran initiated a series of reforms, called Health Sector Evolution Plan in May 2014. Accordingly, all of the government hospitals affiliated to the universities of medical sciences started the program. One of the objectives of this program is to reduce the direct payment of the patients admitted to the government hospitals. The specific objective of this program is the reduction of out-of-pocket payment paid by the insured patients to 5-10% and the prevention of patient referrals to outside of the government hospitals for buying medicine, medical materials, and instruments or undergoing diagnostic and therapeutic medical procedures (15).

Amirkola Children's Hospital, Mazandaran, Iran, is one of the subspecialized hospitals affiliated to the Babol University of Medical Sciences, which has started the operational packages related to health sector reform since May 2014 (16). The neonatal care department of this hospital is one of the standardized neonatal care units of Iran, which has the third and fourth levels of neonatal service delivery. This department is an academic center, which has accepted fellowships in neonatology since 2000.

To the extent of the researchers' knowledge, no previous Iranian study has been published about the impact of this reform on neonatal cares. Considering the wide range of pediatric clinical cares in this hospital, this study was performed to evaluate the impact of health sector reform (17, 18) on the costs paid by the families whose neonates were admitted to this hospital.

Methods

This observational analytic study was conducted in 2015 by reviewing the medical records of all admitted neonates in Amirkola Children's Hospital during late 2013 (before the implementation of health sector reform in Iran) and late 2014 (after the implementation of this reform). Related documents have been reviewed by census. A data

collection form has been made by considering the viewpoints of managers and faculty members affiliated to Babol University of Medical Sciences who were subspecialists in neonatology. These forms were filled out by reviewing the hospital records of all neonates who have been admitted in the mentioned time duration.

Demographic and medical characteristics of the neonates, including the province and city, age, the type of health insurance, date of admission, duration and cause of admission, conditions related to the child birth (such as the location of birth, hospital type as governmental or private, type of delivery, gestational age and birth weight), medical procedures and interventions carried out for the neonates after hospital admission, total hospital cost, expenditure related to the share of insurance organizations and final cost paid by the neonate's family were recorded in data collection form. Data were analyzed by SPSS package version of 21 at significance level more than 0.05. The Kolmogorov-Smirnov test was used to evaluate the normal distribution of quantitative data. Some data (such as hospital costs) did not have a normal distribution and Mann-Whitney U test, a non-parametric method, was used to compare the costs between two groups before and after the implementation of health sector reform. In other data, t-test was used to compare the two groups.

Results

In total, 397 hospital records have been included: 188 neonates before the implementation of health sector reform (in the year 2013) and 209 neonates after this reform (in the year 2014). Mean of admission duration was 8.8 ± 6.2 days (ranged 1-53 days). Demographic variables in two groups are summarized in table 1. The number of neonates admitted in this center has been increased nearly 11% in the year 2014 which may be attributed to health sector reform. On average 55.6% of the neonates admitted in this center in two time periods were from Babol and 44.2% came from other cities. More than fifty-eight percent of the infant's family living in urban areas and 41.6% were rural. Insurance type was Social Security Insurance (51%), Rural Insurance (26.4%), Iranian Insurance (6.5%), Armed Forces Insurance (4.3%), and Therapeutic Services Insurance (3%), respectively and 1.3% had no insurance coverage.

Child birth conditions (hospital type as governmental or private, type of delivery, gestational age and birth weight) were divided into before and after health sector reform as presented in table 2. This table shows that on average, 80.6% of the

Table 1. Demographic characteristics of the neonates

Variable	Before health sector reform (second half of the year 2013) Number (percent)	After health sector reform (second half of the year 2014) Number (percent)	p-value
Total number of admitted neonates	188	209	<0.001
City where live			
Babol	101 (54.9)	117 (56.3)	0.681
Other cities of Mazandaran province	82 (44.6)	91 (43.7)	
Other provinces	1 (0.5)	0	
Living address			
Urban	88 (56.8)	69 (60.5)	0.537
Rural	67 (43.2)	45 (39.5)	
Has received medical services before referring to this center			
No	173 (92.0)	197 (94.3)	0.377
Yes	15 (8.0)	12 (5.7)	
Insurance type			
Social Security Insurance	102 (54.3)	100 (48.1)	0.008
Rural Insurance	54 (28.7)	51 (24.5)	
Health Insurance	0	6 (2.9)	
Armed Forces Insurance	5 (2.6)	12 (5.7)	
Iranian Insurance	19 (10.1)	7 (3.4)	
Therapeutic Services Insurance	7 (3.7)	5 (2.4)	
Without any insurance coverage	1 (0.5)	4 (1.9)	

Table 2. Conditions related to children's birth

Variable	Before health sector reform (second half of the year 2013) Number (percent)	After health sector reform (second half of the year 2014) Number (percent)	p-value
Type of the hospital where child was born			
Governmental	102 (82.9)	87 (78.4)	0.378
Private	21 (17.1)	24 (21.6)	
Delivery type			
C/S	137 (81.5)	93 (78.8)	0.566
NVD	31 (18.5)	25 (21.2)	
Gestational age			
Mean \pm SD	37.3 \pm 0.2 weeks	37.1 \pm 0.3	0.625
Range	28-42	24-41	
Less than 40 weeks	125 neonates (97.7)	109 (95.6)	
40 weeks	0	1 (0.9)	
More than 40 weeks	3 (2.3)	4 (3.5)	
Birth weight			
Mean \pm SD	3155.6 \pm 62.6 gram	3327.9 \pm 66.4	0.862
Range	1100-4400	2100-4100	

neonates have been born in governmental hospitals and 80.1% of them were born by Caesarean section. Most of admitted neonates had gestational ages less than 39 weeks (on average 37.2 weeks) and average of their birth weight was 3241.7 gram.

Related costs were divided into total hospital cost, expenditure related to the share of insurance organizations, discounts by hospital director and final cost paid by the neonate's family. Mean of

these costs are presented in table 3 and figure 1. Table 3 shows that although the number of admitted neonates increased 11.2%, mean of total hospital expenditure increased 116.4% after health sector reform compared to the similar time duration before this reform, and the share of insurance organizations reached to 44 million Rials and increased to 2.5 fold values. Mean of the cost paid out-of-pocket by the patient's family was 2.7 million Rials which decreased 33% compared

Table 3. Costs related to neonatal care in Amirkola Pediatric Hospital, before and after health sector reform in Iran

Variable	Before health sector reform (second half of the year 2013) Costs in 1000 Rials	After health sector reform (second half of the year 2014) Costs in 1000 Rials	P-value
Mean of total hospital cost	21628.7 \pm 18095.9	46812.8 \pm 46942.7	<0.001
Mean of the share of insurance organizations	17268.7 \pm 15082.7	44014.9 \pm 44571.6	<0.001
Mean of the cost which was discounted in the hospital	312.5 \pm 1455.6	78.4 \pm 199.8	0.005
Mean of the cost paid out-of-pocket	4047.5 \pm 2924.0	2719.5 \pm 3877.1	<0.001

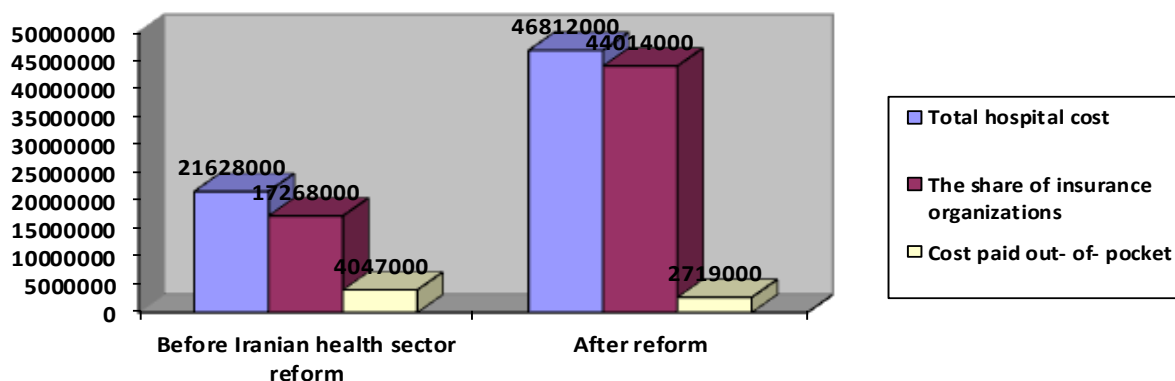


Figure 1. Hospital costs in Amirkola Children's Hospital, before and after health sector reform in I.R.Iran (Rials)

to the time before health sector reform. Total hospital cost, the share of insurance companies and final cost paid by the neonate's family had significant difference between two groups (p-value <0.001).

Discussion

The result of our study showed that the rate of neonates admitted in this center has been increased 11% after health sector reform. Mean of total hospital cost increased almost 2.2 fold compared with before this reform, and the share of insurance organizations increased 2.5 fold. Mean of the cost paid by patients families was 2.7 million Rials (less than 300,000 Tomans) which decreased 33% compared with before health sector reform. Nearly, 5.8% of total expenditures related to neonatal inpatient cares were paid out-of-pocket.

Several universities of medical sciences in Iran have published various reports about achievements, impacts and challenges related to the implementation of this health sector reform but we could not find a published similar research evaluated the impact of this reform in target group of neonates.

Kashan University of Medical Sciences reported that 36000 patients have been benefited of hospital cost reduction associated to this reform since May to December 2014. The patients paid more than 37% of the costs related to inpatient medical services before this reform, but this percent decreased to less than 6% after this program (19). Similar to our finding in the cross-sectional study of Khayeri, et al in duration of May 8, 2014 to September 2, 2014, amount of decrease in inpatient care costs related to 197 hospitals (79% were general and 21% specialized hospitals)

affiliated to 57 faculties and universities of medical sciences was assessed and showed that the trend of decrease in out-of-pocket payment is medium to high (20).

In research of Soleimani (2014), data related to 116365 patients referred to the hospitals affiliated to Shahrekord University of Medical Sciences were analyzed and represented that households who were not benefited from this program had to pay 30% of total cost (70% of total cost were shared with insurance coverage), while in individuals covered by the program 87% of total cost were shared by insurance companies, 9% covered by reform-related financing and only 4% of this cost were paid by the patients. In this research, similar to our study, the number of patients referred to governmental hospitals was increased obviously after health sector reform, compared with before this program (21).

In the research of Althabe all of systematic reviews which assessed the strategies to improve the quality of children and maternal health care in low and middle income countries, were reviewed. This study showed that 99% of maternal, neonatal and infant mortality rates occur in low and middle income countries, but most of related researches are focused on 1% of these deaths which occur in high income countries. Especially, there are a few studies that evaluate the impact of financial interventions on the health care of this target group (3), therefore our study is valuable because it addresses this issue.

Lefevre evaluated effectiveness of neonatal and maternal healthcare packages (such as homecare) in Sylhet region of Bangladesh, because this region had the highest neonatal mortality rate of this country (63 neonatal deaths in 1000 live births). Findings showed that these packages were

cost-effective to decrease neonatal mortality rate (22). Flores-Huerta in Mexico suggested that having insurance coverage in less than 2 years infants would decrease the costs related to their medical cares which should be paid directly by their families and could be effective in lowering their mortality rate (23). Also, Lawn stated that official support by the government for neonatal health care could have impact to decrease their mortality and to increase their survival (24).

In our study, total hospital costs were increased in the second half of year 2014 compared to the similar time in year 2013, this might be related to the new version of "relative values of health services in Islamic Republic of Iran" which has been accomplished in Iran since September 23, 2014. In this version, the costs related to most of diagnostic and therapeutic medical procedures have been increased. On the other hand, considering the increase in the share of insurance organizations for inpatient care costs, proper participation of these companies in healthcare financing should be notified more and more (25).

One of the most important objectives of health sector reform in Iran is to reduce out-of-pocket payment of patients who are under insurance coverage to 10% of total costs related to hospital admission (15, 26), also evaluation of main health indicators in Islamic Republic of Iran published by the Academy of Medical Sciences stated that the percent of health expenditures paid by patients has been increased and the government's share has been decreased in duration of 2003-2012 (14). In our study, findings showed that only 5.8% of total costs related to admission of neonates in Amirkola Hospital were paid out-of-pocket, this result represents that health sector reform in Iran was successful in realization of its goals.

Conclusion

Results indicated that total cost related to neonatal hospital cares, the share of insurance organizations and the cost paid by patients' families had significant differences in the time after health sector reform compared to before this reform. Furthermore, less than 6% (almost 5.8%) of total expenditures related to neonatal inpatient cares were paid out-of-pocket in Amirkola Pediatric Hospital.

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Conflicts of interests

None declared.

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