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Effect of Health System Transformation on Two Main Public Health Issues: Prenatal Care and Tetanus Toxoid Vaccination

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Abstract

Background: Health care systems in many countries are changing, for a variety of reasons. This brings both opportunities and threats for public health professionals. Monitoring of preventive services becomes more important during these transition periods.

Objective: It was aimed to determine tetanus toxoid vaccination and prenatal care coverage of mothers, to establish how routine services are affected by changes in the health care system.

Methods: Two descriptive, cross-sectional studies were conducted in the city center of Gaziantep, Turkey by the Lot Quality Assurance Sampling Technique. The first study was applied just before transition, and the second was applied one year after transition to family medicine.

Results: While a total of 82.8% mothers received first dose of tetanus toxoid in Gaziantep before the transition, it increased significantly to 90.1% ($p<0.005$) after the family medicine. Of the mothers, 82.8% received prenatal care before transition, it was 92.5% after family medicine ($p<0.005$). The percentage of mothers who gave birth in a health facility declined to 98.1% from 99.3%. The number of unacceptable lots dicreased from 22 lots to 10 lots after system change.

Conclusion: A relatively high coverage was achieved for the first dose of tetanus toxoid and, prenatal care after family medicine. However, the coverage for booster doses are still under to be desired.

Keywords: Family medicine; Lot quality assurance sampling technique; Health care outcome; Prenatal care; Turkey; Vaccination coverage

Introduction

Health care systems in many countries are changing, for a variety of reasons. This brings both opportunities and threats for public health professionals. Change offers the possibility to challenge existing arrangements and maximize the contribution of health services to population health. Public health professionals, with their emphasis on improving population health, have a legitimate role in ensuring that the pursuit of health gain becomes a central objective of health care systems, whatever other objectives may be being pursued by others [1].

As described by the World Health Organization (WHO), a health system is the sum total of the organizations, institutions, and resources whose primary purpose is to improve health [2]. In 2005, Turkey began a transformation from a "socialization of health services" system to a "family medicine" system. The pilot system was implemented in Düzce, Turkey and was introduced throughout the country by the end of 2010.

The most important and main act in health care was the Socialization of Health Services, which was adopted in 1961 and implemented beginning in 1963 in the city of Muş. The medical services were listed in a hierarchical order from the lowest to the highest as follows: health post, health center, secondary level hospital and tertiary level hospital. The main principle of the socialization of health services was to provide free, equal and permanent health services by a team of health care professionals worked full-time [3].

In Turkey's health transformation program (from a "socialization of health services" system to a "family medicine" system), family physicians are primarily responsible for the individuals registered to them. The duties of the family physician include recording the health records of the persons registered, assuming primary diagnostic and therapeutic services together with immunization and other preventive health care services, and coordinating their secondary and tertiary care. Each family physician works with a family health care staff in the Family Health Center [4].

Pregnancy, the antepartum period, delivery and the postpartum period are very important for maternal and child morbidity and mortality. Appropriate health care during these periods is critical for reducing the risks of various problems and improving the quality of life for women and children [5]. As a part of prenatal care, the tetanus vaccination is one of the primary strategies to prevent maternal and neonatal tetanus. According to the WHO data, each year, 450,000

newborns and 40,000 mothers die because of neonatal and maternal tetanus worldwide [6]. The World Health Assembly first called for the elimination of neonatal tetanus in 1989. This goal was expanded to include the elimination of maternal tetanus in 1999 [7]. The elimination of maternal and neonatal tetanus is among the main goals of the Expanded Immunization Program of Turkey (EPI) [8]. Vaccination of pregnant and/or non-pregnant women with tetanus toxoid (TT) before delivery and the provision of clean delivery services is potentially the only way to prevent neonatal tetanus.

During transition periods, rapid changes in service areas and increased staff mobility may disrupt routine services. Therefore, monitoring of preventive services becomes more important during these transition periods. The main objective of this study was to establish how routine services are affected by changes in the health care system. The other objectives were to determine effect of health system transformation on TT vaccination and prenatal care coverage of mothers, to determine which lots have a service problem, to compare the results with a study conducted before the transition occurred, and, finally, to determine whether conditions have improved.

Material and Methods

This is a descriptive, cross-sectional study conducted in the city center of Gaziantep. The data were obtained via two studies applied at the same lots. The first study was applied just before transition, and the second was applied one year after transition to family medicine.

Lot Quality Assurance Sampling (LQAS) was used to determine the sample size to decide whether one or more health service units (lots, health center district) is meeting the standard of performance and to measure TT vaccination and prenatal coverage of mothers. This technique was used in many previous studies and proved feasible for routine monitoring of vaccination coverage [9-11].

The study subjects were mothers of children aged 0-11 months that lived in the "lots," which were the provincial districts that served as the centers of health care before the system changed to family medicine. The population of Gaziantep was 1.244.000. The total number of children aged 0-11 months (target population) was 28.160. The level of accuracy was set as ± 3%, the level of confidence was set as 95%, and the total sample size was estimated as 1,066. The total number of lots to be studied in the city center of Gaziantep was 50, so the minimum lot sample size was estimated as 20. Twenty original and 5 alternate children were chosen by a simple random sampling technique for each lot.

The decision value was set at 3 (whose mothers were not vaccinated against Tetanus) in 20 children (15%) for each lot. If we found one more individual above the decision value, we judged the lot as "unacceptable." A low threshold level was set as 85% for TT coverage among mothers living in each lot.

The WHO's book on the LQAS Technique was used as a guideline for preparing the questionnaire [12]. The questionnaire was applied to mothers by intern doctors and researchers by face-to-face interviews between December 1, 2010 and December 31, 2010 in the first study and between December 1, 2011 and December 31, 2011 in the second study. We asked whether the mothers had vaccination cards, whether they received prenatal care when she was pregnant with her child; if the response was 'yes,' we next asked from whom and where she received prenatal care. We asked mothers how many times she received the TT vaccine and the vaccination dates of each dose. Additionally, we asked for the place of the delivery.

Ethics Statement

Gaziantep University ethics committee has confirmed that this study would not have required ethics approval. Mothers gave orally approvement to the study.

Results

The results of two studies are shown in Table 1. The results of the first study were given bold for easy comparison and understanding.

Of the mothers, 38.7% (22.5%) had an immunization card. A total of 90.1% of the mothers received TT1 (82.8%), while the coverage of the 2nd, 3rd, 4th and 5th doses were 70.0%, 26.5%, 5.4% and 1.8%, respectively (53.7%, 22.8%, 10.9% and 3.6%). Approximately, 90% of the vaccine doses were taken in family health centers. Of the mothers, 92.5% received prenatal care (82.8%). Prenatal care in private hospitals was 60.0% in the first study, and this declained to 20.0% in the second. The place of prenatal care was national hospital [29.7% (26.4%)], family health center [17.1% (5.8%)], and private doctors [1.3% (5.3%)], respectively. In the second study, 30.3% of the mothers received prenatal care from more than one facility. Prenatal care was mostly received from obstetricians [(56.6%) (93.1%)], followed by general practitioners [(14.5%) (5.2%)] and midwives [2.3% (1.7%)], and 26.6% of the mothers received prenatal care from more than one provider in the second study. Facilities used for delivery were; national hospital [63.4% (40.7%)], private hospital [31.3% (57.5%)], private doctors [0.1% (0.9%)], university hospital [2.9% (0.2%)] and family health center (0.4%). Totally, 98.1% (99.3%) of the mothers gave birth at a health facility and 1.9% (0.7%) of them gave birth at home. The percentage of children immunized against tetanus at birth in the second phase of the study was significantly higher than that immunized in the first phase (90.1% vs. 82.8%; $p < 0.005$). Population weighted coverage in the second phase (89.75%) was significantly higher than that of the first phase of the study (82.92%) ($p<0.005$).

Ten of the 50 Lots [22] were considered unacceptable.

	First Study		**Second Study**	
	n	**Coverage (%)**	**n**	**Coverage (%)**
Antenatal Care	828	82.8	925	92.5
TT 1	828	82.8	901	90.1
TT 2	537	53.7	700	70
TT 3	228	22.8	265	26.5
TT 4	109	10.9	54	5.4
TT 5	36	3.6	18	1.8
Children Immunized against Tetanus at Birth	828	82.8	901	90.1

Table 1: Comparative results of the two studies.

Discussion

Inadequate determination of pregnancy and inadequate prenatal care are shown to be among the main reasons for maternal and neonatal tetanus elimination failure in Turkey [6]. We observed that 92.5% of the mothers received prenatal care after family medicine was implemented, and this percentage was higher than before the system changed (82.8%). Although relatively good prenatal care was already available in the first study, most of the women (60.0%) received prenatal care from private hospitals in this period. After the transition to family medicine, this rate decreased to 20.0%. This is a positive finding, and it may be due to performance payments. The family medicine system places an excessive amount of responsibility on family physicians. According to the countrywide Turkish Demographic and Health Survey (TDHS), prenatal care coverage was 62.4% in 1993, 67.5% in 1998, 80.9% in 2003, 92% in 2008 and 96.9% in 2013 [13-17]. Good progress was archived countrywide before family medicine was implemented. Therefore, it is improper to connect these progress only to family medicine implemention. The percentages of women receiving prenatal care were 89.9% in Kenya, 93% in Zambia, 78% in Kathmandu and 59% in rural north India [18-21]. According to WHO, "the proportion of pregnant women in developing countries who attended at least one prenatal care visit has increased from approximately 64% in 1990 to approximately 81% in 2009; but, in the least developed countries, only 36% of pregnant women attended four or more prenatal care sessions during 2005-2010" [22]. After the government launched a mother and child healthcare program in Bangladesh, a significant improvement was observed in prenatal care in different regions [23]. These results suggest that healthcare programs run by governments have an impact on the health care utilization by people.

Maternal and child health is one of the basic components of primary health care facilities. The women attending a first level health facility for prenatal care increased to 17.1% from 5.8% after the implementation of family medicine. The referral chain system has never been achieved in Turkey, neither in the socialization of health services nor in family medicine. This may be due to various reasons: first, both physicians and Turkish society have negative perceptions of primary health care. The Turkish public and physicians have positive critics about specialist physicians. Second, every person can apply to any health organization (private and public) that he or she wishes after family medicine implementation, and people prefer to apply to private hospitals. For increasing applications to first-level facilities, primary health care should be strengthened and the chain of referrals must be operated by health administrators.

Most of the women received prenatal care from obstetricians (56.6% (93.1%)), followed by general practitioners (14.5% (5.2%)) and midwives (2.3% (1.7%)). These findings may correlate with the low tetanus vaccination coverage because obstetricians' insensitivity to pregnant tetanus vaccination is shown to be among the main reasons for maternal and neonatal tetanus elimination failure in Turkey [6]. A study conducted in Zambia showed that prenatal care was predominantly (91%) provided by nurses and midwives [19]. We can assume that cultural differences, local customs and a different health care system had an impact on choosing the prenatal care provider.

Tetanus disease does not make a person immune, so vaccination against tetanus is highly important. A total of 82.8% mothers received TT1 in Gaziantep before the transition and, increased significantly to 90.1% ($p<0.005$). We took the success criterion (threshold) as 85% immunization for TT1 coverage; this criterion was met after the implementation of family medicine.

Low vaccination TT2 coverage among women aged 15-49 is one of the main reasons for the maternal and neonatal tetanus elimination failure in Turkey [6]. The coverages of TT2, TT3, TT4 and TT5 were 70.0%, 26.5%, 5.4%, and 1.8%, respectively (53.7%- 22.8%- 10.9%- 3.6%). The coverage decreased at the subsequent doses, both before and after family medicine. In our study conducted approximately ten years ago, TT2 vaccination coverage was 13.3% in women who gave birth in the past 5 years [24]. In the past ten years, good progress is seen, and majority of this progress was already prior to family medicine. It would be wrong to simply connect the increase in TT coverage to family medicine, because in another study conducted by us at the same time and method, the coverage of childhood vaccinations decreased in general after family medicine was implemented [25]. We believe that the services are better if a person is registered to a physician. However, if a person (especially a newborn) is not registered to a physician, this can cause problems related to routine services. Health managers should pay more attention to the registration of newborns and new people who come to live in a district.

Turkey is one of the 35 countries that have been validated to have eliminated maternal and neonatal tetanus in 2014 [7]. However, the emphasis on vaccination should not decline for maintaining elimination because the coverage goal of the EPI, which is 80% for primary immunization in the Maternal and Neonatal Tetanus Elimination Program, was not reached at the subsequent doses. We think that both physicians and women lose interest in maintaining vaccine coverage. The review of two studies assessing vaccinations of women of childbearing age showed fewer cases of neonatal tetanus when two or three doses were applied [26]. According to a study conducted in Pakistan, 87% of the women recalled receiving 2 doses of TT [27]. In a study in Bangladesh, 88% of urban mothers and 84% of rural mothers received TT during their pregnancy period [23]. In a cross-sectional study in Peshawar, Pakistan, 55.6% of married women were vaccinated [28,29]. TT1 coverage both before and after the implementation of family medicine seems better than that of the other countries, but the TT2 and TT3 are lower. In a study conducted in Ankara, Turkey, the percentage of women who did not receive TT was 53.3%, while the percent of women who received one and two doses of TT was 18.9% and 27.8% [30]. In a region of China, only 14% of women gave consent for the TT vaccination [31]. In rural north India, 2/3 of pregnant women had 2 or more doses of the TT vaccine [19]. In Kenya, it was found that the percentage of women who received the TT vaccine was less than that of women receiving prenatal care [18]. It can be clearly observed that there is an inconsistency between prenatal care and TT vaccination percentages, even though the studies were conducted in different countries. This can be attributed to either problems in access to vaccines or worries about the safety of vaccines.

In total, 98.1% (99.3%) of mothers gave birth at a health facility. According to the TDHS data, the percentages of deliveries that occurred in health facilities were 59.6% in 1993, 72.5% in 1998, 78,2% in 2003, 89.7% in 2008, and 96.8% in 2013 (13-17). Good progress has been achieved in our country over the last ten years. In Katmandu, the percentage of home births was 34%, while the percentage was 85% in China [20,31,32]. In India, only 25% of the births were assisted by a trained medical professional [21]. It is known that giving birth in health care centers, assisted by trained medical professionals, plays a crucial role in the prevention of mother and child deaths. The percentages of home deliveries were low both before and after the

implementation of family medicine. We should aim to maintain this level.

Conclusion

Relatively good prenatal care is available in Gaziantep since the transition to family medicine. A relatively high coverage was achieved for the first dose of TT, but the coverage decreased for TT2, TT3, TT4, and TT5 and, the coverage goal of the EPI was not reached at the subsequent doses. There has been a small increase in the utilization of first-level health facilities since family medicine; however, the levels are not as expected. Thus, the use of primary health care should be arised. Efforts must continue to achieve better rates of prenatal care and TT coverage. Further studies using the LQAS technique will be necessary to evaluate whether prenatal care and TT coverage increases and to evaluate how community-based services are being affected by the implementation of family medicine.

Conflict of Interest

The authors declare that they have no conflict of interest.

Contribution of Authors

NA: have made substantial contributions to conception and design, acquisition of data, and analysis and interpretation of data; have been involved in drafting the manuscript and revising it critically for important intellectual content; and have given final approval of the version to be published.

BO: have made substantial contributions to conception and design, acquisition of data, analysis and interpretation of data; have been involved in drafting the manuscript and revising it critically for important intellectual content; and have given final approval of the version to be published.

FC: have made substantial contributions to conception and design, acquisition of data, and analysis and interpretation of data; have given final approval of the version to be published.

HT: have made substantial contributions to conception and design, acquisition of data, and analysis and interpretation of data; have given final approval of the version to be published.

SO: have made substantial contributions to conception and design, revised it critically for important intellectual content; have given final approval of the version to be published.

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