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Short Communication

Gaining Insight into the Prevention of Maternal Death Using Narrative Analysis: An Experience from Kerman, Iran

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Abstract

Reduction in maternal mortality requires an in-depth knowledge of the causes of death. This study was conducted to explore the circumstances and events leading to maternal mortality through a holistic approach. Using narrative text analysis, all documents related to maternal deaths occurred from 2007 to 2011 in Kerman province/Iran were reviewed thoroughly by an expert panel. A 93-item chart abstraction instrument was developed according to the expert panel and literature. The instrument consisted of demographic and pregnancy related variables, underlying and contributing causes of death, and type of delays regarding public health aspects, medical and system performance issues. A total of 64 maternal deaths were examined. One third of deaths occurred in women less than 18 or higher than 35 years. Nearly 95% of them lived in a low or mid socioeconomic status. In half of the cases, inappropriate or nonuse of contraceptives was seen. Delay in the provision of any adequate treatment after arrival at the health facility was seen in 59% of cases. The most common medical causes of death were preeclampsia/eclampsia (15.6%), postpartum hemorrhage (12.5%) and deep phlebothrombosis (10.9%), respectively. Negligence was accounted for 95% of maternal deaths. To overcome the root causes of maternal death, more emphasis should be devoted to system failures and patient safety rather than the underlying causes of death and medical issues solely.

Keywords

Maternal Mortality, Maternal Health Services/Organization and Administration, Patient Safety

Background

Maternal death, according to World Health Organization (WHO), is attributed to the death of a woman during pregnancy or within 42 days of the termination of pregnancy that is not from accidental or incidental causes (1). Maternal death is important from various aspects. Mothers, as the center of the family, have a significant role in social, cultural and economic development of a nation (2) and maternal dearth, not only is a tragedy for the family, but also imposes long-term impacts on physical, psychological and social health of children and the following generations (3). Furthermore, maternal death is an index that can be used for estimating equity in health in a country (4). Indeed, maternal mortality ratio (MMR) is one of the pivotal indices in the evaluation of healthcare system strengths and the success of health policies in a country (2).

A total of 287,000 preventable maternal deaths occur around the world every year, of which 99% is in the developing countries (5). Although Iran is one of the successful countries in achieving Millennium Development Goal (MDG) with 75% decrease in MMR by the year 2015 (5), the current MMR in Iran (25–30 per 100,000) is still worthy of consideration (6,7). The first step in decreasing maternal mortality cases is to have a precise view at details of mortality cases from different aspects (8).

One of the effective strategies in studying the chain of events leading to maternal death is maternal death reviews that are well performed in developed countries such as US and UK (9). The main point in performing such reviews is to discover failures from three aspects of public health, medical care and management of health policy opportunities (8). In Iran, collected data by maternal mortality surveillance system have satisfactory quality due to continuous supports and supervisions a documents of this system have provided a good opportunity to achieve a more in-depth picture of maternal death (10). WHO emphasizes on using reports of maternal death in order to design maternal death preventive interventions by healthcare planners and managers (11).

One of the methods used in explaining circumstances and events leading to mortality and morbidity is narrative analysis. This method has been used in compiling injury prevention strategies (12), gaining in-depth insight toward the quality of care of dying patients (13) and planning interventions for palliative care of cancer patients (14).

The present study aimed to explore the events leading to maternal death through narrative analysis and to answer *"why do mothers die?"* through a holistic view.

Methods

In the present study, all documents related to maternal deaths from 2007 to 2011 in Kerman province/Iran were reviewed through narrative analysis. Kerman province is the largest province of Iran and one of the provinces with the highest maternal death reports (7).

The national maternal mortality surveillance system in Iran is an ongoing and active system (6,10); that is, in a short time after maternal death, a work group is formed who visits the place of

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residency and death of died woman to interview all individuals who have information about the pregnancy period and death of woman including her family members, community health workers and delivery attendances including midwives, nurses and the delivery agent. The questions cover demographic features such as age and educational level, pregnancy-related variables such as parity, mode of delivery, pregnancy intendedness and risk factors and underlying causes of death. Answers are recorded in closed or open forms in the case file and enclosed with a copy of hospital record of the case. In this way, a 50–200 pages record is compiled and after finishing this step, the record is investigated in two committees. One of the committees investigates the case from public health dimension and issues such as contraceptive methods, and prenatal care are surveyed by committee members including specialist physicians (two gynecologists and other specialists depending on the clinical process of the mortality case). The latter committee reviews the contents of case record from medical aspect to explore the probable shortcomings. Eventually, in the final committee, in addition to public health and medical aspects, management aspects and quality of care are evaluated. Finally, the results of evaluations in the two committees are recorded in the case file. The narrative text analysis of documents was performed by two of the authors (RE and SF). In narrative research it is required to differentiate between narrative text analysis and qualitative analysis applied to narratives (13). We used the first method; that is, one of the chart reviewers, who was herself an active member in all three mentioned committees, in cooperation with a trained abstracter, filled out the 93-item chart abstraction instrument (1,8,9,11,12). Indeed, we conducted a facility-based maternal deaths review which is defined as a *"qualitative, in-depth investigation of the causes of deaths which occur in circumstances surrounding maternal healthcare facilities"* (11).

The instrument included four major parts. The first part included demographic features and pregnancy-related variables such as parity and place of delivery. The second part recognized the type of delay based on "the Three-Delay Model" (3). The third part identified predisposing risk factors leading to maternal death (15). This part was designed for better understanding of maternal deaths considering risk factors and contributing causes of death (1). The forth part included underlying causes of death based on the classification suggested by WHO (1). The accuracy of instrument filling was evaluated and confirmed by an expert external reviewer. Finally, the system deficiencies that had a share in the process of maternal death were classified separately into four phases of before pregnancy, pregnancy, delivery and postpartum. Professional negligence (i.e., care that falls below the standard expectations of health staff) was assessed in various categories of health staff.

Results

The whole number of maternal deaths was 64. Most cases were in the age group of 19–34 years and 51.6% were urban residents (Table 1). More than one third of them were in a low socioeconomic status according to the work group report. In whole, 9.4% had high parity and 40.6% had one underlying systemic disease. Most deaths (87.5%) had occurred in the postpartum period of which, 26.7% were in the first postpartum day. The highest rate of delay was observed for the provision of medical care (Table 1).

Table 1. Demographic and pregnancy variables of maternal deaths (n=64)

Variable	Frequency (%)
Age group	
≤18	4 (6.2)
19–34	43 (67.2)
≥35	17 (26.6)
Area of residence	
Urban	33 (51.6)
Rural	31 (48.4)
Woman's education level	
Illiterate/Primary	20 (31.2)
Secondary	17 (26.6)
Diploma	15 (23.4)
College	12 (18.8)
Income level	
Low	36 (56.2)
Mid	25 (39.1)
High	3 (4.7)
Occupation	
Household work	53 (82.8)
Productive work	11 (17.2)
Parity	
<5	58 (90.6)
≥5 (high parity)	6 (9.4)
Pregnancy wantedness	
Yes	50 (78.1)
No	14 (21.9)
Underlying systemic disease	
Yes	26 (40.6)
No	38 (59.4)
Period of death	
During pregnancy	8 (12.5)
Labor	0 (0)
Postpartum	56 (87.5)
Time of postpartum death	
1st day	15 (26.7)
2nd day	9 (16.1)
3rd – 7th day	7 (12.5)
8th – 42th day	22 (39.3)
After 42th day	3 (5.4)
Place of death	
Home	4 (6.2)
Hospital	56 (87.5)
During transportation	4 (6.3)
Birth attendant	
Obstetrician	39 (60.9)
Midwife	17 (26.6)
Traditional midwife	7 (10.9)
No one	1 (1.6)
Type of delivery	
Cesarean	37 (57.8)
Vaginal	27 (42.2)
Type of delay	
Decision making	33 (51.6)
Transportation	30 (46.9)
Provision of medical care	37 (57.8)

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The most frequent causes of death were respectively preeclampsia/eclampsia, postpartum hemorrhage and deep phlebothrombosis (Table 2).

Table 2. Underlying causes of maternal deaths (n=64)

Cause	Frequency (%)
Preeclampsia/Eclampsia	10 (15.6)
Postpartum hemorrhage	8 (12.5)
Deep phlebothrombosis	7 (10.9)
Cardiac disease (including pre-existing hypertension)	6 (9.4)
Puerperal sepsis	5 (7.8)
Autoimmune disorders	4 (6.2)
Abruptio placentae	4 (6.2)
Genitourinary conditions	3 (4.7)
Gastrointestinal tract	3 (4.7)
Central nervous system	2 (3.1)
Cerebral venous thrombosis	2 (3.1)
Induced abortion	1 (1.6)
HELLP syndrome	1 (1.6)
Placenta previa	1 (1.6)
Medication error or reaction	1 (1.6)
Sickle cell anemia	1 (1.6)
Thrombocytopenic thrombotic purpura	1 (1.6)
Unknown	4 (6.2)

In 48.5% of cases, incorrect use of contraceptive methods or not, receiving family planning services were observed. During pregnancy, lack of correct diagnosis and treatment by health personnel (54.7%), delay in providing treatment services (37.5%) and carelessness of the pregnant woman or her family about symptoms of pregnancy risks (45.3%) were among noticeable system's shortcomings during pregnancy (Table 3). During delivery, too, incorrect diagnosis or treatment by physicians or other health personnel (53.1%) were responsible for maternal death. During postpartum period, incorrect diagnosis and treatment in the hospital had contributed respectively to 37.5% and 34.8% of maternal deaths (Table 3).

In 94.8% of cases, traces of health personnel neglect was observed among them, the role of specialist physicians (obstetricians or other specialists) was more frequently identified (Table 4).

Discussion

This article provides an interesting picture on the current situation of maternal mortality in the Southeast Iran. The innovative components of the study are the attempts to attribute each failure or gap to different phases of woman's life: pre-pregnancy, pregnancy, delivery and postpartum period. In addition; the article goes ahead with the use of the three-delays framework to identify pitfalls and delays during the care woman received to deal with the condition leading to death.

The present study showed that maternal death in most cases is more closely related to health system failure rather than the

Table 3. Quality shortcomings contributing to maternal death during three different stages: gestation, labor and postpartum period (n=64)

Phase	Failure	Frequency (%)
Pregnancy	Not receiving prenatal care	5 (7.8%)
	Maternal addiction or high risk behaviors	13 (20.3%)
	Lack of access to emergency centers	2 (3.1%)
	Neglect toward pregnancy risk factors by woman/her family	29 (45.3%)
	Lack of facilities	13 (20.3%)
	Not receiving complete prenatal care	39 (60.9%)
	Misdiagnosis/mistreatment by healthcare personnel/midwives/physicians	35 (54.7%)
	Delay of health personnel in providing services	24 (37.5%)
Delivery	Lack of access to emergency care	4 (6.3%)
	Delivery at home with lack of facilities	8 (12.5%)
	Insufficient and inadequate facilities	20 (31.3%)
	Misdiagnosis/mistreatment by physicians or health personnel	34 (53.1%)
	Problems in the process of anesthesia	7 (10.9%)
	Neglect of physicians/other health personnel & delay in providing service	23 (35.9%)
	Insufficient/inadequate healthcare services by physicians/hospital staff	9 (14.1%)
	Elective cesarean section and its complications	2 (3.1%)
Postpartum	Insufficient facilities in the hospital	10 (15.6%)
	Not receiving postpartum care	4 (6.3%)
	Neglect toward women's health condition by woman/her family	9 (14.1%)
	Not receiving necessary care by physicians/other health staff	18 (28.1%)
	Misdiagnosis in the hospital	24 (37.5%)
	Mistreatment in the hospital	28 (34.8%)

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Table 4. Frequency of negligence contributed to maternal death according to the category of health staff

Job group	Frequency (%)
Healthcare center personnel	25 (39.1)
Midwife	23 (35.9)
General physician	28 (43.8)
Obstetrisian/Gynecologist	39 (60.9)
Other specialist physicians	43 (67.2)
At least one of the above	60 (94.8)

natural course of the disease. The estimated MMR for the world shows 34% decrease from 1990 to 2008, while the same value is 80% in Iran. According to WHO, Iran is the third (after Maldives and Romania) successful country in decreasing MMR (5). Different contributing factors to this success are improvement in women's educational level and capabilities, more access to emergency obstetric care and the increase of contraceptive prevalence (6). According to the recent reports, MMR in Iran is 25 per 100,0007 which is still significantly far from that in the developed countries (5).

The positive point of the present study is its holistic view toward maternal death; that is, the story of maternal death was evaluated in four phases of before pregnancy, during pregnancy, during delivery and after delivery (9,11) from two community-based and facility-based aspects and with considering three -delay framework (16). Generalization of the results of this study to the whole country should be done with caution, since variations in the same country are usually significant (7).

In the present study, approximately 27% of deaths had occurred in women over 35 years, while 11.5% of all deliveries in our country occurs in this age range (10). According to a study on age pattern of maternal deaths in 38 countries, the trend of maternal death has a J shaped curve with age increase and the highest risk of maternal death is in ages over 35 years. This emphasizes on the importance of contraceptive methods in this age group (17).

Approximately half of the deaths had occurred in rural residents, while only 21% of the total deliveries occured in rural women (15). Meanwhile, 3.6% of the whole deliveries in Iran occurs in high parity women, but in our review 10% of maternal deaths were related to high parity women. High probability of maternal death in rural women can be attributed to the inaccessibility of emergency obstetrical care for this group (18).

In the present study, most deaths (87.5%) had occurred in postpartum period of which, 27% were in the first postpartum day. While, 45% of postpartum deaths in the world occur in the first 24 postpartum hours (16). Difference in the causes of death might have a role in this difference; that is, the first cause of maternal death in the world is postpartum hemorrhage (34%), (16) while in the present study it was in the second place after preeclampsia (12.5%). Maternal death pattern in Iran during the last four decades has changed. Forty years ago, the main causes of maternal death were infection and postpartum hemorrhage, but today preeclampsia and underlying systemic diseases have a pivotal role and this pattern is more similar to the developed countries (6).

The most delay was observed after arriving at a health facility or hospital. In poor-resource countries, delay in seeking care and lack of access to a health services have usually more important roles among the three delays and while the first one is a cultural barrier, the second one is a more direct indicator of inequity (18).

Table 3 presents health system defects involved in maternal death with a systemic view. In several cases, woman's death was due to multiple causes. Among the mentioned causes, neglect of woman or her family toward risk factors, neglect of healthcare personnel toward woman's health and their misdiagnosis/ mistreatment were frequent contributing causes of maternal death. According to verbal autopsy and facility based maternal death reviews and also interview with physicians and nurses, traces of fault by healthcare personnel including community health workers, nurses, midwives, general practitioners, gynecologists and other specialist physicians were observed in 95% of all occurred mortalities (Table 4). For this, The Joint Commission defines maternal death as a sentinel event (19). Sentinel event is any unanticipated event in healthcare facility resulting in death or sequel which is not commonly resulted from the natural course of the disease; for example, surgery on the wrong body part is a sentinel event. Grossman asserts that the health service itself is often the problem (20). Therefore, improvement of patient safety should be the main base of preventive interventions (8).

In conclusion, the present study, through surveying the details of maternal death, illuminated a number of problems in healthcare settings which are required to be solved through effective strategic planning. The study calls attention of health policy-makers to the innovative results the study found on the role of health professionals in misdiagnosis and mistreatment of the patients.

Ethical issues

Not applicable.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

RF collected the data and analysed the records and participated in manuscript drafting. SF interpreted the data and participated in manuscript writing. NN prepared the proposal and drafted the manuscript and supervised the research process.

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