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ABSTRACT Pregnant women have a major role to play in assessing and improving their own quality of care. This study in Tabriz, Islamic Republic of Iran, aimed to assess the effectiveness of an intervention for pregnant women—based on education and support groups and involvement in quality assessment activities—in order to improve the technical quality of public maternity care at public health centres. The intervention phase took place between September 2012 and may 2013. The outcome measure was health-care providers' degree of adherence to the Iranian maternity care standards. An intervention group of 92 pregnant women from 10 health centres was compared with a control group of 93 pregnant women from 11 centres. Logistic regression analysis showed that the self-assessed technical quality of maternity care received by the women was significantly better in the intervention that the control group for several of the standards concerning clinical examinations, maternal education and vitamin and

mineral supplements.

Auto-évaluation des patients pour améliorer la qualité technique des soins de maternité à Tabriz : étude communautaire

RÉSUMÉ Les femmes enceintes ont un rôle majeur à jouer dans l'évaluation et l'amélioration de la qualité des soins qui leur sont dispensés. Cette étude conduite à Tabriz, en République islamique d'Iran, avait pour objectif d'évaluer l'efficacité d'une intervention pour les femmes enceintes, reposant sur des programmes éducationnels et des groupes de soutien ainsi que sur l'implication dans des activités d'évaluation de la qualité, dans le but d'améliorer la qualité technique des soins de maternité publics dispensés dans les centres de santé publique. La phase d'intervention s'est déroulée entre septembre 2012 et mai 2103. La mesure du résultat était le degré d'adhésion des prestataires de soins de santé aux normes de soins de maternité iraniennes. Un groupe d'intervention de 92 femmes enceintes venues de 10 centres de santé a été comparé à un groupe témoin de 93 femmes venues de 11 centres. L'analyse de régression logistique a montré que la qualité technique auto-évaluée des soins de maternité reçus par les femmes était sensiblement meilleure dans le groupe d'intervention que dans le groupe témoin en ce qui concerne plusieurs normes liées à l'examen clinique, à l'éducation des mères et à la supplémentation en vitamines et en minéraux

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Introduction

Pregnant women and their newborns are among the most vulnerable and high-risk groups of the population. In 1998 the World Health Organization (WHO) summarized the theme for World Health Day with the slogan "Pregnancy is special: let us make it safe" (1). Too many women still die in pregnancy and delivery worldwide, and therefore improving maternal health and reducing maternal mortality should be among the major aims of governments. Continuous care for normal as well at-risk-pregnancies is an essential factor in mortality prevention (1).

Measuring the quality and performance of health-care providers is an important factor for health-care managers in efforts to increase physicians' responsibility and accountability and to improve the quality of delivered care. Quality of care can be understood as having 3 principal components: service quality, customer quality and technical quality (2). Technical quality concerns standards of care established for each treatment and is defined as what customers receive relative to what is known to be effective, and largely reflects issues related to health-care providers' knowledge and experience (3,4). There are several models to measure technical quality in health care and each has advantages and disadvantages. It is believed that customer-based information can be a useful reflection of the quality of maternity care delivered in the public health sector through the primary health-care system (5,6).

In 1999 the Iranian Ministry of Health (MOH) developed an evidence-based guideline document on maternity care services (7) which was widely disseminated in rural and urban health centres throughout the country and was advocated as an appropriate protocol to care for pregnant women. The protocol defined a set of standards and the minimum recommended frequency of care for each standard. The degree of adherence to the standard by health-care providers should be a reasonable indicator of the overall quality of maternity care provided by the health system. Wilson et al. studied providers' adherence to these standards from the perspective of pregnant women in Tabriz and showed that there was a need to improve the technical quality of maternity care, particularly for providing supplements and for education in pregnancy (5).

Empowering patients by increasing their knowledge, skills and responsibility to implement effective change has the potential to promote overall health and maximize the use of available resources (8). Pregnant women have a major role to play in assessing and improving their own quality of care. However, greater participation of pregnant women in their own care may be hampered by a lack of knowledge of pregnancy care procedures and childbirth (9). Vlemmix et al. found that an educational programme can be an effective method to increase knowledge, decrease decisional conflict scores and decrease anxiety among pregnant women (10). Another way to promote mothers' involvement in the care process is CenteringPregnancy®, a model for group prenatal care conceived by Rising in 1998 (11), which involves women in their care process by giving them active roles in decision-making and community networking. Group prenatal care contains the basic components of individual health care. However, through interactions with group facilitators, guest speakers and other pregnant women, members of the

group gain additional education and support. This has been shown to be an acceptable model for the care of first pregnancies, combining satisfaction, good outcomes and effective delivery of care (12–14).

This study in Tabriz aimed to assess the effectiveness of an intervention using the CenteringPregnancy-based customer self-audit model for women's involvement in quality assessment activities in order to improve the technical quality of maternity care at public health centres. The outcome measure was the health-care providers' degree of adherence to the Iranian MOH maternity care protocols from the perspective of the pregnant women.

Methods

Study design

This was a randomized, community-based intervention trial conducted according the Comprehensive Quality Measurement in Health care (CQMH) model to improve the technical quality of maternity care from the perspective of pregnant women in Tabriz (15). The study was carried out between September 2012 and May 2013 at health centres and health posts in different urban areas of Tabriz.

The Tabriz University of Medical Sciences research and ethics committee approved the study protocol. In addition, all participants provided their written, signed, informed consent before entering the study and completing the questionnaire; women who did not wish participate in the study or who did not continue the research process were excluded from the study.

Participants

The study sample was calculated using G*Power software. Based on 80% power and a confidence level of 95%, and considering 0.05 as maximum tolerable error rate (d) and based on 0.38 standard deviation of adherence rate in a previous study we estimated a sample size of 97 in each group as:

$$n = (Z\ 1\text{-}\alpha 2 / Z\ 1 - \beta)2\ s2)/d\square 2$$

The study groups were randomly selected from the lists of pregnant women registered at 21 health centres and health posts (10 intervention centres and 11 control centres). The criteria for inclusion in the study were: being pregnant, living in Tabriz, receiving care from a health centre

or health post of the public health system and receiving at least 3 or more antenatal care visits from health centres and posts during pregnancy. Women who declined to participate were excluded from study. Among 210 pregnant women contacted (105 women in each group), 92 women in the intervention group and 93 in the control group completed the study (88.1% response rate). Among 25 non-respondents, 11 women (5 cases, 6 controls) were lost to follow-up due to emigration, 7 women (5 cases, 2 controls) were unable to answer the questionnaires and 7 women (3 cases, 4 controls) did not complete the informed consent forms.

Intervention

The intervention phase began in September 2012 and lasted 8 months. During the intervention period, participants attended support groups for maternity care. Groups of 8–12 pregnant women, grouped according to gestational age, participated in educational meetings which were scheduled to correspond with their routine maternity care programme. Participants in the intervention group attended 6 sessions during their pregnancy. Each session lasted 1.5 hours and was facilitated by a family health expert, a midwife and a doctor in each session. Sessions were guided by participants' questions and concerns, and also emphasized experiential learning, coping, problem-solving and goal-setting abilities. Health experts presented the educational material at the beginning of each session and then the participants would discuss their experiences and problems with the health experts. Participants also shared their shared their experiences and knowledge with each other.

In addition, a maternity care book was developed, based on to the maternity care protocol of the Iranian MOH (7), and was provided to the intervention group. This contained maternity health educational materials, the MOH recommended service standards during pregnancy and a checklist for the care received at every antenatal visit (16). The last section of the maternity care book was designed as a self-administered home medical record, so that after each routine care visit the pregnant woman checked the maternity care protocols and marked what services she had received. In this section women were also able to record their blood pressure and weight routinely.

The women in the control group received standard maternity care at the control health centres and health posts.

Outcome measures

All intervention and control group participants completed a study questionnaire concerning: demographic information (age, educational level); health-care service background (care provider, pregnancy history, health insurance); and their self-assessment of maternity care services overall and adherence to each of the maternity care standards For their assessment of

the quality of maternity care the participants were asked about their experience of maternity care services provided by the public health network over the whole 9 months of pregnancy. The recommended frequency of delivering items of maternity care was defined by process measures based on the protocols of the Iranian MOH (7), and this was considered as a proxy measure of technical quality (Table 1).

Participants were asked to report the frequency of receiving care for each factor over the antenatal period. The assessment score-sheet had 3 standards for health-care services received, 11 standards for clinical measurements done, 9 standards for pregnancy advice and health education received, 3 standards concerning vitamin and mineral supplements taken and 3 standards about para-clinical tests done. Each woman's self-reports of service frequency were compared with the standard frequency and recorded as a binary variable (standard adhered to or not). The percentage of women reporting adherence or non-adherence to each item of the national protocol for maternity care was then compared between the intervention and control groups.

The validity of the study questionnaire was reviewed and confirmed by 10 experts at Tabriz University of Medical Sciences and its reliability was confirmed according to Cronbach alpha index (α = 0.803), based on a previous study conducted in Tabriz (5).

Statistical analysis

The data were presented as frequencies and mean and (SD). Chi-squared and Fisher exact tests were used to analyse differences in categorical variables between groups. A hierarchical logistic regression analysis was applied in 2 steps using the enter method (17). Variables found to be associated with technical quality adherence indicators in the univariate analysis were included in the multivariate logistic regression model. The cut-off P-value for entry and removal variables in the stepwise logistic regression model was 0.15. In the second step, the health centre level, pregnancy history, education level and occupation were entered into the model as confirmatory factors. The final model consisted of significant baseline characteristics and all confirmatory factors. Data were analysed using SPSS, version 13 statistical package. P-values < 0.05 were considered statistically significant.

Results

Background characteristics of the groups

Study participants in both groups were mostly aged 20–29 years old (68.5% of the intervention group and 67.7% of the control group) and almost half (31.5% of intervention versus 33.4% of control group) had received elementary or secondary school education. The majority of participants (56.6% of intervention and 53.8% of control group) were primigravidae and 73.9%

of intervention women and 75.3% of controls had planned the pregnancy. The only significant difference in demographic characteristics between the intervention and control group was occupation; more women in the intervention group were employed than in the control group (P < 0.001). The majority of participants in both groups (90.2% of intervention women and 87.1% of controls) were covered by health insurance. Most participants (97.8% of intervention women and 93.4% of controls) assessed the overall quality of their received care as good or excellent (P = 0.091). Based on the study findings 63.0% of women in the intervention group and 69.9% of the control group received care from an obstetrician in addition to services provided in health centre (Table 2).

Adherence to maternity care standards

The results of the assessment of adherence to maternity care standards showed that only 81.5% of pregnant women in both groups received care which met the standards (Table 3).

For some services, adherence to the standard was especially low in both groups, such as feet examination to assess oedema (8.7% of cases, 6.5% of controls), eye examination (15.2% of cases, 0% of controls), neonatal risk factors and care education (28.3% of cases, 5.4% of controls), ultrasound examination (16.3% of cases, 15.1% of controls) and uterus height measurement (23.9% of cases, 28.0% of controls).

Three of the 11 clinical measurement items in the maternity care protocol were significantly more likely to be done in the intervention than the control group: body temperature (69.6% versus 33.3%), respiration rate (65.2% versus 25.8%) and pulse rate (75.0% versus 46.2%) (P ≤ 0.001) (Table 3).

Among the 9 pregnancy advice and health education items in the maternity care protocol, education about the following items were significantly more likely to be received by the intervention than the control group: high-risk pregnancy (57.6% versus 26.9%) (P ≤ 0.001), nutrition and supplements (63.0% versus 43.0%)

(P = 0.008), individual hygiene (53.3% versus 23.7%) (P ≤ 0.001), mental and sexual health (53.3% versus 19.4%) (P ≤ 0.001), neonate risk factor and care (28.3% versus 5.4%) (P ≤ 0.001) and oral health (69.6% versus 34.4%) (P ≤ 0.001) (Table 3).

Among the 3 items assessed concerning vitamin and mineral supplements (ferrous sulfate, multivitamins and folic acid) only folic acid supplementation showed a significant difference and was received by significantly more of the intervention than control women (52.2% versus 28.0%) (P ≤ 0.001).

None of the 3 para-clinical test items (blood test, urine test and ultrasound examination) showed a significant difference between intervention and control groups.

Multiple logistic regression

Demographic and clinical history

All health centres and health posts were classified into three groups (high, middle and low level) based on performance data, facilities, socioeconomic status and experience of district health experts. The significant associations of pregnancy history, education level and occupation with adherence to maternity care protocols in the univariate analysis were confirmed in the multiple logistic regression analysis with adjustment of the data for health centre level.

Services received

In the multiple logistic regression analysis of the standards for clinical assessments received the following items were significantly associated with the intervention: measurement of body temperature [adjusted odds ratio (aOR): 4.4, 95% CI: 2.31– 8.4; P ≤ 0.001], measurement of respiration rate (aOR = 5.93, 95% CI: 2.96–11.88; P ≤ 0.001) and measurement of pulse rate (aOR = 3.35; 95% CI: 1.74–6.44; P ≤ 0.001) (Table 3).

Educational interventions received

With regard to education about pregnancy and healthy behaviours, the results of multiple logistic regression showed that the following standards were significantly more likely to be met in the intervention group: high-risk pregnancy education (aOR 3.78; 95% CI: 1.96–6.28; P ≤ 0.001), nutrition and supplements education (aOR 2.14; 95% CI: 0.16–3.93; P = 0.015), individual hygiene education (aOR 3.64; 95% CI: 1.89–7.14; P ≤ 0.001), mental and sexual health education (aOR = 4.73; 95% CI: 2.39–9.35; P ≤ 0.001), safe delivery education (aOR = 2.18; 95% CI: 1.12–4.25; P = 0.021), neonate risk factor and care education (aOR = 7.71; 95% CI: 2.70– 21.98; P ≤ 0.001) and oral health education (aOR = 4.39; 95% CI: 2.30–8.35; P ≤ 0.001) .

Vitamin and mineral supplements received

With regard to standard of vitamin and mineral supplements received the only item showing a

significant association with intervention was folic acid supplementation (aOR = 2.94; 95% CI: 1.57–5.50; P ≤ 0.001). (Table 3).

Discussion

Although the field of pregnancy and childbirth has pioneered evidence-based practice, resulting in a wealth of clear guidance for evidence-based maternity care, there remains a widespread and continuing underuse of beneficial practices, overuse of harmful or ineffective practices and uncertainty about the effects of inadequately assessed practices. In this study we used pregnant women's reports of the frequency of care activities received rather than the health-care provider's reports or the health service records.

According to the results of this study in Tabriz the recommended intervention has contributed to improving the technical quality of maternity care from the perspective of pregnant women. The study findings indicated that in aspects of care that are more related to women's own ability and perceptions, such as education about pregnancy care and healthy behaviours, quality of care was improved more than in other aspects of care, such as clinical assessments and para-clinical tests. The results therefore showed that empowering pregnant women and involving them in the care process in close interaction with care providers can be an effective strategy to improve the standard of care delivered.

The key finding of this study is that providers' adherence to the MOH recommended protocol for maternity care standards, as assessed by pregnant women themselves, was significantly better in the intervention group than the control group. The regression analysis of rate of adherence to several of the protocol standards—specifically measurement of body temperature, respiration rate and pulse rate; education about high-risk pregnancy, hygiene, mental and sexual health, neonatal risk factors and care, and oral health; and supplementation with folic acid—were about 3 to 6 times higher in the intervention group than the control group. This finding indicates that the recommended intervention was effective in quality improvement in maternity care. After adjusting the data to health centre level, pregnancy history, education level and occupation the differences between the groups was preserved.

In this study we combined several methods to improve the effectiveness of the implemented intervention. Centring pregnancy care, a pregnancy care information book and home medical records were used simultaneously to cover the weaknesses of any one method. In the intervention group the pregnancy care book provided at the women's first maternity visit contained a section related to the recommended standard of care for each antenatal care visit. The intervention group also received educational information from the pregnancy care book and via the centring pregnancy model and support groups in the health centre and health houses.

Maternity support groups developed in other settings such as Scotland established postnatal reunion groups and almost all the studied pregnancy care units recommended this service (18). In a WHO collaborative study in 8 countries Shah et al. found that pregnant women's participation in their care could be improved by an intervention including take-home records and maternity risk factor education (6).

Gabrysch and Campbell found that mother's educational level was consistently associated with the health behaviour of pregnant women by increasing their knowledge and empowering them to participate in the service delivery process and increasing their demand to get better services from care providers (19). Bekker and Lhajoui reported that education is an important factor in improving the health and well-being of pregnant women (20). The results of a study in Brazil revealed that the proportion of women who had at least 6 visits during pregnancy increased from 5.7% in 2001 to 62.7% in 2006 with a project to improve the quality of maternity care by encouraging and empowering pregnant women to use maternity care (21).

The third area of care we studied was vitamin and mineral supplements. According to our results after adjustment for confounding factors, participants in the intervention group were 3 times more likely than the control group to receive folic acid. On the other hand, in relation to iron and multivitamin supplements there was no significant difference between the groups and only two-thirds of participants in both intervention and control groups received the standard care. This result was confirmed by a previous study in Tabriz and another setting in the Islamic Republic of Iran (5,22–23). Part of this problem reflects the absence of prepregnancy care, late attendance at maternity programmes and other factors such as the poor quality of tablets provided in public health-care centres.

In relation to the fourth area of maternity care, para-clinical tests, our results showed that adherence to the standards for blood and urine tests were better in the intervention group than the control group but that these differences were not statistically significant. Other researchers in the Islamic Republic of Iran have reported similar results. For instance, the earlier study in Tabriz in 2010 found that 66% of pregnant women had completed a blood test and 76% of them had completed a urine test fully (5). Moreover, a study in Semnan indicated that pregnancy tests had been done at the standard level for only 72% of pregnant women (24). In some cases pregnant women who had such tests may not remember and some of the deficiencies can be due to recall bias. According to our study findings only 15% of pregnant women in both groups received ultrasound examination at the recommended level, showing that our proposed intervention and education did not change pregnant women's attitudes and behaviours with regard to ultrasound examination (25). A minimum of 3 screening tests should be performed during pregnancy (26). Unlike developed countries, the quality of pregnancy care is below standard and a shortage of some services in developing countries is a major weakness in antenatal care. However, a proportion of our participants recorded overuse as well as underuse

of ultrasound examination and in some countries, including ours, these services tend to be over-used due to a misunderstanding about the safety of ultrasound scans in pregnancy (5,25–27). Therefore, care providers especially specialists and private sector providers must inform pregnant women about the side-effects of over-use of ultrasound and advise them to follow the recommended standard.

One of the limitations of this study is that we used self-reported data which contains several potential sources of bias. However, according to previous studies customer-reported data in some settings such as maternity care can be considered as a valid data source. The small sample size, considering the scope and volume of maternity care, may be seen as a limitation to implementing the intervention on a larger scale. Finally, we included only urban public health centres in our study and it may be difficult to generalize the finding of our study to private and rural health centres.

Conclusion

The results of this study indicate that increasing women's participation in care delivery and informing pregnant women about maternity care standards have important roles in improving the quality of maternity care and could assist health systems to achieve their objectives for delivering high quality services.

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