Original Article

Effectiveness of Awareness Training on Birth Preparedness and Complication Readiness among Community Health Workers of New Delhi, India

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Abstract

Background: In India, current maternal mortality ratio is 97/100,000 livebirths, and still more efforts are needed to achieve Sustainable Development Goal 3, target 1 of 70/100,000 livebirths. Women die because of complications during and following pregnancy and childbirth. Skilled care during and immediately after delivery has been identified as one of the key strategies in reducing maternal mortality. Birth preparedness and complication readiness (BPCR) has been implemented as a comprehensive strategy to fill this gap. BPCR is one of the key interventions to reduce the maternal mortality. **Materials and Methods:** This was a community-based before and after interventional study (quasi-experimental study) and was conducted in two randomly selected primary health centers of South West district of Delhi. **Results:** A total of 152 community health workers (CHWs) took part in the study. About one fourth (22.03%) had knowledge regarding water breakage without labor, which increased to 85.53% after training and was statistically significant ($P < 0.0001$). Mean knowledge score preintervention was 4.35 (1.82), whereas the postintervention mean knowledge score was 8.98 (0.99) and was statistically significant ($P < 0.0001$) **Conclusion:** Though awareness of CHWs on some aspects of the BPCR components was good before the training program, marked improvement was seen in most of the domains after the training session.

Keywords: Antenatal, birth preparedness, labor, maternal mortality

Introduction

Maternal mortality reduction was the key global health agenda since the previous two decades.[1] It is estimated that greater than 90% of maternal deaths could be avoided even in low-income countries. However, the burden is still high.[1] Almost all the maternal deaths (99%) occur in developing countries and one-third of them occur in South Asia.[2] In India, current maternal mortality ratio (MMR) is 97/100,000 livebirths,[3] and still more efforts are needed to achieve Sustainable Development Goal (SDG) 3, target 1 of 70/100,000 livebirths.[4] Birth preparedness and complication readiness (BPCR) is one of the key interventions to reduce the maternal mortality. The World Health Organization recommends that pregnant woman should receive focused "antenatal care" in which BPCR is a key component.[2,5]

A set of indices has been established by Johns Hopkins Program for International education in gynecology and obstetrics (JHPIEGO) (an affiliate of Johns Hopkins University, USA) to measure BPCR at different levels – individual, family, community, health-care provider, facility, and policy levels.[6,7] BPCR includes the desired place of birth, the preferred birth attendant, the location of the closest facility for birth and in case of a complication, funds for any expenses related to birth and in case of complications, supplies and materials necessary to bring to the facility, an identified labor and birth companion, an identified support to look after the home and other children while the woman is away, transport to a facility for birth or in the case of a complication, and identification of

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compatible blood donors in case of emergency.[8] However, at the individual level, pregnant women and their partners can prepare by learning to recognize danger signs that may indicate life-threatening complications for the mother and her baby. Communities and families can prepare by making the arrangements for money, transport, or a blood donor to assist a woman and her family in reaching and receiving care in case of an obstetrical emergency. Facilities can prepare by having the required equipment, supplies and support systems available. At the provider level, clinical personnel can prepare by acquiring the necessary knowledge and skills needed to attend normal childbirth and manage obstetric and newborn complications. Policymakers can prepare by instituting evidence-based health-care policies and assuring adequate funding for maternal and newborn health-care services.[8,9]

Women die because of complications during and following pregnancy and childbirth. Skilled care during and immediately after delivery has been identified as one of the key strategies in reducing maternal mortality.[7] There is evidence that encouraging BPCR enhances preventative behaviors, improves mothers' awareness of danger indicators, and improves care seeking during obstetric emergencies from rural Nepal,[10] Burkina Faso,[11] Ethiopia,[12] and India.[12,13] Schemes like Janani Suraksha Yojana, Janani Shishu Suraksha Karyakram, Facility Based Newborn Care, and Home Based Newborn Care are efforts to ensure that vulnerable members of society have no out-of-pocket medical expenses and their access to health care is improved.

Community mobilization through stakeholders such as community health workers (CHWs) forms part of the BPCR concept.[14] The term "CHWs" encompasses a wide variety of local health-care providers such as Accreted Social Health Activist (ASHA), Auxiliary Nurse Midwife (ANM), Anganwadi Workers (AWW), and Lady Health Visitors (LHV). CHWs form the backbone of all the maternal health programs.[15] CHWs enable access to and utilization of health services and inculcate healthy behavior among the communities.[16]

However, it is important that the CHWs should be well equipped with a thorough knowledge and skills on BPCR.[17] Studies[17,18] revealed training as an effective intervention on BPCR awareness of CHWs. There are few studies[19] conducted before in Delhi which showed that significantly less number (only 17.6%) of women were well prepared for BPCR. In India's rural areas, knowledge of BPCR procedures is still limited and underutilized. In this regard, the purpose of this study was to assess the effectiveness of awareness training on BPCR among CHWs of South West district of Delhi. Further, this study would be of great use for further evidence-based fine-tuning of ongoing maternal and child health interventions to minimize the complications and avert maternal deaths.

Materials and Methods

Study design and study population

This study had a pre-post interventional study design.[20] It was conducted in two randomly selected primary health centers (PHCs) of South West district of Delhi. The intervention was given in both the selected PHCs and post intervention score was compared with respect to baseline score. The selection of PHCs was done through simple random sampling by lottery method. The study included 155 CHWs for a period of 2 months (August 2022 to October 2022), but only 152 workers agreed to participate in the study.

Inclusion criteria

All CHWs who had completed 6 months in their job and were willing to participate in the study by giving written informed consent were included in the study.

Exclusion criteria

CHWs who were unable to complete the training and were having difficulty in communication and responding to interview schedule were excluded from the study.

Sample size and sampling

Based on a study conducted among CHWs in an urban area regarding awareness of practice of BPCR, it was found that 21.8% of ASHA workers were aware of service provision regarding BPCR.[13] Assuming the same proportion, the sample size was calculated using OpenEpi 16 software, taking a power of 80%, level of significance of 5%, and 7% absolute error. The minimum required sample size was 134 After adjusting for a dropout of 10%, the sample size required was rounded off to 150. However, we tried to include all CHWs from the two PHCs. As per the administrative section of PHCs, we have around 155 CHWs in the two PHCs. Training was conducted in batches of around 20–25 CHWs over 5–6 days. There are four PHCs in the South West district of Delhi. Of these, two were selected by simple random sampling using lottery method.

Tool and methodology

A pretested, semi-structured questionnaire [Annexure 1] based on JHPIEGO was used to collect data on the components of BPCR. After getting clearance from the institutional ethical committee (IEC), line listing of all CHWs (ASHA, ANM, LHV, AWW) who were registered with the concerned PHC was done. A total of 60 min of training was given after filling the Performa regarding identification details of the participants and collecting the baseline data of BPCR components. Training sessions were prepared and conducted by the investigator after having a detailed discussion with the expert doctors in the field of maternal and child health. Training session included 15 min of health talk about BPCR elements by the investigator, followed by a 45-min video film and distribution of pamphlets. The content of the film included key danger signs as well as other danger signs during pregnancy, childbirth, and the postpartum period and other elements for birth preparedness. All the danger signs were included, such as severe vaginal bleeding, swollen hands and feet, blurred vision, convulsions, prolonged labor, high fever, etc., Training included information about BPCR components, Antenatal care (ANC) facilities for pregnant women, and danger signs in newborn. BPCR components included counseling for institutional delivery,

explaining cash assistance benefit, identifying transport for delivery/emergency, identifying birth companion, identifying blood donor, etc., Questions from the respondents were encouraged. There was a question and answer session, which was followed by distribution of pamphlets containing information and photographs regarding safe motherhood and danger signs of pregnancy as a self-help material for reinforcement of training. All CHWs were reinterviewed after 2 weeks of refresher training program and were evaluated based on the same questionnaire.

Ethical considerations

Permission was obtained from IEC before the start of the study. Informed consent was also sought from each participant before commencement of the study.

Outcome variable

Change in proportion of CHWs' awareness on BPCR elements pre- and post-training session was the outcome variable.

Statistical analysis

The present study was a pre-post interventional study. Categorical variables were analyzed employing McNemar test. Similarly, for the continuous variables, we first applied Shapiro Francia test of normality and as the data set (knowledge scores) was normally distributed (Shapiro Francia test was nonsignificant), we applied paired *t*-test. Data was entered in MS Excel spreadsheet and analyzed using Statistical Package for the Social Sciences for Windows (version 23.0; IBM, Armonk, NY, USA). A *P* value less than 0.05 was significant.

Operational definitions

- *Effectiveness:* Refers to improvement regarding BPCR practices after "awareness training" among CHWs, as revealed by statistical tests.
- *Awareness training:* Refers to planned instruction regarding knowledge on various BPCR elements.
- *Awareness:* Refers to awareness of CHWs regarding BPCR, as revealed by baseline information.
- Baseline knowledge score was computed taking the following key danger signs:
- The key danger signs during pregnancy include severe vaginal bleeding, swollen hands/face, and blurred vision.
- The key danger signs during labor and childbirth include severe vaginal bleeding, prolonged labor (>12 h), convulsions, and retained placenta.
- The key danger signs during the postpartum period include severe vaginal bleeding, foul-smelling vaginal discharge, and high fever.

Results

Of the total 152 CHWs in the training program, more than half, that is, 87 (57%), were working as ASHA workers; 49 (32%) were working as AWW, 11 (7%) as ANM, and five (3%) as LHV. Among the study participants, 69 (45.4%) were in the age group of 40–49 years. The mean age of CHWs was 42.98 years with a standard deviation of 6.47, and 146 (96.4%) were married. Around one third, that is, 56 (36.8%), were from joint family. Nearly two-thirds of CHWs, that is, 102 (67.1%), had work experience between 10 and 20 years, and 22 (14.4%) CHWs had more than 20 years of service [Table 1].

Knowledge about BPCR components

Table 2 shows CHWs' knowledge regarding the components of BPCR, before and after the training program, of which strikingly good improvement was seen in identification of transport as an essential part of BPCR, as the baseline knowledge of 68.42% improved to 100% after the training program ($P < 0.0001$). Significant improvement was observed in all other components too (institutional delivery [$P = 0.0005$], cash assistance [$P < 0.0001$], referral institute [$P < 0.0001$], birth companion [$P < 0.0001$], blood donor [$P < 0.0001$], clean item kit [$P = 0.0027$]).

Knowledge about danger signs during pregnancy

CHWs' knowledge on danger signs during pregnancy increased after the training program. About one fourth (22.03%) had knowledge regarding water breakage without labor, which increased to 85.53% after training and was statistically

Table 1: Sociodemographic profile and work experience of participants (*n*=152)

Variable	Frequency (*n*)	Percentage
Age (completed years)		
20–29	2	1.3
30–39	54	35.5
40–49	69	45.4
50–59	27	17.7
Marital status		
Married	146	96.1
Unmarried	3	2
Widow	3	2
Family type		
Nuclear	96	63.2
Joint	56	36.8
Work experience		
<10 years	28	18.4
10–20 years	102	67.1
>20 years	22	14.4

Table 2: Knowledge about BPCR components

Variable	Pretest, *n* (%)	Posttest, *n* (%)	McNemar test	*P*
Institutional delivery	140 (92.11)	152 (100)	12	0.0005
Cash assistance	71 (46.71)	124 (81.58)	53	<0.0001
Identify transport	104 (68.42)	152 (100)	48	<0.0001
Referral institute	115 (75.66)	151 (99.34)	36	<0.0001
Save money	103 (67.76)	149 (98.03)	46	<0.0001
Birth companion	97 (63.82)	146 (96.05)	49	<0.0001
Risk danger signs	73 (48.03)	96 (63.16)	23	<0.0001
Blood donor	69 (45.39)	139 (91.45)	64.47	<0.0001
Clean item kit	143 (94.08)	152 (100)	9	0.0027

BPCR=birth preparedness and complication readiness

significant ($P < 0.0001$). Other danger signs, such as vaginal bleeding, swollen hand/feet, blurred vision, convulsion, difficulty in breathing, severe weakness, severe abdominal pain, severe headache, severe abdominal pain, and acceleration/deacceleration fetal movement, also significantly improved ($P < 0.0001$) [Table 3].

Knowledge about danger signs during labor and childbirth

Table 4 shows CHWs' knowledge on danger signs during labor and childbirth before and after the training program. Nearly one fifth (19.74%) had knowledge about retained placenta, which improved after training to more than 97% and was statistically significant ($P < 0.0001$). Similar increase in percentage was observed in knowledge regarding severe headache ($P < 0.0001$). Other danger signs which significantly improved ($P < 0.0001$) after training were vaginal bleeding, prolonged labor, convulsion, high-grade fever, and loss of consciousness.

Knowledge about danger signs postdelivery

CHWs' knowledge on danger signs during the postpartum period increased after the training program. Less than 10% had knowledge about severe headache, which improved after training to 49.34% and was statistically significant ($P < 0.0001$). Improvement in all other danger signs (foul vaginal discharge, high-grade fever, blurred vision, swollen hand/feet, loss of consciousness, vaginal bleeding, and difficulty in breathing) was also statistically significant ($P < 0.0001$) [Table 5].

Knowledge about danger signs in newborn

Table 6 shows CHWs' knowledge on danger signs in newborn before and after the training program. About one fifth (23.68%) had knowledge about difficulty in breathing in newborns, which improved after training to 55.26% and was statistically significant ($P < 0.0001$). There was significant improvement ($P < 0.0001$) in other danger signs also, such as knowledge about jaundice, poor suckling/feeding, umbilical cord bleeding, convulsions/rigidity, failure to pass stool, and fever.

Maximum baseline knowledge score was 10 and minimum score was 0. Mean knowledge score preintervention was 4.35 (1.82), whereas the postintervention mean knowledge score was 8.98 (0.99). Paired *t*-test was applied and the difference in mean score was found to be statistically significant ($P < 0.0001$) [Figure 1].

Discussion

BPCR is the process of planning for normal birth and anticipating the actions needed in case of an emergency. In many societies in the world, cultural beliefs and lack of awareness inhibit preparation in advance for delivery and the expected baby. The majority of pregnant women and their families do not know how to recognize the danger signs of complications. When complications occur, the unprepared family wastes a great deal of time in recognizing the problem, getting organized, getting money, finding transport, and reaching the appropriate referral facility. Birth preparedness is a strategy to promote the timely use of skilled maternal and neonatal care, especially during childbirth, based on the theory that preparing for childbirth reduces delays in obtaining this care. Despite the great potential of BPCR in reducing the maternal and newborn deaths, its status is not well known.[21]

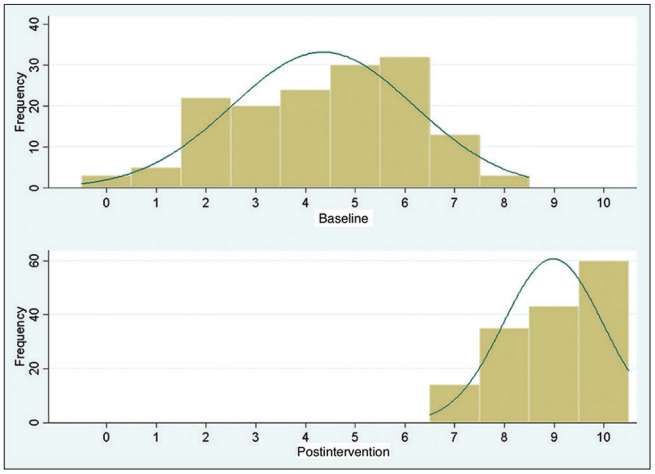

Figure 1: Differences in knowledge scores of danger signs among CHWs. CHWs = community health workers

Table 3: Knowledge about danger signs during pregnancy

Variable	Pretest, *n* (%)	Posttest, *n* (%)	McNemar test	*P*
Vaginal bleeding	97 (63.8)	152 (100)	55	<0.0001
Swollen hand/feet	65 (42.76)	144 (94,74	79	<0.0001
Blurred vision	38 (25)	133 (87.5)	95	<0.0001
Convulsion	67 (44.08)	139 (91.45)	68.21	<0.0001
Severe headache	41 (26.97)	126 (82.89)	77.69	<0.0001
High-grade fever	38 (25)	138 (90.79)	100	<0.0001
Loss of consciousness	53 (34.87)	138 (90.79)	85	<0.0001
Difficulty in breathing	48 (31.58)	138 (90.79)	88.04	<0.0001
Severe weakness	105 (69.08)	145 (95.39)	36.36	<0.0001
Severe abdominal pain	47 (30.92)	134 (88.16)	87	<0.0001
Acceleration/deacceleration fetal movement	69 (45.39)	146 (96.05)	77	<0.0001
Water break without labor	35 (22.03)	130 (85.53)	95	<0.0001

Table 4: Knowledge about danger signs during labor and childbirth

Variable	Pretest, *n* (%)	Posttest, *n* (%)	McNemar test	*P*
Vaginal bleeding	136 (89.47)	152 (100)	16	<0.0001
Prolonged labor	57 (37.50)	147 (96.71)	90	<0.0001
Convulsion	52 (34.21)	140 (92.11)	88	<0.0001
Placenta >30 min	30 (19.74)	148 (97.37)	114.13	<0.0001
Severe headache	29 (19.08)	148 (97.37)	119	<0.0001
High-grade fever	25 (16.45)	148 (97.37)	123	<0.0001
Loss of consciousness	32 (21.05)	71 (46.71)	23.4	<0.0001

Table 5: Knowledge about danger signs postdelivery

Variable	Pretest, *n* (%)	Posttest, *n* (%)	McNemar test	*P*
Vaginal bleeding	97 (63.82)	152 (100)	55	<0.0001
Foul vaginal discharge	22 (14.47)	98 (64.47)	76	<0.0001
High-grade fever	68 (44.74)	99 (65.13)	31	<0.0001
Severe headache	14 (9.21)	75 (49.34)	61	<0.0001
Blurred vision	12 (7.89)	64 (42.11)	52	<0.0001
Convulsion	36 (23.68)	84 (55.26)	48	<0.0001
Swollen hand/feet	18 (11.84)	74 (48.68)	56	<0.0001
Loss of consciousness	46 (30.26)	87 (57.24)	41	<0.0001
Difficulty in breathing	16 (10.53)	106 (69.74)	82.65	<0.0001
Severe weakness	83 (54.61)	108 (71.05)	25	<0.0001

Table 6: Knowledge about danger signs in newborn

Variable	Pretest, *n* (%)	Posttest, *n* (%)	McNemar test	*P*
Difficulty in breathing	36 (23.68)	84 (55.26)	48	<0.0001
Jaundice	67 (44.08)	114 (75)	47	<0.0001
Poor suckling/feeding	115 (75.66)	118 (77.63)	3	0.25
Umbilical cord bleeding/pus	76 (50)	112 (73.68)	36	<0.0001
Decreased weight	93 (61.18)	104 (68.42)	5.26	0.0218
Skin lesion	25 (16.45)	77 (50.66)	52	<0.0001
Convulsion/rigidity	28 (18.42)	103 (67.76)	75	<0.0001
Abdominal pain	33 (21.71)	80 (52.63)	47	<0.0001
Stool passing failure	54 (35.53)	96 (63.16)	42	<0.0001
Fever	30 (19.74)	73 (48.03)	43	<0.0001

In our study, the mean age of CHWs was 42.98 (6.47) years and 96.1% were married. Also, 57% (87) of CHWs were ASHA workers. A study by Kochukuttan *et al.*[22] showed that the mean age of ASHA workers was 30–35 years and 90% were married. Findings from a study[17] conducted in Delhi also showed that majority of the participants were from the age group of 25–45 years and were married. Based on ANC care before the training program, 133 CHWs (87.5%) had knowledge about registration of pregnancy, which was less compared to that reported by Valiveti *et al.* (100%).[23] One hundred and thirty-two (86.84%) CHWs said four health checkups were needed, which was more compared to that reported in the study of Kohli *et al.* (74.5%).[17]

Knowledge regarding Iron folic acid (IFA) tablets and tetanus toxoid injection was found in 141 (92.76%) and 129 (84.87%) CHWs, respectively, which was more compared to the values reported in the studies of Kaur *et al.*[24] (81.8%) and Rajendra *et al.* (99.4%).[25] After the training program, knowledge regarding ANC in the above areas improved to 100% and was also statistically significant.

Regarding danger signs of pregnancy before the training program, knowledge about severe vaginal bleeding was present in 97 (63.8%) CHWs, about convulsions in 67 (44.08%) CHWs, about swelling of legs in 65 (42.76%) CHWs, about severe anemia in 23 (29.1%) CHWs, about high fever in 38 (25%) CHWs, and knowledge about blurred vision was present in 38 (25%) CHWs, which were higher compared to the values reported by Dinesh *et al.*[26] A study from Aligarh showed that 88% ASHAs had knowledge about excessive vaginal bleeding.[27]

Kochukuttan *et al.*[22] observed that almost all ASHA workers (98.6%) counseled mothers for institutional delivery and 75.8% of ASHA workers explained transport assistance. This finding was similar to our study, where 92.11% of ASHA workers counseled mothers for institutional delivery and 68.42% of ASHA workers helped in identifying transport during transport. Regarding practices of accompanying pregnant mothers to hospitals, 97 (67.76%) ASHA workers had been doing it before the training program, which improved to 98.03% after the training period, but Kohli *et al.*[17] reported that only 34.5% accompanied pregnant women to hospital, which was lesser than the value found in the present study. This enlightens about the importance of a training program as ASHA mainly helps in reducing MMR by giving right information at the right time to the pregnant mother to avoid maternal deaths. In our study, 48.03% of CHWs considered fever as the danger sign in newborn, which is very less compared to the values reported by Grover *et al.*[28] and Rajawat and Talwar.[29] It was found that fever was assessed correctly in nearly 73% and 67% of newborns, respectively.

CHWs' ability to advance Maternal and child health (MCH) is hampered by several issues, such as inadequate infrastructure, supervision, and back-up assistance, as well as insufficient practical training. These obstacles, however, also point to ways to improve MCH initiatives in Delhi, such as emphasizing more practical training, providing supporting supervision, and boosting community involvement, particularly in relation to preparedness for complications.

Strengths and Limitations

One of the strengths of this study was that the training of health workers could also have provided a sort of refresher course for CHWs to improve their knowledge and skills on BPCR, further giving insight into the areas that need to be focused in related training program. CHWs were recruited from the field practice area of medical college (insiders), and hence, ownership and sustainability are feasible.

It is worth mentioning the limitations related to this study. This study was conducted in a Hindi-speaking belt and the intervention was in Hindi; the effect can be language dependent and may not be similar in other language belts. The ability to fully interpret the results is limited to the nature of the pre/post design. A randomized controlled trial would have reduced the bias when interpreting the results. As the study duration and data collection period were short, for ease of administration, only awareness regarding danger signs was assessed and not the entire BPCR package. Social desirability cannot be ruled out as the participants may have given responses that are thought to be the best desirable practices. Post-training knowledge of CHWs was assessed after 2 weeks of the training program due to time constraints. If the assessment would have been done after 6 months or more, there may be a change in their knowledge level, which may be increased or reduced in certain components. Scores were not calculated after a washout period to measure the long-term changes.

Conclusion and Recommendations

Though awareness of CHWs on some of the aspects of BPCR components was good before the training program, marked improvement was seen in most of the domains after the training session. Awareness about the danger signs of pregnancy and the danger signs during labor improved significantly after training. In conclusion, marked improvement was seen in post-training program, highlighting the effects of training program. If regular annual refresher training is provided without fail to CHWs, it will have great impact on the positive health care of maternal and child health. Efforts should be targeted to increase the awareness about various components of BPCR and the involvement of CHWs and health-care providers. CHWs can help expectant mothers and their families make well-informed decisions that will improve the feto-maternal outcome. Further studies should explore the awareness of BPCR at the individual and community levels, as their involvement is elemental to achieve SDG 3, target 1 of providing safe motherhood and reducing maternal mortality.

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Conflicts of interest

There are no conflicts of interest.

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