Original Article

Safe Delivery application with facilitation increases knowledge and confidence of obstetric and neonatal care among frontline health workers in India

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Abstract

Background: Digital learning tools have proliferated among healthcare workers in India. Evidence of their effectiveness is however minimal. We sought to examine the impact of the Safe Delivery App (SDA) on knowledge and confidence among frontline health workers (HW) in India. We also studied whether facilitation to address technical challenges enhanced self-learning. **Methods:** Staff nurses and nurse-midwives from 30 facilities in two states were divided into control and intervention groups through randomization. Knowledge and confidence were assessed at baseline and after 6 months. Three rounds of facilitation addressing technical challenges in downloading and usage along with reminders about the next phase of learning were conducted in the intervention group. A user satisfaction scale along with qualitative interviews was conducted in the intervention group at the endline along with qualitative interviews on facilitation. **Results:** The knowledge and confidence of the healthcare workers significantly increased from the baseline to endline by 4 percentage points ($P < 0.001$). The participants who received facilitation had a higher mean score difference in knowledge and confidence compared to those who did not receive facilitation ($P < 0.001$). The participants were highly satisfied with the app and video was the most-watched feature. They reported a positive experience of the facilitation process. **Conclusion:** The effectiveness and acceptability of the SDA indicate the applicability of mHealth learning tools at the primary healthcare level. In a time of rapid digitalization of training, facilitation or supportive supervision needs further focus while on-ground digital training could be invested in to overcome digital illiteracy among healthcare workers.

Keywords: Frontline healthcare workers, India, maternal and newborn health, mHealth, Safe Delivery App

Introduction

The time of childbirth poses the most risks for the mother and child. In 2019, 2.4 million children died in their first month while nearly 6,700 newborns died every day.[1] In the same year, approximately 2 million babies or one every 16 s died during childbirth.[1] An estimated 2,95,000 maternal deaths occurred worldwide out of which 94% were from low- and middle-income countries.[2] The biggest contributor to these deaths is the lack of quality of skilled care around childbirth.[3,4] It is estimated that investments in skilled care can prevent an estimated 1,13,000 maternal deaths, 5,31,000 stillbirths, and 1·325 million neonatal deaths annually.[5]

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India accounts for a fifth of the annual global maternal deaths (32,000).[2] Although neonatal mortality has reduced substantially to 24.9 in 2019–2021,[6] it still accounts for more than a quarter of neonatal deaths.[7] This urgently calls for a closure in quality gaps, especially in primary healthcare settings, where referrals are delayed or hampered due to distance, cost, and family apprehensions.[8] The primary healthcare centers in both urban and rural areas were found to have low intrapartum care capacity.[9] Nurses who take care of the bulk of deliveries in primary care settings are often unable to provide quality care due to inadequate infrastructure, poor training, limited access to continuing education, and professional support from experienced clinicians among others.[10] Skill-based trainings for nurses are of short duration and are conducted away from the health facility which is not very effective. It, therefore, becomes important that a ready tool for the nurses to refer to continuously is available at their health facility after their training. The use of mHealth technology in educating the frontline workers is a commonly accepted strategy to improve healthcare practices.[11-13] The Safe Delivery Application is a mHealth learning tool developed by the Maternity Foundation, the University of Copenhagen and the University of Southern Denmark. It has been used and tested in several countries[14-16] and found to improve the knowledge of management of post-partum hemorrhage and neonatal resuscitation.[15-17]

The safe delivery app (SDA) was designed to reinforce the professional competencies of skilled birth attendants on how to manage basic emergency obstetric and newborn care (BEmONC) using a mLearning platform made of animated instructional videos and a self-mapp uses simple, animated instruction videos, procedures, drug lists, and e-learning tools to guide health workers (HW) in basic emergency obstetric and newborn care. It includes a MyLearning feature, where users can test their knowledge and earn certification as Safe Delivery Champions. The Indian version of the SDA approved by the Government of India was launched in December 2017 in an English and Hindi version. The app is freely available for download in the Google Play App Store for Android users. So far, 91,335 downloads across India have been achieved. The app's effectiveness among frontline HW is not known in India except for a study among nursing students.[17]

We partnered with the Maternity Foundation to study the effect of SDA on the knowledge and confidence of HW of the Community Health Centers (CHC) in Aspirational Districts (AD) in managing complications of labor. Furthermore, given the technical challenges of using mHealth in poor network areas,[16] there was an interest in examining the role of facilitation in the overall effectiveness of the SDA.

Methods

Study objectives

The objectives were to assess:

- Whether the SDA is effective in improving the knowledge and confidence of service providers?
- Whether the SDA is acceptable as a capacity-building tool to service providers?
- Which of the two implementation models—SDA alone or SDA with facilitation—is more effective in increasing the knowledge and confidence of service providers?

Study design

A quasi-experimental study with two arms was designed—one with facilitation and one without facilitation. By facilitation, we mean technical troubleshooting and reminders about the SDA learning material.

Selection of health facilities

Two AD of Uttarakhand were included in the facility selection. In Jharkhand, out of 19 AD, 3 were purposively selected based on the feedback of the State Maternal Health cell to represent districts that were poor performing and marginally remote from the state capital. A mix of six CHC and sub-divisional hospitals (SDH) in each district that cater to a high caseload (above 100 patients in a month) and having at least four staff nurses and auxiliary nurse midwife (ANM) were selected. A random table generator was used to randomly assign the facilities into the intervention and control arm.

Participants

The participants included staff nurses/ANMs from the selected facilities having access to a smartphone or tablet. A total of 118 such health providers were recruited at baseline which dropped to 105 (at endline) due to staff transfers and leaves as a result of the corona virus disease (COVID-19) pandemic [Figure 1].

Study tools

The tools, originally developed by the Maternity Foundation were adapted to include Indian standards. The questionnaire had seven questions under three domains: active management

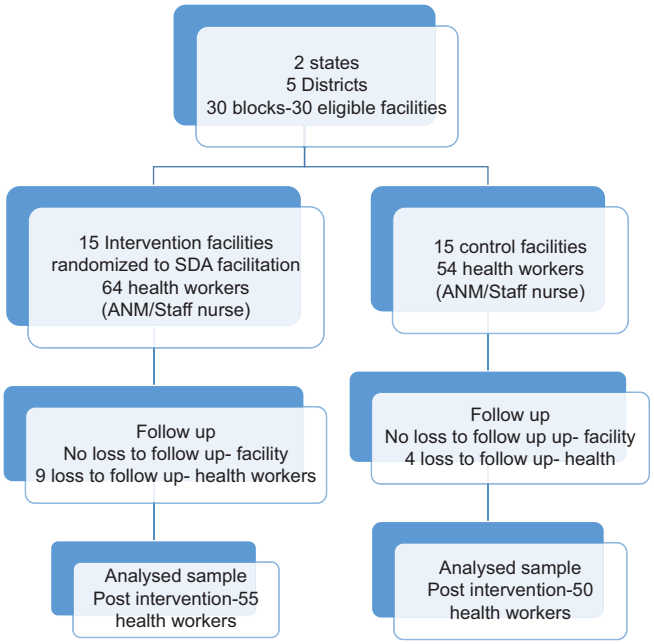

Figure 1: Flowchart of sample allocation

of the third stage of labor (AMTSL), neonatal resuscitation, and management of maternal complications. A confidence scale in each domain was additionally used. A user satisfaction tool was used at the endline among the intervention group along with a qualitative guide on the usefulness of the app and the facilitation. The tools have been tested and used in other settings.

Intervention

In the control group, the participants were introduced to the SDA, instructed to work on the three modules, followed by a 'dormant' phase during which they received no further support. In the intervention group, the project team members conducted remote facilitation at the end of every 1–2 months, during which reminders about the topic for the following phase were done along with addressing technical glitches. The facilitation did not include an explanation about the content of the learning material.

Procedure

Baseline assessments were conducted onsite by project consultants. Following the assessment, an SDA orientation was conducted in both the control and intervention facilities. During the endline, assessments were conducted slightly differently. Due to the ongoing COVID-19 outbreak, the respondents had to be assessed remotely using a Google Form. It was ensured that the participants from the same facility were sent out the forms at different times to rule out consulting with each other. Qualitative interviews were conducted remotely by external consultants.

Data management and data analysis

Primary data was entered in an excel-based tool. Study outcomes included knowledge scores on three domains of delivery and newborn care, confidence scores, and user satisfaction level.

Correct knowledge was evaluated by 21 multiple-response questions on the domains of AMTSL, post-partum hemorrhage (PPH), and neonatal resuscitation. The confidence score based on the same domains used a 5-point Likert scale. The satisfaction level was measured using a 5-point Likert scale **[**Appendix A and B**].**

Descriptive statistics ((mean, standard deviation, percent) were performed. The differences in proportion for correct knowledge of safe delivery care at pre- and post-intervention were tested using the Chi-square test while significant differences between-group for mean on confidence score were attained through statistical t-test (analysis of variance).

Method of evaluation

Difference-in-Differences (DiD) measure was used to compare the changes in the outcomes over time between the intervention and the control groups. In the two-group two-period DiD design, the common trend assumption amounts to a simple statistical model of the treated and untreated potential outcomes. The DiD estimate is obtained as the β-coefficient in the following ordinary least squares (OLS) regression, in which $\beta_{0\ I}$ is the constant term before intervention at both the study arm, β_1 is treatment/control (A_s) group fixed effects, β_2 before/after fixed (B_t) effects, β_3 is a dummy equaling 1 for treatment observations in the after period (I_{st}) (otherwise, it is zero) and ε_{ist} the error term.

$$Y_{ist} = \beta_0 + \beta_1 A_s + \beta_2 B_t + \beta_3 I_{st} + \varepsilon_{ist}$$

The causative relationship between intervention implementation and outcomes was estimated by determining the interaction between the pre-post and treated-untreated variables. A significant change in the interaction coefficient was predicted statistically from the level of significance. Further, to test for potential confounding, between-group differences were calculated to examine the role of age, facility level, and years of experience on the outcome. The data were analyzed using STATA version 14.0 software.

Ethical approval

We obtained permission from the state health departments, state National health mission (NHM), and facility in charge. The study was not submitted to the ethical review board as the impending COVID pandemic slowed the process. We kept to the tenets of the principles for ethical research embedded in the Helsinki Declaration. Informed consent forms developed in Hindi and English contained information about the risks, benefits, and confidentiality. Identifiers were used which could not be traced back to the participants.

Results

Demographic characteristics

The age of the participants ranged between 22 and 59 years. The intervention study participants were slightly older. Participants having less than 10 years of experience were more (55%—control, 63%—intervention). Selected facilities were mostly from level 2 and level 3; this ratio was 2:3 in the control region and 4:1 in the intervention arm [Table 1].

Table 1: Baseline sample characteristics of the health workers (*n*=118)

Characteristics	Control		Intervention	
	%	*n*	%	*n*
Age (Min-Max=22-59 years)				
<35 years	53.7	29	42.2	27
>=35 years	46.3	25	57.8	37
Years of experience (Min-Max=0.3-40)				
<10 Years	57.4	31	60.9	39
>10 Years	42.6	23	39.1	25
State				
Uttarakhand	25.9	14	35.9	23
Jharkhand	74.1	40	64.1	41
Facility Level				
L2	68.1	37	78.1	50
L3	31.5	17	21.9	14

App-related characteristics among the study participants in the control and intervention facilities

The participants who had received orientation before the SDA study were slightly higher in the intervention (45%) than in the control area (43%) ($P > 0.05$). Almost all the participants had downloaded the mobile app on their phone at the endline in both study arms compared to the baseline ($P < 0.001$). More HW received safe delivery champion certificates and had a higher mean percentage of MyLearning in the intervention arm (40%) compared to the control arm [Table 2].

Knowledge and confidence

The aggregate mean score of correct knowledge of safe delivery care significantly improved among the HW on the maximum range of 0–43 (31.7–34.5, *P* value < 0.001), and the overall confidence score was improved significantly by 4 percent points (64.2–66.9, *P* value < 0.001) [Appendices 1 and 2]. The median value of the correct response shifted toward the maximum score with a lower inter-quartile range at the endline [Figure 2]. Similarly, the confidence of performing delivery care also reached its highest value with a reduced inter-quartile range [Figure 2].

Impact of intervention

The net intervention effect is shown in [Figure 3]. The result demonstrates a significant improvement in the outcomes at the endline ($P < 0.001$) when controlled for intervention phases and treatment groups (2 x 2). In addition, the DiD estimates were obtained between the subgroup of facility level, age, and years of working experience of the HW for both the key outcomes. Improvement in knowledge was significant at the level 3 facility. The health workers with <10 years of experience had a significantly higher knowledge score than HW with more experience. Similarly, the confidence scores were also significantly enhanced among participants from the higher facility. The HW having lesser experience (< 10 years) and younger ages (<35 years) had more confidence [Table 3].

User satisfaction

The feedback of SDA use was examined using a 5-point Likert scale. The internal consistency of the scale was moderately good (Cronbach's alpha = 0.71). The majority were extremely satisfied with the information, content, and learning of the app. About 40% responded similarly on the ease of use, language, and use in delivery care [Table 4].

About 70% used all five features in the app [Figure 4]. The video was the most preferred feature.

Qualitative findings

HW had very positive views about the app. They appreciated the content, videos, and animation used to explain the concept.

"This is the most useful app for all of us, we have attended so many trainings but after training, we sometimes get confused or forget what we have learned, but this app helps us to review and revise all the things- it is like training on the go for us. (ANM #56)

The HW reported that the SDA helped them in delivery and newborn management. A few participants shared their experience of using the correct dose and administration of misoprostol if oxytocin was not available. They reported stabilizing the mother and child before referral.

The participants reported that while downloading initially, they were not aware of all the functions but the calls from facilitators helped in these issues. Whenever they faced any problem with the app, they consulted the facilitators. Facilitators asked about the issues with the app and encouraged them to achieve the champions' certificate.

HW suggested additional content on cervical episiotomy and more details about newborn care. They also suggested including information about when and how to use the drugs apart from the drug list.

Discussion

We found an overall improvement in the knowledge and confidence scores among the HW in the study. The limitation in obstetric care capacity among Indian HW in primary and community

Table 2: Sample characteristics by study arm at pre- and post-intervention

	Control				*P* (χ^2)	Intervention				*P* (χ^2)
	Baseline (*n*=54)		Endline (*n*=55)			Baseline (*n*=64)		Endline (*n*=50)		
	n	%	*n*	%		*n*	%	*n*	%	
Received SDA training before this										
No	29	56.9	NA	NA		35	54.7	NA	NA	0.816[#]
Yes	22	43.1	NA	NA		29	45.3	NA	NA	
Downloaded SDA on phone										
No	17	32.1	2	4.0	<0.001	21	34.4	1	1.8	<0.001
Yes	36	67.9	48	96.0		40	65.6	54	98.2	
Received Safe Champion Certificate										
No	39	88.4	38	76.0	0.112	45	80.4	33	60.0	0.016
Yes	5	11.6	12	24.0		11	19.6	22	40.0	
Mean Percentage in MyLearning Platform (self-reported)	54	54.1	50	62.0	0.244[@]	64	57.7	55	89.0	<0.001[@]

[#]χ^2-test between control and intervention values at baseline, [@]*t*-test for mean values

Table 3: Subgroup difference in the knowledge scores and confidence scores-DiD estimates analyzed by the type of facility, years of experience, and age group

	Knowledge score-DiD model estimates				Confidence score-DiD model estimates			
	Treatment (β_s)	Phase (β_t)	$\beta_{(sXt)}$	Constant (β_0)	Treatment (β_s)	Phase (β_t)	$\beta_{(sXt)}$	Constant (β_0)
Facility level 2 (*n*=153)								
Estimates	1.7	3.5	0.7	29.9	0.7	3.5	-0.4	63.7
P	0.260	0.042	0.763	<0.001	0.533	0.005	0.793	<0.001
95% CI	-1.27 4.67	0.13 6.96	-3.74 5.09	27.62 32.26	-1.47 2.84	1.04 5.88	-3.60 2.75	62.05 65.36
Facility level 3 (*n*=70)								
Estimates	-6.0	-2.6	9.0	36.5	-3.7	-1.1	5.4	66.4
P	0.002	0.132	<0.001	<0.001	0.066	0.572	0.0644	<0.001
95% CI	-9.72-2.22	-6.05 0.81	3.70 14.38	33.95 38.99	-7.75 0.26	-5.02 2.80	-0.32 11.07	63.54 69.28
Years of experience <10 years (*n*=139)								
Estimates	-1.5	0.5	4.3	33.0	-0.2	1.9	2.3	64.0
P	0.308	0.737	0.045	<0.001	0.908	0.196	0.238	<0.001
95% CI	-4.47 1.42	-2.60 3.66	0.10 8.45	30.72 35.28	-2.87 2.55	-0.99 4.81	-1.55 6.17	61.88 66.12
Years of experience >10 (*n*=84)								
Estimates	0.2	2.5	1.7	31.0	-1.3	2.0	-0.1	65.3
P	0.911	0.276	0.591	<0.001	0.343	0.163	0.950	<0.001
95% CI	-3.94 4.42	-2.04 7.07	-4.58 8.00	28.03 34.06	-3.89 1.37	-0.82 4.79	-4.03 3.79	63.49 67.21
Age <35 years (*n*=110)								
Estimates	0.4	0.8	2.9	32.3	-1.0	1.5	2.9	64.0
P	0.824	0.619	0.19	<0.001	0.528	0.366	0.225	<0.001
95% CI	-2.7 3.49	-2.33 3.89	-1.50 7.49	30.04 4.64	-4.29 2.22	-1.75 4.71	-1.79 7.53	61.66 66.42
Age >35 years (*n*=113)								
Estimates	-1.5	2.3	3.0	31.8	-0.5	2.7	-0.1	65.2
P	0.409	0.285	0.285	<0.001	0.632	0.038	0.942	<0.001
95% CI	-5.18 2.12	-1.96 6.62	-2.51 8.46	29.05 4.70	-2.69 1.64	0.15 5.24	-3.37 3.13	63.53 66.87

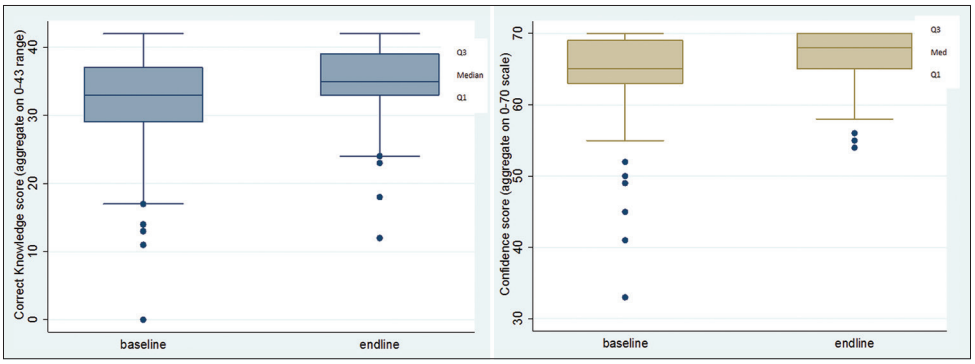

Figure 2: Knowledge and confidence score at the baseline and endline

health facilities has been frequently observed.[8,18-20] Nevertheless, competency-based training in emergency obstetric care improves clinical practices and neonatal outcomes.[21] Mentoring and training programs in India among the ANM and staff nurses are found to increase their knowledge and skills.[22-24] However, the practices are seen to decline after the intervention is over.[22,24] With the rise in public health facility deliveries in rural areas (65.3% as per National family health survey (NFHS-5)), there is an urgent need to update the skills and continue the positive outcomes of training among primary care providers and it is in this context that a self-learning tool like the SDA which is constantly at the side of the provider becomes useful. A limitation of our study was that we did not assess the impact of the competency gained on actual practice. However, considering the evidence that competency increases with significant improvements in knowledge and skills,[21] we could expect to see the same in the study facilities.

The difference in knowledge and confidence among the participants provided with periodic facilitation was higher than among those who were not provided facilitation and this is consistent with the studies that have found positive outcomes of mentoring on the skills of the health providers to handle complicated delivery.[22-24] Technical problems related to downloading, password resetting, logging in, profile set-up, and refreshing past accounts among other issues were addressed by the facilitators. It has been found that the provision of technical support to address real-time problems helps HW to utilize mobile devices effectively.[25-29] The timely resolution of

Table 4: Feedback of SDA from users of the intervention group reported on a 5-point scale at endline (*n*=55)

Internal consistency (Cronbach's alpha=0.71)	Extremely Important/ Satisfied/Agree	Important/ Satisfied/ Agree	Uncertain	Somewhat important/ Satisfied/Agree	Least important/ Satisfied/Agree
How important is the information provided in the app?	93.02	4.65	2.33	0	0
How would you rate the selection of a topic in this app?	93.02	4.65	0	0	2.33
How suitable was the knowledge level provided in the app?	83.7	16.2	0.0	0	0
How would you rate my learning in terms of the appropriateness provided and difficulty level?	69.7	30.3	0.0	0	0
Is this app easy to download?	41.8	55.8	0	0	2.3
Can the Safe Delivery App be used in all maternal and neonatal health settings?	32.56	65.1	2.3	0	0
The language used in this app is simple and easy to understand	41.86	55.8	2.3	0	0
How well the objectives of your learning were served?	51.16	41.86	0	4.6	2.3
How was your overall satisfaction level toward the Safe Delivery App?	46.51	51.2	2.3	0	0

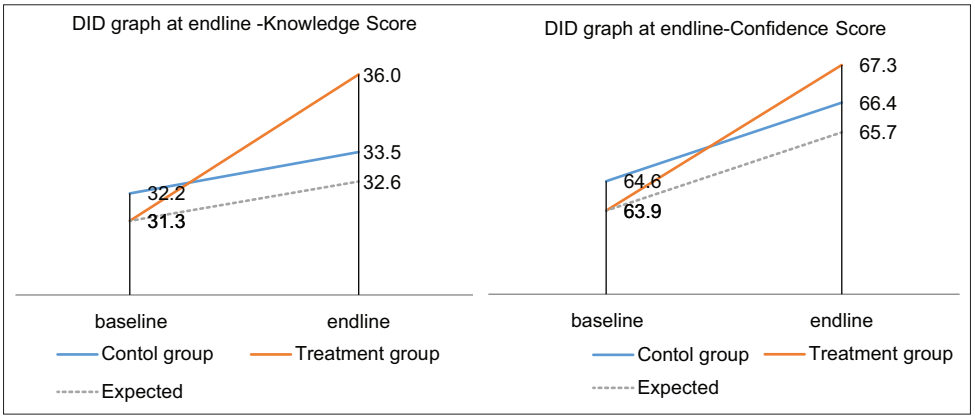

Figure 3: Mean score difference of knowledge and confidence among the intervention and control groups

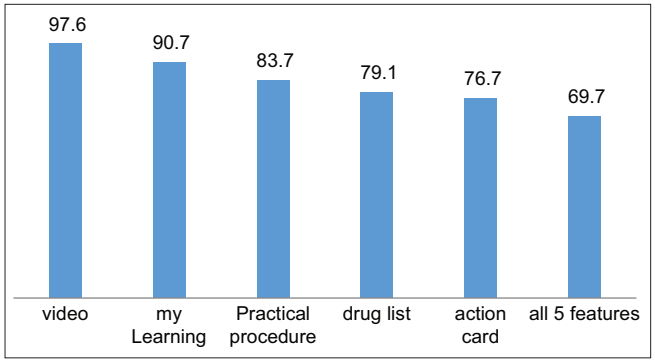

Figure 4: Features most preferred by healthcare workers (*n* = 55)

technical problems played a critical role in fostering adherence to the digital app among HW.[30] It is seen that HW often give up when mobile apps are not easy to use and they face technical problems.[26,31-34] While the SDA is easy to use, the handholding and encouragement were critical factors in utilizing the app, echoing another study among the non-specialists HW in India.[35] In qualitative interviews, HW reported that the facilitators reminded them about completing MyLearning, and encouraged them to achieve the champions' certificate, indicating that reinforcing messages about using the app was effective.

Due to the COVID-related travel restrictions, most of the facilitations in our intervention occurred telephonically which was perceived to be helpful consistent with another Indian study.[29] A recent review of HW's experience of using mHealth technology noted that having a strong technical infrastructure like network coverage and technical support is critical to the usage of mHealth applications.[36] Network coverage was not an issue in our study areas and this perhaps explains the wide use of SDA in both the control and intervention facilities at the end of the study period.

Further analysis reveals that participants from a higher facility (level 3) had greater improvement in knowledge. Higher facilities are better equipped in terms of staff and equipment which perhaps creates an enabling environment for increased motivation to learn and apply knowledge. This may be due to having better-trained nurses in higher facilities and also higher caseload which allows them to practice and learn skills as has been found in other studies.[15,37] SDA usage, in another setting, was found to rest on HW competence, availability of equipment, and frequency of births attended.[38] Moreover, HW with fewer years of experience increased their knowledge significantly, consistent with the findings from another study.[14] Perhaps HW with more years of experience were used to the routine work, and hence,

failed to imbibe the updated standards and new learnings to the same extent.

User satisfaction was high for the App. This is encouraging as the study occurred in the backward areas of Jharkhand and Uttarakhand, which are generally found to have facilities of poor capacity.[10] The video was the most seen feature and most liked by HW, consistent with the findings from other studies.[15,38] Elsewhere, visual communication was shown to have an improved effect on skills.[39]

The study has several limitations. The data collection methods had to be altered due to the pandemic which might have influenced the endline results as nobody was supervising the data collection process. A major limitation was that the facilitators were not blinded to the intervention arms which may have influenced the results. However, they were periodically supervised on the content of their facilitation which provided sufficient quality control over their communication.

In summary, the study highlights that a self-learning mHealth app is effective in increasing the capacity of the primary care providers especially when a mentor or peer facilitates the process by addressing technical challenges in using the app. While the network was not an issue, the availability of infrastructure and equipment within the facility would enhance learnings from the tool. Our study highlights the new finding that even with minimal effort, reminders and remote help with technical challenges increase utilization of mHealth tools.

Conclusion

The study findings are significant in the context of the greater focus on quality-skilled intrapartum care in the primary healthcare facilities. The SDA increases knowledge and skills among the frontline HW in the public health facilities in the districts which have historically experienced a lack of quality obstetric care. Findings from the study add to the state of knowledge on the mHealth application adoption among healthcare workers while also highlighting the role of technical support in the appropriate utilization of digital applications.

Acknowledgments

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. United Nations Inter-agency Group for Child Mortality Estimation (UN IGME) 2020. Levels and Trends of Child Mortality. Report 2019.
2. World Health Organization. Trends in maternal mortality 2000 to 2017: Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division. Geneva: World Health Organization; 2019. Licence: CC BY-NC-SA 3.0 IGO.
3. Kruk ME, Gage AD, Arsenault C, Jordan K, Leslie HH, Roder-DeWan S, *et al.* High-quality health systems in the sustainable development goals era: Time for a revolution. Lancet Glob Health 2018;6:e1196-252.
4. Sorensen BL, Rasch V, Massawe S, Nyakina J, Elsass P, Nielsen BB. Advanced Life Support in Obstetrics (ALSO) and post-partum hemorrhage: A prospective intervention study in Tanzania. Acta Obstet Gynecol Scand 2011;90:609-14.
5. Bhutta ZA, Das JK, Bahl R, Lawn JE, Salam RA, Paul VK, *et al.* Can available interventions end preventable deaths in mothers, newborn babies, and stillbirths, and at what cost?. Lancet 2014;384:347-70.
6. International Institute for Population Sciences. National Family Health Survey-5. 2019-21. Ministry of Health and Family Welfare. Government of India.
7. Liu L, Oza S, Hogan D, Perin J, Rudan I, Lawn JE, *et al.* Global, regional, and national causes of child mortality in 2000–13, with projections to inform post-2015 priorities: An updated systematic analysis. Lancet 2015;385:430-40.
8. Bossyns P, Abache R, Abdoulaye MS, Lerberghe WV. Unaffordable or cost effective? Introducing an emergency referral system in rural Niger. Trop Med Int Health 2005;10:879-87.
9. Sharma J, Leslie HH, Regan M, Nambiar D, Kruk ME. Can India's primary care facilities deliver? A cross-sectional assessment of the Indian public health system's capacity for basic delivery and newborn services. BMJ Open 2018;8:e020532.
10. Evans CL, Maine D, McCloskey L, Feeley FG, Sanghvi H. Where there is no obstetrician-increasing capacity for emergency obstetric care in rural India: An evaluation of a pilot program to train general doctors. Int J Gynecol Obstet 2009;107:277-82.
11. Florez-Arango JF, Iyengar MS, Dunn K, Zhang J Performance factors of mobile rich media job aids for community health workers. J Am Med Inform Assoc 2011;18:131-7.
12. Lee S, Chib A, Kim JN. Midwives' cell phone use and health knowledge in rural communities. J Health Commun 2011;16:1006-23.

13. Chib A, Lwin MO, Ang J, Lin H, Santoso F. Midwives and mobiles: Using ICTs to improve healthcare in Aceh Besar, Indonesia. Asian J Commun 2008;18:348-64.
14. Lund S, Boas IM, Bedesa T, Fekede W, Nielsen HS, Sørensen BL. Association between the safe delivery app and quality of care and perinatal survival in Ethiopia: A randomized clinical trial. JAMA Pediatr 2016;170:765-71.
15. Bolan NE, Sthreshley L, Ngoy B, Ledy F, Ntayingi M, Makasy D, *et al.* mLearning in the Democratic Republic of the Congo: A mixed-methods feasibility and pilot cluster randomized trial using the safe delivery App. Glob Health Sci Pract 2018;6:693-710.
16. Nishimwe A, Ibisomi L, Nyssen M, Conco DN. The effect of an mLearning application on nurses' and midwives' knowledge and skills for the management of post-partum hemorrhage and neonatal resuscitation: Pre-post intervention study. Hum Resour Health 2021;19:14.
17. Usmani S, Chhugani M, Khan M. A study to assess the effectiveness of safe delivery application for pre-service nursing students in a selected college of nursing of New Delhi. Int J Nurs Midwif Res 2019;6:22-7.
18. Brhlikova P, Jeffery P, Bhatia GP, Khurana S. Intrapartum oxytocin (mis) use in South Asia. J Health Stud 2009;2:33-50.
19. Iyengar K, Jain M, Thomas S, Dashora K, Liu W, Saini P, *et al.* Adherence to evidence based care practices for childbirth before and after a quality improvement intervention in health facilities of Rajasthan, India. BMC Pregnancy Childbirth 2014;14:270.
20. Sabde Y, Diwan V, Randive B, Chaturvedi S, Sidney K, Salazar M, *et al.* The availability of emergency obstetric care in the context of the JSY cash transfer programme in Madhya Pradesh, India. BMC Pregnancy Childbirth 2016;16:116.
21. Ameh CA, Mdegela M, White S, van den Broek N. The effectiveness of training in emergency obstetric care: A systematic literature review. Health Policy Plan 2019;34:257-70.
22. Ahmad T, Sattar K, Akram A. Medical professionalism videos on YouTube: Content exploration and appraisal of user engagement. Saudi J Biol Sci 2020;27:2287-92.
23. Bradley J, Jayanna K, Shaw S, Cunningham T, Fischer E, Mony P, *et al.* Improving the knowledge of labour and delivery nurses in India: A randomized controlled trial of mentoring and case sheets in primary care centers. BMC Health Serv Res 2017;17:14.
24. Rao KD, Srivastava S, Warren N, Mayra K, Gore A, Das A, *et al.* Where there is no nurse: An observational study of large-scale mentoring of auxiliary nurses to improve quality of care during childbirth at primary health centers in India. BMJ Open 2019;9:e027147.
25. Murray E, Burns J, May C, Finch T, O'Donnell C, Wallace P, *et al.* Why is it difficult to implement e-health initiatives? A qualitative study. Implementation Science 2011;6:1-11.
26. Rothstein JD, Jennings L, Moorthy A, Yang F, Gee L, Romano K, *et al.* Qualitative assessment of the feasibility, usability, and acceptability of a mobile client data app for community-based maternal, neonatal, and child care in rural Ghana. Int J Telemed Appl 2016;2016:2515420.
27. Garg SK, Lyles CR, Ackerman S, Handley MA, Schillinger D, Gourley G, *et al.* Qualitative analysis of programmatic initiatives to text patients with mobile devices in resource-limited health systems. BMC Med Inform Decis Mak 2016;16:16.
28. Hao WR, Hsu YH, Chen KC, Li HC, Iqbal U, Nguyen PA, *et al.* LabPush: A pilot study of providing remote clinics with laboratory results via short message service (SMS) in Swaziland, Africa - A qualitative study. Computer Methods and Programs in Biomedicine 2015;118:78-83.
29. Ilozumba O, Dieleman M, Kraamwinkel N, Belle S, Chaudoury M, Broerse JEW. "I am not telling. The mobile is telling": Factors influencing the outcomes of a community health worker mHealth intervention in India. PLoS One 2018;13:e0194927.
30. Modi D, Dholakia N, Gopalan R, Venkatraman S, Dave K, Shah S, *et al.* mHealth intervention "ImTeCHO" to improve delivery of maternal, neonatal, and child care services-A cluster-randomized trial in tribal areas of Gujarat, India. PLoS Med 2019;16:e1002939.
31. Khan NU, Rasheed S, Sharmin T, Ahmed T, Mahmood SS, Khatun F, *et al.* Experience of using mHealth to link village doctors with physicians: Lessons from Chakaria, Bangladesh. BMC Med Inform Decis Mak 2015;15:62.
32. Mwendwa P. Assessing the fit of RapidSMS for maternal and new-born health: Perspectives of community health workers in rural Rwanda. Dev Pract 2016;26:38-51.
33. Praveen D, Patel A, Raghu A, Clifford GD, Maulik PK, Mohammad Abdul A, *et al.* SMARTHealth India: Development and field evaluation of a mobile clinical decision support system for cardiovascular diseases in rural India. JMIR Mhealth Uhealth 2014;2:e54.
34. Schoen J, Mallett JW, Grossman-Kahn R, Brentani A, Kaselitz E, Heisler M. Perspectives and experiences of community health workers in Brazilian primary care centers using m-health tools in home visits with community members. Hum Resour Health 2017;15:71.
35. Sinha Deb K, Tuli A, Sood M, Chadda R, Verma R, Kumar S, *et al.* Is India ready for mental health apps (MHApps)? A quantitative-qualitative exploration of caregivers' perspective on smartphone-based solutions for managing severe mental illnesses in low resource settings. PLoS One 2018;13:e0203353.
36. Odendaal WA, Anstey Watkins J, Leon N, Goudge J, Griffiths F, Tomlinson M, *et al.* Health workers' perceptions and experiences of using mHealth technologies to deliver primary healthcare services: A qualitative evidence synthesis. Cochrane Database Syst Rev 2020;3:CD011942.
37. Creanga AA, Jiwani S, Das A, Mahapatra T, Sonthalia S, Gore A, *et al.* Using a mobile nurse mentoring and training program to address a health workforce capacity crisis in Bihar, India: Impact on essential intrapartum and newborn care practices. J Glob Health 2020;10:021009.
38. Thomsen CF, Barrie AMF, Boas IM, Lund S, Sørensen BL, Oljira FG, *et al.* Health workers' experiences with the Safe Delivery App in West Wollega Zone, Ethiopia: A qualitative study. Reprod Health 2019;16:50.
39. Nilsson C, Sørensen BL, Sørensen JL. Comparing hands-on and video training for postpartum hemorrhage management. Acta Obstet Gynecol Scand 2014;93:517-20.

Appendix A

सुरक्षित प्रसव APP-जानकारी सर्वेक्षण

DISTRICT/जिला_____

_____

BLOCK/ब्लॉक _____

NAME OF THE HEALTH FACILITY/स्वास्थ्य सुविधा केन्द्र का नाम _____

LEVEL OF THE HEALTH FACILITY/स्वास्थ्य सुविधा केन्द्र का प्रकार _____

ASSESSMENT DATE/मूल्यांकन की तिथि/तिथि माह वर्ष □ □ □ □

Q.No.	QUESTIONS AND FILTERS	CODING CATEGORIES	REMARKS
	Section A: व्यक्तिगत जानकारी/Personal Information		
101	Name of the ANM/STAFF NURSE /ए.एन.एम./स्टाफ नर्स का नाम	_____ _____	
102	Mobile Number of the ANM/SN/ए.एन.एम./स्टाफ नर्स का मोबाइल नंबर/	□ □ □ □ □ □	
103	Age of the ANM/SN /ए.एन.एम./स्टाफ नर्स की आयु/	पूर्ण वर्षों में □ □	
104	Years of experience of the ANM/SN/ ए.एन.एम./स्टाफ नर्स को कितने वर्षों का अनुभव है?	COMPLETED YEARS /पूर्ण वर्षों मे □ □	
105	Training Status of ANM/SN (please tick the training) ए.एन.एम./स्टाफ नर्स द्वारा प्राप्त की गयी ट्रेनिंग (कृपया प्राप्त की गयी ट्रेनिंग के आगे tick करे)	SBA □ Dakshata/Care around birth □ NSSK □ Skills lab □	
106	Please enter details of the most recent training /हाल ही में की गयी ट्रेनिंग का विवरण लिखें	Name of Training/ट्रेनिंग का नाम Date of Training/ट्रेनिंग की तारीख	
107	Have you received Safe Delivery App orientation before this? क्या इससे पहले आपकी सेफ डिलिवरी एप की ओरीएंटेशन हुई है?		
108	If the answer is yes, please mention date /अगर जवाब हाँ है, तो तारीख लिखि		
109	Do you have Safe Delivery App in your phone? /क्या आपके फोन में सेफ डिलीवरी एप है?		
110	Have you done the registration on MyLearning platform? क्या आपने माई लर्निंग प्लेटफार्म पर रजिस्ट्रेशन किया है?		
110	If answer is yes, mention the percentage in MyLearning platform अगर जवाब हाँ है, तो कितने प्रतिशत किया है?		
111	Have you received the Safe Delivery Champion Certificate? क्या आपने सेफ डिलीवरी चैंपियन प्रमाण पत्र हासिल किया है?		
112	If answer is yes, please mention the date अगर जवाब हाँ है, तो तारीख लिखि		

Appendix B

B SAFE DELIVERY APP - CONFIDENCE LEVEL TEST

Imagine yourself in one of the situations listed below.
On a scale from 1 to 5, please indicate how confident you feel in managing these different situations. There are also response options if you are not permitted to manage the complication or have not been in the situation
कल्पना करें की आप नीचे लखिी गयी परसि्थतियो में है।
1-5 के पैमाने पर ये बताये, की आप इन अलग अलग परसि्थयिों का प्रबंधन करते समय कतिना आश्वस्त महसूस करते है । अगर आपको ऐसे परसि्थतियो का प्रबंधन करने की अनुमत निहीं है या आपने कभी ऐसी परसि्थति निहीं देखी है तो उसका भी वकिल्प चुन सकते है।
कृपया करके ईमादारी से जवाब दे ।

Panic - घबराहट
Scared- डर जाते हैं
Neutral - उदासीन
Coping - परसि्तथि सँभालने की पूरी कोशशि करते है
Confident - आत्मवशि्वास के साथ संभाल सकते है

99. Not permitted to manage - परसि्थतियो का प्रबंधन करने की अनुमत निहीं है
0. Haven't been in the situation - आपने कभी ऐसी परसि्थति निहीं देखी है

B SAFE DELIVERY APP - CONFIDENCE LEVEL TEST

प्रसव की तीसरी अवस्था का प्रबंधन/AMTSL -

How confident are you in providing active management of third stage of labor (AMTSL)?/आप प्रसव की तीसरी अवस्था का प्रबंधन करने में कतिने आश्वस्त है? _____
How confident are you in giving uterotonic drugs after delivery?
प्रसव के बाद यूट्रोटॉनकि देने में आप कतिने आश्वस्त है? _____
How confident are you in the delivery of the placenta?
प्लेसेंटा की डलिीवरी करवाने में आप कतिने आश्वस्त है? _____
How confident are you in assessing the newborn?
नवजात का आकलन करने में आप कतिने आश्वस्त है? _____
How confident are you in examining the placenta?
प्लेसेंटा का परकि्षण करने में आप कतिने आश्वस्त है? _____

नवजात का Resuscitation/Neonatal Resuscitation

How confident are you in performing neonatal resuscitation?
/नवजात का resuscitation करने में आप कतिने आश्वस्त है? _____
How confident are you in performing neonatal resuscitation?
गाढ़े मयुकोनयिम के साथ पैदा हुए नवजात का प्रबंधन करने में आप कतिने आश्वस्त है?
How confident are you in providing observational care after resuscitation?
resuscitation के बाद नवजात का अवलोकन एवं देखभाल करने में आप कतिने आश्वस्त है? ____
How confident are you in when to stop the resuscitation?
resuscitation कब रोकना है इसे लेकर आप कतिने आश्वस्त है? _____

PPH- पीपीएच

How confident are you in performing bimanual compression?
बाई-मैन्युअल कम्प्रेशन करने में आप कतिने आश्वस्त है? _____
How confident are you in administering uterotonic drugs?
यूट्रोटॉनकि देने में आप कतिने आश्वस्त है? ----------
How confident are you in removing retained placental tissue?
प्लेसेंटा के बचे हुए हसि्सों को नकिालने में आप कतिने आश्वस्त है? _____
How confident are you in identifying the location and the degree of a perineal trauma?
perineal के ट्रॉमा की जगह और डगि्री की पहचान करने में आप कतिने आश्वस्त है? _____
How confident are you in treating damage to the perineal muscles?
perineal muscles के टयिर का प्रबंधन करने में आप कतिने आश्वस्त है? _____

Safe Delivery APP-जानकारी सवेणि		
Section C: ज्ञान संबंधी प्रश्न		
	नोट: नरि्देशों को तरिछे अक्षरों में लखिा गया है| सही उत्तर पर टकि करें और इसके आगे कॉलम में लखिें।	
	ए.एम.टी.एस.एल/**AMTSL**	
201	When should oxytocin be given? Please select only one answer. ऑक्सीटोसनि कब देना चाहएि? कृपया केवल एक वकिल्प का चयन करें	Within 1 min following the birth of the newborn जन्म के 1 मनिट के भीतर.A Within 5 min following the birth of the newborn after ruling out second baby जन्म के 5 मनिट बाद एवं दूसरे बच्चे की जाँच के बाद. B Within 3 min following the birth of the newborn after ruling out a second baby जन्म के 10 मनिट बाद एवं दूसरे बच्चे की जाँच के बाद. C Within 1 min following the birth of the newborn after ruling out second baby जन्म के 1 मनिट के भीतर एवं दूसरे बच्चे की जाँच के बाद. D
202	How much oxytocin should be given? Please select only one answer. कतिना ऑक्सीटोसनि दयिा जाना चाहएि कृपया केवल एक वकिल्प का चयन करें	Oxytocin 10 IU intravenous (IV) ऑक्सीटोसनि 10 आईयू इन्ट्रा वीनस (IV). A Oxytocin 10 IU intramuscular (IM) ऑक्सीटोसनि 10 आईयू इन्ट्रा मस्कुलर (आईएम). B Oxytocin 10 IU intravenous bolus ऑक्सीटोसनि 10 IU इन्ट्रा वीनस बोलस. C Oxytocin 10 IU deep intramuscular ऑक्सीटोसनि 10 IU गहन/डीप इन्ट्रा मस्कुलरI. D
203	What should be done if there is no oxytocin to administer as a part of AMTSL? Please select only one answer. यदि ए.एम.टी.एस.एल. के लिए ऑक्सीटोसनि लगाने के लिए उपलब्ध नहीं है तो क्या करना चाहएि? कृपया केवल एक वकिल्प का चयन करें	Give 600 mcg of misoprostol sub-lingual जीभ के नीचे 600 माइक्रोग्राम मीसोप्रोस्टोल देना.A Give 600 mcg of misoprostol orally मुँह द्वारा 600 माइक्रोग्राम मीसोप्रोस्टोल देना.B Give 800 mcg of misoprostol orally मुँह द्वारा 800 माइक्रोग्राम मीसोप्रोस्टोल देना. C Give 800 mcg of misoprostol sub-lingual जीभ के नीचे 800 माइक्रोग्राम मीसोप्रोस्टोल देना. D
204	What do you look for when you examine the placenta? Select all answers that apply. आप प्लेसेंटा परीक्षण में क्या देखते है? उन सभी वकिल्पों का चयन करें जो लागू हो	That membranes are intact यह देखना की झलि्ली (मेमब्रेन) लगा है या नहीं A That the umbilical cord is intact and properly attached to the placenta यह देखना कि गर्भनाल पूर्ण हो और प्लेसेंटा से अच्छी तरह से लगा हो B No missing cotyledons on the maternal surface … देखना कि गर्भाशय की सतह पर कोई ऊतक न छूटा हो C No examination required कसिी तरह के परीक्षण की आवश्यकता नहीं है …… D
205	How do you perform controlled cord traction? Select one answer. नयिंत्रति कॉर्ड कर्षण (कंट्रोल्ड कॉर्ड ट्रैक्शन) कैसे करते हैं? कृपया केवल एक वकिल्प का चयन करें	Apply counter traction on the cord downward and forward with traction on the pubic bone (uterus) upward कॉर्ड पर ट्रैक्शन नीचे की ओर लागू करें और प्यूबकि बोन (गर्भाशय) पर ऊपर की ओर ट्रैक्शन लगाए. A Apply counter traction on cord upward and forward with traction on the pubic bone (uterus) backward कॉर्ड पर काउंटर ट्रैक्शन को ऊपर की तरफ लगाएं और पीछे की तरफ प्यूबकि बोन (गर्भाशय) पर ट्रैक्शन के साथ आगे की ओर लगाए.B At the time of uterine contraction, apply traction on cord downward and forward with counter traction on the pubic bone (uterus) upward यूटेरस के संकुचन के समय,कॉर्ड पर ट्रैक्शन ऊपर की ओर लागू करें और प्यूबकि बोन (गर्भाशय) पर काउंटर ट्रैक्शन के साथ आगे की ओर.C At the time of uterine contraction, apply traction on cord upward and forward with counter traction on the pubic bone (uterus) backward यूटेरस के संकुचन के समय, कॉर्ड पर ट्रैक्शन को ऊपर की तरफ लागू करें और प्यूबकि बोन (गर्भाशय) पर पीछे के ट्रैक्शन के साथ आगे की ओर.D
206	What are the benefits of early initiation of breastfeeding for mother and newborn? Select all answers that apply. माँ और नवजात शशि के लिए प्रारंभकि स्तनपान के क्या लाभ हैं उन सभी वकिल्पों का चयन करें जो लागू हों	It strengthens the newborn immune system and provides nutrition यह नवजात प्रतरिक्षा प्रणाली को मजबूत करता है और पोषण प्रदान करता है.A It initiates breast milk यह स्तन से दूध की शुरुआत करता है. B Keeps the baby warm यह नवजात को गर्म रखता है C It helps the uterus to contract यह गर्भाशय को संकुचन करने में मदद करता है.D

207	How should oxytocin be stored? Select one answer ऑक्सीटोसनि को कैसे संग्रहति कयिा जाना चाहएि? कृपया केवल एक वकिल्प का चयन करें	Between -5 and -2°C -5 से -2 डग्रिी सेल्सयिस के बीच.A Between 2 and 8°C 2 और 8 डग्रिी सेल्सयिस के बीच.B Between 25 and 30°C 25-30 डग्रिी सेल्सयिस के बीच.C Between 10 and 25°C 10-25 डग्रिी सेल्सयिस के बीच.D
	मातृक जटलिताओं का प्रबंधन/MANAGEMENT OF MATERNAL COMPLICATIONS	
	प्रसव पश्चात् रक्तप्रवाह/POST-PARTUM HEMMORHAGE	
208	What are the causes of post-partum bleeding? Select all answers that apply प्रसव बाद रक्तप्रवाह के क्या कारण है? उन सभी वकिल्पों का चयन करें जो लागू हों	A loss of tone in the uterine musculature युटेरनि मुस्कुलेचर के खचिाव ख़त्म हो जाने के कारण. A Trauma to the birth canal like tears to the cervix, the vagina, or the perineum जन्म वाले रास्ते पर आघात जैसे सर्वक्स, योनयिा पेरनियिम में खरोंच या चीरा लग जाने सेB Placental tissue retained in the uterus गर्भाशय के अन्दर प्लेसेंटल टशिू के छूट जाने से C
209	Which drug should not be given if the woman has hypertension? Please select only one answer. अगर महलिा को उच्च रक्त चाप हो तो इनमें से कौन सी दवाई नहीं देनी चाहएि? कृपया केवल एक वकिल्प का चयन करें	15- Methyl prostaglandin F2-alpha/carboprons 15- मथिाइल प्रोस्टाग्लैंडीन ऍफ़ 2 - अल्फा/कार्बोपर्सों A Misoprostol मसिोप्रोस्टोल B Ergometrine/methergin एरगोमेट्रनि/मेठेरगनि C Oxytocin ओक्सटिोसनि D
210	How do you correctly position a bleeding woman during PPH? Please select only one answer. जसि महलिा को पीपीएच के दौरान रक्त् स्राव हो रहा हो उसको सही तरीके से कैसे रखते है? कृपया केवल एक वकिल्प का चयन करें	On the back, legs up, and head flat so that blood flows toward head पीठ के बल, पैर ऊपर,सरि सपाट जसिसे खून सरि की तरफ़ जाए.A On the back, legs down, and head flat so that blood flows toward head पीठ के बल, पैर नीचे,सरि सपाट जसिसे खून सरि की तरफ़ जाए. B On the back, legs down, and head up so that blood flows toward head पीठ के बल, पैर नीचे,सरि ऊपर जसिसेखून सरि की तरफ़ जाए …… C On the back, legs up, and head up so that blood flows toward head पीठ के बल, पैर ऊपर,सरि ऊपर जसिसे खून सरि की तरफ़ जाए…… D
211	What are the contraindications for ergometrine IV Select all answers that apply एर्गोमेट्रनि इन्ट्रा-वीनस के लएि कांट्राइंडकिशन क्या हैं? उन सभी वकिल्पों का चयन करें जो लागू हों	Hypertension उच्चरक्तचाप.A Heart disease दलि की बीमारी., B Allergy to steroids स्टेरयिोड्स से एलर्जी. C Diabetes मधुमेह.D
212	What is the dose for misoprostol as part of PPH management? Please select only one answer पीपीएच में मेसोप्रोस्टोल की खुराक क्या है? कृपया केवल एक वकिल्प का चयन करें	600 mg sub-lingual जीभ के नीचे 600 माइक्रोग्राम मीसोप्रोस्टोल देना.A 800 mg sub-lingual जीभ के नीचे 800 माइक्रोग्राम मीसोप्रोस्टोल देना.B 1600 mg sub-lingual जीभ के नीचे 1600 माइक्रोग्राम मीसोप्रोस्टोल देना. C 1200 mg sub-lingual जीभ के नीचे 1200 माइक्रोग्राम मीसोप्रोस्टोल देना.D
213	What are the interventions involved in PPH management? Select all answers that apply. पीपीएच प्रबंधन में क्या शामलि हैं उन सभी वकिल्पों का चयन करें जो लागू हों	Uterus massage गर्भाशय की मालशि. A Condom balloon tamponade कंडोम बलून टैम्पोनैड. B Bimanual compression बाई मैन्यूअल कम्प्रेशन. C Uterotonic drug यूट्रोटॉनकि ड्रग. D
214	What is done in moderate bleeding management of PPH? Select all answers that apply. पीपीएच के मध्यम रक्तस्राव प्रबंधन में क्या कयिा जाता है? उन सभी वकिल्पों का चयन करें जो लागू हों	Check vital signs वाइटल साइन देखना. A Empty the bladder मूत्राशय को खाली.करना.B Uterotonic drug यूट्रोटॉनकि ड्रग.C IV fluids इन्ट्रा-वीनस फ्लूइड.D

नवजात शशि का पुनर्जीवन/NEONATAL RESUSCITATION

215	The "first golden minute" implies that all newborns should do the following by 1 min of age. Select all answers that apply. पहले गोल्डन मनिट का मतलब सभी नवजात को एक मनिट के अन्दर नम्निलखिति काम करना चाहएि? उन सभी वकिल्पों का चयन करें जो लागू हों	Spontaneous breathing on their own स्वयं से साँस लेना A Start breastfeeding स्तनपान शुरू करना B If not breathing, be ventilated with a bag and a mask यदि साँस नहीं लेता तो बैग और मास्क से वेंटलिट करना.C
216	Immediately after birth, you find that the newborn is not breathing well. What do you do next? Please select all answers that apply. जन्म के तुरंत बाद आप को पता चला की बच्चा अच्छी तरह साँस नहीं ले रहा है| आप आगे क्या करेंगे? उन सभी वकिल्पों का चयन करें जो लागू हों	Suction the baby's mouth and nose बच्चे के नाक और मुह में सक्शन करेंगे A Stimulate the baby by drying and rubbing the back with a dry cloth after suction of mouth and nose मुंह और नाक से सक्शन के बाद सूखे कपड़े से पीठ को रगड़कर और सुखाकर बच्चे को स्टमि्युलेट करना.B Place baby under radiant warmer बच्चे को रेडयिंट वार्मर के नीचे रखेंगे.C
217	How is ventilation initiated in a newborn who is not crying? Please select only one answer नवजात अगर नहीं रो रहा है तो, वेंटलिशन की प्रक्रयिा कैसे शुरू करेंगे? कृपया केवल एक वकिल्प का चयन करें	The first five slow ventilations in neonatal resuscitation—each breath is sustained for 2-3 s while the chest rises नीओनेटल resusciatation में पहले पांच धीमा वेंटलिशन-प्रत्येक ब्रेथ 2 से 3 सेकण्ड रुकना चाहएि जब सीना फैलता है.A Ventilating the newborn with at a rate of 80 breaths per minute—with each breath you say "breathe-2-3" बच्चे को वेंटलिशन 80 साँस/मनिट की दर से-प्रत्येक साँस देते समय "ब्रेथ -2-3" बोलना/ B The first spontaneous breaths the newborn takes unassisted on its own पहला स्वतः साँस नवजात बनिा कसिी सहायता से अपने आप ले लेता है.C
218	How many ventilation breaths should be given per minute? Please select only one answer. प्रतमि मनिट कतिनी वेंटलिशन ब्रेथ देनी चाहएि? कृपया केवल एक वकिल्प का चयन करें	5-10 breaths per min 5-10 ब्रेथ प्रतमि मनिट A 20-30 breaths per min 20-30 ब्रेथ प्रतमि मनिट. B 40-60 breaths per min 40-60 ब्रेथ प्रतमि मनिट.C
219	After ventilation, the heart rate is more than 100 bpm and breathing is regular. What do you do now? Please select all answers that apply. वेंटलिशन के बाद हृरदय गतदिर 100 बीपीएम से ज्यादा है और साँस रेगुलर है तो क्या करना चाहएि? उन सभी वकिल्पों का चयन करें जो लागू हों	Breast feeding within 1 h जन्म के एक घंटे के भीतर स्तनपान शुरू करवाए A Keep the newborn in skin to skin contact with the mother माँ एवं नवजात को त्वचा से त्वचा की स्थतिमिें रखना B Monitor neonate for HR, temp, breathing and color हार्ट रेट, टेंपरेचर, ब्रीदगि और कलर के लएि नवजात को मॉनटिर करे.C
220	What do you do if the chest is not rising at each ventilation? Select all answers that apply. यदहिर वेंटलिशन में सीना नहीं फैलता तो आप क्या करते है? उन सभी वकिल्पों का चयन करें जो लागू हों	Reposition the head सरि को पुनः सही तरीके से रखना (रेपोजशिन करना) A Reapply the mask to form a better seal बेहतर सील बनाने के लएि मास्क को फरि से लगाना ……B Clear the mouth and nose for any secretions कसिी भी स्राव के लएि मुँह और नाक साफ करना. C Give chest compressions चेस्ट कम्प्रेशन देना. D
221	When should you stop the resuscitation? Select all answers that apply रेससटिशन कब बंद कर देना चाहएि? उन सभी वकिल्पों का चयन करें जो लागू हों	If the newborn has a heart rate below 100 bpm for more than 15 min यदनिवजात का हृरदय गतदिर 15 मनिट से अधकि समय तक 100 bpm से नीचे रहता है.A If the newborn is not breathing and has no pulse after 5 min of ventilation जब 5 मनिट वेंटलिशन देने के बाद भी यदनिवजात साँस नहीं लेता और नाड़ी नहीं चलती.B If the newborn is not breathing and has no pulse after 10 minutes of effective ventilation जब 10 मनिट प्रभावी वेंटलिशन देने के बाद भी यदनिवजात साँस नहीं लेता और पल्स नहीं चलती.C If the newborn has a heart rate below 60 bpm for more than 20 min यदनिवजात की हृरदय गतदिर 20 मनिट से अधकि समय तक 60 बीपीएम से नीचे हो.D

Appendix 1: Knowledge of AMTSL, PPH, and newborn resuscitation at baseline and endline

Knowledge score analysis

Question no.	Question	*n*	Maximum correct score	Baseline	Endline	% point change
Q201	1. When should oxytocin be given? Please select only one answer.	223	1	57.6	79.1	21.420
Q202	2. How much oxytocin should be given? Please select only one answer.	223	1	86.4	88.6	2.130
Q203	3. What should be done if there is no oxytocin to administer as a part of AMTSL?	222	1	49.2	62.5	13.350
Q204	4. What do you look for when you examine the placenta? Select all answers that apply.	223	3	59.3	71.4	12.110
Q205	5. How do you perform controlled cord traction? Select one answer.	223	1	19.5	41.9	22.410
Q206	6. What are the benefits of early initiation of breastfeeding for mother and newborn? Select all answers that apply.	223	4	54.2	65.7	11.470
Q207	7. How should oxytocin be stored? Select one answer/	222	1	76.3	93.3	17.000
Q208	8. What are the causes of post-partum bleeding? Select all answers that apply	223	3	65.3	65.7	0.460
Q209	9. Which drug should not be given if the woman has hypertension? Please select only one answer.	215	1	74.4	82.7	8.290
Q210	10. How do you correctly position a bleeding woman during PPH? Please select only one answer.	223	1	86.4	88.6	2.130
Q211	11. What are the contraindications for ergometrine IV. Select all answers that apply.	216	2	26.5	47.5	20.970
Q212	12. What is the dose for misoprostol as part of PPH management? Please select only one answer.	222	1	49.6	73.3	23.760
Q213	13. What are the interventions involved in PPH management? Select all answers that apply.	223	4	55.9	81.0	25.020
Q214	14. What is done in moderate bleeding management of PPH? Select all answers that apply.	223	4	61.9	81.9	20.040
Q215	15. The "first golden minute" implies that all newborns should do the following by 1 min of age. Select all answers that apply.	223	2	54.2	61.9	7.660
Q216	16. Immediately after birth, you find that the newborn is not breathing well. What do you do next? Please select all answers that apply.	223	3	55.1	70.5	15.400
Q217	17. How is ventilation initiated in a newborn who is not crying? Please select only one answer.	220	1	67.8	17.7	-50.150
Q218	18. How many ventilation breaths should be given per minute? Please select only one answer.	221	1	54.2	65.1	10.810
Q219	19. After ventilation, the heart rate is more than 100 bpm and the breathing is regular. What do you do now? Please select all answers that apply.	222	3	72.9	86.5	13.660
Q220	20. What do you do if the chest is not rising at each ventilation? Select all answers that apply.	222	3	50.9	49.0	-1.810
Q221	21. When should you stop the resuscitation? Select all answers that apply.	220	2	33.3	30.1	-3.230
	Overall score (mean)	223	43	31.7	34.5	2.745

Appendix 2: Confidence level of performing AMTSL, PPH management, and neonatal resuscitation

	Mean confidence score (5-point scale)	Baseline	Endline	*P*	Baseline	Endline
AMTSL	1. How confident are you in providing active management of the third stage of labor (AMTSL)?	4.8	4.8	0.898	24.1	24.2
	2. How confident are you in giving uterotonic drugs after delivery?	4.9	4.9	0.683		
	3 How confident are you in the delivery of the placenta?	4.9	4.9	0.413		
	4. How confident are you in assessing the newborn?	4.8	4.8	0.363		
	5. How confident are you in examining the placenta?	4.9	4.9	0.155		
Resuscitation/ Neonatal Resuscitation	1. How confident are you in performing neonatal resuscitation?	4.5	4.7	0.014	18.0	18.9
	2. How confident are you in performing neonatal resuscitation?	4.5	4.7	0.026		
	3. How confident are you in providing observational care after resuscitation?	4.7	4.8	0.206		
	4. How confident are you in when to stop the resuscitation?	4.6	4.8	0.027		
PPH	1. How confident are you in performing bimanual compression?	4.1	4.4	0.011	22.1	23.7
	2. How confident are you in administering uterotonic drugs?	4.8	4.9	0.073		
	3. How confident are you in removing retained placental tissue?	4.6	4.8	0.001		
	4. How confident are you in identifying the location and the degree of a perineal trauma?	4.3	4.8	0.000		
	5. How confident are you in treating damage to the perineal muscles?	4.6	4.8	0.007		
	Overall (mean score)	64.2	66.9	0.000		