

Gizachew Tadele Tiruneh, Ali Mehryar Karim, Bantalem Yeshanew Yihun, Bizuhan Gelaw Birhanu, Agazi Amaha, Bereket Mathiwos, Biruk Tensou Tessema, Abera Workneh Wanboru, Wuleta Aklilu Betemariam. *Ethiop Med J*, 2019, Supp. 3

ORIGINAL ARTICLE

EFFECTIVENESS OF SUPERVISION ON THE CONSISTENCY OF NEONATAL SEPSIS MANAGEMENT SKILLS OF HEALTH EXTENSION WORKERS

Gizachew Tadele Tiruneh, MPH^{1*}, Ali Mehryar Karim, PhD², Bantalem Yeshanew Yihun, MSc¹, Bizuhan Gelaw Birhanu, PhD³, Agazi Amaha, MSc³, Bereket Mathiwos, MSc⁴, Biruk Tensou Tessema, MSc⁵, Abera Workneh Wanboru, MPH¹, Wuleta Aklilu Betemariam, MPH¹

ABSTRACT

Introduction: Ethiopia has implemented community-based neonatal sepsis management as one strategy to reduce its persistently high neonatal mortality rate since 2012. The key strategies to maintain the quality of community-based management of neonatal sepsis are training, supportive supervision, and woreda-level performance review.

Objectives: Examine the effects of supervision visits provided to health posts on the consistency of neonatal sepsis management skills of health extension workers in Ethiopia.

Methods: The study domain was limited to 6,416 health posts in 269 woredas of Ethiopia. Longitudinal program monitoring data captured from registers between January 2014 and June 2016 was used for this study. The health post-level repeated measures were accounted for using random effects multiple logistic regression models.

Results: All health posts (6,416) received at least one supportive supervision visit, 20% (1,289) received two, and 5% (301) received more than two visits. The consistency of neonatal sepsis management was 71%, 76%, and 84% during the first, second, and third supervision visits, respectively. The effects of supportive supervision that were observed between the first and third rounds of supervisory visits were statistically significant.

Conclusion: The findings of this study suggest that supportive supervision visits were an effective intervention in improving the consistency of skills of neonatal sepsis management. At least three rounds of supervision are needed to ensure the optimum skills of management of neonatal sepsis at the community level. In the Ethiopian context, policymakers and program planners should make additional investments to sustain the effort of supportive supervision of the community-based newborn care.

Keywords: clinical mentoring, community-based neonatal sepsis management, Ethiopia, health extension program, supportive supervision.

INTRODUCTION

Community-based management of common childhood illnesses is one of the child survival initiatives that has been implemented at the community level since 2010 in Ethiopia (1). However, the utilization of community-based integrated community case management (iCCM) service for newborns and young infants was low. The introduction of community-based newborn care (CBNC) was found to be imperative to improve the survival of newborns.

The Ministry of Health incorporated the CBNC package within the iCCM platform of the Health Extension Program (HEP) in 2012. This includes incorporating a newborn care package along with the continuum of maternal, newborn, and child healthcare and management of neonatal sepsis (2).

Competency-based training, prompt post-training follow-up, continued coaching through regular supportive supervision, and woreda-level performance review and clinical mentoring meetings (PRCMMs) are key implementation strategies specified in national CBNC plans (2) to improve and maintain the quality of community-based management of neonatal sepsis. However, the frequency of supportive supervision varied across health posts and over time. Moreover, most of the evidence available on the effect of supportive supervision on the performance of health workers pertains to facility-based integrated management of neonatal and childhood illnesses (IMNCI) and iCCM of common childhood illnesses. There is no evidence concerning the effectiveness of supervision on the consistency of neonatal sepsis management skills of Health Extension Workers (HEWs).

¹JSI Research & Training Institute, Inc., The Last Ten Kilometers (L10K) Project, Addis Ababa, Ethiopia.

²Bill & Melinda Gates Foundation, Addis Ababa, Ethiopia. ³UNICEF, Addis Ababa, Ethiopia

⁴EngenderHealth, Addis Ababa, Ethiopia. ⁵Creative Associates International, Addis Ababa, Ethiopia

* Email addresses of corresponding author: gizt121@gmail.com

Thus, this study examines the effects of supportive supervision on the consistency of neonatal sepsis management skills of the HEWs.

METHODS

Study areas and sample sizes

The study domain was limited to 6,416 health posts in 269 woredas in Amhara, Oromia, Southern Nations, Nationalities, and People's Region (SNNPR), and Tigray regions covering about 33 million people supported by the Last Ten Kilometers (L10K) Project of the JSI Research and Training Institute and Save the Children International (SCI) Ethiopia. The unit of analysis was the supportive supervision visits carried out in these health posts. A total of 8,006 supportive supervision visits to the health posts were analyzed during the 30-month review period (January 2014–June 2016).

Intervention

A competency-based, four-day CBNC clinical training was provided to all HEWs in the intervention areas to enable them to provide case management of neonatal infections at the community level. Most HEWs had been providing iCCM services. Supportive supervisions visits were provided to their health posts and PRCMMs were held at the woreda level to further enhance their skills and to motivate them.

A national CBNC register was introduced at health posts to serve as a checklist for HEWs to manage sick neonates. The register contains patient demographic data, clinical signs, and columns for classifications and treatments provided to patients. HEWs manage sick neonates using the national CBNC algorithm. They then record the classifications and treatments provided to sick neonates in the register.

To monitor the proper implementation of CBNC strategies, CBNC staff from partner organizations and health center and/or woreda health staff carry out supportive supervisory visits on a quarterly basis to health posts using standard checklists. The primary purpose of the supportive supervision was to reinforce the skills and positive attitude of HEWs and to motivate them to initiate management of neonatal sepsis through mentorship and supervision. During supervision, supervisors reviewed case registers for completeness and consistency between recorded signs/symptoms, classification, and treatment against the CBNC management protocol using paper-based checklists. Also, supervisors looked at the availability of drugs and supplies, reviewed performance related to mobilization of communities and to delivery of key maternal and newborn health services, assessed the knowledge of HEWs, and provided feedback based on any gaps identified.

Community-based newborn care partner staff and woreda officials facilitated the two-day PRCMMs bi-annually at woreda level involving the staff of the woreda health office, health center care providers, and HEWs to reinforce the skills of HEWs and to address service utilization challenges. During PRCMMs, the HEWs from all the kebeles in a woreda met together with their registers. On the first day, facilitators abstracted service statistics from case record registers, reviewed case records for completeness and consistency between recorded signs/symptoms, classification, and treatment against the CBNC management protocol with HEWs, and discussed issues related to consistency of case management and utilization of services. On the second day, clinical practice was carried out for HEWs in a health facility and feedback was provided to HEWs by facilitators.

Study of the intervention and data collection

The data abstracted during the supportive supervision and woreda-level meetings were entered into district health information software (DHIS2), a public-domain, web-based database customized for local use, for further presentation and analysis. A secondary analysis was carried out using these longitudinal data from January 2014 to June 2016 obtained from 269 woredas.

Study variables and their operational definitions

The independent variables of interest were the frequency of supportive supervision and the number of woreda-level performance review and clinical mentoring meetings provided to HEWs. The outcome variables were the consistency of neonatal sepsis management skills of HEWs. The consistency of sepsis management was defined by comparing the recorded classification, treatment including correct dose, duration, and frequency, and follow-up of neonatal sepsis cases according to the national CBNC protocol. A health post was considered to provide consistent case management for sepsis if 100% of the cases assessed were consistently classified, treated, and followed-up within two days of initiating treatment.

Data analysis

Monitoring data captured from case record registers in health posts between January 2014 and June 2016 were used for this study. Data were analyzed for descriptive and inferential statistics using Stata version 14.2 (3). To assess the effect of woreda meetings on the effect of consistency of sepsis management skills of HEWs, the PRCMM database for each of the woredas was combined with the supportive supervision database. In this case, the data from health posts that received PRCMMs before they received supportive supervision visits were excluded as these events could not be combined with the supportive supervision database.

The health post-level repeated measures were accounted for using random effects multiple logistic regression models. The within-woreda variation of the consistency of case management across the observation quarters and across health posts was assumed to be random and uncorrelated with the predictor variables included in the model. We ran random-effects models with observation quarters, regions, and implementing partners as fixed factors to assess the net effect of the supportive supervision and PRCMMs provided to health posts on the consistency of neonatal sepsis management skills of HEWs. In the regression analysis, we excluded the first observation from the quarter of 2014 due to a lack of variability in the number of supervision visits because, at that time, the health posts were receiving the first round of supervision visits (see Table 2). The goodness-of-fit of the regression models was estimated using Wald statistics to see whether all the coefficients in the model differed from zero, with all results at <5% alpha level considered significant. The measures of associations were presented as odds ratios (ORs) with their 95% confidence intervals (95% CIs).

Ethical considerations: Confidentiality of the data were guaranteed for the registers reviewed and the anonymity of the sick neonates and HEWs were preserved. Moreover, all personal identifiers were removed during data entry into DHIS2 and analysis.

RESULTS

Distribution of the supportive supervision visits

Overall, 8,006 supportive supervision visits were car-

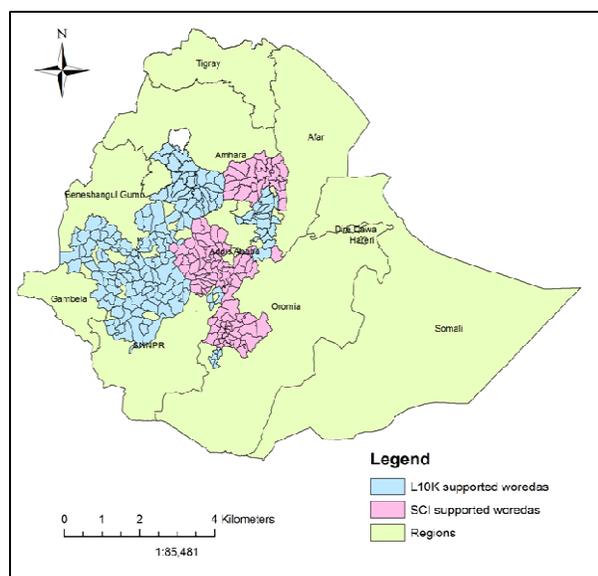


Figure 1: Map showing the study woredas in the four regions of Ethiopia

Of these, all health posts received at least one supportive supervision visit, 20% (1,289) received two, and 5% (301) received more than two visits. The number of second and third supervision visits increased over observation periods (Table 1 and Figure 2). About a quarter (26%) of health posts participated in the woreda level review meetings.

In 17% (1,336) of visit events at 942 health posts that managed sepsis cases, supervisors reviewed neonatal sepsis cases for consistency of correct classification, treatment, and follow-up to coach HEWs. On the other hand, in 14% (1,086) visit events at 809 health posts, neonatal sepsis referral cases were reviewed for correct classification and correct pre-referral treatment. Accordingly, these referral cases were not included in this analysis as their treatment follow-up was not determined; only those cases managed at health posts were included in this analysis.

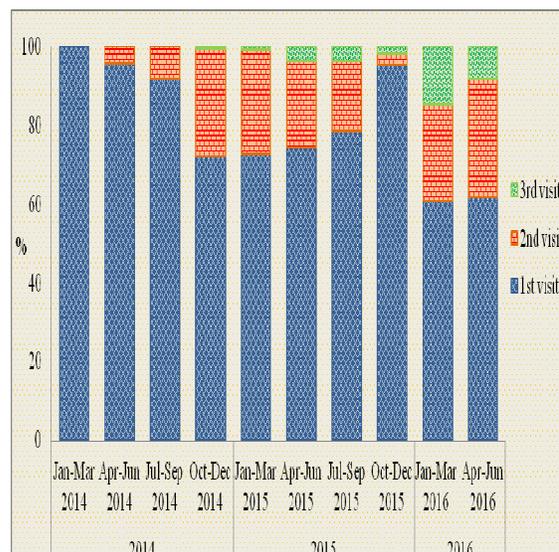


Figure 2: Distribution of supportive supervision visits over observation periods

Consistency of neonatal sepsis management skills of HEWs

The overall consistency of neonatal sepsis management was 71%, 76%, and 84% during the first, second, and third supervision visits, respectively. The consistency of neonatal sepsis management skills of HEWs increased over the observation periods and with the frequency of supportive supervision visits (Table 2).

Table 1: Distribution of health post visits by sepsis cases management according to frequency of visit, observation period, region, and PRCMM

Variables	% of visits did not manage sepsis cases	# of visits did not manage sepsis cases	% of visits managed sepsis cases	# of visits managed sepsis cases	Total % of visits	Total # of visits
Period						
Jan-Mar 2014	94.8	179	5.2	10	100.0	189
Apr-Jun 2014	91.1	781	8.9	76	100.0	857
Jul-Sep 2014	92.1	628	7.9	54	100.0	682
Oct-Dec 2014	88.1	782	11.9	106	100.0	888
Jan-Mar 2015	90.1	247	9.9	27	100.0	274
Apr-Jun 2015	79.4	643	20.6	167	100.0	810
Jul-Sep 2015	77.5	1,031	22.5	300	100.0	1,331
Oct-Dec 2015	79.2	1,127	20.8	296	100.0	1,423
Jan-Mar 2016	78.1	633	21.9	177	100.0	810
Apr-Jun 2016	83.4	619	16.6	123	100.0	742
Region						
Amhara	86.5	1,857	13.5	289	100.0	2,146
Oromia	83.4	2,371	16.6	471	100.0	2,842
SNNP	80.3	2,301	19.7	564	100.0	2,865
Tigray	92.2	141	7.8	12	100.0	153
Frequency of SS visit						
1	85.3	5,473	14.7	943	100.0	6,416
2	76.6	987	23.4	302	100.0	1,289
3	69.8	210	30.2	91	100.0	301
Number of PRCMMs						
0	85.4	5,050	14.6	860	100.0	5,910
1	77.3	1,453	22.7	427	100.0	1,880
2	77.3	167	22.7	49	100.0	216
Total	83.3	6,670	16.7	1,336	100.0	8,006

Table 2: Trend in consistency of neonatal sepsis management skills over observation quarters and frequency of supportive supervision visits

Year	Quarter	1st visit		2nd visit		3rd visit	
		% consistent	# of cases	% consistent	# of cases	% consistent	# of cases
2014	Apr-Jun	78.8	52	87.5	8	0.0	0
	Jul-Sep	88.9	36	100.0	6	0.0	0
	Oct-Dec	92.0	50	91.9	37	0.0	0
2015	Jan-Mar	53.8	13	78.6	14	0.0	0
	Apr-Jun	76.1	109	85.0	40	91.7	12
	Jul-Sep	77.2	206	79.4	63	90.9	22
	Oct-Dec	58.8	323	40.0	5	66.7	3
2016	Jan-Mar	74.5	106	65.4	52	84.8	33
	Apr-Jun	64.1	39	65.3	72	76.5	17
Total		70.8	942	75.8	297	84.1	87

Effects of the supportive supervision on the consistency of neonatal sepsis management skills of the HEWs

The analysis indicated that the odds of consistency of neonatal sepsis management skills of HEWs in Oromia region were 2.7 times higher than Amhara region and 1.7 times higher in SNNP than Amhara region (p -value <0.05). However, the consistency of sepsis management skills of HEWs in Tigray region was not statistically different from Amhara region (p -value > 0.05), which might be due to the small sample size as depicted in Table 1 above.

The odds of consistency of neonatal sepsis management skills of HEWs increased by 25% during the first PRCMM and 95% in the second PRCMM as compared to health posts without PRCMMs. The consistency of sepsis management skills of HEWs was not statistically significantly different between health posts that were visited once and those visited twice; however, the difference was statistically significant when compared between those visited once and those visited more than twice (OR 2.49; p -value <0.05) (Table 3).

Table 3: Random effects logistic regression model estimates of the predictors of consistency of neonatal sepsis management

Variables	OR	95% CI	P-value
Observation period			
Apr-Jun 2014	1.00		
Jul-Sep 2014	2.02	0.55–7.51	0.292
Oct-Dec 2014	2.25	0.78–6.52	0.135
Jan-Mar 2015	0.40	0.12–1.36	0.143
Apr-Jun 2015	0.67	0.27–1.65	0.378
Jul-Sep 2015	0.71	0.30–1.63	0.410
Oct-Dec 2015	0.30	0.12–0.73	0.008
Jan-Mar 2016	0.50	0.19–1.30	0.156
Apr-Jun 2016	0.43	0.17–1.12	0.083
Region			
Amhara	1.00		
Oromia	2.70	1.59–4.60	<0.001
SNNP	1.68	1.01–2.81	0.046
Tigray	2.33	0.43–12.64	0.328
Implementing partner			
SCI	1.00		
L10K	1.01	0.61–1.68	0.975
Number of supervision visit			
1	1.00		
2	1.32	0.86–2.02	0.208
3	2.49	1.16–5.38	0.020
Number of PRCMMs			
0	1.00		
1	1.25	0.80–1.95	0.324
2	1.95	0.71–5.36	0.198
_cons	2.44	1.04–5.73	0.040

DISCUSSION

The analysis showed that there is an increase in the rate of consistency of case management skills of HEWs across supportive supervision visits (71% during the first visit, 76% during the second visit, and 84% during the third visit). It also showed that the third supportive supervision visit had a significant effect on the consistency of neonatal sepsis management skills of HEWs.

The rate of consistency of case management of neonatal sepsis is consistent with a study carried out in India, reporting 89% correct diagnosis and 81% correct treatment rate for neonatal sepsis management by community volunteers (4). However, it is a little higher than the consistency of case management of the three common childhood illnesses—pneumonia, malaria, and diarrhea in Ethiopia (5,6).

It is generally agreed that supportive supervision is effective in improving the performance and motivation of community health care workers (5, 7-9). It has been tested to improve adherence to medical protocols as well as bridge know-do gap (10). Regarding the characteristics of supervision, reviews of intervention studies in low-and-middle-income countries suggest that supervision and audit with feedback are effective (10). Other trials demonstrate positive effects on worker performance when supervision is more frequent and supportive (11), based on trusting relationships between supervisor and supervisee, including team spirit and open two-way communication (12), and when a checklist is introduced (13). On the contrary, irregular and infrequent supervision of health workers does not affect performance and motivation (14-17) and can lead to de-motivation and poor performance of health workers (14). Our study demonstrated a dose-response relationship between the number of supportive supervision visits received by the health posts and improvements in the consistency of the sepsis case-management skills of HEWs.

Participation in the woreda-level PRCMM showed a positive improvement over the consistency of sepsis management skills of HEWs in this study. However, it did not reach a statistically significant level and it should be interpreted cautiously as the number of health posts participated in the woreda-level review was small. There are also contradictory reports that PRCMMs improved (6, 18) or did not improve (5) the consistency in management of iCCM cases by HEWs in Ethiopia.

There is no evidence generated earlier concerning the effectiveness of supervision on the consistency of neonatal sepsis management skills of HEWs in the country. This paper is unique in reporting the effect of supervision visits on the consistency of neonatal sepsis management skills of HEWs in Ethiopia. However, it has limitations. First, the effect estimates observed could be confounded by unmeasured variables and the presence of possible selection bias. The analytic technique we used, the random effects models, did not account for the effect of unmeasured variables that may have confounded the observed associations. Moreover, of the 6,416 health posts visited only 942 health posts that managed sepsis cases were used for the study which is not randomly selected. This affects the representativeness of study samples and generalizability of study results to other settings and other samples. The effect of selection bias would be reduced and the external validity of the study would be improved if there were longer periods of observation and

Second, we assumed that all health posts in each woreda attended woreda-level PRCMMs; however, this assumption might not always be true. Third, health posts that received PRCMMs before they received supportive supervision visits were excluded from this analysis as these events could not be combined with the supportive supervision database. This might affect the effect of PRCMMs on the outcome variable of interest negatively. Finally, health posts' participation rate in the woreda-level review meetings were small; as a consequence, this does not have the statistical power to detect the effect of PRCMM on the consistency of case management skills of HEWs.

Additional studies and/ or further analytical methods are needed to determine the effectiveness of PRCMMs on the neonatal case management skills of HEWs. The researchers recommend continuing to track this type of data on the effects of supportive supervision and PRCMMs on the quality of care as part of improving program implementation.

A qualitative study is recommended to explore the nature of supportive supervision that results in high performance and motivation of HEWs. There is no evidence to suggest what type and intensity of supportive supervision are needed overtime to sustain the skills of HEWs to manage neonatal sepsis at the community level. Thus, a longitudinal study would also be helpful. We recommend implementation research be continued on the effects of integrated supervision for primary health care unit on the quality of neonatal sepsis management skills of HEWs.

The findings of this study suggest that supportive supervision with case reviews and/or register reviews and the discussions that emerge from them were an effective intervention in improving the consistency of skills of neonatal sepsis management at the community level. At least three rounds of supervision are needed to maintain consistency in the management of neonatal sepsis. Policymakers and program planners should make additional investments to sustain the effects of supportive supervision.

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