

Original Article

Impact of training on practical skills of Iraqi health providers towards integrated management of neonatal and childhood illness- a multicenter cross-sectional study

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Abstract

Background: This study aims to assess the mandatory practical skills of caregivers towards the implementation of the Integrated Management of Neonatal and Childhood Illness (IMNCI) strategy in primary health care (PHC) centers of Salah al-Din governorate in Iraq.

Methods: A cross-sectional comparative study was conducted from January to May 2014. An equal sample of 42 trained and 42 non-trained caregivers who are working in 20 PHC centers in Tikrit city and other districts of Salah al-Din governorate of Iraq were included. The study tool was a semi-structured questionnaire with 20 questions covering different required practical skills that caregivers should have. The total score was 100 and in a range of 4-6 points for each question. An independent sample t-test was used to compare the means of numerical variables.

Results: The mean age of total respondents were (33.18 ± 5.82Years), and the vast majority (63, 75.0%) were females. More than two-third (58, 69.0%) were paramedical compared to 26 (31.0%), who were doctors. Trained caregivers had statistically significant better practice (73.48 ± 13.46) compared to non-trained caregivers (63.95 ± 17.44). Trained doctors had statistically significant better practice (88.15 ± 2.70) compared to trained paramedical staff (66.90 ± 10.84). Trained caregivers from Tikrit city had statistically significantly better practice (80.26 ± 7.38) compared to trained caregivers from districts (67.89 ± 14.85). The highest proportion (97.5%) of trained caregivers felt the child for fever or body hotness appropriately, and the lowest proportion (59.5%) of them recorded age, height, and weight correctly.

Conclusion: This study showed that training has a positive influence on the implementation of IMNCI interventions. IMNCI-trained caregivers were more likely to correctly classify illnesses than non-trained caregivers.

Keywords: IMNCH, Child, Healthcare provider, Practice, Tikrit, Iraq

Background

Since its first issue during the 90s of the last century, Integrated Management of Neonatal and Childhood Illness (IMNCI) strategy focused on illnesses that cause the majority of deaths in children under-5 years, many of which are preventable or readily treatable using simple interventions; these are pneumonia, diarrhea, meningitis, malaria, malnutrition, anemia and HIV/ AIDS [1,2]. All IMNCI-trained caregivers should receive at least one follow-up visit in their health facility after training, to reinforce their skills and solve implementation problems [3]. Children (under-5 years) examined by IMNCI-trained caregivers were much more likely to get the right treatments [4]. Although medical consultation at the IMNCI

center takes a long time, it has proved to be more efficient [5] and cost less than routine health care in some other centers [6]. An evaluation carried out in 5 countries [7] showed improvements in IMNCI-trained caregivers' performance following IMNCI training [8,9]; however, the IMNCI performance among worldwide caregivers was often poor. In underdeveloped countries such as Uganda [10] and Peru [11], only 50% and 10% of children received correct treatment, respectively. Nevertheless, there is a broad field to improve in some of the most successful IMNCI implementation places [12].

Since 1998, the IMNCI strategy was introduced to Iraq; however, the progress of this strategy received no more attention, whether from the local or international researcher. The preparation period (1998-2004) for IMNCI implementation was weak and fluctuated up to the second half of 2004. The beginning of the year 2005 considered the real date signing the

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launch of the program, where the Ministry of Health (MOH), in collaboration with World Health Organization (WHO) reactivated the process jointly with United States Agency for International Development (USAID) project to scale up IMNCI-training as part of the work to support the newly constructed PHC centers with health professionals [13,14]. The expansion phase between 2006 and 2012 indicated the progress of IMNCI implementation in Iraq. Several Iraqi doctors were engaged in 11 days training program. Over six years (2006-2012), the number of provinces that implemented the IMNCI program tripled, and the number of provinces increased from 4 to only 90.

The same period witnessed a remarkable increase in the percent (0.9% to 77.3%) of health facilities implemented the IMNCI program, and the number of IMNCI-trained caregivers increased from 189 in 2006 to over 5268 in 2012. The number of new IMNCI-training courses has increased from 5 in 2006 to 90 in 2012 [13,15]. However, very few have been done to assess this program. Tawfiq (2009), in his study, compared the quality of care at six health centers providing IMNCI activity in Baghdad city with six other non IMNCI health facilities. Among other vital findings reported by this study, "Large proportions of conditions incorrectly classified by the provider were under-classified as milder cases in non IMNCI centers, the reasons included inaccurate history, incomplete or incorrect assessment, not taking assessment findings into account, or giving no classification at all" [16]. Yasin et al. (2014) found that knowledge of forty-two caregivers who had attended at least one 7-days IMNCI- training course, with experience of more than six months in IMNCI units, was statistically significantly higher than their counterpart [15]. Recently, Abdullah and Bahir (2017) indicated that the knowledge was fair, and performance was poor among fifty-one IMNCI-trained caregivers selected from two PHC centers in Baquba city, Iraq [17]. Therefore, it was necessary to practically evaluate how the Iraqi caregivers implement the guidelines of IMNCI and their experiences in follow up outpatient visits. This study aimed to assess the difference in the practice of IMNCI between (IMNCI- trained and non-trained caregivers), (IMNCI-trained physicians and paramedical staff) and between IMNCI-trained caregivers from Tikrit PHC centers and those from districts PHC centers. Manuscripts with many symbols should have a nomenclature that conforms to the system of standard international (SI) understood by the general reader.

Methods

This study was a secondary analysis of a large study [15] conducted in health facilities in Salah al-Din governorate of Iraq from January to May 2014. Salah al-Din governorate is located in Northeast and was among the several regions in Iraq that have launched the IMNCI strategy in PHC centers. As per Salah al-Din governorate health department statistics (January 2014), 33 operational PHC centers are offering multiple health services, including the under-five curative services.

Briefly, a cross-sectional comparative study was designed to collect (total sampling technique) the data from all central and district PHC centers that having a working unit of IMNCI within the Salah al-Din governorate. A list of the caregivers was obtained from each included PHC center, and they were contacted personally by the researcher team. The eligible

respondents were both genders of whatever age. Inclusion and exclusion criteria are listed in Table 1. Due to exclusion criteria. Twenty PHC centers have been included (7 from Tikrit city and 13 from district regions). Thirteen centers were excluded as eight centers didn't have working IMNCI units, and five centers have no actively IMNCI-trained caregivers. Two caregivers were not willing to participate, and one more was absent on the day of data collection. The final study population consisted of 84 participants (42 IMNCI- trained and 42 non-trained). Understood by the general reader.

Table 1 Inclusion and exclusion criteria

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No.	Inclusion and Exclusion Criteria	IMNCI-Trained	Non-Trained
1.	PHC centers that were having the working unit of IMNCI	+	+
2.	Doctors	+	+
3.	Paramedical caregivers	+	+
4.	Willing to participate	+	+
5.	Caregivers of the Maternal & Child Care Unit (MCU)	+	-
6.	Actively engaged in IMNCI program for more than six months	+	-
7.	Participated in one 7-days IMNCI-training course as a minimum	+	-
8.	Chief medical officer (CMO)	-	-
9.	Deputy CMO	-	-
10	Hospital manager		
11	Deputy hospital manager		

(+) Inclusion criteria, (-) Exclusion criteria

Study instrument

The available scientific literature, including the guidelines and training materials distributed by Iraqi MOH, were reviewed to design a semi-structured questionnaire. The scale included 20 items covering different required practical skills that the caregiver should have. Components of practical assessment have been selected and approved by a scientific committee composed of four qualified and expert professionals (pediatric specialist, community medicine specialist, maternal and child health nursing specialist, primary healthcare specialist). The English version was translated into the Arabic language by a linguistic and academic expert committee. The scoring of the questions in practice assessment was ranging from 4-6 marks according to importance with a final total score of 100 points.

Pilot study

In the first pilot study, five physicians and five paramedical were randomly selected and separately asked to examine two different cases thoroughly and record all negative and positive findings apart by 10-15 minutes for each. The cases were the daily outpatient visitors (children under-5 years) of the PHC. According to the symptoms described by their mothers, children have been categorized into four groups: breathing difficulties, diarrhea, fever, and feeding difficulties. Findings showed that under close observation but without researcher interference, most caregivers (2 physicians and four paramedical) were confused and unable to cover all elements in less than 15 minutes. A second pilot study was implemented on another ten caregivers with similar criteria but in a different center. In this time, two statements have been refined, and the caregivers were

observed at a distance and left free to receive the mother with her child, take a history, do the general examination and record information in a classical child card. Findings were satisfactory, and most of the caregivers were able to practice the full examination within the average time of 15-20 minutes. The scientific committee approved the items, marks, and time and considered the questionnaire for this study.

Statistical analysis

The Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA) [18] used for data entry and analysis. Data presented in mean and standard deviation. The normality test (Kolmogorov-Smirnov) was run, and all the quantitative data were found to be normally distributed. Inspection of Q-Q Plots revealed that practice was normally distributed for both groups and that there was homogeneity of variance as assessed by Levene's Test for Equality of Variance. Therefore, bivariate analyses such as an independent t-test were run on the data to compare means of numerical variables, as well as 95% confidence interval (CI) for the mean difference. An alpha level of $p < 0.05$ is considered to be statistically significant. The practice questionnaire was statistically reliable (Cronbach's α coefficient was 0.964) indicated an excellent degree of homogeneity among the scale items. A validity statistic test was found to be inconvenient because there was no unique study collecting all standard elements of practice to compare with.

Results and Discussion

Descriptive analyses

The total participants were 84 caregivers (42 IMNCI-trained and 42 non-trained). The average age of participants was 33.13 (SD 5.82) years, of which 63 (75.0%) were females, and 85(69.0%) were the paramedical staff.

Table 2 Frequency distribution of socio demographic respondents (n=84)

Variables	Total sample	IMNCI-Trained	Non-trained
Age (mean \pm SD)	33.18 \pm 5.82	34.36 \pm 6.07	32.09 \pm 5.41
Gender			
Male	21(25.0%)	9(21.4%)	12(28.6%)
Female	63(75%)	33(78.6%)	30(71.4)
Occupation			
Doctors	26(31.0%)	13(31.0%)	13(31.0%)
Paramedical	58(69.0%)	29(69.0%)	29(69.0%)

Practice score

The criteria of examination were compatible with those discussed in the second pilot study. The lowest scoring was labeled four marks, and the highest-scoring was six marks for each item in relation to importance. The score of each caregiver was registered by the researcher in terms of skills and speed. Caregivers had a mean practice score of 68.71(SD11.62) with a minimum score of 92 and a maximum score of 33.

The highest proportion (97.5%) of IMNCI-trained caregivers felt the child for fever or body hotness appropriately, and the lowest proportion (59.5%) of them recorded age, height, and weight correctly. The vast majority (80.25%- 85.20%) of them took the proper position of the child during the examination,

took the child's temperature by the thermometer, counted the respiration rate (breaths) for 60 seconds, checked the skin turgor for signs of dehydration, and asked about healthy feeding habits when the child is not ill.

More than seventy percent (70.0% - 79.75%) of them checked for pallor by looking at palms and lips, checked for enlarged lymph nodes in front of the neck, pressed both feet to check for edema, asked about healthy breastfeeding habits when the child is not ill, asked about feeding or breastfeeding habits or practices for the child during this illness, and mentioned the child's weight or growth to the caretaker, or discussed growth chart.

About two-third (61.5% - 68.43%) of them looked in child's ear and behind it, if there is ear problem, undressed child to examine (from shoulders to ankles), offered the child water to drink if she/he has diarrhea, asked about the child's immunization card and history, administration of oral rehydration therapy (ORT and ORS), wrote on the child's recording form and asked about general danger signs such as the child is unable to drink or breastfeed; child vomits everything; the child has had convulsions with this illness.

Table 3 Illustrates the optimal score for each item, mean results with standard deviation, and percentage of the performance.

No.	Practice statements	Mean	SD	Scores	%
1	Took proper position of child during the examination	4.14	0.75	5	82.80
2	Took child's temperature by the thermometer	4.19	1.04	5	83.80
3	Felt the child for fever or body hotness	3.90	0.37	4	97.50
4	Counted respiration (breaths) for 60 seconds	4.02	1.07	5	80.40
5	Checked skin turgor for dehydration	4.26	0.77	5	85.20
6	Checked for pallor by looking at palms and lips	3.95	0.94	5	79.00
7	Recorded age, height, and weight correctly.	3.57	0.86	6	59.50
8	Looked in child's ear & behind it if there is an ear problem	3.69	1.22	6	61.50
9	Undressed child to examine (from shoulders to ankles)	3.40	0.83	5	68.00
10	Pressed both feet to check for edema	3.50	1.08	5	70.00
11	Checked for enlarged lymph nodes in front of the neck	3.14	0.75	4	78.50
12	Offered the child water to drink if she/he has diarrhea	3.35	0.65	5	67.00
13	Asked about healthy feeding habits when	3.21	0.52	4	80.25

14	the child is not ill Asked about healthy breastfeeding habits when the child is not ill	2.97	0.46	4	74.25
15	Asked about feeding or breastfeeding habits or practices for the child during this illness	3.19	0.63	4	79.75
16	Mentioned the child's weight or growth to the caretaker, or discussed growth chart	2.95	0.62	4	73.75
17	Asked about the child's immunization card and history	3.86	0.98	6	64.33
18	Administration of ORT & ORS.	4.09	1.30	6	68.17
19	To write on the child's recording form.	3.26	0.77	5	65.20
20	Asked about general danger sign:	4.79	1.16	7	68.43

Bivariate analysis

An independent-sample t-test was run to determine if there were differences in practice scores between IMNCI-trained and non-trained, IMNCI-trained medical and paramedical staff, and between IMNCI-trained from Tikrit city and trained from the district regions (Table 4).

Table 4 Descriptive Statistics between total trained and non-trained, trained medical and paramedical, trained from Tikrit and other Districts respondents

Variables	Trained n=42	Non Trained n=42	df,t-test, p- value	95%CI
Total IMNCI-trained and non-trained	73.48 ± 13.46	63.95 ± 17.44	(t (82) = 2.802, p = 0.024)	2.76 -16.29
IMNCI-T=trained (medical and paramedical)	88.15 ± 2.70	66.90 ± 10.84	(t (40) = 6.932, P =0.000)	15.10 - 27.46
IMNCI-trained (Tikrit and other districts)	80.26 ± 7.38	67.89 ± 14.85	(t (40) = 3.310, p = 0.011)	4.83 -19.96

Total IMNCI-trained and non-trained

IMNCI-trained caregivers had statistically significantly better practice (73.48 ± 13.46) compared to non-trained caregivers (63.95 ± 17.44) ($t(82) = 2.802$, $p = 0.024$), with a difference of 9.524 (95% CI, 2.76 to 16.29). These findings were not surprising and were concurrent with other findings from Morocco, which showed that IMNCI-trained PHC nurses provided better quality care to under-fives compared to those who had not been trained [19]. Chopra et al. (2005) in his study in South Africa found that the performance of caregivers to assess the general danger signs in sick children showed a marked improvement from just 7% before IMNCI-training to 72% after training [20]. Adekanye et al. (2014) found that the

majority of Nigerian nurses had acquired knowledge and became aware of the IMNCI strategy during their training and clinical practice in child health care centers [21]. Nguyen et al. [22] in his systematic review and meta-analysis study concluded that IMNCI-trained caregivers were more likely to correctly classify illnesses. Furthermore, Chitembo [23] indicated that the majority of IMNCI-trained caregivers were able to assess the sick children correctly and communicate to their caretakers satisfactorily. Moreover, findings from Brazil revealed that the caregivers who had received IMNCI-training were significantly more likely to classify a child correctly than those who had not received IMNCI-training, with an adjusted prevalence ratio of 2 (95% CI: 1.6-2.4; $p < 0.001$) [24].

IMNCI-trained medical and paramedical staff

IMNCI-trained medical staff (doctors) had statistically significantly better practice (88.15 ± 2.70) compared to IMNCI-trained nurses or paramedical staff (66.90 ± 10.84) ($t(40) = 6.932$, $p = 0.000$), with a difference of 21.257 (95% CI, 15.10 to 27.46). Usually, the post-graduate medical doctors in Iraq are expected to have high knowledge and better practice because they already had undergone a focus training course during their study and in the working place (hospital) compared to their counterparts (nurses).

Similarly, Nigerian study in 2014, found that lack or insufficient professional aids such as wall charts and chart booklets have encouraged nurses to improvise materials and consequently reflect negatively on IMNCI implementation [21]. Also, these nurses found difficulty in implementing the IMNCI guidelines because they need a long time and, as such, would increase the average time for assessing, managing/ treating children [21]. However, a Tanzanian study done in 2004 reported that IMNCI-trained nurses had better performance than IMNCI-trained medical officers [25]. Furthermore, a study conducted in 2008 in Kenya revealed that nurses generally expressed positive attitudes about IMNCI, while some clinical officers and doctors have not accepted the IMNCI approach. They feel that the guidelines are simplistic and do not allow them to make full use of their clinical training [26].

IMNCI-trained caregivers from Tikrit city and districts

IMNCI-trained caregivers from Tikrit city had statistically significantly better practice (80.26 ± 7.38) compared to IMNCI-trained caregivers from districts (67.89 ± 14.85) ($t(40) = 3.310$, $p = 0.011$), with a difference of 12.39 (95% CI, 4.83 to 19.96). IMNCI-trained caregivers who are working in PHC centers in Tikrit city had received more IMNCI-training programs, especially those carried out under direct supervision of USIAD, the principal trainer. This partly could explain the higher skill of knowledge [15] and the practice of IMNCI-trained caregivers from Tikrit city compared to their counterparts in other districts. Similarly, findings from Senegal [27] showed that the IMNCI-training had improved the caregivers' knowledge and skill in managing pediatric patients and increased their opportunities to utilize the IMNCI-strategy guidelines.

However, this study found that only 16.0% of caregivers who are working in districts used the IMNCI approach regularly. This low rate of compliance is due to the inefficiency of IMNCI procedures and the inability of caregivers to apply treatment protocols, appointment planning, or emergencies [27].

World Health Organization (2008) indicated that "Follow-up is an essential component to reinforce skills acquired during training and to help solve problems encountered during the implementation of the IMNCI strategy" [71].

There are some limitations to this study. Although the researcher included all populations in the research, however, the sample of caregivers included in IMNCI was relatively small, so that further analytic could not be performed, and the study was limited to a descriptive one. The study also limited by the time, logistic barriers, and the security situation in Iraq, which made PHC centers inaccessible and difficult to cover a huge province such as Salah al-Din. Further, response bias is a possible bias because direct observation of candidates during an assessment may increase their attention and ultimately stimulate them for maximum efforts, so the results were higher than expected. Finally, the scores were scaled and considered by a committee of a pediatrician and a PHC specialist as there was no previous study, so it could not be so reliable.

Policy implication

The results of the current study may reveal the positive impact of training on implementing IMNCI. However, many points might be considered to improve performance, such as the introduction of training materials for IMNCI in all Iraqi medical and nursing schools. Additionally, efforts need to expand the level of the mother and childcare unit in the provinces to the level of the department. Further studies are encouraged with specific concentration on recent advances like e-IMNCI, administering IMNCI protocol into mobile for faster, cheaper, and more straightforward implementation.

At the level of the directorate of health, necessary actions have to be taken, such as to increase the supportive supervision and periodic training courses to IMNCI-trained caregivers, especially at the districts level and to encourage HPs working in MCU by adding bonus on their salary and protecting them from leaving their unit. It is recommended to improve the recording and mother instructions skills among caregivers and giving more attention to establishing an independent statistics unit with an active referral system and feedback nutrition at the level of PHC centers, general hospitals, and directors. Finally, national programs to encourage health education and community sharing about the IMNCI role as a therapeutic and protective measure (e.g., home care of the sick child, accidents of children, vaccination, and nutrition of children, and so forth).

Conclusion

Discrepancies were evident among trained and non-trained caregivers towards essential aspects of IMNCI implementation, indicating the skill gap. Trends toward more significant training benefits were also observed among trained caregivers from different geographical regions. The trained caregivers who are working in districts PHC centers have less opportunity to utilize the IMNCI strategy guidelines because the training courses advocated by USAID (United States Agency for International Development) were strictly confined to Tikrit city.

Abbreviations

IMNCI: Integration Management of Neonatal and Childhood Illness; PHC: Primary Health Care MOH: Ministry of Health; USAID: United States Agency for International Development;

WHO: World Health Organization MCU: Maternal and Child Care Unit; ORT/ORS: Oral Rehydration Therapy CI: Confidence Interval; CMO: Chief Medical Officer; SD: Standard Deviation

Declarations

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Availability of data and materials

Data will be available by emailing ma_m776@yahoo.com.

Authors' contributions

MAM is the principal investigator of the study who designed the study and coordinated all aspects of the research, including all steps of the manuscript preparation. He is responsible for the study concept, design, writing, reviewing, editing, and approving the manuscript in its final form. SAAJ contributed to the study design, analysis and interpretation of data, drafting the work, writing the manuscript and reviewed and approved the manuscript. All authors read and approved the final manuscript.

Ethics approval and consent to participate

We conducted the research following the Declaration of Helsinki, and the protocol was approved by the Ethics Committee of the Postgraduate Studies Unit (PSU), College of Medicine, University of Tikrit (Ref: 3/7/813 at 17-December -2013). Moreover, written informed consent was obtained from each caregiver and oral consent from each mother willing to participate after explanation of the study objectives and the guarantee of secrecy.

Consent for publication

Not applicable

Competing interest

The authors declare that they have no competing interests.

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