

# Primary Health-Care Staff Barriers to Immunization

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## Abstract

**Background:** Missed opportunities for immunization (MOI) is considered as the most important preventable reason for underimmunization. Health-care workers stand beyond more than half the children's missed opportunities due to gaps in their knowledge, attitudes, and practices (KAP) regarding immunization. **Objectives:** This study assessed immunization staff at primary health-care centers in Baghdad/Al-Karkh for KAP that may lead to MOI. **Materials and Methods:** KAP survey was conducted on field immunization service providers at primary health-care centers in Baghdad/Al-Karkh. Barriers are considered to present whenever scores found <80 in any of KAP. Data were collected using a self-administered structured questionnaire analyzed by SPSS 24. **Results:** Among 217 respondent health professionals, 69 (31.8%) were physicians and 148 (68.2%) were nurses. The studied sample got mean scores for KAP of  $84.7 \pm 11.4$ ,  $71.1 \pm 22.7$ , and  $74.8 \pm 20.3$ , respectively. Physicians had higher mean knowledge score compared to nurses ( $P < 0.05$ ). Both physicians and nurses got mean scores below 80 for both attitudes and practices. **Conclusion:** Attitudes and practices in both physicians and nurses need to be improved to avoid MOI.

**Keywords:** Health-care workers, immunization, knowledge, missed opportunities

## INTRODUCTION

Immunization is one of the most proven public health interventions for preventing, eliminating, and even eradicating life-threatening vaccine-preventable diseases, by which children's morbidity and mortality can be minimized.<sup>[1,2]</sup> By 2020, the immunization coverage rates should reach at least 90% at the national level and at least 80% in every district or equivalent administrative unit for all vaccines in national immunization programs.<sup>[3]</sup> Nationally, there is a stumble in the achievement of the Expanded program on immunization (EPI) immunization coverage targets.<sup>[4]</sup>

Many reasons are found to be associated with underimmunization of children, but the most important preventable single reason is missed opportunities for immunization (MOI).<sup>[5,6]</sup> The WHO EPI defines a missed opportunity to immunize as "any contact with a health service that did not result in an eligible child or woman receiving the needed vaccines."<sup>[7]</sup>

The main reasons that have contributed to MOI are categorized into three main groups: reasons related to the health-care workers, reasons related to the parents, and reasons related to the health service logistics and organization.<sup>[8,9]</sup> A previous

national study revealed that health-care workers stand beyond more than 60% of children's MOI.<sup>[10]</sup>

A high grade of knowledge and convenient criteria of vaccination practices among health-care providers must be carried out to attain high immunization coverage rates.<sup>[11]</sup> Studies showed that health-care workers had gaps in knowledge and practices regarding immunization services. Sufficient knowledge and practices in vaccination are significant to improve the effectiveness of immunization.<sup>[12]</sup>

This study had focused on assessing immunization field staff for knowledge, attitudes, and practices (KAP) that may lead to MOI.

## MATERIALS AND METHODS

This KAP survey targeted health-care professionals (physicians and nurses) working in immunization services at primary

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health-care centers (PHCCs) in Baghdad/Al-Karkh (Western half of Baghdad). This KAP survey was conducted during December 2017–March 2018.

Sampling technique was random cluster sampling. Fifty PHCCs (50%) were selected by computer-based simple random sampling from a list of PHCCs in Baghdad/Al-Karkh, and then, all available health-care professionals working in immunization services in the selected centers were invited to participate in this study.

A self-administered structured questionnaire, already prepared by the WHO,<sup>[13]</sup> was used to collect specific data on the health-care professionals' KAP related to MOI in children. The questionnaire consisted of four sections: the first section collected background information on health-care professionals; the second section is about knowledge of health-care workers containing twenty questions regarding vaccines received by healthy children, diseases prevented by vaccines, vaccine contraindications, vaccine administration, vaccine failure, and vaccine types; the third section (five questions) is about health-care workers' attitudes that facilitate or inhibit vaccination including attributes of incomplete immunization schedule, who should evaluate the child's immunization status, inquiry about the child's immunization status, health-care worker fears about vaccine adverse reactions, and maintaining registries linked to timely vaccination; and the fourth section contains five questions about health-care workers' practices related to vaccination, including vaccines that should be given after newborn delivery, advising parents to deal with vaccine adverse reactions, informing parents about possible vaccine adverse reactions, managing children with delayed vaccinations, and opening a multidose vaccine vial for a single child.

Data were entered and analyzed by SPSS 24 (IBM Corp. IBM SPSS Statistics for windows, version 24.0. Armonk, NY: IBM Corp). *t*-test for two independent variables and one-way ANOVA were used as appropriate to test the significance of observed difference in means. The level of significance was set at 0.05.

## RESULTS

Of the 229 immunization service providers encountered in the selected settings during data collection, only 217 questionnaires were returned filled with a response rate of 94.8%. Among the 217 respondents, 69 (31.8%) were physicians and 148 (68.2%) were nurses. Age varied from 23 to 62 years with a mean age of  $40.6 \pm 10.0$  years. Male-to-female ratio was 1:1.75 [Table 1].

Experience in vaccination field exceeded 5 years in 46.5% of the participants and around 87.6% received at least one formal training course [Table 1].

Proportions of correct responses of participants to the study questions are illustrated in Tables 2 and 3.

Around 78.3% of the respondents think that their general knowledge of vaccination is sufficient and not outdated.

A small proportion (7.4%) described that their knowledge of vaccination and EPI does not meet the needs of PHCCs.

About 82.9% of the health-care workers said that vaccines' supply (for all types) is sufficiently covering children attending PHCCs for immunization.

The mean scores for KAP were  $84.7 \pm 11.4$ ,  $71.1 \pm 22.7$ , and  $74.8 \pm 20.3$ , respectively [Table 1].

The mean knowledge score did not vary significantly with any of participant's sex, experience duration, or status of formal training [ $P > 0.05$ , Table 1]. It was significant to find that physicians have higher mean knowledge scores ( $90.0 \pm 11.0$ ) compared to nurses ( $82.0 \pm 11.0$ ) [ $P < 0.05$ , Table 1]. Those having knowledge barriers (i.e., those who got knowledge scores  $< 80$ ) constituted 24.4% of the surveyed health-care workers.

Attitude scores did not vary significantly with any of participant's sex or status of formal training [ $P > 0.05$ , Table 1]. The mean attitude scores show a significant increase if the participants were physicians and if having experience longer than 5 years [ $P < 0.05$ , Table 1]. Those having attitude barriers (who got attitudes scores less than 80) constituted 40.6% of the surveyed health-care workers.

According to this study, none of sex, job title, experience, and status of formal training significantly influenced practices scores [ $P > 0.05$ , Table 1]. Those having practice barriers (i.e., got practices scores  $< 80$ ) constituted 42.9% of the surveyed health-care workers.

## DISCUSSION

KAP of health-care workers in the immunization wards at PHCCs determines the quality and success of immunization services delivered and hence can save the lives of many children.<sup>[12]</sup> MOI is the most important preventable single reason for underimmunization.<sup>[6]</sup> Improper health-care workers' practices are responsible for MOI.<sup>[14]</sup>

The current study revealed that about 24.4% of the participated health-care workers were considered to have knowledge barriers, 40.6% were considered to have attitude barriers, and 42.9% were considered to have improper vaccination practices. This indicates that the participants' knowledge was not translated into proper practice which is consistent with what found by Himat in Sudan.<sup>[15]</sup>

In this study, almost all health-care workers were knowledgeable about children's immunization schedule. This finding is consistent with the findings of Himat 2003 in Sudan<sup>[15]</sup> and Odera-Ojwang 2016 in Kenya<sup>[16]</sup> and disagreed with Malual 2018 in South Sudan<sup>[17]</sup> who found that health workers have poor knowledge of immunization schedules.

The health-care workers' knowledge about diseases prevented by the whole-cell pentavalent vaccine had been found to be fair in this study, while Odera-Ojwang in Kenya<sup>[16]</sup> disagreed with us in that most of the health workers in her study

**Table 1: Scores for health workers' knowledge, attitudes, and practices according to demographic factors**

Variables	n (%)	Knowledge score (out of 100)		Attitude score (out of 100)		Practices score (out of 100)	
		Minimum-maximum	Mean±SD	Minimum-maximum	Mean±SD	Minimum-maximum	Mean±SD
Sex							
Male	79 (36.4)	45.0-100.0	86.0±12.5	20.0-100.0	74.2±22.2	0.0-100.0	73.4±23.3
Female	138 (63.6)	55.0-100.0	84.0±10.7	0.0-100.0	69.3±22.8	40.0-100.0	75.7±18.4
P			0.216		0.126		0.436
Job title							
Physician	69 (31.8)	45.0-100.0	90.0±11.0	20.0-100.0	79.0±23.0	0.0-100.0	78.0±23.8
Nurse	148 (68.2)	55.0-100.0	82.0±11.0	0.0-100.0	67.0±22.0	20.0-100.0	73.4±18.3
P			<0.001		<0.001		0.120
Experience (year)							
≤5	116 (53.5)	55.0-100.0	85.0±11.2	0.0-100.0	67.9±23.6	40.0-100.0	75.5±19.6
>5	101 (46.5)	45.0-100.0	84.5±11.7	20.0-100.0	74.7±21.1	0.0-100.0	74.1±21.1
P			0.771		0.029		0.598
Formal training (years)							
≤2	153 (70.5)	55.0-100.0	85.6±11.2	0.0-100.0	72.2±22.0	20.0-100.0	76.1±18.5
>2	38 (17.5)	45.0-100.0	83.8±12.9	20.0-100.0	70.0±24.0	0.0-100.0	71.6±25.3
None	26 (12.0)	60.0-100.0	81.2±9.8	20.0-100.0	66.2±24.5	40.0-100.0	72.3±22.0
P			0.159		0.438		0.376
Total sample	217 (100.0)	45.0-100.0	84.7±11.4	0.0-100.0	71.1±22.7	0.0-100.0	74.8±20.3

SD: Standard deviation

**Table 2: Prevalence of correct responses for knowledge questions**

Area of question	Correct responses		
	Physicians, n (%)	Nurses, n (%)	All, n (%)
Healthy children should receive			
BCG vaccine	69 (100.0)	146 (98.6)	215 (99.1)
MMR vaccine	68 (98.6)	142 (95.9)	210 (96.8)
Hepatitis B vaccine	67 (97.1)	142 (95.9)	209 (96.3)
Td vaccine	48 (69.6)	121 (81.8)	169 (77.9)
Rotavirus vaccine	68 (98.6)	143 (96.6)	211 (97.2)
The whole-cell pentavalent vaccine prevents			
Poliomyelitis	42 (60.9)	92 (62.2)	134 (61.8)
Hepatitis B	60 (87.0)	115 (77.7)	175 (80.6)
Whooping cough	64 (92.8)	145 (98.0)	209 (96.3)
Meningitis caused by <i>Haemophilus influenzae</i> Type b	36 (52.2)	85 (57.4)	121 (55.8)
Measles	66 (95.7)	137 (92.6)	203 (93.5)
Polio vaccine is contraindicated in			
Breastfeeding	69 (100.0)	148 (100.0)	217 (100.0)
Temperature of 37.5°C	60 (87.0)	128 (86.5)	188 (86.6)
Mild malnutrition	69 (100.0)	146 (98.6)	215 (99.1)
Mild diarrhea	65 (94.2)	134 (90.5)	199 (91.7)
Not contraindicated in any of the above conditions	57 (82.6)	118 (79.7)	175 (80.6)
Booster dose of BCG at 4-6 years of age	67 (97.1)	147 (99.3)	214 (98.6)
Hexa vaccine given at 2, 4, and 6 months of age	63 (91.3)	145 (98.0)	208 (95.9)
Pneumonia or other serious diseases are contraindications for any vaccine	30 (43.5)	92 (62.2)	122 (56.2)
When to consider vaccine failure	55 (79.7)	116 (78.4)	171 (78.8)
What are vaccine types	39 (56.5)	74 (50.0)	113 (52.1)

BCG: Bacille Calmette Guérin, MMR: Measles, Mumps and Rubella

knew. Accurately the diseases that can be prevented by the administration of pentavalent vaccine.

Although participants' knowledge of vaccine contraindications appeared good in relation to polio vaccine, this was not the

status for the general contraindications for vaccination that about 44.0% did not consider pneumonia or other serious diseases as a contraindication. This result agreed with Al-Ayed and Sheik in Saudi Arabia<sup>[11]</sup> who reported that the knowledge

**Table 3: Prevalence of correct responses for attitude and practice questions**

Area in question	Correct responses		
	Physicians, <i>n</i> (%)	Nurses, <i>n</i> (%)	All, <i>n</i> (%)
Attitude areas			
Attributes of incomplete immunization schedule	29 (42.0)	52 (35.1)	81 (37.3)
Who should evaluate the child's immunization status	66 (95.7)	135 (91.2)	201 (92.6)
Inquiry about the child's immunization status	46 (66.7)	124 (83.8)	170 (78.3)
Health-care worker fears of vaccine adverse reactions	39 (56.5)	103 (69.6)	142 (65.4)
Maintaining registers linked to timely vaccination	42 (60.9)	135 (91.2)	177 (81.6)
Practice areas			
Vaccines follow newborn delivery	61 (88.4)	128 (86.5)	189 (87.1)
Advice parents how to deal with adverse reactions	65 (94.2)	144 (97.3)	209 (96.3)
Informing parents possible vaccine adverse reactions	64 (92.8)	145 (98.0)	209 (96.3)
Managing children with delayed vaccinations	21 (30.4)	85 (57.4)	106 (48.8)
Opening a multidose vaccine vial for a single child	21 (30.4)	78 (52.7)	99 (45.6)

of health-care workers of vaccine contraindications is fairly good but disagreed with Smith *et al.*<sup>[18]</sup> who revealed that there is misunderstanding of the valid contraindications among their respondents and also disagreed with the findings of a South Sudanese researcher<sup>[17]</sup> who stated that the majority of health workers in his study were not aware of the contraindications of the main vaccines.

About 78.8% of the health-care workers believed that in some situations, a person vaccinated against a certain disease could contract that disease years later because of secondary vaccine failure which is agreed with the findings of a Kenyan study,<sup>[16]</sup> and 47.9% considered pneumococcal conjugate vaccine as a live-attenuated vaccine.

Concerning the attributes of incomplete children's immunization schedules, the most frequently mentioned reason for not having a complete vaccination schedule was parents' negative beliefs related to vaccination, which is close to what found by Odera-Ojwang.<sup>[16]</sup>

Less than 10% of the health-care workers believed that it is primarily the responsibility of doctors to assess the child's immunization status which is a wrong belief because it is a corporate responsibility of the child's parents, doctors, and nurses responsible for immunization. This result is the opposite of that found by Himat,<sup>[15]</sup> who stated that more than 90.0% of the respondents believed that it is primarily the responsibility of doctors.

About 21.7% of the health-care workers did not assess the child's immunization status when the child presented for other than immunization, while a Sudanese researcher revealed that more than 70.0% of the health workers did not assess the immunization status for children coming for curative purposes.<sup>[15]</sup>

More than 30.0% of the participants declared that they fear the vaccines' adverse reactions, and <20.0% said that completing nominal registries delays the timely vaccination of children.

Regarding the health-care workers' practices related to vaccination, about 51.2% of them showed that parents of

children with delayed vaccination should be reminded to vaccinate their children without making home visits because this will waste their time, which is incorrect because home visits are important to encourage the family to complete the child's vaccination schedule.

The most single encountered health-care workers' practice responsible for MOI is their refusal to open a multidose vaccine vial for a single child. This finding is compatible with the findings of Smith *et al.* 1999 in the United States of America and Wallace *et al.* 2017 in Nigeria.<sup>[18,19]</sup>

In contrast, their practices were very good regarding vaccines that should be administered to a newborn before leaving the hospital and advising the parents about the possible adverse reactions following vaccination and how to deal with them.

Due to the difference in obtained education, it is rational to find in this study physicians are more knowledgeable than nurses and this is attributed to the degrees they hold.

The health-care workers' attitudes were found to be significantly associated with their job title; also, physicians had higher attitude scores than nurses, which may be due to their higher education or higher knowledge scores.

Furthermore, it is found that there is a significant association between the workers' attitudes and their experience in the field of immunization, in that those who have an experience of more than 5 years in the field have higher attitude scores than those who had an experience of 5 years or less. This finding may be logical because as the health-care workers spend more time in vaccination wards, their cumulative field experience will increase.

## CONCLUSION

The attitudes and practices of immunization staff (both physicians and nurses) need to be improved to avoid MOI. Training and frequent supervision of immunization staff at PHCCs are advised.

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## Conflicts for interest

There are no conflicts for interest.

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