Childhood communicable disease surveillance: Perception and performance of paediatric residents, Sudan 2019-2020

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ABSTRACT:

Background Communicable disease surveillance system is heavily relied upon for effective disease control, health decision-making and to build health strategies. This study assessed the perception and performance of paediatric residents toward two running surveillance programs in Khartoum state, Sudan.

Methods This is a descriptive cross-sectional study conducted among paediatric residents in Khartoum State, Sudan 2020. Data was collected through structured, self-administered questionnaire. The total number of residents included in the study was 305**.** They were selected using "stratified random sampling" technique. Data were analyzed via Statistical Packages for Social Sciences version 23. The level of significance was at $p \leq 0.05$.

Results Two hundred and sixty-three paediatric residents participated in the study; 56% (n=148) of the participants knew the correct definition of the case of a child to be included in acute flaccid paralysis surveillance program, while 38% (n=99) correctly defined the case definition of measles and rubella of the surveillance program. There was no significant association between attending an awareness session about the programs and the knowledge of the correct case definition of the surveillance programs (p=0.357 for acute flaccid paralysis surveillance and p= 0.333 for measles and rubella surveillance). In contrast, there was a statistically significant association between the level of residency of paediatric residents and the correct perception of acute flaccid paralysis surveillance program (p=0.033), whereas, there was no significant association between the level of residency and correct knowledge of measles and rubella surveillance program (p=0.363); 92.5% (n=147) of respondents who met a case of acute flaccid paralysis during their training period, notified the case. While three quarters (n=180) of those who met a case of measles during their training period did not notify the case. More than half (n=100) of them stated that they did not know that they should notify. Of two hundred forty-eight participants who notified about acute flaccid paralysis or measles cases, a quarter (n=61) of them received feedback from the surveillance staff about the results of the patients.

Conclusion The study revealed the significant gap in the knowledge and practice of disease surveillance and notification among residents particularly for the measles and rubella surveillance program, and this will impact negatively on the health system, and impede the achievement of disease elimination. We recommend implementing effective training courses for residents and update them regularly about disease surveillance and notification.

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INTRODUCTION

Surveillance of infectious diseases is recognized as the cornerstone of public health decision-making and practice. Public health surveillance is an ongoing, systematic collection, analysis, interpretation and dissemination of data for use in various public health actions including reducing morbidity and mortality as well as improving health[1]. Despite increased interest in strengthening

health systems for developing countries, the current reality is that the health systems in most developing countries falls short of the requirements to implement the goals suggested by the WHO[2]. One of the greatest obstacles that countries face is lack of clear understanding of the public health surveillance programs and their profound importance in health system.

In Sudan, the Communicable Disease Surveillance System (CDSS) is part of the National Surveillance System launched in 1994. The two major surveillance programs in children are acute flaccid paralysis, and measles and rubella surveillance. Acute flaccid paralysis (AFP) surveillance is the primary means of poliovirus detection, supplemented in selected countries by environmental surveillance. The Global Polio Laboratory Network facilitates laboratory identification of polioviruses and genomic analysis to track poliovirus spread. Rapid improvements in AFP surveillance are needed in African region countries to ensure timely polio-free certification[3].

The highly contagious measles virus kills nearly 250 children each day, making it one of the leading causes of death in those under the age of five years; while rubella is most often a mild viral disease, However if it infects a pregnant mother in her first trimester and the baby survives, she has a 90% chance of delivering a child with life-threatening birth defects referred to as congenital rubella syndrome (CRS). Each year, more than 100,000 babies begin life suffering from CRS[4].

At the end of the last century, many countries implemented national communicable diseases surveillance systems (NCDSS) for the ongoing, systematic collection, analysis and interpretation of the communicable diseases data. In every country the creation and implementation of surveillance systems is essential for effective controlling and managing of communicable diseases[5]. Communicable disease surveillance systems rely on reporting of cases by physicians and laboratories. Studies from various countries have concluded that low compliance of physicians with notification systems is partly caused by insufficient feedback of surveillance data to the physicians[6]. This study aimed to identify the knowledge and performance of paediatric residents towards public health surveillance system and offer rationalized information for variety of beneficiaries in Sudan.

MATERIAL AND METHODS

This is a descriptive, cross sectional study, conducted in the period from November 2019 to May 2020. The study population was all the paediatric residents enrolled in the training program and working in the public hospitals in Khartoum State. Stratified random sampling technique was used according to the grade of residency as follows: The sample size from the first year residents comprised 30% (n=91) while those form the second, third and fourth year residency comprised 20.5% (n=63), 24% (n=63) and 25.5% (n=78), respectively.

Structured self-administered questionnaire detailing demographics data, knowledge of surveillance and reporting practices was used for data collection. It included 7 (yes or no) questions, 10 multiple-choice questions, and one open ended question. Their knowledge of surveillance programs was assessed by specific questions with a multiple-choice format about the case definition of AFP, measles and rubella in the surveillance programs. The residents were also asked whether they notify AFP and measles cases, and reasons for lack of notification if they did not. Moreover, they were inquired about notification guidance and receiving feedback from surveillance program. The content validity of the questionnaire was assessed by two experts in the area. The questionnaire was pilot tested and revised accordingly. The response rate of the questionnaire was 86% (n=263)

Statistical Package for Social Sciences software version 23.0 (IBM SPSS Inc., Chicago, IL) was adopted. Both descriptive and inferential statistics involving Pearson Chi square test was used and a p-value of <0.05 was considered significant. Written ethical clearance and approval was obtained from Sudan Medical Specialization Board

Ethical Committee. Informed written consents were obtained from the paediatric residents. The confidentiality was intentionally considered.

RESULTS

Two hundred and sixty-three paediatric residents were enrolled in this study; females were 82.1% and males were 17.9%. The majority (n=141; 53.6%) of the residents were in a group of 1-2 years of paediatrics practice before residency. The least number (n=9; 3.4%) of residents were in a group of more than five years. The majority (n=182; 69.2%) of the residents did not attend any awareness session about surveillance programs More than half (n=148; 56.3%), of them knew the correct case definition included in AFP surveillance; however, 43.7% (n=115) defined the case incorrectly. Of all participants, 37.6% (n=99) knew the correct case definition included in the measles and rubella surveillance program, while 62.4% (n=164) of the participants defined the case incorrectly.

There was no statistically significant association between the sex (p= 0.427) or increasing years of practice of participants before residency (p= 0.640) and their correct knowledge of the AFP surveillance program. In contrast, there was a statistically significant association between the level of paediatric residency and the correct perception of AFP surveillance program (p= 0.033, Table 1).

There was also no significant association between the sex (p=0.078) or years of practice before residency (p=0.088) and the participants' correct knowledge neither of measles and rubella case definition nor of the surveillance program. Although the higher proportion of paediatric residents in each level of residency defined the case definition that was included in measles and rubella surveillance incorrectly, nevertheless, there was no significant association between the level of residency and correct knowledge of measles and rubella surveillance program (p= 0.363, Table 2).

Table 1. Perception of AFP surveillance program and demographical characteristics (n=263)

Variables		Case definition included in AFP surveillance		Chi-square P-value
		Correct n (%)	Incorrect n (%)	
Gender	Male	23 (48.9)	24 (51.1)	0.427
	Female	92 (42.6)	124 (57.4)	
Working in the field of paediatrics before residency	< 1 year	37 (48.7)	39 (51.3)	0.640
	1-2 years	61 (43.3)	80 (56.7)	
	3-5 years	14 (37.8)	23 (62.2)	
	> 5 years	3 (33.3)	6 (66.7)	
Level of residency	R1	37 (46.8)	42 (53.2)	0.033
	R2	31 (57.4)	23(42.6)	
	R3	26 (41.3)	37 (58.7)	
	R4	21 (31.3)	46 (68.7)	

AFP = Acute flaccid paralysis. R1,….R4 =First…..fourth year residents

Table 2. Perception of measles and rubella surveillance program and demographic characteristics (n=263)

Variables		Case definition included in measles and rubella surveillance		Chi-square P-value
		Correct n (%)	Incorrect n (%)	
Gender	Male	23 (48.9)	24 (51.1)	
	Female	76 (35.2)	140 (64.8)	0.078
Working in the field of paediatrics before residency	< 1 year	36 (47.4)	40 (52.6)	
	1-2 years	48 (34.0)	93 (66.0)	
	3-5 years	14 (37.8)	23 (62.2)	
	> 5 years	1 (11.1)	8 (88.9)	0.088
Level of residency	R1	28 (35.4)	51 (64.6)	
	R2	17 (31.5)	37 (68.5)	
	R3	23 (36.5)	40 (63.5)	
	R4	31 (46.3)	36 (53.7)	0.363

Eighty-one residents attended an awareness session about surveillance programs, out of them 60.5% (n=49) knew the correct case definition that was included in AFP surveillance, while only 42.0% (n= 34) defined the case definition included in the measles and rubella surveillance program correctly. However, there was no statistically significant association between the correct knowledge and attending awareness sessions about surveillance programs (p=0.357 for AFP and p= 0.333 for measles and rubella surveillance).

One hundred fifty-nine of the participants diagnosed at least a case of AFP in their training period, 92.5% (n= 147) of them notified the case. The majority (98%, n= 144) did the notification in the first 72 hours after they had seen the case while 7.5 % (n=12) did not notify about the case, the reasons for not notifying are shown in Figure 1.

Out of 147 who notified AFP cases, 60.5% (n= 89) defined the case definition of AFP surveillance program correctly, though there was no significant statistical association between knowledge of the correct definition of case definition included in AFP surveillance and notification of the cases (p = 0.332).

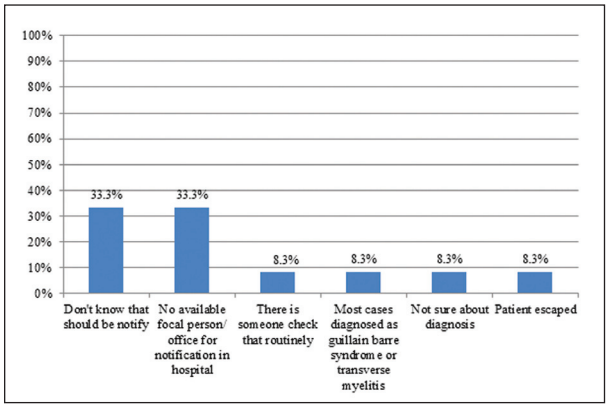

Figure 1. Reasons for not notifying AFP cases (n=12)
AFP = Acute flaccid paralysis

Two hundred forty-one (92%) of the participants diagnosed at least one case of measles in their training period; about three quarters 74.7% (n=180) of them did not notify the case; of the sixty-one residents (25.8%) who did the notification, 56.7% of them notified in the first 24 hours. Although only 38% (n=23) of them defined the case definition of measles and rubella surveillance program correctly, yet there was no significant statistical association between knowledge of the correct case definition and that included in measles and rubella surveillance and the notification of the cases (p= 0.93). Among those who did not notify measles cases, more than half (55.7%) of them stated that they did not know that they should notify, especially that there was no

available focal person / office in the hospital.

Out of two hundred and eight participants who notified about AFP or measles cases, 25.0% (n=52) of them received feedback from the surveillance staff about the results of the patients, whereas the majority (n= 157; 75.0%) did not receive any feedback. On the other hand 62 (28.9%) of the residents who notified were guided by themselves while 56 (27%) were guided either by the program focal person or the consultant (25.9%, Figure 2).

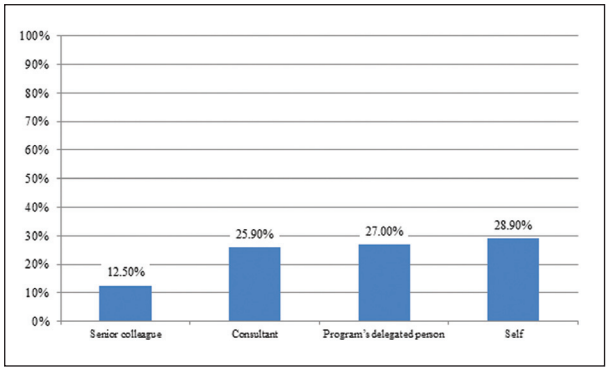

Figure 2. Guidance through notification of AFP or measles cases (n= 248)

AFP = Acute flaccid paralysis

DISCUSSION

In this study, more than half of the participants (56.3%) knew the correct case definition included in AFP surveillance but only one-third (37.6%) knew the correct definition that was included in measles and rubella surveillance. These low rates are alarming, particularly for measles. No similar published studies were found in the local literature. Comparing with studies from the region our figures were better than those reported from Kenya and Nigeria where the correct knowledge was observed for 12.2% of the health workers for the case definition of measles and for 15.9% of AFP case definition, respectively[7,8]. However, they are comparable with the results of another study from Nigeria where half of the respondents (51.8%) among resident doctors were found to have good knowledge of disease surveillance and notification[9]. Even better figures were reported in a study from Qatar that showed 90.7% of the participating physicians identified the measles case definition correctly[10]. Along the same lines, a study in Jeddah, Saudi Arabia for assessing the knowledge of health care workers about surveillance for childhood vaccine-preventable diseases which included polio and measles revealed that only about one-quarter of health care providers had satisfactory knowledge score[11].

The findings of this study showed a statistically significant association between the level of residency of paediatric residents and the correct perception of AFP surveillance program ($p= 0.033$). This is expected as the senior residents are more likely to have attended educating sessions about surveillance programs and be exposed to consultants who had special interest in communicable and notifiable diseases. This is in agreement with the study done in Nigeria that revealed 82.0% of the senior registrars had good knowledge when compared with the other cadre of resident doctors[9].

On the other hand, this study found that a higher proportion of pediatric residents in each level of residency incorrectly defined the measles case that was included in measles and rubella surveillance program. This raises concern about quality and effectiveness of the current training activities, especially in the area of public health although it is true that measles and rubella surveillance program is considered fairly new.

This study also revealed that no significant statistical association between years of practice and correct knowledge about surveillance programs, in spite of increasing the knowledge of the correct case definition included in AFP surveillance with increasing years of practice before residency. This is not compatible with the study from Nigeria where all respondents who had practiced for 15 years and above had a good knowledge of disease surveillance and notification and there was a statistically significant association between the years of practice and knowledge of disease surveillance and notification ($p< 0.001$)[9]. Similarly the report from Qatar found the lowest proportion of best evidence practice (i.e. knowing and applying the case definition) in surveillance was among residents and physicians with five or fewer years of work experience[10]. In this study, 60.5% and

42% of residents who attended awareness session about surveillance programs knew the correct case definition included in the AFP and measles and rubella surveillance programs, respectively. However, there was no statistically significant association between the correct knowledge and attending awareness sessions about surveillance programs, a finding that was also reported in the studies from Saudi Arabia and Qatar[10,11]. This might indicate that the training courses need be re-evaluated based on the best evidence, and effective training courses should be adopted based on WHO recommendations.

The most striking finding in this study was the high rate of notification of AFP cases (92.5%) in comparison to those (25%) of measles and rubella. Certainly, the fairly old, well established, more robust with good infrastructure and resources of the AFP program are contributing factors, for better notification. However, on questioning about reasons for failure of notification, more than half (56%) of residents were not aware of the need to report the measles cases. This is worrisome; as measles is highly contagious. Poor knowledge and awareness among paediatric residents as well as lack of notification will negatively affect the performance of the surveillance system, and hinder the progress of measles control and elimination A similar level of under-reporting in measles surveillance system was also noted in the study from Qatar, which showed that only 22.4% of the surveyed physicians were following best practice in measles surveillance[10].

In this study one-third of the residents who did not notify cases stated that there was no available focal person/office for notification. Moreover, only 38% of participants confirmed the availability of notification forms in their facility, while 30% did not see any. Such inadequate logistic support by the programs and lack of notification reporting forms were also identified as one of the constraints to reporting AFP in the studies from Nigeria, Saudi Arabia, Jordan and Tennesseein in United States[8,11-13]

In this study, feedback, from the surveillance system, was received by only one quarter of the participants and only two weeks after notification. This poor feedback is discouraging. Studies in different territories have concluded that low compliance of physicians with notification systems is partly caused by insufficient feedback of surveillance data to the physicians[14]. Other studies showed that only 14.6%, 14% and 41% of physicians in Qatar, and in Germany and Nigeria, respectively, received feedback on their surveillance data[10,14,15]. Needless to mention that poor knowledge of surveillance programs and notification, unavailability of notification forms in health facilities, and deficient feedback from surveillance staff to doctors are all barriers toward standard practice of notification.

As a limitation of this study, the information was collected from one side: that of the practitioners, in the absence of surveillance staff views. Interviewing surveillance staff and focal persons in the health facilities would have completed the picture.

CONCLUSIONS

- This study was the first in Sudan that examined the knowledge and performance of paediatric residents toward childhood surveillance programs. It revealed an alarmingly low level of knowledge of correct case definitions that were included in the AFP and measles and rubella surveillance programs.
- Senior residents are not more likely to have better knowledge about measles and rubella surveillance compared to juniors.
- This gap in knowledge of the residents is reflected on lack of correct and professional practice where only 25% of respondents notified measles cases and half of those who did not notify were because of lack of awareness.

RECOMMENDATIONS

- Based on these findings, strengthening the training courses for paediatric residents through regular awareness and education programs based on best evidence, emphasizing surveillance systems, notification and public health issues is of high priority
- Measles and rubella surveillance program in particular need more attention as the country is

heading toward control and elimination.

- Further comprehensive studies on examining effective methods of enhancing the knowledge and performance of paediatric residents toward surveillance programs and notification are justified.

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