



Sudan: A Story of Success Transitioning Shift Flu Program to One Health approach, 2022

Omer Ali^{1,2*}, Sanad Mohamed^{1,2}, Talha Elseir¹, Abdalla Mohamed¹, Fadul Almoula¹, Amna Mohamed¹, Ghaida Fareed¹, Magam Kassab¹, Luna Badi³ and Mohamed Elhafiz⁴

¹Surveillance and information Directorate, HEEC, FMOH, Sudan

²Filed Epidemiology Training Program, Sudan

³National influenza center, NPHL, Sudan

⁴World Health Organization, Sudan

*Correspondence: Omer Ali, Surveillance and information Directorate, HEEC, FMOH, Sudan, E-mail: omer.he31@gmail.com; DOI: <https://doi.org/10.56147/jbhs.2.2.20>

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Abstract

Background: The world focused attention toward influenza surveillance after emergence a novel strain of influenza virus A (H1N1) in April 2009. In 2013, a surveillance system for influenza (SARI-ILI) and virologic data was established in Khartoum, Sudan. The Director General of the WHO declared COVID-19 a pandemic as a public health emergency of international concern and on March 11, 2020. The main objective for this study reviews a story of success shift from influenza surveillance to one health respiratory viruses' surveillance.

Method: Across sectional study using national influenza data was conducted and review the guidelines and records well done by technical committee for transition from influenza system to using concept of one health in the in the system. Patient samples were collected and a questionnaire for clinical and demographic variables were administered from all patients that meeting the SARI case definition. Data cleaning was done including PCR result as the main variable and analysis used Microsoft excel to descriptive analysis.

Result: In the surveillance system, a shift was made from the influenza surveillance system to influenza and other respiratory viruses, including Covid. The standard definition of SARI and ILI has been updated, based on the definition of the World Health Organization. In the laboratory pillar, develop testing strategy to include other respiratory viruses. The system involved coordinating between relevant sectors in the aspect of preparedness, early detection, investigation, response and laboratory through one health approach. The number of samples collected by sentinel sites were 236, including seven positive cases of Covid-19 and two cases of influenza positive.

Conclusions: Influenza surveillance shift to influenza and other respiratory viruses using one health approach and address different pillars (preparedness, detection, response and laboratory) applied new system in the influenza sentinel sites, after started the collected 236 samples of these, 7 cases of COVID-19 and 2 of them flu.

Keywords: Surveillance; One health; Influenza; Covid-19

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Introduction

Influenza causes high morbidity and mortality during influenza pandemics, that consider important problem of Public Health worldwide [1].

Influenza cases were reported in the Sudan in 2003, as well as cases of positive AHINI Influenza cases in 2009 [2].

The world focused attention toward influenza surveillance after emergence a novel strain of influenza



virus A (H1N1) in April 2009 [3]. The influenza surveillance system is receiving global and national attention for the possibility of a global pandemic caused by influenza [4].

Early detection and rapid response to an influenza epidemic basically depends on influenza surveillance systems [5].

The global influenza program was established to address the recurring seasonal influenza outbreaks and mitigate their impact on public health. It comprises comprehensive vaccination campaigns, public awareness initiatives and robust surveillance systems to track and respond to flu cases in a timely manner [6].

influenza as a major hazard identified in Sudan using the Strategic Tool for Assessing Risks (STAR), which is used to analyze and prioritize risks for inclusion in a multi-hazard plan [7].

The Director General of the WHO declared COVID-19 a pandemic as a public health emergency of international concern and on March 11, 2020 [8,9].

During the month of October 2022, the number of cases worldwide reached 623.9 million, of which 6.5 million died [10]. The first case declared by the Federal Ministry of Health was recorded in March 2020, an (Imported case) a traveler came from the United Arab Emirates. The local transmission was reported by the first week of April 2020. By October 2021, Sudan reported 63,424 confirmed cases with 4,965 deaths [11].

Historically, the University of Khartoum established the National Influenza Center in the 1960s with the support of the World Health Organization and it is classified as the first WHO collaborative center in the Eastern Mediterranean region and the third in Africa [2].

In 2013, a surveillance system for influenza (SARI-ILI) and virologic data was established in Khartoum, Sudan. The system tracked SARI, ILI and laboratory-confirmed influenza in 3 general hospitals [2].

The One Health approach recognizes the intrinsic link between human, animal and environmental health. It advocates for interdisciplinary collaboration to achieve optimal health outcomes, emphasizing the interconnectedness of health systems across species and ecosystems [12].

The global impact of adopting a One Health approach is profound, as it enables countries to effectively tackle emerging infectious diseases, antimicrobial resistance and zoonoses. The collaborative framework encourages cross-border information sharing and capacity building, ultimately leading to strengthened global health security [13].

Materials and Methods

Study design

Cross-sectional study used influenza surveillance data for 2022 and systematically reviewed records and documents for transition from influenza system to influenza and other respiratory viruses using one health approach, the concept of one health in the Federal Ministry of Health, Sudan.

Study population

Include all ILI/SARI patients of all age groups attending the selected healthcare facilities.

Data definitions

The quantitative part Nasal and throat swabs were collected and a questionnaire for clinical and demographic variables was administered from all patients that meeting the SARI and ILI case definition according to WHO influenza surveillance guideline "an acute respiratory illness with a history of fever or measured fever of $\geq 38^{\circ}\text{C}$ and cough, with onset within the past 10 days, requiring hospitalization" for epidemiological descriptive [14].

The qualitative data were from approved reports and documents generated for the One Health, Influenza and COVID-19 pandemic containment in Sudan.

Data analysis

Socio-demographics, testing status, clinical feature and outcome was obtained for each eligible case using a standard case definition. Data cleaning was done including PCR result as the main variable and analysis used Microsoft excel to descriptive analysis.

Result

During the Covid pandemic, the influenza program was suspended and all resources were directed to detecting and containing the Covid pandemic, which affected the ability to detect and contain any other pandemic.

After updating the list of notifiable diseases, the directorate of surveillance and Information formed a committee to review the guideline of influenza and apply the concept of one health in updating the guideline, as it included all relevant authorities from the Ministry of Health and Livestock.

Sudan used the methodology of the Center for Disease Control to prioritize the zoonotic diseases in Sudan, where it collected data on the common zoonotic diseases in Sudan. Avian influenza was among the highest priority list, which includes 8 zoonotic diseases.

The updated guideline addresses five main pillars (surveillance, coordination, laboratory, investigation,



notification through international health regulations).

In the surveillance system, a shift was made from the influenza surveillance system to the influenza and other respiratory viruses, including Covid.

The standard case definition of SARI and ILI has been updated, based on the definition of the World Health Organization.

In the laboratory pillar, the correct method of taking and preserving samples, sending samples and personal protection measures during sample taking have been updated in the guideline.

The testing strategy for samples collected from the sentinel sites has also been updated, include covid-19 and other respiratory viruses (Figure 1).

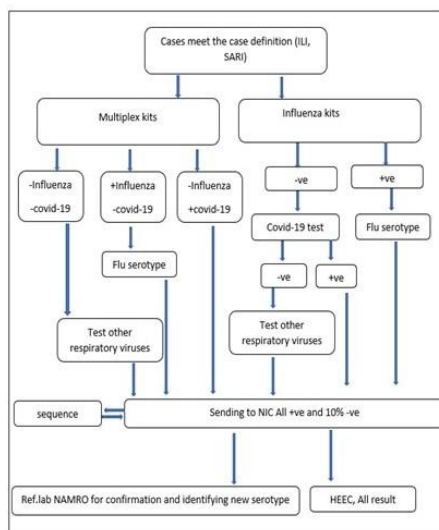


Figure 1: Testing strategy for influenza and other respiratory viruses.

In the previous influenza system, the investigation was not addressed all respiratory viruses, after COVID-19 pandemic developed general investigation form that included influenza and the rest of the respiratory viruses and a standardized case definition of investigation was also made.

One Health is a collaborative, multidisciplinary and multisectoral approach that can address urgent, ongoing or potential health threats at the human-animal-environment interface at subnational, national, global and regional levels. This approach ensuring balance and equity among all the relevant sectors and disciplines.

The system strengthens coordinating mechanism between the relevant sectors using one health mechanism in the aspect of preparedness, early detection, sharing information, response and laboratory.

The International Health Regulations approach was also used in reporting, risk assessment, follow-up and evaluation of activities through (simulation exercise, interaction review, after action review, external evaluation and annual report).

Influenza cadres were trained on the influenza respiratory system, which was approved by the Federal Ministry of Health. They also contributed to the approval of the updated guide.

Descriptive data analysis (Figures 2,3,4,5 and 6).



Figure 2: Distribution of SARI suspected cases by date of onset and lab result in Khartoum state from week 22 to week 40, 2022 (n=236).

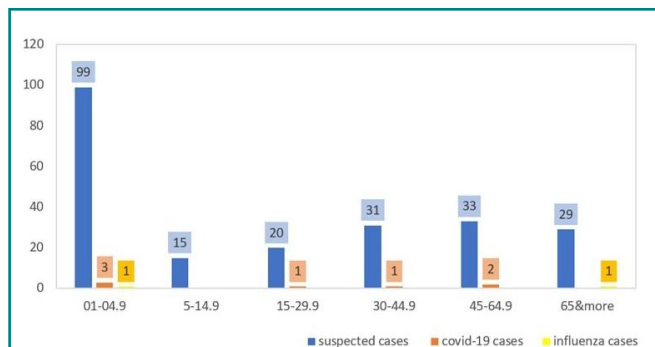


Figure 3: Distribution of SARI cases by age group and lab result in Khartoum state from week 22 to week 40, 2022 (n=236).

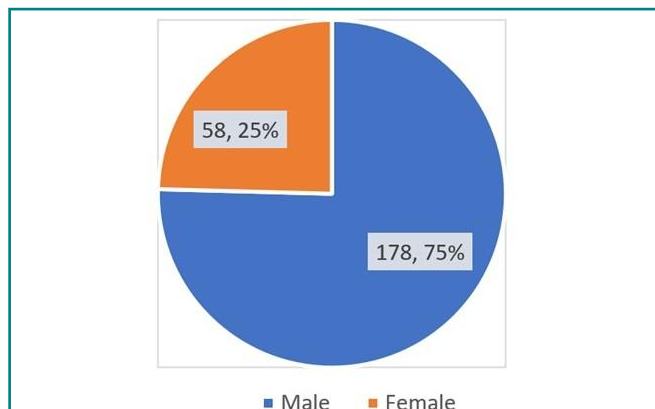


Figure 4: Distribution of SARI cases by gender in Khartoum state from week 22 to week 40, 2022 (n=236).

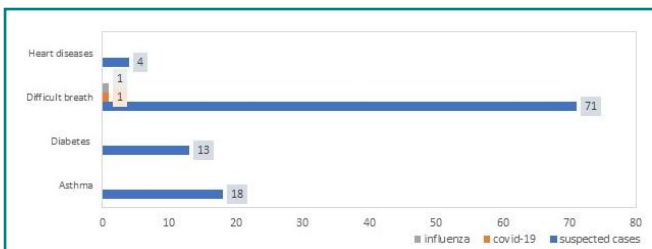


Figure 5: Distribution SARI cases by chronic diseases and lab result in Khartoum state from week 22 to week 40, 2022 (n=236).

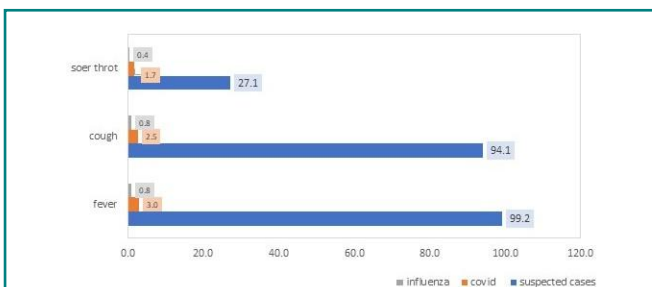


Figure 6: Distribution of SARI cases by symptoms and lab result in Khartoum state from week 22 to week 40, 2022 (n=236).

Discussion

The surveillance of Influenza in Sudan has shifted from only influenza surveillance to influenza and other respiratory viruses, including COVID. Influenza gained greater attention recently in the country as part of the global movements towards control of the disease and prevention against future pandemics. One of the drivers of this, is that outbreaks of Highly Pathogenic Avian Influenza (HPAI) among wild birds are now not uncommon, particularly in Europe [15]. That highlighted the need for more integrated efforts involving the different sectors, especially animal, environment and human health. Influenza in Sudan is now one of the top 8 priority diseases targeted by One-Health approach in surveillance and control, this is the outcome of the last task done by the zoonotic diseases department to prioritize zoonotic diseases for surveillance through one-health approach. This goes well with the global recommendation of building a surveillance system not only focusing on collecting data about cases, but also, that helps in well understanding ecology and virus prevalence trends and used for prediction [16,17].

During the Covid pandemic, the influenza program was suspended and all resources were directed to detecting and containing the Covid pandemic, which affected the ability to detect and contain any other pandemic.

Adopting One Health can lead to improved public health outcomes by facilitating the early detection and response to outbreaks. The integration of human, animal

and environmental health data allows for more accurate risk assessments and more effective intervention strategies.

Implementing a One Health approach is cost-effective in the long term. By addressing the root causes of diseases that affect multiple species and ecosystems, it reduces the overall burden on healthcare systems. Economies of scale and shared resources further amplify cost savings.

One of the major forward steps done by the MoH is updating the case definitions of ARI and SARI, this will increase the sensitivity and detection capacity of surveillance. This came in response to the WHO recommendation about the use of a common case definition to allow data interpretation and comparability with the international context [18]. Moreover, the testing strategy for samples collected from the sentinel sites, has also been updated to include COVID-19 and other respiratory infections. These two steps, in addition to the update done for the investigation forms to cover the other respiratory viruses, can be considered as the major changes and improvements to the influenza surveillance in Sudan.

From a total of 236 suspected SARI cases in Khartoum state (from the 22nd epidemic week to week 40), 1 case (0.4%) was confirmed influenza, 1 case was confirmed COVID-19. This very low number of detected cases could be attributed to the study period where the incidence of the respiratory illnesses is generally low, as it increases commonly in late months.

Conclusion

influenza surveillance shifts to influenza and other respiratory viruses using one health approach and address different pillars (coordination, preparedness, detection, response and laboratory) applied new system in the influenza sentinel sites, after started the collected 236 samples of these, 7 cases of COVID-19 and 2 of the flu.

Recommendation

Adopt of One Health practices through harmonizing regulations across sectors and regions enhance disease surveillance capabilities by integrating animal health data and environmental monitoring.

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