

Implementation Level of Event-Based Surveillance (EBS) as Surveillance Core Capacity Under International Health Regulation in Sudan, 2020: Cross-Sectional Study

Abdalla Mohammed Abdalla^{1*}, Alaa Hamed Dafalla Idreis¹, Daffalla Alam Elhuda¹

¹Republic of Sudan Federal Ministry of Health

*Corresponding Author

Abdalla Mohammed Abdalla, Republic of Sudan Federal Ministry of Health, Sudan. Contact +249912182630.

Submitted: 28 Oct 2022; Accepted: 09 Nov 2022; Published: 17 Nov 2022

Citation: Abdalla, A.M., Idreis, A.H.D., Elhuda, D.A. (2022). Implementation Level of Event-Based Surveillance (EBS) as Surveillance Core Capacity Under International Health Regulation in Sudan, 2020: Cross-Sectional Study. *Curr Res Vaccines Vaccination*, 1(1), 65-70.

Abstract

Background: Surveillance system of infectious diseases and event is recognized as the cornerstone of public health decision-making and practice additionally, the international health regulation requested countries to implement other type of surveillance to support the routine surveillance system and to increase the detection rate and sensitivity in reporting the diseases, event, or any public health emergency with international concern (PHEIC). The aim of this study to assess the implementation level of event-based surveillance systems to ensuring that the system implemented efficiently and effectively.

Methods: descriptive cross sectional institutional based study conducted for all 18 surveillance officer at states to assess the implementation level of event-based surveillance system as core capacity under the international health regulation 2005 (IHR), Data was collected using a per-prepared and pretested questionnaire followed WHO/EMRO tools for surveillance staff at state level felt through field visit and phone calls, data collection also cover the community based surveillance and surveillance system at point of entry as part of event based surveillance, interview done for surveillance focal person at federal level. Data were analyzed using Statistical Packages for Social Sciences (SPSS) (version 20). Written and verbal consents were obtained from all participants as appropriate.

Results: Event based surveillance started in 2016 endorsement and approval of guidelines SOPs and training materials has been develop in 2017 so the study showed significant positive changes in implementation of this system for that the results showed the system implemented in all 18 states, availability of guidelines and SOPs at state level 72.2%, completeness, and timeliness of system data 94.4%, designated focal person in the surveillance structure at state level 94.4%. community Based Surveillance (CBS) implementation Results at states level -Sudan from 2017 – 2020 the result showed the system has been implemented in 17 states (94.4%), the percentage of assigned focal person for the system was 94.1 – trained volunteer at community level 94.4% and availability of system guidelines was 94.1%, the availability of system SOPs 88.2%. The study results also showed the percentage of 94.4 for definition of CBS syndromes, immediate response for event reported was 94.4%, Daily and weekly reports completed send by community volunteers was 94.4% and availability of reporting forms was 94.1% also percentage of 70.6% for system data base and shared the report with the partners. Point of entry Surveillance (PoE) implementation at the states level Results showed that the surveillance at points of entry has been fully implemented in 6 state 46.1% which it had point of entry and it has been designated by IHR, the system had focal person, the training done for all staff with availability of system guidelines and SOPs all this done by 100% 83.3% of point of entry reported Daily and weekly reports, the percentage of report completeness and timeliness was 66.7% with 83.3% for the zero report when no event of cases reported, availability of system data base and documentation for the events and cases reported through the system was 83.3%.

Conclusion: The study showed significant positive changes in implementation of event-based surveillance system under the international health regulation, based on the finding the study recommended that, rapid and early response for the reported cases and rumors or any other event from the locality and state level, Regular refresh, and basic training for surveillance staff internally and external training and strengthen the data management mechanism.

Keywords: Event-Based Surveillance, Indicator-Based Surveillance, International Health Regulation, Community-Based Surveillance, Point of Entry Surveillance

Introduction

The International Health Regulations were adopted by the health Assembly in 1969, having been preceded by the International Sanitary Regulations adopted by the Fourth World Health Assembly in 1951. The 1969 Regulations, which initially covered six “quarantinable diseases” were amended in 1973 and 1981, primarily to reduce the number of covered diseases from six to three yellow fever, plague, and cholera and to mark the global eradication of smallpox [1].

Implementing the IHR is an obligation for WHO and States Parties to the Regulations. One group of such obligations is related to the core capacity requirement for countries to “detect, assess, notify and report events in accordance with the regulations” and to “respond promptly and effectively to public health risks and public health emergencies of international concern” (PHEIC); there are also obligations concerning designated ports and airports, in relation to routine prevention and control measures and response to events that may constitute a PHEIC [2].

The communicable disease surveillance (indicator-based surveillance) in Sudan is sentinel-based and it can be classified as passive surveillance that shifts into partially active during epidemics or outbreaks [3]. For the passive surveillance, 31.6% (1775/5612) of public health facilities report on weekly basis. During epidemics (e.g. COVID-19) or when the risk of occurrence is high, the “Surveillance and Information Department (SID) at national level expands the system to cover all the health facilities and ask for daily reporting even if there is no cases (zero reporting). This is typically done for COVID-19; however there is no system to tell about the exact number of facilities which reported as having zero cases. A study conducted in Khartoum state in 2010 to assess the surveillance activities and functions found out that, despite the good knowledge and data reporting there were poor analysis, preparedness, feedback, documentation, and system update [4]. The surveillance system was also found to be not representative, as it did not include the private, military, and teaching hospitals and facilities in most states.

Event-based surveillance (EBS): Defined by WHO as the organized collection, monitoring, assessment, and interpretation of mainly unstructured ad hoc information regarding health events or risks, which may represent an acute risk to health. Such information can come from diverse sectors and may include animal, environment, and other sectors [5] **Indicator-based surveillance (IBS):** Defined by WHO as the systematic (regular) collection, monitoring, analysis, and interpretation of structured data, i.e., of indicators produced by several well-identified, mostly health based, formal sources [6].

Event-based surveillance (EBS) and indicator-based surveillance (IBS) are components of EWAR and epidemic intelligence. Indicator-based surveillance consists of the routine collection of data from mainly health-based sources and is the conventional form of surveillance in many countries. Event-based surveillance is not meant to replace other forms of surveillance, including IBS. Both IBS and EBS are complementary with each having a different role to play and purpose. Event-based surveillance is likely to be better at picking up small outbreaks early, while IBS is bet-

ter suited for monitoring disease trends over time and is useful for signaling the start of regular seasonal outbreaks of endemic disease. Designating a seasonal alert threshold in an IBS disease monitoring system essentially creates the opportunity to detect a “signal” IBS may not be very useful for smaller events because signals are either averaged out in large data sets or lost in the noise of smaller data sets. Event-based surveillance is also better at picking up signals indicating outbreaks in areas where access to healthcare is limited. This Framework for Event-based Surveillance will focus on how various types of EBS can be implemented and integrated into national surveillance systems [7].

Event-based surveillance (EBS), defined as Organized collection, monitoring, assessment, and interpretation of mainly unstructured ad hoc information regarding health events or risks, which may represent an acute risk to human health,” came into attention following the revision of the International Health Regulations (IHR) (2005) as the IHR expands usual infectious disease notification to include surveillance of public health events from various origins. Furthermore, the IHR urges countries, [8,9] EBS is highly needed where coverage with indicator-based surveillance is limited, and lessons learned from the Ebola outbreak in West Africa and its associated challenges highlight this as an urgent issue [10]. In 2014, WHO developed a guide for the implementation of early warning system with focus on EBS [11].

Materials and methods

A descriptive cross sectional institutional based study was conducted in event-based surveillance system in national and state level during the period from 2017 to 2020. The study collected information related to event-based surveillance implementation level the national level and at 18 states. Data was collected using a pre-prepared and pretested questionnaire followed WHO/EMRO tools for surveillance staff at state level felt through field visit and phone calls, interview done for surveillance focal person at federal level.

The sample size of study was coverage all 18 states data was collected from head of health emergency and epidemics control and 18 event based focal person, at state level, and head of surveillance system and event-based surveillance focal person at federal level

Data analysis

Data were analyzed using Statistical Packages for Social Sciences (SPSS) (version 20), Percentages were used to describe the data where appropriate. Data was presented using frequency tables.

Results

At national level in 2016, development of guidelines and standard operation procedures for the event-based surveillance system started covered the event reported sources. And approval for those documents took place at the end of same year.

In 2017, federal ministry of health was conducted first training for focal persons of event-based surveillance at ministry of health and in all eighteen states (100%), these focal persons were responsible from receive the notifications from different source, and this training included one person from related 22

ministries as focal persons for this system.

The latest version (guideline and SOPs) was written in October 2016 and indorsed in December 2016 by much expertise Established Event based surveillance system in 18 states (2017). The national level devolved the training materials and support the state level in conducted training, also support the state technical and finically to strengthen the event-based implementation.

Urgent public health events-when detected- are immediately reported within 24 hours and include time and place of the event, source, and type of risk, if known, and the number of cases and deaths and control measures, if any. Reported events are always investigated and verified by the rapid response team at locality level and results are given immediately to concerned parties to implement response measures.

At state level the implementation process started after 2017, the endorsement of guidelines and SOPs, training materials, defined system focal person, written tasks and provided all data management tool all these take place after 2017 for that the study focused in 2020 when assessed the level of implementation for the event-based surveillance.

The study result related to presence of Event Based Surveillance (EBS) implementation the result showed the implementation of event based surveillance the system at states level implemented in 18 states with percentage (100%) covered all event information source at other ministries , the percentage of availability of event based system guidelines and SOPs were in 13 states the percentage (72.2%) , 17 states had assigned focal person to follow the system function , implementation process , training and monitoring the system percentage was 94.4% , availability of reporting forms were in 16 states with percentage 88.9%, the event reported through the system was well defined in all states percentage 100% In term of system monitoring indicator, the percentage of data received from deferent source in the system was completed and in time in 17 states the percentage 94.4%, and the report sent from state to the national level was come completed and at time from all 18 states and they keep copy of the report sent to the federal level the percentage was (100%).

Availability of system data based and documentation at state level this was fund in 14 states 77.8% of the analyzed of surveillance system data only done in 4 states 22.2% at state level and shared the reports and finding with partners and related departments this toke place in 16 states the percentage was 88.9%.

Items (N=18)	Yes		No	
	N	%	N	%
EBS	18	100.0	0	0.0
EBS guideline	13	72.2	5	27.8
EBS SOPs	13	72.2	5	27.8
EBS focal person	17	94.4	1	5.6
Availability Forms	16	88.9	2	11.1
Definition of event	18	100	0	0.0
EBS reports Received completed	17	94.4	1	5.6
EBS reports Received in time	17	94.4	1	5.6
EBS reports in time completed to upper level	18	100.0	0	0.0
Keep copies of EBS reports	18	100.0	0	0.0
Data base EBS reports	14	77.8	4	22.2
EBS data analysis	4	22.2	14	77.8
Sharing EBS report with partners	16	88.9	2	11.1

This result followed by improved the implementation level for the community Based Surveillance (CBS) at state level the result showed the system has been implemented in 17 states with percentage (94.4%), the percentage of assigned focal person for the system 94.1%, trained volunteer at community level 94.4% and availability of system guidelines was 94.1%, also the availability of system SOPs 88.2%.

The study results also showed the percentage of 94% for each (immediate response for event reported - Daily and weekly reports completed send by community volunteers – availability of reporting forms) and 70.6% for system data base and shared the report and finding with the partners.

Items (n=18)	Yes		No	
	N	%	N	%
Presence CBS of community-based surveillance	17	94.4	1	5.6
CBS focal person	16	94.1	1	5.6
Training CBS volunteers	17	94.4	1	5.6
CBS guideline	16	94.1	1	5.6
CBS SOPs	15	88.2	2	11.8
Definition of CBS syndromes	17	94.4	1	5.6
Immediate response and verification CBS	17	94.4	1	5.6
Ongoing and zero report for CBS	17	100.0	0	0.0
Daily and weekly reports completed volunteers	16	94.1	1	5.6
CBS forms	16	94.1	1	5.6
CBS reports completed and in time FMOH	17	100	0	0.0
Database CBS reports	12	70.6	5	29.4
Sharing reports with partners	12	70.6	5	29.4

Point of entry surveillance, result showed the surveillance at points of entry has been fully implemented in 6 states from 13 states with percent 46.1% which it had point of entry and it has been designated by IHR, the system had focal person, the training done for all staff with availability of system guidelines and SOPs all this done by 100%.

83.3% of point of entry reported Daily and weekly reports, the percentage of report completeness and timeliness was 66.7% with 83.3% for the zero report when no event of cases reported, availability of system data base and documentation for the events and cases reported through the system was 83.3%.

Items (n=18)	Yes		No	
	N	%	N	%
POE surveillance	6	46.1	7	53.9
POE focal person (n=6)	6	100.0	0	0.0
Training of POE staff (n=6)	6	100.0	0	0.0
POE guidelines (n=6)	6	100.0	0	0.0
POE SOPs (n=6)	6	100.0	0	0.0
Definition of POE disease (n=6)	6	100.0	0	0.0
Daily and weekly POE reports (n=6)	5	83.3	1	16.7
Daily and weekly POE reports completed (n=6)	4	66.7	2	33.3
Daily and weekly POE reports in time (n=6)	4	66.7	2	33.3
Immediate response verification POE reports (n=6)	6	100.0	0	0.0
POE equipped clinic (n=6)	5	83.3	1	16.7
Referral hospital for refer cases (n=6)	5	83.3	1	16.7
Ongoing and zero report for POE (n=6)	5	83.3	1	16.7
POE forms (n=6)	6	100.0	0	0.0
POE reports completed and in time (n=6) FMOH	6	100.0	0	0.0
Database POE reports (n=6)	5	83.3	1	16.7

Discussion

As overall result in surveillance system implementation at state level from 2017 to 2020 there was increased in the level of implementation these was clear stated in implementation event based surveillance the implementation process started in 2017 and in 2020 the percentage was 100%, community based surveillance implementation process started in 2017 and in 2020 the percentage was 94.4% and point of entry surveillance implementation process started in 2017 and in 2020 the percentage was 33.3% the implementation for this system done in the point of entry designated by the IHR with clear plan for expansion.

In order to succeed in implementation of Surveillance systems the basic elements need to be well implemented the results of presence of surveillance systems guidelines for event-based surveillance the percentage was 100%, community-based surveillance was 94.1% and 100% for point of entry surveillance this result showed that the foundation of systems well implemented with guidelines.

For the clear process in the system function the availability of standard operation procedures is very important the study showed the availability or presence of SOPs for event-based sur-

veillance the percentage was 72.2%, community-based surveillance was 88.2% and 100% for point of entry surveillance this result showed that the foundation of systems well implemented with clear standard operation procedures defined the clear role for all system levels.

In term of training and capacity building for surveillance systems staff the result showed increased the percentage of trained personal when compared 2017 and 2020 for event-based surveillance the percentage was 100%, community-based surveillance was 94.4% and 100% for point of entry surveillance these results reflect the staff had basic knowledge and they know how to handle their work.

Accountably in implementation system function is very important and critical, in surveillance system the functions need designated or defined person as focal person for the system under the directorate with clear term of reference and responsibility and supportive team to handle the surveillance system tasks the result of this study when compared 2017 and 2020 showed there was focal person for event based surveillance the percentage was 94.4%, community based surveillance was 94.1% and 100% for point of entry surveillance these result showed that the foundation of systems well implemented with guidelines.

The federal ministry of health taking lead in developing the guideline SOPs , provided the reporting format and developing the case definition for the cases and even the result showed there was clear case definition for event under based surveillance the percentage of availability of event definition was 100%, community based surveillance the percentage of availability of syndrome definition was 94.4% and for point of entry surveillance the percentage of availability of event , syndrome and disease definition was 100%.

For surveillance system data quality and system indicator, the study result showed the timeliness and completeness of data came from state to federal ministry of health level for event-based surveillance the data came completed and in time percentage was 100%, community-based surveillance the percentage of data came completed and in time was 94.4% and for point of entry surveillance the percentage of data came completed and in time was 66.7%.

Conclusion

- There was significant positive change in implementation of event-based surveillance the implementation process started in 2017 and in 2020 the percentage was 100%, community-based surveillance implementation process started in 2017 and in 2020 the percentage was 94.4% and point of entry surveillance implementation process started in 2017 and in 2020 the percentage was 46.1% the implementation for this system done in the point of entry designated by the IHR with clear plan for expansion
- Positive changes in availability of surveillance systems guidelines when compared 2017 and 2020 showed that availability of event-based surveillance guidelines the percentage was 100%, community-based surveillance guidelines was 94.1% and 100% for point of entry surveillance.
- Positive changes in availability of standard operation proce-

dures the study showed the availability or presence of SOPs for event-based surveillance the percentage was 72.2%, community-based surveillance percentage was 88.2% and 100% for point of entry surveillance.

Acknowledgements

The authors thank the health emergency and epidemiology directorate teams in Sudan at state and federal levels for providing logistic, technical, and conceptual support to implement this system during the period of this study. The authors also thank the health cluster partner, particularly WHO, Sudan offices and state suboffice for the support provided

Conflict of interests

No conflict of interests in declared

References

1. World Health Organization. (2008). International health regulations (2005). World Health Organization.
2. World Health Organization. (2014). Coordinated public health surveillance between points of entry and national health surveillance systems: Advising principles (No. WHO/HSE/GCR/LYO/2014.12). World Health Organization.
3. Nsubuga, P., Eseko, N., Tadesse, W., Ndayimirije, N., Stella, C., & McNabb, S. (2002). Structure and performance of infectious disease surveillance and response, United Republic of Tanzania, 1998. *Bulletin of the World Health Organization*, 80, 196-203.
4. Sahal, N., Reintjes, R., Eltayeb, E. M., & Aro, A. R. (2011). Feasibility of implementing recommendations to improve communicable diseases surveillance-a modified Delphi study. *African health sciences*, 11, 93-99.
5. Zaghoul, A., Balajee, A., Varma, J., Idowu, R., & Merali, S. (2018). Africa CDC Event-based Surveillance Framework.
6. FMOH. (2017). Technical Guidelines for Community Based Surveillance System in Sudan.
7. World Health Organization. (2008). International health regulations (2005). World Health Organization.
8. WHO. (2010). Protocol for Assessing National Surveillance and Response Capacities for the IHR (2005). Geneva, (WHO/HSE/IHR/2010.7
9. Sahal, N., Reintjes, R., Eltayeb, E. M., & Aro, A. R. (2010). Assessment of core activities and supportive functions for the communicable diseases surveillance system in Khartoum state, Sudan, 2005-2007. *EMHJ-Eastern Mediterranean Health Journal*, 16 (12), 1204-1210, 2010.
10. World Health Organization. (2014). Early detection, assessment and response to acute public health events: implementation of early warning and response with a focus on event-based surveillance: interim version (No. WHO/HSE/GCR/LYO/2014.4). World Health Organization.
11. FMOH, (2017). Standard Operating Procedures for Community Based Surveillance System Volunteers in Sudan.
12. World Health Organization. (2014). Early detection, assessment and response to acute public health events: implementation of early warning and response with a focus on event-based surveillance: interim version (No. WHO/HSE/GCR/LYO/2014.4). World Health Organization.

13. Africa, C. D. C. (2018). Africa CDC Framework for Event-based Surveillance. Interim version.
14. Nsubuga, P., Eseko, N., Tadesse, W., Ndayimirije, N., Stella, C., & McNabb, S. (2002). Structure and performance of infectious disease surveillance and response, United Republic of Tanzania, 1998. *Bulletin of the World Health Organization*, 80, 196-203.
15. WHO. (2005), 2nd ed. Geneva: World Health Organization.
16. Ratnayake, R., Crowe, S. J., Jasperse, J., Privette, G., Stone, E., Miller, L., ... & Morgan, O. (2016). Assessment of community event-based surveillance for Ebola virus disease, Sierra Leone, 2015. *Emerging infectious diseases*, 22(8), 1431.
17. Kuehne, A., Keating, P., Polonsky, J., Haskew, C., Schenkel, K., De Waroux, O. L. P., & Ratnayake, R. (2019). Event-based surveillance at health facility and community level in low-income and middle-income countries: a systematic review. *BMJ global health*, 4(6), e001878.
18. WHO/EMRO. Manual for the assessment of the public health surveillance system with a focus on Early Warning and Response (EWAR) and Event-Based-Surveillance (EBS). Draft 3. (October 2016)
19. CDC. (2001). Updated Guidelines for Evaluating Public Health Surveillance Systems
20. World Health Organization. (2008). A guide to establishing event-based surveillance.
21. A guide to Establishing Evet Based surveillance
22. Event-Based Surveillance (EBS), (2021) Operational Guideline Khartoum, September 2021 Surveillance, and Information Directorate (SID).

Copyright: ©2022 Abdalla Mohammed Abdalla. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.