

Surveillance System Proposed to Monitor the Burden of Diarrheal Diseases in Pakistan

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Abstract

Pakistan is at high risk of epidemics because of overcrowded cities, unsafe drinking water, inadequate sanitation, poor socioeconomic conditions, low health awareness and inadequate vaccination coverage. The diarrheal diseases contribute to the major disease burden under five along with pneumonia in Pakistan. Unlike vaccine preventable diseases like Polio, measles and maternal & neonatal tetanus, Pakistan does not have any formal responsive surveillance system to monitor the burden of diarrheal diseases and to respond to the outbreaks. Previously, the technical assistance used to be provided by Disease Early Warning System (DEWS WHO) to the outbreaks. Unfortunately, this system is no more functional in Pakistan and WHO had built the technical capacity of the Government staff and had advised health department to carry out their own efforts to monitor the trends of the various diseases including Diarrhea. Thus the objective of this short communication was to identify the gaps in the existing system and to propose a Surveillance mechanism for diarrheal diseases.

We conducted in-depth interviews from Government authorities as well as DEWS officials to understand the surveillance system of various diseases especially for diarrheal diseases placed in Pakistan. We met with Surveillance officer and DEWS officials, headed by provincial coordinator at Directorate Health Service Office, Karachi. These officials informed us about the reporting tools and monitoring system at different levels. After having detailed discussions, we were able to identify certain gaps and loop holes in the currently existing surveillance system and based on that we adopted WHO guidelines to propose surveillance system of diarrheal diseases.

Keywords: Diarrheal disease; Surveillance system; Pakistan

Background

Globally, diarrhea persists to be the second leading cause of death in children under 5 years of age. In the 1980s, five million children worldwide died every year because of diarrhea, essentially because there was no readily available treatment [1]. In the succeeding 30 years, improved management of diarrhea, such as treatment with oral rehydration solutions, intravenous fluids and zinc, has led to a substantial reduction in mortality to approximately 614,000 deaths every year [2]. Nevertheless, diarrhea remains a common cause of death in all children and the question arises that why more children are dying from this preventable disease [3]. Despite of multiple interventions for the management of diarrhea like oral rehydration therapy, intravenous fluids and zinc supplements, the mortality and morbidity associated with this preventable disease has been reduced but could not be cured [2].

Diarrhea is defined as “the passage of 3 or more loose or liquid stools per day or more frequently than is normal for the individual” [4]. It is usually a symptom of gastrointestinal infection and it can be in various forms like acute (presence of three or more loose watery stools within 24 hours), persistent (episodes of diarrhea lasting more than 14 days) and dysentery (bloody diarrhea, visible blood and mucous present) [5,6]. Various bacteria, viruses and parasites can cause diarrhea [7]. Rotavirus is leading cause of severe, dehydrating diarrhea

in children less than 5 years of age globally [8]. Around 25 million outpatient visits and 2 million hospitalizations are attributable to rotavirus. In developing countries, 75% of children have first episode of rotavirus during first 12 months which is delayed till 2-5 years in developed countries. In addition to this, fatal outcomes in children aged 6-14 months have been observed [9].

Overview of surveillance system

Surveillance is an ongoing systematic collection, analysis and interpretation of data, which is used for planning, implementing and evaluating public health policies and practices [10]. There are two important functions of communicable diseases surveillance, first is an early warning of potential threats, which is important for national, regional and global health security and the second is monitoring of program, which is highly important for elimination and eradication of diseases. Moreover, surveillance of communicable diseases helps to monitor the trends of diseases and to take the appropriate action in timely manner [11]. Considering this, different surveillance mechanisms exist for different communicable diseases, which work passively and actively at global and national level [12].

Situational analysis of current surveillance system, placed in Pakistan

Pakistan is at high risk of epidemics because of overcrowded cities, unsafe drinking water, inadequate sanitation, poor socioeconomic

conditions, low health awareness and inadequate vaccination coverage [13]. The diarrheal diseases contribute to the major disease burden under five along with pneumonia in Pakistan [14]. Unlike vaccine preventable diseases like Polio, measles and maternal & neonatal tetanus, Pakistan does not have any formal responsive surveillance system to monitor the burden of diarrheal diseases and to respond to the outbreaks [15].

Previously, the technical assistance used to be provided by Disease Early Warning System (DEWS WHO) to the outbreaks [16,17]. The Disease Early Warning System (DEWS), implemented by the World Health Organization (WHO) in collaboration with the Ministry of Health and National Institute of Health, was the main national surveillance system to detect and respond to infectious disease epidemics in Pakistan. The DEWS was initially implemented in response to natural disaster and displacement emergencies in Pakistan, most notably after the 2010 floods [16]. However, the system had expanded to cover about 107 million people, 57% of Pakistan's population. Its approaches for outbreak detection included immediate alert reporting and weekly data collection on several diseases from about 2,800 health facilities nationwide [18]. Moreover, DEWS used to work in close collaboration with Department of Health, Pakistan and its coverage had been limited to public health facilities in Pakistan. Reporting and quality of the data from these facilities was not up to the mark due to lack of reporting from private health care providers [16]. Moreover, Government authorities were also not taking lead actively regarding their roles and responsibilities in surveillance system. Furthermore, staff placed in public health facilities were not motivated and committed to consider data reporting as a burden rather an important part of their work. They were neither aware about the significance of the surveillance system nor they had technical capacity to collect, analyze or interpret the data and make evidence based decisions.

This system is no more functional in Pakistan and World Health Organization had built the technical capacity of the Government staff and had advised health department to carry out their own efforts to monitor the trends of the various diseases including Diarrhea. Government of Pakistan has many other priorities like polio, dengue hemorrhagic fever etc. therefore no one is making a significant effort to propose the surveillance system for diarrheal diseases. The objective of this short communication was to propose a mechanism to establish a surveillance system for diarrheal diseases in Pakistan.

Methodology

We conducted in-depth interviews from Government authorities as well as DEWS officials to understand the surveillance system of various diseases especially for diarrheal diseases placed in Pakistan. We met with Surveillance officer and DEWS officials, headed by provincial coordinator at Directorate Health Service Office, Karachi. We inquired about the existing surveillance system for various communicable and infectious diseases placed in Sindh along with various roles of different stakeholders especially for diarrheal diseases. These officials informed us about the reporting tools and monitoring system at different levels, from lower level (facility health in charge) to the higher level (District surveillance officer). After having detailed discussions, we were able to identify certain gaps and loop holes in the currently existing surveillance system and based on that we adopted WHO guidelines to propose surveillance system of diarrheal diseases (Figure 1) [19].

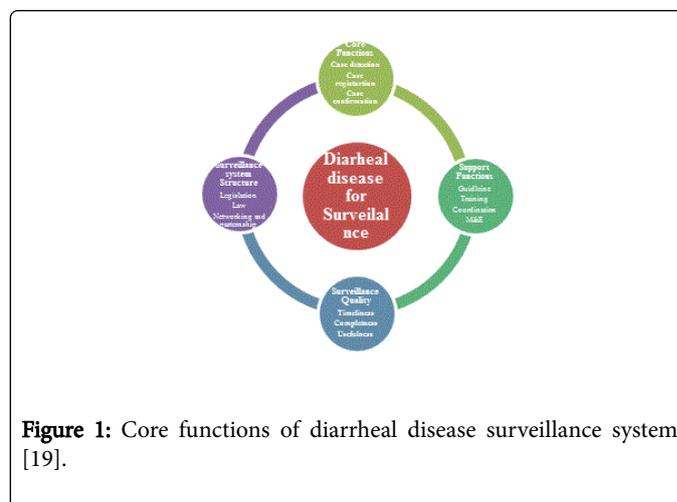


Figure 1: Core functions of diarrheal disease surveillance system [19].

How the surveillance system for diarrheal diseases should operate in Pakistan?

Structure of the system

Considering the nature of diarrheal diseases, broadly there should be a cost-effective passive surveillance system but sentinel surveillance system can also be established at specific sites in particular seasons like summer or after rainy seasons.

The structure of the surveillance and response system is defined by legislation (laws, and regulations, including IHR 2005), the strategy for implementing activities, the implementers and stakeholders, and how they relate to each other and to the various networks and partnerships. This is important that proper legislative support should be there, as it will regularize the private sector to report the data, which was missing in the existing system. Moreover, under-reporting or fake reporting from the health facilities can only be avoided by enforcing laws and legislation.

There are three important surveillance levels i.e. central (province / region, district) peripheral (sub-district, health facility) and community level [19]. Moreover, public as well as private health care providers should be reporting consistently and regularly to each of the above mentioned levels in timely manner. Other stakeholders and implementers including the disease-specific programs, laboratories, and public health training institutions should also be bound to report in timely manner. In addition to this, Directorate health service officer of each district should take the responsibility to ensure the regular reporting from the health facilities and that data should be reported at the provincial level in order to make the evidence based decision making and efficient resource allocation. Moreover, roles and responsibilities of the implementers and stakeholders including health care providers, Government Officials, Surveillance officers, and Monitoring and Evaluation officers should also be clearly articulated and documented before implementing the activities in the field. Health authorities at the district level should take the leading role and they can be facilitated technically or financially by WHO or other donor agencies. The flow of surveillance data and the dissemination and utilization of information needs to be clear and need to be known to implementers and stakeholders and the mechanism for response should be well coordinated across the different levels of surveillance [19].

Core functions

The core functions of the diarrheal surveillance system include case detection, case registration, case confirmation, reporting, data analysis, interpretation and followed by the public health response [19]. This also includes the reports and feedback from the systems to the data providers, stakeholders and decision-makers.

Case detection is the process of identifying cases and outbreaks in a defined geographic area. For diarrheal diseases, a composite case definition is used in Pakistan and Ministry of Health has come up with definitions mentioned in (Table 1) [19].

Disease/Condition	Case definition	Alert threshold	Outbreak threshold
Acute diarrhea (non-cholera)	Acute diarrhea (passage of 3 or more loose stools in the past 24 hours) with or without dehydration, and which is not due to bloody or watery diarrhea	2 times the mean number of cases of the previous 3 weeks for a given location	Cluster of cases in a single location above the alert threshold
Suspected cholera	Suspected case: acute watery diarrhea, with or without vomiting in a patient aged two years or more	1 Acute watery diarrhea (AWD) case	One lab confirmed case, or a cluster (6 or more cases) of AWD in a single locality
Bloody diarrhea	Three or more stools over 24 hours with visible blood, diarrhea, cramping, abdominal pain, fever, nausea, vomiting	3 or more cases in one location	Cluster of cases, 6 or more cases in one location

Table 1: Case definitions of diarrheal diseases with their respective alert and outbreak thresholds [19].

Acute diarrhea (non-cholera) Acute diarrhea (passage of 3 or more loose stools in the past 24 hours) with or without dehydration, and which is not due to bloody or watery diarrhea 2 times the mean number of cases of the previous 3 weeks for a given location Cluster of cases in a single location above the alert threshold

Suspected cholera suspected case: Acute watery diarrhea, with or without vomiting in a patient aged two years or more 1 acute watery diarrhea (AWD) case. One lab confirmed case, or a cluster (6 or more cases) of AWD in a single locality.

Bloody diarrhea, three or more stools over 24 hours with visible blood, diarrhea, cramping, abdominal pain, fever, nausea, vomiting 3 or more cases in one location. Cluster of cases, 6 or more cases in one location.

Case detection should be from both public and private health facilities and these cases should be recorded through a case registration system.

Case/outbreak: Confirmation refers to the epidemiological and laboratory capacity for confirmation. As soon as the suspected case is identified in the facility, health facility in charge should collect the

specimens and send to National Institute of Health (NIH) for investigation. At least index case/primary case should be confirmed through laboratory followed by appropriate and timely response in catchment area. Capacity for case confirmation should be enhanced through improved referral systems, networking and partnerships. Reporting refers to the process by which surveillance data moves through the surveillance system from the point of generation. It also refers to the process of reporting suspected and confirmed outbreaks.

The health facilities across the province are supposed to report to their respective health officials in the Directorate Health Service Office, Karachi through monthly reports. Furthermore, the facilities should also report the outbreak or unusual increase in number of diarrheal diseases based on alert and outbreak threshold to their district authorities. Surveillance data should be analyzed routinely and the information should be used for appropriate public health actions. Appropriate "alert" and "epidemic" threshold values for diseases with epidemic tendencies should be used by the surveillance staff. This should be the responsibility of Town/Taluqa surveillance staff to analyze the data and communicate the trend of diarrheal disease to local as well as higher authorities in order to take the action in timely manner.

Epidemic preparedness: refers to the existing level of preparedness for potential epidemics and includes availability of preparedness plans, designation of isolation facilities, setting aside of resources for outbreak response, etc. The implementation should be at the level of Town/Taluqa, and the coordination with relevant stakeholders should be ensured. Feedback is an important function of all surveillance systems. Appropriate feedback can be maintained through supervisory and monitoring visits. The feedback should involve the dissemination to higher as well as lower levels. Feedback would be either for routine data collection or it could also be on the emergency response from the authorities.

For diarrheal surveillance system, there should be some standard guidelines for implementation, monitoring and evaluation. Standard WHO case definition would be used to define the cases of acute watery, non-watery and other types of diarrhea on routine basis. Apart from this, a threshold would be decided to identify the outbreak/epidemic of diarrhea in any community.

Support functions

One of the essential components of surveillance system would be training of staff on various components like identification of diarrheal cases, reporting of diarrheal cases and timely management of diarrheal cases. Furthermore, health care providers can be trained to identify the diarrheal cases and to avoid the over or under reporting of diarrheal cases. Thus, an ongoing and continuous training would be proposed along with periodic or need based refreshers. This would help to strengthen the capacity of staff and to manage the diarrheal cases effectively. For this, strong supervision would be required to ensure the right use of skills, proper planning of activities and proper mobilization of resources. Moreover, communication facilities would be provided to existing staff for better coordination at each level. Monitoring and evaluation would be a key part of surveillance and proper key performance indicators would be defined to assess the timely implementation of activities.

Surveillance quality

Quality of surveillance data would be assessed through different indicators, such as completeness, timeliness, usefulness and representativeness. It would be ensured that the respective persons of all the facilities should submit the data to the district level in timely manner and data should be comprehensive. Moreover, completeness of case reporting would be verified through random visits by surveillance officers at the facilities or at homes to match the cases reported and actual cases occur over the same period of time. Ideally all forms would be double checked at facility level before these are sent to the district office either through hard copies. Regular feedback would be given from the district office to the facility in charges regarding the completeness of data and reasons would be explored for missing data too. Reporting system would be made, so that immediate notification of acute watery diarrheal cases (suspected cholera) can be made and responded simultaneously. Urgent reporting of acute watery diarrheal cases would be done within 24 hours. All suspected cases of cholera would be confirmed through laboratory investigation by sending the samples to central lab and confirmed cases would be treated as per protocol. The epidemiology of the diarrheal disease would be assessed to identify the high risk areas and to target such groups through proper response to the disease. This would also help to assess the trends of the diarrheal cases over the period of time and any seasonal or cyclic pattern of the disease would be assessed to respond accordingly.

Number of diarrheal cases would be analyzed by year, month, geographical area and age group. Where data exist on etiological agent, incidence rate of each type of organism by geographical area, year, month and age group would also be analyzed. This would help to determine the burden of the disease in the population; prioritize it among other diseases of public health importance; and choose the proper strategies for its control. It can also be ensured that cases should be captured from the predefined catchment area to have a good representativeness of the data from the defined catchment population. Geographic representativeness is highly important to ensure the detection of outbreaks of diarrhea disease and to respond them in timely manner. This would also help to identify the needs of already trained staff for further training to identify all possible cases from the population. Furthermore, data collected through the surveillance mechanism can serve as a baseline against which changes in the proportion of diarrhea hospitalizations can be measured and changes in the age distribution of diarrheal cases, seasonality of diarrhea disease can be monitored. Similarly, high-quality, routinely collected data on all-cause diarrhea hospitalizations can also be used to monitor the impact of various interventions being carried out.

Conclusion

Diarrheal surveillance system is highly important to identify and manage the diarrheal cases in timely manner. Moreover, accountability and regular feedback from higher to lower level is also essential to make the system more efficient. Regular and ongoing refresher trainings for the facility staff should be ensured to develop the technical capacity of staff. This would help them to diagnose and manage the diarrheal cases in timely manner, which in turn would reduce the morbidity and mortality related to diarrhea and would reduce the economic burden on the society as well.

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