Original Article

Evaluation through outbreak simulation exercise points to the need for considerable improvement in the capacity of peripheral health workers for outbreak detection and response, South India, 2018

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Abstract

Background: Outbreaks are emergencies, requiring skilled peripheral health workers in the health system. Given the lack of evaluation of the knowledge and practices of peripheral health workers regarding outbreak investigation and response, we surveyed to estimate the performance level of health workers in outbreak detection and response. **Methods:** We developed a simulation exercise based on hepatitis and fever outbreak to ascertain knowledge and skills in outbreak detection and response. Following a pilot test and with inputs from public health experts, we finalized the instrument in the local language. The simulation exercise was self-administered among all health inspectors (HI) (n = 39) from a district in South India responsible for outbreak investigation. We collected sociodemographic factors, training, education level, awareness about the surveillance program, outbreak triggers, and prior experience with an outbreak. We assigned a score of 0.25 for each correct response (range 0 to 10.75). We categorized a score of <75% as poor performance. The academic ethics committee of ICMR-National Institute of Epidemiology approved the protocol. **Results:** All the HIs were male except one. Median age is 51 years (Range: 37.5–54). The median years of service is 12 (range 5.3 to 23). Twenty-two received training, and fifteen had prior exposure to an outbreak in the previous year. The overall performance of HIs was poor, with the highest mark being below 40%. The median score in the section of history taking was 0.25 [interquartile range (IQR) 0–0.5], 31% (n = 12) scored zero. The median score in the section of data entry, analysis, and outbreak detection was 0.25 (0–0.25), 28% (n = 11) scored zero. The median score in the section of outbreak response was 0.75 (IQR 0.75–1.13), 5% (n = 2) scored zero. **Conclusion:** The HIs performed poorly in outbreak preparedness and response. We recommend improving their performance through field-epidemiology training and regular field or facility-based evaluations.

Keywords: Health inspector, outbreak, simulation exercise

Introduction

Outbreaks are public health emergencies that require a systematic investigation by a trained workforce and a robust public health system for early identification of the causative factors to reduce morbidity and mortality and to develop effective public health measures.[1] The recent Ebola outbreak exposed the existence of weak public health systems in Western Africa. A significant area of weakness was the lack of skilled health personnel at different levels of the health system. In this context, a field epidemiology training program aims at producing qualified epidemiologists to assist in surveillance and health programs. Creating a strong

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epidemiological and surveillance capacity at the national level, although this capacity-building practice does not fully address the needs at the subnational levels.[2] There is induction training, but continuous in-service training at the lower healthcare levels lacks in many countries.[3]

In India, the National Centre for Disease Control (NCDC) is the apex institution that deals with the control, monitoring, and evaluation of infectious diseases in the country. The NCDC has endorsed the step-by-step approach toward outbreak investigation.[4] India's Integrated Disease Surveillance Program (IDSP) under the ambit of NCDC is responsible for the weekly reporting of outbreaks and outbreak investigations in the country since 2004. In India, IDSP consists of peripheral health workers, referred to as health inspectors (HI), with the medical officer being the nodal officer at the primary health center (PHC) level, the HI and medical officer at the block primary health center and the district epidemiologist at the district level. The block medical officer (BMO) receives the report of an outbreak occurring from the district epidemiologist who in turn informs and instructs the PHC medical officer and HI of that service area on outbreak response measures. The IDSP data from all tiers of the health system (i.e., health subcenter, primary health center, block/community health center) are reported weekly with daily reporting in the event of outbreaks. In 2016, the IDSP began publishing monthly disease outbreak reports in its home page.

As stated, according to the established system, at the ground level, health workers play an essential role in detecting disease syndromes and responding under the supervision of the medical officer based on the trigger levels of a disease in their service area. The trigger levels are the thresholds for conditions under surveillance that necessitate predetermined actions at various levels. They depend on the type, magnitude, and severity (fatality). A timely and systematic outbreak investigation requires the integrated involvement of all health workers from the lowest to the highest unit of surveillance.[5] In the absence of a dedicated cadre, the job responsibilities of the peripheral health workers include outbreak response as well.

Research from West Bengal indicates that the competence of health workers for syndromic surveillance was optimal,[6] and another paper from Haryana documents that 10% of the health workers were aware of the knowledge of trigger levels.[7] However, such information is not available regarding outbreak detection and response among peripheral health workers. Therefore, we proposed to estimate the performance level of peripheral health workers, specifically HIs in outbreak detection and response in a district in South India.

Materials and Methods

Human participant compliance statement

We obtained approval for the study from the Academic Ethics Committee of ICMR National Institute of Epidemiology, Chennai and permission was obtained from the district chief of health services of the study district in South India. We obtained written informed consent from each participant who took part in the study. We obtained approval for the study from the Academic Ethics Committee of ICMR National Institute of Epidemiology, Chennai on 1st November 2017.

Study design

We conducted a cross-sectional study among HIs of the primary health centers of one district in South India.

Study population and sample

Assuming 80% poor performance based on a study that has measured competency levels through syndromic surveillance,[6] we needed to interview 40 HIs considering the assumptions of 7.5% precision, 95% confidence interval (CI), and 10% nonresponse. However, we included all the HIs in the district since the number was less than the estimated sample size.

Data collection

We collected information regarding sociodemographic factors, training, education level, awareness about IDSP, trigger levels of an outbreak, and the performance in outbreak detection and response using a self-administered, semistructured questionnaire from March to May 2018.

We developed an outbreak simulation exercise for measuring the performance level on outbreak detection and response. We used inputs from the IDSP manual for health workers (2015) and expert discussions to create hypothetical hepatitis outbreak and fever outbreaks. We prepared the questions with regard to outbreak detection and outbreak response.[1,3,8] For each correct answer, we assigned a score of 0.25. We decided the scoring following peer discussion. The maximum score of the exercise is 10.75 and the minimum score for the activity is 0. (S1) We developed the exercise in English and then translated it into Tamil with the help of a translator. We checked the quality and acceptability through back-translation. We checked the content validity of the instrument through discussions with public health officials. We pilot-tested the questionnaire on two HIs and excluded them from the study. We used the inputs from the review and pilot test to update the instrument before data collection.

Operational definitions

Outbreak simulation exercise

A scenario depicting an outbreak situation at the field level created in a preplanned storyline with questions based on the objective to assess the technical expertize.

Performance

Performance is defined based on the score obtained by the HIs in the outbreak simulation exercise. A score of less than 75% indicates poor performance.

Data analysis

We calculated the median with an interquartile range for sociodemographic characteristics of the study participants.

We calculated the performance score based on the identified correct answers in the simulation exercise. We awarded the marks separately for outbreak detection and outbreak response. We calculated the total score of each outbreak simulation exercise as a percentage. We described the total score in median and quartile. We calculated the performance score (%) for each disease outbreak scenario, and the overall performance score by combining the marks of both the outbreak scenarios. We estimated the proportion of health workers based on the sociodemographic profile, training status, level of education, exposure to outbreak situation, awareness about the IDSP, and trigger levels.

Results

Participant profile

We interviewed 39 HIs, including 38 men and one woman, with a median age of 51 years (IQR: 37.5 to 54). More than half of the respondents were in service for 12 years (IQR = 5.3 to 23). Five respondents had education up to matriculation level. More than half of the respondents had (n = 22) received IDSP training, and 10 had refresher training. Of the interviewed, 15 HIs underwent training for outbreak investigation during the last 12 months and seven respondents over the previous three months.

Awareness regarding IDSP

Of the total surveyed, 30 respondents were aware of IDSP and 11 correctly named it. Seventeen HIs were aware of the term trigger level. A low number of respondents gave the correct definition for the trigger level of dengue (n = 7) and jaundice (n = 4). The correct definition of an outbreak was given only by two HIs. More than half of the HIs (n = 30) were aware of the form submitted for the program, and 25 HIs were aware of the day to submit the form.

Performance of health inspectors in the outbreak simulation exercise

In the preceding year, less than half of the HIs (n = 15) had exposure to an outbreak situation. Of the outbreaks reported by HIs, 60% were dengue (n = 9) followed by other fever outbreaks (n = 3). The performance score calculated was far below the 75% cutoff that was previously decided for categorization. Hence, we calculated the median scores. The median overall performance score for the outbreak simulation exercise was 1.25 (IQR: 0.9 to 1.9) and the highest score was 40% (n = 4.25). More than half of the respondents (n = 25) scored above the median score. The median performance score for the fever-based outbreak simulation exercise was 0.25 (IQR: 0 to 0.5) and that for the hepatitis A–based outbreak simulation exercise was 1 (IQR: 0.75 to 1.38). More than half of the respondents (n = 23) scored above the median score in the hepatitis A outbreak simulation exercise. A lesser number of respondents (n = 15) scored above the median score in the fever outbreak simulation exercise [Figure 1].

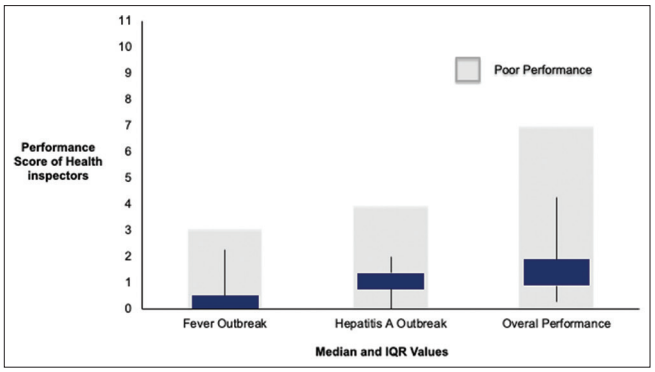

Figure 1: Distribution of performance scores among health inspectors (N = 39) for outbreak simulation by type of disease

Further, we looked into the practice of history taking, data analysis, and outbreak detection and response [Figure 2]. The median score of the respondents in the section of history taking was 0.25 (IQR: 0 to 0.5), 44% (n = 17) of the respondents scored above the median, and 31% (n = 12) of the respondents scored zero. The median score observed in the section of data entry, analysis, and outbreak detection was 0.25 (0 to 0.25); only 8% (n = 3) scored above the median score and 28% (n = 11) of the respondents scored zero. The median score observed in the section of outbreak response was 0.75 (IQR: 0.75 to 1.13); 39% (n = 15) scored above the median and only 5% (n = 2) scored zero.

Discussion

We surveyed peripheral health workers in a district of South India for ascertaining their performance and awareness about outbreak detection, investigation, and response. We identified that the overall performance was low among peripheral health workers as measured through a simulation exercise.

Simulation exercises help in providing an evidence-based assessment for strengthening the functional capacities of workers. Similar tools were used by the World Health Organization (WHO) for capacity building and quality assurance.[9] For this study, we developed an outbreak simulation exercise to assess the performance of the HIs toward outbreak investigation. In the outbreak simulation exercise, we identified that the HIs performed comparatively lower in terms of outbreak detection and data analysis. The traditional form of training for peripheral health workers provides only concepts; however, to improve the performance, experiential training would be more fruitful.[10] Simulation exercises where participants compile and analyze the dataset help in reinforcing the essential concepts in field epidemiology training.[11]

Another observation from the study is that the health staff with more extended service experience were inadequately incompetent with only a smaller number receiving refresher training. This incompetence could also result in poor performance. The low level of awareness on trigger levels and lack of clarity on outbreak definitions support the need for refresher training and

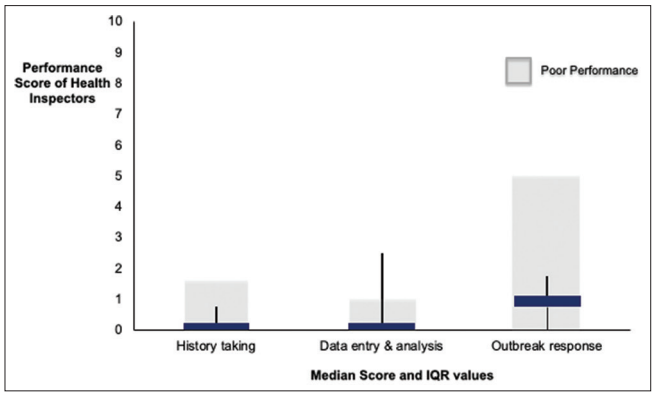

Figure 2: Distribution of performance scores among health inspectors (N = 39) for outbreak simulation by activity in the investigation

support supervision. These findings are in line with the current discussion of public health response to ongoing pandemic, where there is a lack of specific guidelines and policies to ensure specific responsibilities, pandemic preparedness, and continued training for health workers.[12] Further, post training supervision or mentorship would improve the capacity of health workers.[12,13]

Published studies related to ongoing pandemic describe the importance of primary care physicians in direct clinical care. However, to ensure the continuity of care during an emergency there needs to be a strong partnership between the primary care physicians and peripheral health care workers.[14] Adequate health resources, open communication, and supportive supervision are the key measures to ensure a strong partnership and prevent health worker exhaustion in a limited resource setting.[14] The lack of skilled peripheral health workers, as documented in the study, could affect this support mechanism. Hence it is necessary for primary care physicians to monitor performance of health workers. Identify knowledge gaps and ensure regular trainings and assessments to improve the skills of peripheral workers.

Our study has a few limitations. First, we used an outbreak simulation exercise to self-evaluate the performance of HIs in an outbreak scenario. Such evaluations could have been more realistic in capturing the skills if based on a field-based assessment than a classroom-based assessment. We did check the content validity but did not quantify the same. In practical terms, simulation exercises are quick ways of understanding training-related issues in resource-poor settings. Our activity also failed to capture the skills required for resource prioritization and time management.

On the basis of our assessment among peripheral health workers in a district of South India, we conclude that the staff exhibited inadequate performance capacity in terms of outbreak preparedness and response. This incompetence could be due to the lack of a mandatory and continued training mechanism that is integral to the capacity building of health workers. We recommend that such routine assessments using simulation exercise would enable in understanding the gaps in learning and therefore help tailor making training programmes for health workers. The current pandemic, in fact, has highlighted the importance of the outbreak preparedness and coordinated response of primary care physicians and peripheral health workers in achieving sustainable outcomes. Hence, for overall improvement in the surveillance and response operations in the district , we suggest mandatory field- epidemiology based training with routine assessments and supportive supervision.

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Conflicts of interest

There are no conflicts of interest.

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