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Diphteria's Outbreak Control in Blitar District

Gamasiano Alfiansyah[1*], Selvia Juwita Swari[2], Maya Weka Santi[2]

[1]Politeknik Negeri Jember, Jember, Indonesia;
[2]Politeknik Negeri Jember, Jember, Indonesia;

*Corresponding author:
Gamasiano Alfiansyah;
Politeknik Negeri Jember, Jember, Indonesia;
gamasiano.alfiansyah@polije.ac.id

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ABSTRACT

Introduction: Diphtheria is an acute bacterial disease that attacks the pharynx, tonsils, larynx, nose, and sometimes attacks the mucous membranes or skin, conjunctiva, and vagina. Implementing diphtheria control in the Blitar district is constrained by program implementation management, with the number of diphtheria cases still high. This study aimed to analyze the implementation of the prevention of diphtheria outbreaks during the preparation, surveillance, investigation, and response stages.

Methods: This study was qualitative on health workers in charge of managing diphtheria outbreaks at both the health office and community health centers. Data were collected through in-depth interviews and observations and analyzed using content analysis methods.

Results: The results showed that the availability of human resources to deal with diphtheria was inadequate both in terms of numbers and educational background, surveillance training has not been conducted, supplies of Anti-Diphtheria Serum and erythromycin were depleted, limited room isolation, active surveillance has not been carried out, some communities refuse immunization, disinfection has not been carried out, and lack of public knowledge about diphtheria.

Conclusion: This study recommends several suggestions. The Health Office should provide specific surveillance training to health workers, sufficient supply of Anti Diphtheria Serum and erythromycin, establish regulations for supervising close contact and create an isolation room in a private hospital. Community health centers should supervise close contact, disinfection of patients' houses, increase education, and conduct community empowerment in carrying out surveillance.

Keywords: Outbreak, Diphtheria, Control.
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INTRODUCTION

Diphtheria is an acute bacterial disease that attacks the pharynx, tonsils, larynx, nose, and sometimes the mucous membranes or skin, conjunctiva and vagina.[1] Diphtheria is a disease that can cause an Outbreak.[2] The outbreak is the occurrence or increase in the incidence of epidemiologically significant morbidity or death in an area within a certain period. One case of diphtheria is an outbreak, so it is necessary to make efforts to control diphtheria through outbreak management.[3]

Outbreak management is an activity carried out to investigate and respond to an outbreak. It aims to protect public health by identifying the source of the disease and implementing control measures to prevent the further spread of the disease. Outbreak management includes the stages of preparation, surveillance, investigation, and response to the outbreak.[4] Poor outbreak management will cause the number of diphtheria cases to increase, both in the regional and state scope.

Based on national surveillance data, diphtheria disease has spread in several provinces in Indonesia, with East Java as the largest contributing province by 74% and is an area that, almost every year, experiences an increase in the number of cases. The district in East Java with a high incidence of diphtheria is the Blitar district. There were 43 cases of diphtheria in the Blitar district in 2015, with the highest number in the Kanigoro sub-district with 9 cases. There were 43 cases of diphtheria in the Blitar district in 2015, with the highest number in the Kanigoro sub-district with 9 cases.[5] The current control of the diphtheria outbreak by the Blitar district health office is to conduct an epidemiological investigation, close contact identification, early case finding, care for patients according to procedures, prophylaxis for close contacts, intensive surveillance with socialization to all service units, Outbreak Response Immunization (ORI) limited in the outbreak area, and the implementation of the National Immunization.

The researcher conducted a preliminary study through interviews with the surveillance officers of the Blitar district health office and obtained the results that diphtheria outbreak control encountered several obstacles. Therefore, this study aimed to analyze the implementation of diphtheria outbreak control in the Blitar district by examining aspects of organizing an outbreak controlling, intensive surveillance, outbreak investigation, outbreak communication, outbreak documentation, and constraint to overcoming diphtheria outbreaks.

METHODS

Study Design

This research was qualitative research to get an overview of the effectiveness of the

Diphtheria outbreak control program in the work area of the Blitar district health office.[6,7] The study was conducted in the Kanigoro community health center area with the highest diphtheria cases in 2015.

Data Collection

The main informant of the study was the head of the Blitar district health office, the head of the disease control and health problems division of the Blitar district health office, head of the section on prevention and management of health problems at the Blitar district health office, Blitar district health service surveillance officer, head of the Kanigoro community health center, Kanigoro community health center surveillance officer. The triangulation informants were the Gaprang village headman, Sawentar village headman, Gaprang and Sawentar village midwives, former diphtheria patients in Gaprang village, and former diphtheria patients in Sawentar village. Primary data was obtained through in-depth interviews and observation, and secondary data through document review.

Data Analysis

Data were analyzed using the content analysis method through data collection, data reduction, verification and presentation, and conclusions.[8]

RESULTS

Diphtheria is an acute bacterial disease that attacks the pharynx, tonsils, larynx, nose, and sometimes the mucous membranes or skin, conjunctiva, and vagina.[1] Diphtheria is a disease that can cause an outbreak.[2] One case of diphtheria is an outbreak, so it is necessary to make efforts to control diphtheria through outbreak management.[3] Management of diphtheria outbreak was carried out by treating patients to prevent severe complications and eliminating the source of diphtheria transmission. In addition, immunization should be given to provide immunity to vulnerable populations. Investigation and control of diphtheria outbreaks involved epidemiological surveillance, immunization programs, and clinical and laboratory activities. Management of diphtheria outbreak was carried out through patient management in hospitals, epidemiological surveillance, immunization, and laboratory examinations.

The hospital management of patients was carried out through bacteriological examination of the nose and throat swabs of suspected diphtheria patients. If diphtheria was suspected, then specific therapy with antitoxin and antibiotics should be started immediately. Patients with suspected diphtheria were immediately referred to the hospital and placed in an isolation room, reduced patient contact with other people, and the patient was given anti-diphtheria serum (ADS). Patients were considered cured if the laboratory results were negative after the completion of the treatment period.

Epidemiological surveillance was an activity of collecting data, processing and analyzing data, continuously interpreting data, and disseminating information to those who need it to make policies. Diphtheria epidemiological surveillance activities included epidemiological investigations, close contact management, data record review, identification of risk factors, identification of high-risk populations, risk factor interventions, intensive surveillance, immunization coverage surveys, and reporting.

Immunization to overcome diphtheria outbreak included strengthening routine immunization for infants (<1 year), completing DPT-HB immunization status for children aged 12-36 months which was prioritized in non-UCI villages or sub-districts, providing additional immunizations for children aged >3-7 years by using DT vaccine, immunizing Td vaccine in children aged >7-15 years, conducting Rapid Convenience Assessment (RCA) in areas that carry out immunizations to see the validity of immunization coverage as well as community responses to refusing immunization, monitoring the quality and management of the vaccine chain, fostering competence vaccine management officers and immunization program coordinators, replacing vaccine storage refrigerators at public health centers that are not functioning, re-immunizing patients who have recovered based on age groups, and conducting backlog fighting (BLF).

Laboratory examination was very necessary to confirm suspected cases and probable cases and determine whether there were carriers of the disease around the patient. Targets in taking specimens included suspected diphtheria, people who were in close contact with the suspect in the same family, and people in contact with patients such as those in hospital, teachers, and schoolmates.

DISCUSSION

Organizing an Outbreak Controlling

The preparation stage in controlling diphtheria outbreak included guidelines for controlling diphtheria outbreak, diphtheria outbreak control coordinator, rapid action team, human resources, training for officers, and funds for controlling the outbreak.[4] The Blitar district health office is the organization responsible for controlling diphtheria outbreaks. The Blitar district health office has a manual for controlling diphtheria outbreaks. The manual was made by adopting and modifying the diphtheria control manual published by the East Java Provincial Health Office. These modifications included ORI immunization coverage which should be carried out in one village, but it was carried out in one sub-district. In addition, erythromycin should be given to all close contacts only to very close contacts. The standard operating procedure is a written rule that is useful in regulating the behavior of members of the organization to do their job and be responsible for the organization. Standard operating procedures serve to establish a systematic and accountable work system following applicable policies and regulations.[9] The operational standard of work to control diphtheria outbreaks is considered very important as a work instruction to facilitate health workers.[10]

The coordinator of diphtheria outbreak control was responsible for coordinating health workers in dealing with diphtheria outbreaks in the Blitar district. The coordinator of the diphtheria outbreak control had an important role in the management of the outbreak because he acted as a communicator between the Blitar district health office and the ministry of health, the provincial health office, public health centers, and the community, and ensures that the dissemination of

information about outbreak can proceed quickly.[4,11] The position was held by the head of the section for prevention, disease observation, and management of health problems at the Blitar district health office. However, when an outbreak of diphtheria occurred in the community, the fast-moving team that conducted an epidemiological investigation was led by a community health center surveillance officer. Meanwhile, health workers from the Blitar district health office provided advice if there were obstacles and conducted epidemiological investigations on patients who had been hospitalized.

Human resources were an important factor in controlling the diphtheria outbreak in the Blitar district. Health offices and especially community health centers suffered from limited human resources involved in controlling diphtheria outbreaks in terms of number and competence. The lack of human resources was due to the high workload of officers in community health centers. The lack of human resources was caused by staff moving to other institutions and job rotation in community health centers. In addition to providing treatment services at community health centers, community health center officers must carry out epidemiological investigations when diphtheria outbreaks occur, carry out intensive surveillance, carry out prevention efforts such as educating the community and immunization carried out simultaneously in one sub-district.

Competent health workers must carry out diphtheria outbreaks. The lack of skills of officers to control diphtheria outbreaks was due to lack of training and education. The human resources in the community health center did not have a surveillance education background, and they had not gotten enough of the training needed to deal with diphtheria outbreaks. The training carried out was training for taking nasal and throat swabs. In addition, the Blitar district health office provided refresher lessons for midwives to recall lessons such as immunization, injection procedures, and diseases that can be prevented by immunization. Training is providing employees with the skills needed to carry out their duties.[12,13] An outbreak must be handled by trained health workers, so certain training needs to be carried out to support health workers in carrying out their duties.[4] Lack of qualified human resources is one factor that contributes to the spread of diphtheria.[14] Therefore, it was necessary to conduct surveillance training, cold chain management training, and case reporting training.

Equipment to control diphtheria outbreaks was an important factor in overcoming diphtheria outbreaks in the Blitar district. This equipment included tools, medicines, and infrastructure to support diphtheria outbreak control. The Blitar district health office had several tools to control diphtheria outbreaks, such as gloves, masks, antiseptics, amies media, and cold chains. Amies media is a tool to take specimen samples from nose and throat swabs. A cold chain is a tool used to keep vaccines in good condition. The cold chain had been improved for the last three years for the needs of midwives. Isolation rooms for diphtheria patients were located at the Regional General Hospital with a capacity for 2 persons. This was deemed insufficient because, during an outbreak situation, the possibility exceeded the capacity of an isolated patient.

Early diagnosis and treatment of diphtheria antitoxin and antibiotics cases are effective treatments.[15] Erythromycin is an antibiotic used to treat certain infections caused by bacteria. Erythromycin is given to close contacts of diphtheria. Erythromycin 250 mg (for children) and 500 mg (for adults) were currently out of stock. The lack of antibiotics to treat close contacts is one of the major contributing factors to the spread of diphtheria.[14] One way to control diphtheria is to ensure the availability of anti-diphtheria serum (ADS). ADS is an antitoxin that must be given immediately to patients with diphtheria. Blitar district health office ADS supplies were currently running out. ADS ran out at the district level and at the Provincial Health Office, and it was even suspected that ADS was running out nationally. If a case occurs, the health office must look for ADS supplies to other districts, and the patient paid for himself. ADS availability is very important. 73% of the deaths of diphtheria patients were caused by running out of ADS. It would be very difficult to cure diphtheria without ADS.[16,17]

The operational fund was an important factor in controlling the diphtheria outbreak in the Blitar district. The Blitar district health officials did not have a specific budget for the diphtheria outbreak, but the general outbreak funding was combined with other surveillance funding for one year. The operational fund used to control the diphtheria outbreak in the Blitar district was sourced from the special allocation fund from the health ministry to purchase medicine. The national health insurance fund at the community health center could be used if the medicine in the pharmacy warehouse run out. Meanwhile, the General Allocation Fund of the Blitar district government was used for the incentives of immunization officers. However, there was no incentive for community health center rapid action team officers and village midwives to carry out epidemiological investigations. According to the surveillance officer of the Blitar district health office, the funds were considered insufficient due to the large area of the Blitar district. Operational funds can be used as a tool for coordinating work to work together well, support each other, and achieve the goals that have been set so that efforts to control diphtheria outbreaks in the Blitar district are more secure.[18]

Intensive surveillance

The diphtheria surveillance system is the process of collecting, processing, analyzing, and interpreting diphtheria incident data systematically and continuously and disseminating information to units that need it to be able to take policies. Intensive diphtheria surveillance is aimed for early vigilance by finding cases early with diphtheria-like symptoms. The implementation of intensive diphtheria surveillance was supported by weekly reports from the community health center and the Blitar district health office. However, the surveillance carried out was passive. Data were collected from health services, the community, or other sources. The implementation of active surveillance of diphtheria was not carried out properly due to a lack of supervision for close contacts. All close contacts should look for signs and symptoms of diphtheria and be monitored daily for seven days from the

date of the last contact with a diphtheria case.[19] Daily surveillance should include throat examination and temperature measurement.[19,20]

Active surveillance was data collection carried out by health workers visiting the community. Active surveillance included an in-depth search of cases that have the potential to cause an outbreak. Active surveillance is carried out by conducting daily checks on people suspected of having the potential to cause an outbreak and immediately reporting to health services [11]. Active surveillance could be carried out by health workers who were part of the fast-moving team or by health workers in villages such as village midwives. Active surveillance could also be carried out through community empowerment by providing community education and training on detecting early signs or symptoms of diphtheria to be reported to the headman, village midwife, or health services. This would ensure that the surveillance system did not miss a single probable case.[21]

How to control diphtheria is to educate and convey information to the public about diphtheria disease and advise the public to seek treatment immediately if they experience symptoms of diphtheria.[1,20] Most people have low knowledge about the disease they suffer.[22] People who had not received education about diphtheria were one of the risk factors for diphtheria transmission with an OR value of 16,4. People with low knowledge are 16.4 times more at risk of contracting diphtheria than people with knowledge.[23] Therefore, it was necessary to increase self-awareness through education and health promotion that was limited to hospitals and carried out in the community.

Outbreak Investigation

The way to deal with diphtheria is to identify cases quickly.[24] Epidemiological investigation is an investigation to get an overview of health problems in the community through data collection, data processing and analysis, making conclusions, and recommendations in reports. Epidemiological investigations are expected to identify close contacts, immunization coverage, sources of disease transmission, find additional cases, and initiate efforts to prevent the spread of the disease.[19,25]

The first stage of the diphtheria outbreak investigation is to confirm that the suspected case is an outbreak. Confirmation of cases was carried out by health workers asking the patient or his family again about symptoms of illness, time and place of illness, contact during the previous week, and immunization status.[19,25] After confirming that the information was accurate, the diphtheria outbreak was carried out, a W1 report was carried out and continued with an epidemiological investigation by the rapid action team. Epidemiological investigations were carried out immediately (<24 hours) after receiving a report of an outbreak of diphtheria. It aimed to find additional cases immediately and broke the chain of diphtheria transmission in the community. Diphtheria case reports must be complete and accurate based on clinical symptoms and laboratory examinations.[26]

The epidemiological investigation resulted in the identification of close contacts and a population at high risk of diphtheria. Community health center surveillance officers identified close contacts by asking the patient or family of a diphtheria patient who had been in contact with the patient in the previous seven days. Close contact management is a way to control diphtheria outbreaks.[27,28] All close contacts must be monitored for finding pseudomembrane and temperature measurements. Furthermore, close contacts would be given erythromycin treatment for 7-10 days. Close contacts are very important to identify so they could be given protection from becoming diphtheria.

Outbreak Communication

When an outbreak occurs, communication is an important approach to outbreak management. Diseases that cause outbreaks often occur at unexpected times and can spread quickly. When an outbreak of diphtheria occured, communication to the community, coordination between the health office and community health centers, and cross-program collaboration and cross-sectoral collaboration.

Communication to the community was carried out through socialization and education about diphtheria, its symptoms, dangers, and prevention through community activities, radio, and other community activities carried out by health workers from the Blitar district health office and community health centers, village midwives, and cadres. Education to the community was expected to increase public knowledge about diphtheria. Knowledge can be obtained from experience, other people's information, and mass media and electronic media.[29] Knowledge is one of the factors that influence people's behavior. Knowledge is a very important domain in shaping people's behavior.[30]

Coordination between the health office and the community health center was carried out whether there were suspected cases of diphtheria or in controlling diphtheria outbreaks. Coordination was carried out in small meetings consisting of the head of the health office, the head of the community health center, and the disease control team of the health office to make recommendations in controlling diphtheria. Good coordination is very important in an organization to prevent chaos so that officers and their work can be directed to achieve goals. All work is integrated into the desired goals.[31]

Overcoming diphtheria outbreak could not be handled by surveillance officers from the Blitar district health office and community health centers, but collaboration with other parties was needed. Cross-program collaboration in controlling diphtheria outbreaks included collaboration with the immunization department, health promotions, maternal and child health, health care services, and health resources. The cross-sectoral collaboration included the empowerment of family welfare, the education office, the Ministry of Religion, stakeholders, Dharma Wanita, village heads, and heads of sub-districts. This is very important because one of the success factors in tackling diphtheria outbreaks is to improve coordination and cooperation with several partners in public health emergencies.[32]

Outbreak Documentation

Documentation of diphtheria outbreak was reporting the investigation and control of diphtheria outbreak and routine reporting

of the diphtheria surveillance system. The public health center surveillance officer would report the report on the investigation and control of the diphtheria outbreak to the Blitar district health office through the diph-1 document. The diph-1 document contained the patient's identity chronologically until the results of the examination were sent to the provincial health office.

Diphtheria surveillance reports were carried out regularly once a week by the community health center to the Blitar district health office. Comprehensive reports of diphtheria outbreaks were essential for a diphtheria surveillance system. This is because the outbreak data makes it easier to recognize the relationship between events in various regions. The report data can be used to convince health professionals and the public about the importance of preventive measures. Outbreak documentation can be used to evaluate and improve prevention strategies, allows to identify risk factors for rare cases, the reports can be used as a tool in disease study and outbreak investigations, and statistical data for diphtheria outbreak is easier to organize.[4]

Constraint to Overcoming Diphtheria Outbreak

The Blitar district health office had made various efforts to control diphtheria outbreaks, including community education, epidemiological investigations, Outbreak Response Immunization, cross-sector collaboration, swabs to patients, isolation in hospital, giving ADS, and care in close contact with swabs and erythromycin. Prevention of diphtheria can be carried out through immunization and education to the community about diphtheria, the dangers of diphtheria, and the importance of active immunization to infants and children.[1] Immunization given to children aged 6-8 years increases protection against diphtheria.[33]

Overcoming diphtheria outbreaks can be conducted by increasing immunization coverage for children and adults whose immunization coverage is incomplete.[27,28,32,34] The immunization coverage survey was conducted to determine the condition of the immunization status of the community around the case to find out whether the community was a vulnerable group. Immunization coverage survey conducted using cohort data from village midwives to see immunization coverage in a village. A high level of immunity in the community is needed to control diphtheria outbreaks.[34] The factor that causes diphtheria to spread quickly is incomplete immunization, adults who have not received a booster vaccine, and people's low immunity.[35] The region with low immunization coverage (<50%) is prone to the outbreak, and with increasing immunization coverage, the incidence of diphtheria will decrease.[36,37]

However, there was still a group of people who refuse immunization because they did not get permission from their husbands and they considered that immunization was forbidden for their religion. Husband's support affects mothers' participation in immunizing their toddlers, and parental education level significantly affects immunization refusal.[38–40] People who are not immunized are one of the risk factors for contracting diphtheria with an OR value of 19,2. This means that people who are not immunized are 19.2 times more at risk of contracting diphtheria than people who are immunized.[41]

Health workers had not carried out disinfection to deal with diphtheria outbreaks. Disinfection is carried out on all items used by patients and on items contaminated with patient discharge.[19] This is important because goods contaminated by patient discharge have the potential to be a medium for diphtheria transmission. Using the same equipment as diphtheria patients in the same house, such as eating utensils, beds, and towels, is a risk factor for transmission with an OR value of 7,4. People who use the same equipment with diphtheria patients are 7.4 times more at risk of contracting diphtheria than people who do not use the same equipment with patients with diphtheria.[41]

CONCLUSION

This outbreak reminds us that diphtheria may still cause a large, rapidly expanding outbreak. Handling diphtheria outbreak requires good preparation, including human resources, equipment, guidelines, and funds. Participation from various parties is needed to overcome the diphtheria outbreak, and the community needs to increase their knowledge and awareness of diphtheria. In addition, the willingness of the community to participate in immunization is very important to resolving the diphtheria outbreak. Future studies with better study design and minimize the study limitations about the topics.

DISCLOSURE

Author Contribution

All authors have contributed to this research process, including conception and design, analysis and interpretation of the data, drafting of the article, critical revision of the article for important intellectual content, final approval of the article, collection and assembly of data.

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Conflict of Interest

There is no conflict of interest for this manuscript.

Ethical Consideration

This research was approved by the Health Research Ethics Committee of the Politeknik Negeri Jember. Letter of exemption Ref. No. 12 599/PL13/LL/2015

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