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HEALTH PROBLEM ANALYSIS OF CLOSE CONTACT MANAGEMENT OF DIPHTHERIA DISEASE IN MADIUN CITY IN 2023

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Abstract

Background: Diphtheria is an infectious disease caused by the bacterium Corynebacterium diphtheriae that can be prevented by immunization. **Purpose:** The purpose of this research is analyze health problems in the PD3I surveillance program at the Madiun City PP & KB Health Service in 2023. **Methods:** This research is a descriptive observational research. Prioritize problems using methods of Capability, Accessibility, Readiness, Leverage (CARL). The priority of the problems found is to identify the causes of the problem using fishbone analysis. The root cause of the problem that is found will create alternative solutions to the problem. **Results:** Management of close contact chemoprophylaxis and re-immunization diphtheria with a CARL score of 400 is a top priority health problem in Madiun City. Four cases of diphtheria have been identified during the year 2023 for a period of six months (January-June 2023), so the next action is to administer chemoprophylaxis to close contacts. The provision of chemoprophylaxis in Madiun City still has problems, namely the activities of drug-taking supervisors who are not health workers and the behavior of dropping out of drug-taking in close contacts due to the side effects of the drug erythromycin. **Recommendations:** Health workers need to monitor medication supervisors who are not health workers online through WhatsApp groups. Promotion of taking erythromycin medication with meals or after meals to minimize side effects of erythromycin. Promotion of medication adherence in close contacts.

Keywords: Diphtheria, Side Effect of Eritromycin, PMO Activity

Introduction

Diphtheria is a contagious disease caused by bacterial infection through coughing, sneezing or open wounds. Diphtheria is an infectious disease that can be prevented through vaccination. The disease is caused by a toxigenic strain of Corynebacterium diphtheriae. Transmission occurs through close contact with droplets from coughing, sneezing, vomiting, eating utensils, and skin wounds. If untreated and without immunity, the mortality rate is about 50%, but with treatment the mortality rate is about 10%. Diphtheria has an average mortality rate of 5 to 10% in children under 5 years of age and 20% in adults over 40 years [14].

Diphtheria According to Minister of Health Regulation No. 1501/2010, diphtheria is a type of infectious disease that can cause an outbreak. Suspected diphtheria cases with symptoms of pharyngitis, tonsillitis, laryngitis, tracheitis, or a combination of both, with or without fever, and the presence of a gray-white pseudomembrane that is difficult to remove and bleeds easily: Must be reported within 24 hours. Immediate action must be taken to break the chain of transmission. Efforts to contain diphtheria

outbreaks are carried out by involving related programs such as epidemiological studies, vaccination programs, doctors, laboratories, other health programs, and relevant cross-sectoral programs [15].

Diphtheria cases spread to almost all parts of Indonesia in 2021. In 2021, the number of diphtheria cases was 235 cases, the number of deaths was 25 cases, and the CFR was 11%. The number of diphtheria cases in 2021 decreased compared to 2020 (259 cases). The number of deaths due to diphtheria increased significantly compared to the previous year (13 people). CFR increased in 2021 compared to 2020 (5.02%). East Java has the highest number of infections at 59, West Kalimantan 49, and West Java 33, but no diphtheria cases were detected in 11 provinces in 2021 [15]. East Java is the province with the highest incidence of diphtheria. East Java is the province with the most diphtheria cases in Indonesia. The number of diphtheria cases in East Java increased in 2018 by 695 cases. In 2019 diphtheria cases decreased to 358 cases, in 2020 by 94 cases and in 2021 by 45 cases [4]. So diphtheria is still a serious health problem, especially in East Java.

The discovery of Diphtheria suspects in Madiun City in 2021 was 1 (one) case, and there were no deaths. The number is the same as the incidence of cases in 2020 but in 2019 there were 4 (four) suspects. In 2022 there were no diphtheria cases but in 2023 4 (four) suspects were found per 6 months. 2 (two) suspects have unknown diphtheria immunization status, 1 (one) suspect has had diphtheria immunization only based on parental memory, and 1 (one) other suspect has had complete diphtheria immunization with the date of immunization based on the health center immunization program records. In 2022 in Madiun City, the immunization coverage of DPT/HB 1 was 84.66%, DPT/HB 2 was 84.13%, and DPT/HB 3 was 83.40% [5].

The incidence of diphtheria is closely related to a person who is in close contact with a person diagnosed with diphtheria so that an Epidemiological Investigation (PE) is carried out and prophylaxis is carried out. Prophylaxis is carried out to prevent diphtheria transmission by chemoprophylaxis and re-immunization. Chemoprophylaxis is carried out by administering the drug erythromycin with monitoring of taking the drug and re-immunization for someone who has not or forgot to do the DPT 1,2,3 vaccine. The results of the analysis, there were 40 people who carried out chemoprophylaxis where the chemoprophylaxis was incomplete as many as 29 people (72%). In addition, there were drug side effects where someone experienced side effects and stopped taking the drug as many as 15 people (37%). People who were in close contact with patients who had been given prophylaxis mostly did not take the drug for 7 days.

This can make the spread of diphtheria more widespread in Indonesian regions. Madiun City is one of the areas in East Java province that still has diphtheria. The discovery of diphtheria is still high because close contacts who do not carry out prophylaxis according to the rules are still high, so it is necessary to know the factors that influence the low behavior of carrying out prophylaxis according to the rules in the Madiun City PP & KB Health Office area.

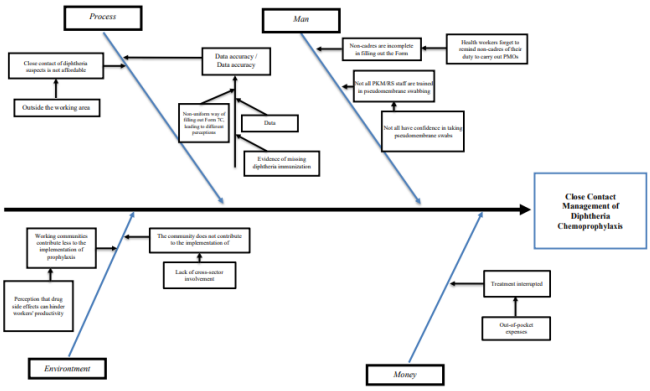
Metode

This research is a qualitative research with descriptive observational design. This research was conducted in the working area of the Madiun City PP & KB Health Office in July-August 2023. The informant in this study was the manager of the PD3I Surveillance program at the Madiun City PP & KB Health Office. Secondary data were obtained from the 2019-2021 health profile and the annual recording report at the Madiun City PP & KB Health Office in 2022-2023. The dependent variable in this study is diphtheria while the independent variables are prioritization of health problems, root causes of problems, and alternative problem solving. The determination of problem priorities in this study uses the CARL method (Capability, Accesibility, Readiness, Leverage). Prioritization of problems found will be identified as the root cause of the problem using a fishbone diagram and alternative problem solving will be made. Data collection in this study was carried out using in-depth interviews through

questionnaires. Data presentation in this research uses tables and narrative texts. This study was reviewed and approved by the Ethics Committee of the Faculty Of Dental Medicine Health, University of Airlangga (Approval Number : 0062/HRECC.FODM/II/2024).

Result

The results of prioritizing the problem can be sought for the root cause of the problem. Identification of the cause of the problem is described using a fishbone diagram using a classification based on Man, Money, Material, Process, Environment. The results of the analysis of the causes of the problem are shown in Figure 1 below :



Disscussion

Root Cause Analysis

Analysis of the root causes of the problem using a fishbone diagram can be described as follows:

1. Man

Man is one of the human resource components that play a role in the implementation of prevention and control of PD3Is. Interviews showed that surveillance officers at the hospital and puskesmas did not remind NonCadres (someone who is not a health worker who is appointed or volunteered to be a drug supervisor such as parents, teachers, and coworkers) in their duty to carry out PMO. The implementation of chemoprophylaxis cannot be separated from the supervision of taking medication carried out by health workers and non-health workers. If the supervisor is a health worker, the supervision and implementation of chemoprophylaxis can run well. If the supervisor of drinking medicine is not from health workers (health cadres and non-cadres), the implementation of chemoprophylaxis that is monitored is not in accordance with applicable management.

Education about diphtheria, in the form of diagnosis, management, and prevention to health workers and local governments, and in collaboration with the mass media to educate the public about diphtheria. Educate the public to immediately go to health services if there are signs and symptoms of throat pain, and use masks including in public places when experiencing signs and symptoms of respiratory tract infections [13]. Health workers are people who are responsible for providing health services to individuals, families and communities. The intended health workers are medical personnel and para-medical personnel such as nursing personnel, midwifery personnel, medical support personnel and so on. The role of health workers is as an educator who is carried out to assist clients and families in increasing health knowledge, disease symptoms and even the actions provided, so that there is a change in behavior after health education is carried out and also the role of health workers is a place of consultation on health problems or behaviors obtained [6].

At the time of chemoprophylaxis to close contacts, the puskesmas and hospital have briefed the PMO who will carry out the task in detail. The main obstacle that often occurs in the implementation of chemoprophylaxis management is when the supervisor of taking medicine is not from the regional cadre. A PMO who is not a cadre is someone who volunteered to be a PMO or someone appointed by the puskesmas or hospital to carry out the task. Sometimes someone who is not a health worker, especially those who are not cadres, tends not to carry out their duties properly so that someone who becomes a PMO must be given more attention so that the implementation of chemoprophylaxis runs according to existing regulations.

Surveillance officers identify those in contact with patients and look for people at risk in all age groups, especially those who have never been immunized [21]. Surveillance officers at puskesmas and hospitals monitor PMOs regularly. At this time monitoring is carried out irregularly because the puskesmas or hospital has limitations in monitoring PMOs where there are several PMOs far from the reach of the puskesmas or hospital in the local area such as at work or at school.

The officers who take specimens, either at the health center or hospital must have confidence so that the specimens taken are not mistaken. In taking specimens in the field, laboratory staff are not all trained because of the rarity of cases so there are some officers who have never taken pseudomembrane specimens directly. To determine whether there is a spread of the disease and preventive measures to prevent wider transmission, laboratory examination of close contacts should be carried out. Samples taken are from nasal swabs or throat swabs, but if it is not possible to take from both samples, then taking throat swabs is better than nasal swabs because the findings of diphtheria in throat swab samples have a greater presentation than samples taken through nasal swabs [12].

2. Money

Health funding is one of the important things in realizing health status. The availability of sufficient funds can affect the implementation of a program and the activities of an organization will also run optimally. Funds in the implementation of prophylaxis management at puskesmas and hospitals become an integral part of the PD3I surveillance budget from the Madiun City PP & KB Health Office. When taking chemoprophylaxis, there are some people who experience side effects of the drug. If they experience such side effects, they tend to decide to discontinue the drug, as this would require them to undergo additional treatment at their own expense.

The implementation of activities from an existing program, the implementers must get the resources needed for the program to run smoothly, one of which is in the form of money. Funds as a condition for the smooth running of a program must be allocated appropriately, as well as smoothness in the process of providing and using them [2]. Planning funding sources for immunization can come from the government. Financing sourced from the government varies at each administrative level, namely the central level sourced from the State Budget (APBN), the provincial level sourced from the APBN and provincial APBD, the District / City level sourced from the APBN and District / City APDB in the form of DAU (General Allocation Fund) and DAK (Special Location Fund). This funding is allocated based on population, fiscal capacity, number of poor people and others [16].

PHC budgets should be allocated to organize time and resources to ensure that all close contacts who experience adverse drug events (ESOs) can receive appropriate care, so that they do not have to self-medicate and incur out-of-pocket expenses. In terms of funding for patients who experience adverse drug events during chemoprophylaxis, the responsibility for such patients should be undertaken by the health center or hospital concerned. The health center picks up patients who experience ESOs or surveillance personnel together with doctors at the health center or hospital visit the patients and provide drugs to reduce the side effects so that they do not persist and become a hindrance.

The implementation of the epidemiological investigation of diphtheria does not have special funding from the central government, the Health Office only receives vaccines and erythromycin drugs

and provides them to health centers according to predetermined targets. There is also no budget for health workers who carry out epidemiological investigations. Based on a circular letter from the Indonesian Ministry of Health regarding the technical guidelines for the implementation of prophylaxis, this fund provides vaccines and erythromycin while drugs for side effects are not budgeted and it is also stated that operational costs are sourced from the Provincial / District / City APBD [18]. Strong, stable, and sustainable health financing plays an important role in the delivery of health services in order to achieve goals. The goal of development in a country is equitable health services and access and quality services. Therefore, health policy in a country should give an important focus to health financing policy to ensure the implementation of adequacy, equity, efficiency and effectiveness of health financing itself [23].

3. Environtment

The environment is the surrounding conditions that can influence both directly such as family support and reminders from PMO and indirectly such as financial readiness if there are side effects from the drugs taken in the implementation of chemoprophylaxis. Epidemiologically, the incidence of diphtheria suspected cases is not transmitted to each other, not a previous close contact or a previous case. Environmental factors can cause diphtheria disease to occur. Environmental factors that influence the incidence of diphtheria are the density of house occupancy, lighting and ventilation factors. Diphtheria is easily transmitted in a poor environment with a low level of sanitation. Therefore, in addition to maintaining personal hygiene, we must also maintain the cleanliness of the surrounding environment [9].

Environmental factors such as sleeping room occupancy density, humidity in the house, and floor type are associated with the incidence of diphtheria [19]. There is a relationship between home environmental factors and the incidence of diphtheria because a bad home environment can cause diphtheria germs to develop. Lighting that enters the house can function as light and can kill diphtheria germs because of the ultraviolet rays that come from sunlight. The entry of sunlight into the house has a role in killing disease germs and other types of disease germs. Inadequate ventilation can also cause humidity in the house so that diphtheria germs can survive in that humidity. The existence of a qualified ventilation area that functions to reduce humidity can help reduce the presence of these germs [9].

Occupancy density is the floor area in the house divided by the number of family members of the occupants. The area of a healthy house must be sufficient for the residents in it, meaning that the area of the house must be adjusted to the number of residents. The area of the house that is not proportional to the number of residents will cause overcrowding. Buildings that are narrow and not in accordance with the number of occupants will have an impact on the lack of O2 in the room so that the immune system decreases, then the rapid onset of respiratory diseases. The size of the house that does not match the number of occupants also facilitates the transmission of disease, if one family member has an infectious disease, it will easily spread to other family members [8].

Epidemiological investigations (PE) in the patient's home environment must involve cross-sectors such as Kelurahan, Bintara Pembina Desa (BABINSA), Bhayangkara Pembina Keamanan dan Ketertiban Masyarakat (BHABINKAMTIBMAS), and sometimes involve community leaders. Involving cross-sectors makes the community more open and less resistant to PE and chemoprophylaxis than without involving cross-sectors. The workplace or agency environment is more difficult because with chemoprophylaxis they consider this to interfere with or hamper the productivity of workers, because when close contact consumes erythromycin drugs there are those who experience ESO so that it can hamper performance. This is the toughest challenge in implementing chemoprophylaxis in contrast to the school environment which tends to be easier because of help from parents and teachers at school they can be directed. This obstacle is in line with research [20] that the obstacle they found in the community was that there were still patients, families of patients or other communities who were

less cooperative when an epidemiological investigation was carried out, resulting in tracking not getting maximum results.

4. Process

The process of implementing prophylaxis is closely related to filling in the forms that have been provided by both the East Java Provincial Health Office and the Ministry of Health of the Republic of Indonesia. The form consists of the Epidemiological Investigation Form (PE Dif 1) for recording the discovery of diphtheria suspects and in the form there is an attachment for close contacts. The results of the investigation found that the name of the close contact was not written in its entirety because the PE Dif 1 Form was done real time at that time. This resulted in less thorough monitoring such as close contacts with neighbors, playmates, workmates and so on. This is in line with research [11] that when a diagnosis of diphtheria suspects has been made, an Epidemiological Investigation (PE) is carried out by health center staff by conducting interviews and observations using the Diphtheria Suspect Form 1. To find a complete close contact, it is carried out on the next day to carry out further searches which will be recorded on Form Dif 2. In Form Dif 2, all close contacts are recorded which will be completed by the puskesmas after the close contact has been interventarised.

Diphtheria prevention is carried out on every diphtheria suspect by conducting epidemiological investigation (PE) and looking for additional cases and contacts, then immediate referral of diphtheria cases to the hospital for treatment and care, patients are given prophylaxis to contacts and carriers. Carry out Outbreak Response Immunization (ORI) as soon as possible in locations where diphtheria outbreaks occur with targets according to epidemiological studies for three rounds with an interval of 0-1-6 months regardless of basic or advanced immunization status) in order to reach at least 95% [20]. After completing the recording, prophylaxis is then carried out using Form Dif 7C. Form Dif 7C is a chemoprophylaxis monitoring to consume erythromycin for 7 days which is filled in by the Drug Drinking Supervisor (PMO).

Drug Drinking Supervisors who are not health workers, especially those who are not health cadres, are a challenge in filling out the Dif 7C Form where there are several fillings that do not match the information available when carrying out chemoprophylaxis, namely related to the frequency of taking medication, the amount of medication, so that at the puskesmas level and the PP & KB City Health Office will have difficulty analyzing whether the medicine is taken regularly, even if it is regular how many times a day, whether there are side effects when taking the medicine. Side effects of medication greatly affect the filling of Dif Form 7C. When close contacts undergo chemoprophylaxis, there are some people who experience side effects such as weakness, nausea, heartburn, abdominal pain, body aches so that when side effects appear most of them decide not to continue chemoprophylaxis.

When they decide not to take the medicine, the completion of Form 7C will be poor and the medicine given will not be used up, and the action of the medicine in the body will not be maximized to prevent the incidence of diphtheria suspected cases. As a result, the completion of the Dif 7C Form is not good enough, the medicine given is not used up, and the drug does not work optimally to prevent the incidence of diphtheria suspected cases. Another obstacle when filling out the Dif 7C Form is when the PMO is someone who is not competent, especially not a health worker and not a health cadre.

The understanding of diphtheria and what needs to be considered is one of the risk factors that cause diphtheria is still very limited for health workers, especially in terms of diagnosing a disease that requires proper examination. If there is a delay in diagnosis, it will also cause delays in medical treatment as a result there will be fatal clinical complications and even death [3]. Diagnosing diphtheria must be done by means of laboratory examination which is a supporting examination that is needed in confirming the diagnosis of diphtheria. The gold standard for diphtheria laboratory examination is Culture-PCR-Toxigenic which is carried out at the Litbangkes Laboratory [17]. Contacts can become

carriers and can be a source of infection for other family members and their environment. A person infected with C. diphtheriae with a history of DPT immunization does not cause symptoms, or even if symptoms occur, they are mild, but have the potential to become a source of transmission [22].

Alternative Problem Solving

1. An alternative to overcoming PMO problems is to ensure that the PMO is someone who can be trusted, such as the puskesmas staff themselves or for non-health workers, such as health cadres or someone who has a position in the institution where the close contact is located, for example at work, who can become a PMO, namely the boss or at school, namely the class teacher. The boss or class teacher can utilize a person's position to carry out PMO. Another alternative is for the health center or hospital to create a WhatsApp group for all close contacts to monitor and remind people who are taking chemoprophylaxis. Monitoring carried out by health center staff to drug supervisors is expected to fill in Form 7C correctly and completely and produce valid data.
2. Conducting a strategy to approach the community regarding the prevention of diphtheria cases for people who will carry out chemoprophylaxis. Provide a presentation on the concept of preventing the healthy from becoming sick, because if close contacts do not carry out chemoprophylaxis, the risk of contracting diphtheria will increase. The low level of public knowledge has the greatest influence on the spread of diphtheria cases. One of the efforts to prevent the transmission of diphtheria is through socialization activities, where the community, especially parents, are given information about the concept of diphtheria, the dangers of diphtheria, and the need for active vaccination of infants and children [1].
3. If someone experiences side effects from taking medication, appropriate services should be provided so that people still want to carry out chemoprophylaxis at no out-of-pocket expense. A person who carries out prophylaxis is people who are exposed to the patient's respiratory secretions or who live together with the patient. Prophylaxis can be given in the form of intramuscular benzylpenicillin antibiotics at a dose of 600,000 IU for ages under six years, and 1,200,000 IU for ages over six years, single dose. In addition, oral erythromycin can also be given at a dose of 125 mg every 6 hours for children under 2 years old, 250 mg every 6 hours for children 2-8 years old, and 250-500 mg every 6 hours for children over 8 years old for 7 days [10].
4. Diphtheria cases that are rarely found make laboratory staff in charge of taking pseudomembrane specimens hesitate to do so, therefore an alternative that can help is when a case is found, on the job training is carried out when there are patients who want to take specimens, other officers are present to be trained in taking these specimens.

Supporting Factor

To carry out prophylaxis management properly and correctly, officers at the health center and hospital monitor and remind supervisors to take medicine so that prophylaxis runs according to direction. One way to improve public health is by socializing the introduction of diphtheria disease [25]. Likewise, the family is an open system where its members are subsystems, support from the family is a support and strength from within to carry out diphtheria prevention behavior. Underlying family-centered care, namely facilitating parental involvement in care and increasing the ability of families (mothers) to care for their children [24].

The role of good health workers towards patients is influenced by health workers' awareness of work professionalism greatly affects patient satisfaction. The role of good health workers is very important to support better health, especially for the achievement of basic immunization, and help mothers to believe that basic immunization is important to be done to children [6].

Inhibiting Factors

The factor that hinders the implementation of this prophylaxis is the perception of the community who still think that taking medicine is only for people who are sick. From this perception, we want to approach the understanding that those who are healthy must be kept from getting sick. Education about diphtheria, in the form of diagnosis, management, and prevention to health workers and local governments, and in collaboration with the mass media to educate the public about diphtheria. Educate the public to immediately go to health services if there are signs and symptoms of throat pain, and use masks including in public places when experiencing signs and symptoms of respiratory tract infections [14].

The high level of education allows a person to absorb and understand information more easily so that in experiencing changes in health behavior, it shows an increase in awareness and ability to do something positive to improve their health status. Vice versa, someone with a low education is usually difficult to accept something that is considered new and not the same as their habits. Mothers who have a high education will have an awareness of the importance of immunization for children, so that they can directly allow and actively support their children to follow immunizations including additional immunizations such as diphtheria sub-PIN [7].

Conclusion

The conclusion of the Health Problem Analysis study in Madiun City in 2023, namely the identification of PD3I Surveillance health problems in Madiun City, found that the implementation of close contact management of diphtheria chemoprophylaxis was not appropriate using the CARL method (Capability, Accesibility, Readiness, Leverage). Finding the root cause of the problem using a fishbone diagram, namely: 1) Man: Medication supervisors who are not health cadres. 2) Money: Health care coverage for chemoprophylaxis close contacts who experience drug side effects. 3) Environment: The work environment that hinders the implementation of chemoprophylaxis because it is considered to hinder work and for the patient's home environment it is easier to do if it involves cross-sectors. 4) Process: The flow of filling out Form Dif 7C is still not feasible because sometimes indifferent PMOs and close contacts decide to take medicine when side effects of erythromycin appear.

From the root causes of the problem, researchers found several alternatives in solving the problem, namely: 1) Periodic monitoring by health center staff of drug-taking supervisors who are not health cadres. With this monitoring, Form 7C will be filled in properly and correctly and produce valid data. 2) Conducting an understanding approach regarding the prevention of diphtheria cases to people who will carry out chemoprophylaxis. 3) If someone experiences drug side effects, they should be given appropriate services such as providing health services at no cost so that people still want to carry out chemoprophylaxis at no cost to themselves. 4) For health workers who are still hesitant to collect specimens, it is better if there is a suspected discovery given the opportunity to do so.

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