Effectiveness of hand foot mouth disease prevention and control measures between high and low epidemic areas, Northern Thailand

A qualitative approach

Received 19 October 2017
Accepted 6 February 2018

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Abstract

Purpose – Hand foot mouth disease (HFMD) is an emerging disease caused by Enterovirus. HFMD usually occurs in South-East Asian countries including Thailand. Thailand has been indicated as one of the countries having high epidemic rate in children less than five years of age, particularly in the northern regions. The paper aims to discuss this issue.

Design/methodology/approach – A qualitative method was used to extract information from 48 informants from two different areas; high and low epidemic areas of HFMD. Question guidelines were developed from literature review and viewed by three external experts in the field before use. Interviews took place in a private and confidential room. Each interview lasted approximately 50 minutes.

Findings – There are no policies regarding HFMD control in both high and low epidemic areas of HFMD. The staff at sub-district local government level did not have the necessary qualifications for HFMD control. Additionally, staff were not stable, and there was a lack of a disease control team. Antiseptics for cleaning day care centers (DCC) were not effective for disease control; most DCC use Dettol®, soap, dishwashing liquid, detergent and water for cleaning the environment. These antiseptics do not include chlorine making it ineffective in destroying the virus.

The authors would like to thank the directors of all 18 sub-district local administration offices in Chiang Rai, Chiang Mai, and Pha Yao provinces for their cooperation in providing essential information. The authors would also like to thank the Center of Excellence for the Hill Tribe Health Research and Mae Fah Luang University, Thailand for providing the grant for this study.

Journal of Health Research
Vol. 32 No. 3, 2018
pp. 217-228
Emerald Publishing Limited
2586-940X
DOI 10.1108/JHR-05-2018-023

Originality/value – The sub-district local government should be concerned about HFMD control; the staff should have the necessary qualifications suitable for disease control. Standard and practical HFMD control guideline should be set up and used in DCC.

Keywords Qualitative approach, Hand foot mouth disease, Day care center, High and low epidemic areas

Paper type Research paper

Introduction

Hand foot mouth disease (HFMD) is an emerging disease caused by Enterovirus[1, 2] and has been reported in most tropical areas, especially in Asian countries such as China, Japan, Hong Kong, Korea, and Thailand[2, 3]. Coxsackievirus A16 and Enterovirus 71 are the main types of epidemic viruses in Thailand. The World Health Organization reported the most vulnerable age for infection was young children of less than five years old. The clinical manifestations range from fever, reduced appetite, sore throat, skin rash with red spots in the palms of the hands and soles of the feet. Severe stages include nervous system complications.

In Thailand, HFMD has been regularly reported in all regions and tends to increase every year. Many episodes of the disease outbreaks were reported throughout the year. There are more cases in the early period of the rainy season which is cold and damp. Infections usually occur in day care centers (DCC) or day care center kindergartens. In 2015, a total of 17,462 cases were reported (incident rate of 26.81 per 100,000 of the population). The most common age was less than three years old (72.85 percent). The northern region had been reported as the highest incident rate area at 31.05 per 100,000 of the population, followed by the central region 24.55 per 100,000 of the population. In 2015, Chiang Rai province was indicated as the highest epidemic area of HFMD, followed by Chiang Mai, and Pha Yao provinces[4, 5, 6].

The sub-district local government office[7, 8, 9] is a peripheral organization of the national administrative system in Thailand. It was first established in 1994. All resources used for operations in the organization have been subsidized by the central government. There are, in fact, many functions that the sub-district local governments have to perform in the area including taking care of young children in the DCC.

DCC[10, 11, 12] is a center that mostly takes care of young children aged less than six years old during the daytime. The operation cost of the center is totally supported by the local government. The staff of the center are given their salary or wage (depending on their work status) by the sub-district local government. One important duty that the sub-district local government has to perform is disease control and prevention at the DCCs. The ministry of public health is a key partner that supports the sub-district local government in all activities related to health, including disease prevention and control.

The Ministry of Health, Thailand, has provided guidance on HFMD prevention in DCC, nurseries, and schools. The contents of guidance on HFMD control consisted of two sections; HFMD surveillance guidelines, and HFMD prevention and control in schools and DCC[13]. Even though Thailand has the guideline and surveillance system for HFMD, however, it seems non-effective because there were many outbreaks of HFMD reported in DCCs every year, and the numbers of episode of outbreaks are increasing. The study aimed to investigate the insight information and personal point of view regarding HFMD prevention and control measures by in-depth interview from the relevant persons in the sub-district local government between the high and low epidemic areas in northern Thailand based on the information of the case report of HFMD in 2015.

Materials and methods

Study design

A qualitative method was employed. Data were collected by in-depth interview with the staff from two areas: high and low epidemic areas of HFMD in Chiang Rai, Chiang Mai,

and Pha Yao provinces. The study areas were selected based on the cumulative prevalence rate of HFMD in 2015.

Study setting. The study was conducted in three different provinces in northern Thailand: Chiang Rai, Chiang Mai, and Pha Yao provinces. There are a total of 417 sub-district local government offices: 142 offices in Chiang Rai, 205 offices in Chiang Mai, and 70 offices in Pha Yao. We selected three sub-district local government areas among the high epidemic areas from each province, and another three sub-district local government areas among the low epidemic areas from each province. The classification criteria for the high and low HFMD epidemic areas in the study was based on the median line of the number of HFMD cases three years ago (2012-2014), at 146:100,000 of the population[14]. In total, nine sub-district local governments areas from the low epidemic areas, and another nine sub-district local government areas from the high epidemic areas were chosen as the study settings.

Study sample. The key informants of the study were sub-district local government officers who acted as the major responder to all activities regard HFMD prevention and control in DDCs where the disease occurs. In total, 23 participants from high epidemic areas, and another 25 participants from low epidemic areas were invited to provide the relevant information.

Research instruments. Question guideline had been developed based on literature review and a pilot test was conducted with three selected participants in Chiang Rai province before use in the field. The question guideline consisted of 14 items including an organization chart, qualification of relevant staff, resources for disease control and prevention, situation of the disease, policy, process of work, barriers, etc., for example, details of responsibility when cases of HFMD are reported, major factors influencing successful control of HDFM in the previous year, details of the barriers to HFMD prevention and control, questions relating to problems with teamwork for disease control and problems relating to resource support for HFMD control and prevention, and finally, queries about cooperation with other health offices for prevention and control HFMD. All questions had been validated by three external experts in the field. After having the opinion from three experts, it was reviewed by researchers for improvement before use. The national standard guideline, which consists of nine items, for disease prevention and control at DCC provided by the Ministry of Public Health was also assessed[15].

Data collection and data analysis. We contacted all selected areas and made appointment before meeting with officers in their office. The interview was conducted at the office in the selected areas. The interview took place in a private and confidential room and lasted 50 minutes each. An audio-recorder was used to record the interview contents, after agreeing with the participants. The audio-recordings were first transcribed in the language in which they were conducted (local northern Thai language), then translated into Thai. Translations of study materials and transcripts were checked for consistency and accuracy of important concepts. The information obtained from all participants was reviewed. Content analysis was used for extraction of all essential information by the NVivo program.

Ethical approval. All the research procedures had been approved by the Mae Fah Luang University Research Ethics Committee on Human Research (No. 59024). All participants were fully informed and signed a consent form before interview. A small gift was given once the interview terminated as a token of appreciation for their cooperation.

Results

Data were collected by in-depth interviews from 48 participants including: 23 officers from sub-district local government areas of the high epidemic area in Chiang Mai, Chiang Rai and Pha Yao provinces, 25 officers from sub-district local government areas of the low epidemic

areas in Chiang Mai, Chiang Rai and Pha Yao provinces. In total, 34 participants included heads of the educational department division working on HFMD prevention and control in DCCs, and another 14 participants were public health professional-related officers. The results were as follow.

Organizational characteristics

There were several factors influencing the effectiveness of HFMD control and prevention:

- Leadership characteristics

There were several factors associated with the occurrence of HFMD. Sub-district administrative organizations that have female leaders had a stronger policy in HFMD control and prevention in DCCs compared to having a male as leader. Female leaders tend to allocate a larger amount of financial support to the DCCs compared to male leaders. Female leaders had a greater concern for disease control and prevention for the children. A woman leader stated, "I have two children attending a DCC and each had been diagnosed with HFMD last year. They reached a severe stage before making a great recovery. This is the reason that I am interested in prevention of HFMD in DCCs under my area. I have spent a lot of money to support the project related to HFMD, and sincerely hope that we could prevent a recurrence eventually." She explained more "Before appointing in this position, I worked as a public health professional at a health promoting hospital for 26 years":

- Organizational structure

The structure of organization and step of communication and command were also associated with HFMD. Those sub-district administrative organizations that have shorter communization based on organization structure were having more effectiveness on HFMD control in DCCs. The level of command was a key factor for HFMD control. For instance, three-to-four steps command to the working staff level authorized to deal with an outbreak had less effectiveness to control the disease compared to one or two steps of command. A woman said "I realized that having a short step of communication from me to my staff would be more effective for work." She added "Sometimes I ask some of my staff if they understood my speech. This makes communication within the organization more effective":

- Teamwork

Teamwork among the staff was shown to have a significant impact on disease control and prevention in DCCs. Many of the sub-district administrative governments had a small size of staff, in some cases, 15-25 staff members, who had to work in a wide variety of local government administration roles. Nine major missions have been assigned to these sub-district offices in Thailand including: responsibility for the construction of all public transportations; waste management; disease control and prevention; disaster management; supporting educational, cultural, and religious activities; supporting activities related to children, elderly, women, and disabled populations; protecting and supporting the activities that support environmental and natural resources; supporting and encouraging local culture and wisdoms; and working on tasks assigned by the central government. Therefore, it is very difficult to achieve these varied missions of the organization with a small number of staff. Teamwork is a key principle for the organization to work effectively. A young health professional said, "We need to have effective teamwork for prevention and control of HFMD in DCCs because very often, the occurrence of the disease is reported to us late in the day or there are multiple reports of the disease in more than one DCC on the same day." He added "supportive teamwork makes us always have a very nice flow of work and effective results":

- Feasibility of resource allocation

A feasibility of resource mobilization was also one of the factors found in the low epidemic areas. Most of the low epidemic areas had a specific technique or process of mobilizing resources particularly during periods of disease epidemic. The proactive plan was additional characteristics found in low epidemic areas. The feasibility of mobilization of resources and a good proactive plan for disease control and prevention in low epidemic areas were a supportive factor to achieving effective disease control:

- Communication

Communication and its channel had been found as another key factor in the low epidemic areas. Most of the staff commands from the leader level to the worker level had a good and clear process of communication. They used the "Line" application as their major route of communication, particularly during disease epidemic seasons. Frequency of communication from the leaders was one of the factors that made the disease control and prevention effective:

- A top up budget

A small budget is available for implementing disease control and prevention programs at the community level. This budget is supported by the National Health Security Office. The allocated budget is based on 40 baht/head, which is aimed at conducting any health promotion program for any members of the population who are vulnerable in their area. This top up budget has been implemented across Thailand since 2006[16]. However, in the high epidemic area, the officers tended to apply for this grant less than those officers working in the low epidemic area. Approximately two projects with 24,000 baht per sub-district administrative government had been used for the particular disease control projects in the low epidemic area, whereas less than one project with a budget of less than 5,000 baht had been used for disease control and prevention-related activities in the high epidemic area. The budget allocation for this financial support is based on the application requested from the relevant officers, therefore, no budget support for those organizations that did not apply. The result is that the budget would then be used for other activities, not for disease control and prevention:

- Interfering factor on decision making

Authority to make a decision within the organization is another factor that effectively supports disease control. It was found that the director of two sub-district administrative government organizations from the high epidemic area had reported that they experienced difficulties in making any decision on HFMD prevention and control particularly in closed DCCs when there is a report of HFMD or an epidemic. The reason was that the parents of the children attending the DCCs did not like to close them as they had to leave their children in these DCCs during the day. The director of sub-district administrative organization said that if they close the DCCs often according to the guideline, the people would be against this move. In comparison, in the low epidemic areas, the majority of local government directors deported that they usually had no negative impact from closing the DCCs:

- Policy and perception

After interviewing the representatives from the high and low epidemic areas of HFMD, results showed there were different concerns and perceptions of having a policy regarding HFMD prevention and control, and also other actions. The organization directors from the low epidemic areas had a greater concern and perception of HFMD control and prevention than the representatives from the high epidemic areas. In the high epidemic areas, most of the organization directors presented their concern in other aspects such as improving public utility, road construction, etc. In 2015, only 0.79 percent of the total financial budget had

been utilized for disease prevention and control in the high epidemic areas, whereas, 3.66 percent of the total financial budget had been utilized in disease prevention and control in the low epidemic areas.

From the results, it was found that some local administrations in the high epidemic areas only had commands rather than policy statements regarding HFMD control and prevention. A representative from the high epidemic area said "Here, there is no policy on HFMD control. Instead, the focus is on promoting child education at day care centers." One officer from the high epidemic area said, "At the day care center, we had few statements on guidance for HFMD, it had been sent to us from some organization a few years ago, I forgot its name. I sometimes used it for screening the disease. I brought a thermometer for screening fever among children. We do not have a policy statement regarding HFMD control and prevention from the director."

Regarding consistency with the low epidemic area; the officer said, "The director of the sub-district local administrative organization announced in a meeting room and cooperated with nurses to train staff about nutrition and communicable disease control. All of this is the policy of the public health division which was done in collaboration with the education division and public health division." Some areas suggested the idea for prevention in DCC such as "If HFMD occurred in this area, we will assign the child care giver to plan the disease control program." The other representative said, "No policy statement on HFMD; instead focus is on communicable disease, such that if we have the outbreak of disease, the sub-district local administrative organization will alert the day care center. We focus on day care giver, parents, and children and must immediately inform chief executive of the sub-district local administrative organization to solve the problem."

However, in the low epidemic areas, there were much more evidence on having better concern and perception among the directors on HFMD prevention and control. One representative from the low epidemic area said "The director of the sub-district administrative organization commanded me to screen children at the day care center. If a child has fever and rash, we will inform parents not to take that child to the day care center. Whenever there is a HFMD case, we will close the day care center and the child care giver will clean the day care center at least one time per week. We do this but it is not practical and not effective because after this we find more cases." Another representative said, "Prevention guideline of HFMD was sent from district level to the chief executive of the sub-district administrative organization directly. The main point is screening children and cleaning equipment in day care centers such as sleeping bags as this is currently not practiced often." Another representative said, "No policy, but we focus on practicality and prevention by providing health education to parents the and child care giver."

Staff or employees

There are several levels of staff relating to HFMD prevention and control at the DCCs. The characteristics, education qualification, experience, knowledge and skills were related to the effectiveness of HFMD prevention and control:

(1) Care taker's characteristics at DCCs:

- Number and ratio between care taker and children in a DCC

It was found that there were some differences in the number of staff of DCCs between the high and the low epidemic areas. Under the DCCs standard of the Ministry of Public Health[13] and the standard criteria of DCCs of the Ministry of Social Development and Human Security[17], the DCC needs to have a ratio between staff and children at 1:20. If the number of children in any DCC is greater than 20 but less than 40, they will need one more additional staff member.

Based on observation, five of nine sub-district administrative organizations from the high HFMD epidemic areas had not passed the criteria. The ratio between the care takers and the number of children was not proportionate according to the standard criteria. However, two of nine sub-district administrative organizations from the low HFMD epidemic areas had not passed the standard criteria as well with the ratio between care taker and children exceeding the standard. This could be the factor influencing the occurrence of HFMD in the high epidemic area:

- Experience of care takers

Comparison between those DCCs from the low HFMD epidemic areas and the high HFMD epidemic areas, it was found that those care takers from the low HFMD epidemic areas (average 7.2 years) had a longer work experience than those care takers from the high HFMD epidemic area (average 2.5 years). Moreover, those care takers from the low epidemic areas had been exposed to the epidemic of HFMD previously; therefore, they had more skill on prevention and control of the disease. A woman said, "I have worked on HFMD prevention and control program in my previous office, I do the steps to prevent and control HFMD very well." A man said, "I have more than 20 years experience in disease prevention and control, then, I have no problem for any public health intervention in DCCs and also how to communicate to the parents":

- Educational qualification

The educational background of most care takers from the low and high HFMD epidemic area was not different. Most care takers from the low HFMD epidemic areas and the high epidemic areas graduated at university level in the field of education, and some of them graduated with a business management degree. However, none of the officials had a qualification related to health science.

From the interview, they themselves reported that having knowledge in disease control and prevention was a crucial point to stop the spread of HFMD in a DCC. Even though many of them had been trained on disease control program previously, many real situations did not make them feel confident to implement the disease prevention and control. They still needed to get help from public health and medical professionals to lead on disease control and prevention. Providing a regular training program on disease prevention and control for the care takers is one of the responsibilities of the sub-district administration organizations particularly in the period of early days of opening the school[3, 4]. However, from the interview, those care takers who were working in the high HFMD epidemic areas reported having less opportunity to attend the course than those care takers who were working in the low epidemic areas:

- Attitude and working experience on HFMD prevention and control

There were some differences on the opinion or attitude of care takers between those who had long working experience (greater than two years working experience) and recent years working (equal or less than two years working experience) in a DCC. Those who had longer experience had a greater and better concern for HFMD impact for the children. Those who had a longer working experience also had a positive attitude and tended to propose their project for disease prevention and control compared to those who had a short working experience:

(2) The officers at sub-district administration organization office:

- Specific function

Due to having a limited number of staff and wide range of organization job descriptions, sub-district administration organization officers needed to share and help each other to achieve some specific project such as disease prevention and control. In the low HFMD

epidemic areas, most of the staff had a greater harmony of working as a team than those staff from the low HFMD epidemic areas:

- Workload and motivation

Since a sub-district administration organization has a variety of jobs, but limited working staff, therefore, it was one of the factors impacting HFMD prevention and control. The staff who were working in the low HFMD epidemic area had better motivation and lower workload compared to those who were working in the high HFMD epidemic area. The motivation for working for their organization and people under their care was also key significant for achieving HFMD control. A man said, "I think the motivation for working is important to get a goal of organization. We do need to have and encourage all people who are working here regularly, because our office is located in very remote area and we have time once a month to visit the city":

- A position of employee

There are many positions related to care for a child in DCCs in the sub-district administration organization; teacher, assistant teacher, teacher assistant, daily worker, cook, and maid. Even though they have many positions in caring for a child in DCCs, a large proportion of them do not meet the qualification required. To find those with proper qualification and to recruit into the proper position is not easy for organizations in remote areas of Thailand. This may be the cause of ineffective child care especially with regards to personal hygiene which is obviously related to disease prevention and control in DCCs:

(3) Infrastructure.

There were several infrastructural factors related to HFMD prevention and control in DCCs:

- Space used in DCC and the number of children

In 45 percent of the DCCs in the high epidemic area, the proportion between number of children and the space inside the building did not meet the standard criteria. Whereas, 23 percent of the DCCs in the low epidemic area did not meet the standard criteria. Only 13.5 percent of the DCCs in the high epidemic areas had an infirmary, and 20 percent of DCCs in the low epidemic area had an infirmary. Most of the DCCs in the high epidemic area had a greater proportion of poor air ventilation than those DCCs in the low epidemic areas:

(4) Number of public health intervention plans implemented in the area.

There were some differences in frequency, topic, media, and topic of the public health intervention plans implemented in the area. The frequency and topic of public health intervention which was related to HFMD had been implemented in the high epidemic area rather than in the low epidemic area in the previous year. All of the implemented projects were conducted in Thai language. However, some DCCs from the remote areas are located in the hill tribe villages. Intervention used by Thai, therefore, was not successful in translating the messages to the target population. Some care takers said that they could not control HFMD by closing the DCCs or even send the children who got illness during the day back to their family because the parents were at work in their field. Sending back children who are possibly infected with HFMD to their parent is not an effective method in these areas.

From the report of care takers from the DCCs in the high epidemic areas, they did not know the role of the Surveillance and Rapid Response Team. This indicates that the system of disease prevention and control was in a stage of inefficiency. Most of the DCCs in the low epidemic areas had a better collaboration and communication channel than the DCCs in the high epidemic areas. Many of the DCCs in low epidemic areas used the "Line"

application in their communication particularly in a HFMD epidemic episode. "Line" is a free smart mobile application. All DCCs members had a mobile applicable for "Line" application use.

Antiseptic for cleaning DCC

From the results, it was found that most DCC have occurrence of HFMD in high epidemic areas. They use Dettol®, soap, dishwashing liquid, detergent and water for cleaning the environment and disinfecting the objects at the DCC. One representative said, "when HFMD occurs, I close the day care center and use Dettol® for cleaning because this is what was suggested to me. I have no knowledge about the best antiseptic for cleaning the environment." Another representative said, "the material for cleaning the day care center is UMONIUM® which is provided by the public health provincial office." A representative said, "we lack budget for antiseptics and because we have six day care centers, antiseptics are usually not enough so before the start of the semester, we use antiseptics, soap, and dishwashing liquid and water to clean the environment." Another representative said, "when there is an outbreak of HFMD, we close the day care center for five days and use detergent to clean the environment and dry the toys outside."

For the low epidemic areas, they use chlorine and detergents to clean the floor and the environment. The detergent is composed of chlorine that can destroy HFMD agent. The first representative said, "if there are five cases of HFMD, the day care center is closed for seven days. We use HAITER and Dettol® for cleaning the toys and the environment." Another representative said, "we have a budget for buying hand-cleaning alcohol gel and Dettol." The last representative said, "when HFMD occurs, we close the day care center for two days and the sub-district local organization provides chlorine for cleaning the day care center because we can always prepare chlorine in the day care center. We use chlorine to clean the floor and the toys." Further information found in the interview was most of the staff had improper concentration use of the antiseptic for control of the disease. One representative said, "I do not know exactly how much of the UMONIUM® to put into 1,000 liters of water, but we actually use 1 kg of UMONIUM®." According to scientific information, 1 kg of UMONIUM is needed for 1,000 liters of drinking water, but 5 kg is required for viral infection control.

There are several kinds of toys in DCCs. From observation, we found that toys could be the sources and major routes of HFMD transmission from one child to others. Children used, shared, and played with toys together in DCCs each day. However, there was less frequency in cleaning toys in a week or a month. The most regular cleaning method is by water, and it was very difficult in epidemic season which was in the rainy season. Toys in DCCs are made by different materials such as wood, plastic, and clothes. They need to be cleaned by different methods with different concentration of solvents or detergents. But in the real situation, care takers in DCCs had poor idea and practice on cleaning toys in the school. Another problem was the financial constrain. It had a great impact on DCCs management especially in preparing antiseptic for HFMD prevention and control.

A characteristic of children

The characteristics of children in DCCs were also a factor influencing HFMD epidemic. Many of DCCs that have epidemic of HFMD were mainly of the hill tribe children or located in remote and poor living areas. Obviously, socioeconomic status was one of the major factors contributing to HFMD epidemic in northern Thailand. In the low epidemic DCCs, we found that most of the parents had a high socioeconomic status and lived in municipal areas. Children from the low HFMD epidemic areas had a better personal hygiene compared to children from the high epidemic DCCs areas.

Age of children was another factor related to HFMD epidemic. Children in the high HFMD epidemic area had an average age lower that those children in the high epidemic area. But the ratio between male and female in the low and the high epidemic DCCs were not different.

Discussion

Effective HFMD control in Upper North Thailand is lower than standard. Barriers to control and prevent HFMD are quite diverse. Data from in-depth interviews found that sub-district local government did not have a clear policy on the prevention and control of HFMD. This barrier showed the lack of clear guidelines to work so there should be a policy on the prevention and control of HFMD. Policy defines the role and duties of HFMD control in area of responsibility. A clear policy supports the planning of development plan in organization, which is consistent with the control of disease[18, 19]. Disease control may be contained in the strategic plan or development plan for three years. When the development plans relates to the HFMD control, it affects the preparation of the budget for HFMD control in sub-district local government organizations. Policy for the HFMD control should be consistent with the real situation; the solution can be implemented in a way that addresses the problem and is generally accepted[19, 20].

There was shortage of staff because most of the epidemic areas are in remote places[21]. As a result, the staff usually does not stay long term. Most of them move on when they find a better job. Another important point is the lack of qualification suitable for HFMD control such as the HFMD outbreak in DCC; the staff have a background in education which is not related to disease control. When asked about their knowledge and expertise in the control and prevention of HFMD disease the result showed that these staff did not have the knowledge and expertise of HFMD control. The sub-district local government should be concerned about these problems. Configuration of the disease control staff as officials with knowledge and expertise in the control and prevention of disease such as public health staff[1, 4]. Furthermore, results showed the lack of HFMD control and prevention teams, therefore, authorities should establish a specific team of disease prevention and control. Team members must be knowledgeable and specialize in control of HFMD.

If the staff has experience in prevention and control of HFMD, it is better because the confidence will ensure better control of the disease as well. One point of interest in controlling the disease is that the disease control team should be multidisciplinary. The staff should specialize in each field and collaborate with other organizations. It will further enhance the performance of the team to control the disease better.

Antiseptic for cleaning the environment: some materials for cleaning such as Dettol®, soap, dishwashing liquid, detergent and water are not suitable. These materials do not contain chlorine that effectively destroys the Enterovirus infection. There is a lack of budget and some staff did not understand the suitable materials for disinfecting the Enterovirus. Some staff order non-safety and inefficient products for cleaning the environment which is not effective in HFMD disinfection. Importantly, the sub-district local government should set the list of disinfectants for cleaning the environment. Sodium hypochloride or chlorine bleach is an effective and safe alternative in disinfecting most surfaces in DCC when diluted and applied appropriately. It is effective against Enterovirus. All facilities should have a written procedure that includes the steps to take in cleaning and disinfecting environmental surfaces. The procedure should be considered when using specific products, e.g. proper dilutions, storage and safety measures[22, 23, 24].

Conclusions

A qualitative study was conducted to describe and compare the effective of HFMD prevention and control measures between low and high epidemic areas. An in-depth

interview method was used to collect the data from 18 staff members who work in sub-district local governments in the northern part of Thailand. The results from interview showed an inefficient HFMD control because this organization has no policy of HFMD control and some areas only had commands without statement evidences of HFMD control. Low epidemic areas have greater feasibility of resources allocation for HFMD prevention and control than those in a high epidemic area. Another problem is that the staff are not stable because of the nature of the area. Staff do not have the necessary qualification suitable for HFMD control and there is lack of a disease control team. Some areas do not even have disease control staff. Most of them have background in education; their main job is to cooperate with other staff. The last issue is antiseptic for cleaning the environment; it was found that most DCC use Dettol®, soap, dishwashing liquid, detergent, and water for cleaning the environment. These materials do not contain chlorine, so they are ineffective for disinfecting Enterovirus. Therefore, it is necessary for government to be aware of this problem. Sub-district local governments should develop a guideline for HFMD control; this guideline can be practical for the control of HFMD especially in new staff.

A few limitations have been found in the study. Some key informants had been appointed in the position for a short time before interview; therefore, we got limited information for analysis. Furthermore, selected key information disappeared in the date of appointment. In this case, we interviewed through the telephone.

We encourage further research using a community participation approach to accomplish the study objective in particular relating to poorer communities.

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