PUBLIC HEALTH RESPONSE TO A HIGHLY PATHOGENIC AVIAN INFLUENZA (H5N1) OUTBREAK AMONG POULTRY IN KELANTAN, MALAYSIA 2017

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ABSTRACT

Background: Human H5N1 infections are concerning as they are associated with severe disease and death. On 6th March 2017, the Veterinary Department alerted the Health Department regarding the isolation of H5N1 virus in a dead domestic chicken in Kampung Pulau Tebu in Kota Bharu district, Kelantan. The objective of this paper is to describe the key strategies to prevent H5N1 transmission to humans during the outbreak in poultry in Kelantan.

Materials and Methods: This was a cross sectional study used for the epidemiological investigation and public health response in human for the avian influenza outbreak in poultry. Public health response was in compliance with the Standard Operating Procedure for Potential Infectious Diseases. The strategies executed were emergency preparedness and contingency plan, public awareness and risk communication, interagency co-operation and collaboration and stakeholder support and commitment. Data were obtained from District Health Offices and the State Veterinary Department. Data entry and analyses were conducted using Microsoft Excel 2016

Results: There were 6 districts and 36 foci with positive H5N1 results in poultry whereby 55450 poultry were culled and 17531 eggs were destroyed. The population at risk of 13385 individuals were screened and 23 were suspected to have Avian Influenza, 5 with ILI symptoms and 50 with mild URTI symptoms. Laboratory results for 23 samples that were negative for H5N1. A total of 330 healthcare workers and 184 veterinarian staff exposed to infected poultry were monitored for 10 days and were well. Biosecurity measures were undertaken by the state veterinary and health departments.

Conclusion: The public health response was successful in preventing H5N1 transmission from poultry to human.

Keywords: H5N1, avian influenza, HPAI, Kelantan

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1.0 Introduction

Highly pathogenic avian influenza (HPAI) viruses are mainly restricted to H5 and H7 subtypes. Infection with these viruses may result in high mortality within a susceptible poultry species (Rebel et al., 2011). Sporadic human infections with HPAI viruses are rare but have occurred after prolonged and close contact with infected birds. Human infections are concerning as they are associated with severe disease and death. Ultimately, these pathogens have a pandemic potential thus making it a global health threat (CDC, 2015).

The last cases of HPAI in poultry reported were in 2004 in Kelantan and 2007 in Malaysia. There had been no confirmed human cases of HPAI in Malaysia thus far. On 6th March 2017, the Kelantan Veterinary Department alerted the Kelantan Health Department regarding the isolation of H5N1 virus among dead domestic chicken in Kampung Pulau Tebu in Kota Bharu district, Kelantan.

This prompted an immediate comprehensive public health response to halt the transmission of avian influenza from poultry to humans. In total, there were six districts which were recognized to have positive poultry for H5N1. These areas were within a 30km radius from the index case in Kampung Pulau Tebu, Kota Bharu. The last positive poultry was reported on 27th March 2017.

2.0 Objective

The aim of this paper is to describe the key strategies to prevent H5N1 transmission to humans during the outbreak in poultry in Kelantan.

3.0 Methodology

A cross-sectional study performed to investigate the outbreak epidemiologically and implement public health response in human involving 6 districts in Kelantan. Public health response, activities and procedures were carried out in compliance with the Guideline on Alert, Enhanced Surveillance and Management of Avian Influenza in Human (MOH, 2004) and the Requirement of Notification for Avian Influenza in accordance with the Communicable Disease Act 1988 Circular (1/2017) from the Director General of Health (Ministry of Health, 2017).

A suspected case of avian influenza was defined as a person presenting with Influenza like illness (ILI) with fever (>38 °C) and cough, sore throat or shortness of breath and either one of the following:

a) Direct handling with dead poultry (with pending laboratory results) 10 days prior to onset of symptoms in a 10km radius area from the index case or farm with confirmed H5N1 in poultry or history of visiting that area
b) Handling samples (animal or human) suspected of containing H5N1 virus in a laboratory or other setting.

Four key strategies were carried out under the public health response to prevent the transmission of HPAI from poultry to humans that were i) Emergency Preparedness and Contingency Plan ii) Public Awareness and Risk Communication iii) Interagency Co-operation and Collaboration iv) Stakeholder Support and Commitment.

i) Emergency Preparedness and Contingency Plan

Emergency preparedness is a continuous effort of all health facilities in Kelantan including the Kelantan State Department, district health offices, hospitals and health clinics. The preparedness was tested annually through simulation exercises. This is to ensure rapid response and effective coordination during any health-related events or incidents. On 6th March 2017 when the Kelantan Veterinary Department isolated a H5N1 virus in a dead domestic chicken in Kampung Pulau Tebu in Kota Bharu district, Kelantan the Kelantan Health Department was alerted immediately. The State and District Operational Rooms were activated for central command and coordination of response and intra and interagency activities.

The strategic measure that was implemented by the Kelantan Veterinary Department to break the transmission of infection was by adopting a stamping out policy. Stamping out policy is defined by the killing of affected animals and those suspected or have been exposed to infection likely to cause the transmission of the causal pathogen (World Organization for Animal Health, 2011). This process is also commonly referred to as culling. All susceptible animals (vaccinated or unvaccinated) are killed and their carcasses destroyed commonly by burning or burial, or by any other method which will eliminate the spread of infection through the carcasses or products of the animals killed (World Organization for Animal Health, 2011).

For prevention activities, communities were stratified to high, medium and low risk depending on the distance from a positive H5N1 foci. The high risk group was those in a 300 metre radius from a positive focus, healthcare workers and veterinarian staff that are directly involved in control activities. Surveillance and active case detection for suspected cases of AI or mild upper respiratory tract infections (URTI) was conducted for a period of 10 days after the last involvement in culling activities. Daily home monitoring was also carried out for AI suspected individuals or symptomatic for URTI till the 10th day period after the last activity of culling. Social distancing was advised for all symptomatic cases.

Health alert cards were distributed to communities in the buffer zone. Alert and updates to all health centres were performed regularly and fever and ILI surveillance were intensified. Signages were displayed at the entrance of local clinics, warning the people regarding exposure to dead or infected poultry. Anti-viral drug (Oseltamivir) was prescribed for suspected AI cases. In the event of admission, cases would be admitted in designated infectious disease hospitals (Hospital Tumpat and Hospital Raja Perempuan Zainab 2) and managed by an Infectious Disease Physician.

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Clinical samples were sent to National Public Health Laboratory in Sungai Buloh, Selangor which was gazetted as a Biosafety Level 3 laboratory. Biosafety level 3 laboratories are applicable when work is performed with agents that may cause serious or potentially lethal disease through inhalation and may contaminate the environment. It requires that laboratory personnel receives specific training in handling pathogenic and potentially lethal agents, and be supervised by scientists competent in handling infectious agents and associated procedures. All work is performed in biocontained environments using appropriate engineering controls. (Mourya et al., 2014)

ii) Public Awareness and Risk Communication

Risk communication was imperative to enhance awareness regarding Avian Influenza to the public. This was to facilitate informed decisions to protect their health and well-being. Risk communication was targeted towards healthcare workers, veterinary staff and the community. This approach was taken to disseminate and exchange information in real time and incorporate key contents such as the risk of exposure and symptoms of infection, to ensure poultry products are adequately cooked prior to consumption and address queries and concerns. Risk communicators also intended to allay panic among the public and dispel rumours or inaccurate information.

Risk communication and activities to enhance public awareness were performed by medium and low risk groups. People living in the area of 300 metres to 1 kilometre radius from a positive foci were categorized as medium risk. In these areas, intensive health education activities were channelled by means of individual and small group discussions, distribution of pamphlets, display of posters and health educations at the local clinics. The key aim was to ensure that all individuals living in this area should be aware of H5N1.

Areas in the radius of 1 to 10 kilometre radius were classified as low risk. Efforts to propagate information to this mass community were performed by using modalities such as mass media, social media and also conduction mass health education. The Kelantan State Health Department uploaded a component of Frequently Asked Questions (FAQ’s) of Avian Influenza on their official website and created infographics on the subject matter. Social media utilities such as Facebook and Whatsapp were used as crucial platforms for the provision of information in real time.

iii) Interagency Cooperation and Collaboration

Interagency collaboration was established between State Health Department, State Veterinary Department and Local Town Council. The purpose was to divide critical tasks based on area of expertise, share essential information and updates on the situation of the Avian Influenza outbreak in poultry.

The Veterinary Department provided daily reports to the Operation Room regarding the health status of staff involved in prevention and control activities, list of premises that were positive for H5N1 in poultry, complaints received on the sudden death of poultry, surveillance data and laboratory investigations. Contact numbers and coordinates were also
provided to accelerate investigations by the health team to enable the prescription of public health measures accordingly. The mass media also played a crucial role in ensuring that information was accurate, relevant and disseminated in a timely manner nationwide.

iv) Stakeholder Support and Commitment

Stakeholder commitment and support were evident through a technical committee that comprised of representatives of public health personnel, clinicians, Veterinary Department, State Government. Technical committee meetings were the platform for vital decision making and coordination of activities by respective agencies and departments. The media also showed support by ensuring timely dissemination of information to the public. Press statements were released by State Government, Ministry of Health and Veterinary Department.

Data were obtained from the respective District Health Offices and the State Veterinary Department. Data entry and analyses were conducted using Microsoft Excel 2016

4.0 Results

There were 6 districts and 36 foci with positive H5N1 results in poultry. These areas were within a 30km radius from the index case. The first and last reported positive poultry case in Kelantan was on the 6th and 27th March 2017 respectively. Stamping out activities were carried out till the 31st of March 2017. A total of 55451 poultry were culled and 17531 eggs destroyed by the State Veterinary Health Department.

Surveillance included the community in the 300 metre buffer zone (n=13385) as well as healthcare workers (n=330) and veterinary staff (n=184). Active case detection screened individuals for ILI or mild upper respiratory tract infections (URTI) symptoms. In total, there were 23 cases of suspected Avian Influenza which fulfilled the definition, from which 12 had a history of contact with infected poultry, 6 were laboratory staff from the Veterinary Department and 5 who were in the buffer zone. There were 50 individuals that experienced mild URTI symptoms. Table 1 shows the details on the surveillance activities by the 6 respective districts.

Daily home monitoring was conducted for a period of 10 days after the last exposure of culling. All monitored individuals were asymptomatic and not clinically suspected for Avian Influenza. The last human contact with infected poultry was on 10th April 2017. The health department took 10 days as the incubation period. Public health response activities lasted until 20th April which was the duration of 2 times (20 days) the incubation period of the last human contact with infected poultry.

Laboratory samples were taken for all 23 suspected Avian Influenza cases and were sent to the National Public Health Laboratory in Sungai Buloh, Selangor which were all negative for H5N1. 3 samples were positive for influenza A H1N1 and 4 samples were positive for...
Influenza B. Symptomatic cases were advised for social distancing. Additionally, health alert cards were distributed.

Health promotion activities such as talks, individual advice, small group discussions, health demonstrations, display of posters and distribution of health alert cards, brochures and disinfectant hand rubs were among the core activities for risk communication and public awareness. Table 2 presents the details and outcomes of those activities aforementioned.

Health education on Good Animal Husbandry and Poultry Farming were conducted in collaboration with the local town council. In total, 176 premises were inspected and a total of 327 individual consultations and talks were given to individuals that were involved in slaughtering, handling and selling poultry. In adjunct to these efforts, a press release was conducted by the Malaysian General Health Director to promulgate accurate, relevant and crucial information nationwide.

A total of 2942 healthcare staff received training on Outbreak Management of Avian Influenza. The healthcare staff comprised of 681 doctors, 124 pharmacy staff, 231 medical assistants, 78 laboratory personnel and 863 of various other categories. 95 healthcare providers from the private sector were also included in these sessions.

Table 1: Surveillance of Population at Risk in 300 metre Radius by Districts

<table>
<thead>
<tr>
<th>Districts</th>
<th>Number of Foci</th>
<th>Number of Localities</th>
<th>Persons Screened</th>
<th>ILI symptoms</th>
<th>Mild URTI symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachok</td>
<td>6</td>
<td>6</td>
<td>847</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Kota Bharu</td>
<td>15</td>
<td>20</td>
<td>7246</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Pasir Mas</td>
<td>6</td>
<td>6</td>
<td>1764</td>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>Pasir Puteh</td>
<td>3</td>
<td>4</td>
<td>808</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tanah Merah</td>
<td>1</td>
<td>1</td>
<td>181</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Tumpat</td>
<td>5</td>
<td>6</td>
<td>1764</td>
<td>0</td>
<td>13</td>
</tr>
<tr>
<td>Total</td>
<td>36</td>
<td>43</td>
<td>13385</td>
<td>5</td>
<td>50</td>
</tr>
</tbody>
</table>

Table 2: Health Promotion Activities

<table>
<thead>
<tr>
<th>Activities</th>
<th>300m</th>
<th>300m - 1km</th>
<th>1km - 10km</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Talks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sessions</td>
<td>8</td>
<td>11</td>
<td>15</td>
<td>34</td>
</tr>
<tr>
<td>Attendance</td>
<td>306</td>
<td>2523</td>
<td>550</td>
<td>3379</td>
</tr>
<tr>
<td>Small group discussions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sessions</td>
<td>1549</td>
<td>1332</td>
<td>265</td>
<td>3146</td>
</tr>
<tr>
<td>Attendance</td>
<td>5561</td>
<td>4836</td>
<td>997</td>
<td>11394</td>
</tr>
<tr>
<td>Health demonstrations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendance</td>
<td>0</td>
<td>1841</td>
<td>147</td>
<td>4061</td>
</tr>
<tr>
<td>Sessions</td>
<td>0</td>
<td>3762</td>
<td>350</td>
<td>9794</td>
</tr>
<tr>
<td>Individual advice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attendance</td>
<td>113</td>
<td>4188</td>
<td>1463</td>
<td>31065</td>
</tr>
</tbody>
</table>
5.0 Discussion

The HPAI outbreak among poultry lasted one month and was widespread covering 6 districts and a 30 kilometre radius from the index case. The swift response of the Veterinary Department especially in terms of culling managed to control the virus circulation among poultry thus eliminating the source of infection. The swift public health response was successful in preventing animal to human transmission. This was similarly reported by Munasighe et al., 2008 that managed to prevent human infection of H5N1 in Suffolk, United Kingdom.

All components which were emergency preparedness and contingency plan, public awareness and risk communication, interagency co-operation and collaboration and stakeholder support and commitment were the key pillars of the success. Eventhough the frequency of H5N1 infections to humans is low (Vong et al., 2006), from year 2003 and 2018 there were 16 countries that reported human cases (WHO, 2018). A total of 860 cases of H5N1 and an alarming figure of 454 related deaths. The Asian countries from this list include Bangladesh, Cambodia, China, Indonesia, Myanmar, Pakistan, Thailand and Vietnam (WHO, 2018).

Effective risk communication and reliability of information that was disseminated also helped to mitigate anxiety in the public. Based on our approach, we managed to not only protect the public from the potential HPAI infection but also through the high risk group workforce which were from the healthcare workers and Veterinary Department staff. Full PPE and monitoring and adequate lab facilities which was tested in a level 3 lab.

Interagency collaboration particularly with the Veterinary Department was essential to curb the H5N1 spread in poultry. In this outbreak, the Veterinary Department categorized a 1 kilometre radius from a positive focus as the stamp-out zone. In total, 3792 samples were taken from 924 premises. There were 53 premises involving 36 locations that tested positive for H5N1 and poultry in a 1km radius from these locations were culled. The remains of the culled poultry were buried and extensive disinfection of the area was carried out. People were advised not to rare or breed poultry for a 2 month period. There was a restriction imposed on the movement of poultry and its products out of the state’s borders. Localities in the radius of 1 to 10 kilometres from a positive premise were under surveillance by acquiring cloacal swab samples from each poultry farm and shop owner for a period of 42 days.

To decrease the risk of transmission to human effectively, animal and health sectors must collaborate to limit human exposure to HPAI viruses in affected poultry, surveillance of high

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risk groups, dissemination of information, restricting people from entering infected premises unnecessarily, anti-viral prophylaxis, use of PPE and foster interagency collaboration to maximise resources and efforts.

6.0 Conclusion and Recommendations

An outbreak of HPAI occurred in poultry in March 2017 in Kelantan. The public health response executed was successful in halting the infection from animal to human. Surveillance of the high risk group continued till 10th April 2017 which was 10 days after last culling activity on the 31st March 2017. The State Health Department’s operation room was deactivated on the 20th of April 2017 which was double the incubation period (20days) of the last human contact with infected poultry. The State Veterinary Department continued close surveillance in poultry continued till the 1st July 2017 which was 90 days following the last culling activity.

Albeit H5N1 viruses are inefficient at transmitting infections from poultry to human, swift comprehensive and effective public health measures are crucial to further mitigate the risks to an absolute minimum.

Acknowledgements

We express gratitude to the Ministry of Health, Kelantan State Health Department, Kelantan Veterinary Department, Local Town Council, mass media for their effort, assistance input and support rendered in the control and prevention of the HPAI outbreak among poultry in Kelantan. We also would like to thank the Director General of Health Malaysia for his permission to publish this article.

Ethical Approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Ethical approval was obtained from the National Medical Research Register [Reference no: KKM.NIHSEC.800-4/4/1 Jld.59(14)].
Declaration

All authors declare no conflict of interest in this study.

Authors Contribution

Author 1: Supervision, co-ordination of prevention and control activities, data collection, manuscript writing concept and proofreading
Author 2: Data collection and analyses, manuscript concept and writing, ethical approval, proofreading
Author 3: Supervision, involvement in prevention and control activities, data collection and proofreading
Author 4: Supervision, involvement in prevention and control activities, data collection and proofreading
Author 5: Involvement in prevention and control activities, data collection, ethical approval
All authors have read and approved the manuscript prior to submission.

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