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Dear Reader,

Welcome to the second issue of volume three of the Uganda National Institute Public Health (UNIPH) Quarterly Epidemiological Bulletin.

This bulletin aims to inform the district, national, and global stakeholders on disease outbreak investigations, public health surveillance and interventions undertaken in detecting, preventing and responding to public health events in the country.

In this issue, we present reports on the investigation of Anthrax in Kween District; Intussusception in Kampala District; Malaria upsurge in Nwoya District, CCHF outbreak in Kakumiro District and RVF outbreak in Kiruhura District. Also in the issue is a policy brief entitled: Introduce Measles Mumps Rubella (MMR) vaccine into Uganda's Routine Immunization Schedule.

In case you would like to access original references used in this issue, feel free to contact us at: **musewaa@musph.ac.ug** **OR** **dkadobera@musph.ac.ug**

We will appreciate any feedback regarding the content and general outlook of this issue and look forward to hearing from you. We hope this will be both an informative and enjoyable reading to you.

Thank You

Inside this issue:

4 ANTHRAX IN KWEEN DISTRICT

6 INTUSSUCEPTION IN KAMPALA

8 MALARIA OUTBREAK IN NWOYA

10 CCHF IN KAKUMIRO AND MUBENDE DISTRICTS

Uganda Public Health Fellowship Program (Advanced FETP) fellow wins award at this year's Epidemic Intelligence Services (EIS) conference International Night in Atlanta, Georgia, USA

By: Angella Musewa

The Epidemic Intelligence Services (EIS) conference is held annually by CDC Atlanta and provides a platform for EIS officers and FETP residents all over the world to present a wide range of work in field epidemiology. The 2018 FETP International Night was held on April 17 & 18 at the Atlanta Hilton Hotel. International Night is a chance to share work being done through Field Epidemiology Training Programs (FETPs) around the world and to recognize the impact these programs make everyday in public health.

The Uganda Public Health Fellowship Program (PHFP) submitted 10 abstracts, two of which were selected for presentation (one oral and one oral-poster) at the International Night. The event provides a forum for FETP residents and graduates to give scientific presentations and increase their knowledge about surveillance, outbreak investigation, quality improvement studies and improving health outcomes in their respective countries.

It's an opportunity for the residents to network across FETPs and EIS Officers, exchange ideas and expand the global network of disease detectives who can be called upon in times of emergency.

Since 2015, PHFP has had abstracts accepted for oral and poster presentations at the EIS conference every year and has won three awards; the 2016 Jeffrey P. Koplan Award of Excellence in Scientific presentation, the 2017 CDC Director's Award for Excellence in Epidemiology and Public Health Response and this year's William Foege Award. A big thank you to PHFP for all the achievements as they continue to support innovations in public health.

From Left to right are: Prof. Dionisio H. Guibert- Director, TEPHINET; Dr. Carl Reddy- Director, South African FETP; Dr. Phoebe H. Alitubeera - Fellow, Uganda Public Health Fellowship Program; Dr. Stephen C. Redd, Asst. Surgeon General; Director, Office of Public Health Preparedness and. Response, CDC; Capt. Nancy Knight - Director, Division of Global Health Protection, CGH, CDC; Dr. Kip Baggett - Chief, Workforce and Institute Development Branch, Division of Global Health Protection, CGH, CDC; Dr. Bao-Ping Zhu Resident Advisor, Uganda FETP

Upcoming Events

International Conference on Emerging Infectious Diseases (ICEID), August 26-29, 2018

The US Centres for Disease Control and Prevention (CDC) will host the next International Conference on Emerging Infectious Diseases (ICEID) on **August 26–29, 2018**, at the Omni Atlanta Hotel at CNN Center in Atlanta, GA. Held every 2–3 years, the conference brings together more than 1500 public health professionals from around the world to encourage the exchange of the latest information on issues affecting the emergence, spread, and control of infectious diseases. Dr. Innocent H. Nkonwa, Cohort 2017 PHFP Fellow will make an oral presentation during this conference. We wish him good luck.

USHS 18th Annual Scientific Conference, 2-3rd August 2018

Organised by Makerere University College of Health Sciences, Uganda Society of Health Scientists (USHS) and University of Georgia, this annual scientific conference held in Uganda brings together a large audience from a wide range of disciplines. This year's conference will be held at Hotel Africana, Kampala Uganda with a Theme: Shaping the Next 10 years' Research Agenda

World Hepatitis Day, 28 July 2018

WHO urges countries to take rapid action to improve knowledge about hepatitis, and to increase access to testing and treatment services. Today, only 1 in 20 people with hepatitis know their status, and just 1 in 100 people with the disease are being treated. "The world has ignored hepatitis at its peril," said Dr Margaret Chan," It is time to mobilize a global response to hepatitis on the scale similar to that generated to fight other diseases with similar outcomes like HIV/AIDS and tuberculosis." Let's go screening for Hepatitis B and have the vaccine.

Saving Mothers Giving Life Initiative – Close out Project, Regional Event

This event will be held at Mountains of the Moon Hotel, Fort Portal on 13 July 2018

RMNCAH Assembly

Reproductive, Maternal, Neonatal, Child and Adolescent Health Assembly will be held at Kampala Serena Hotel on 9 August 2018

Challenges of conducting a disease outbreak investigation in a refugee setting

By: Angella Musewa

On Saturday, 24 February 2018, PHFP fellows of cohort 2018 went out to investigate a large cholera outbreak in Hoima District, host to Kyangwali refugee settlement in Kyangwali subcounty. Conducting an investigation in a refugee settlement is an experience that is worth sharing. Kyangwali is 76km via the new tarmacked "Oil road" through Bugoma forest which is approximately 2 hours away.

To access the settlement or visit the camp reception where refugees are received, permission from the camp commandant office of the prime minister is sought before any works start. The heart of the cholera outbreak Maratatu B &C camps with diverse culture and ethnic groups from DRC Congo. An investigator required two or three translators which was not only cumbersome but expensive. Its increase the chances of errors in data collected due to multiple interpretation and translation by the interpreters .

Above is a new settlement for incoming refugees from DRC, South Sudan and Burundi. The structures are situated in such a way that access to a toilet takes approximately 45 minutes thus increasing chances of open defecation which sparked off the cholera outbreak.

In addition, the investigator requires a nose mask, this is for safety purposes since many of the refugees were found to have cough and also to protect yourself from other communicable disease/airborne illnesses.

Data collection in the refugee settlement is so challenging. Refugees shift from one household to the next in a very time. The investigator therefore has to collect as much information at one as possible since the possibility of getting in touch with a refugee for another interview is very difficult. To note, refugees get upset so easily (due to the trauma), you cannot interview them over and over again. Compose yourself very well as an investigator and ensure that your capture as much information needed at that point as possible.

The mobile and telecom network is on and off, taking GPS coordinates is also challenging especially when one gets deep into the valley. Another thing about the refugee camp is access to information requires a lot of time. Most refugees don't know their names, their age and the number of people in a household. Some households are occupied by more than one family. Notably, refugees expect you to give them money to buy a few things to use, some will ask you to get them jobs. Ensure maximum caution and don't distance yourself from the VHTs but also avoid to move at night when conducting an investigation in the refugee camp.

Government Launches National Fitness Day

President Yoweri Museveni launched the National fitness Day at Kololo Ceremonial Grounds on 8 July 2018. Cabinet endorsed the creation of a National Fitness Day to address the raising burden of Non-Communicable Diseases (NCD) like diabetes, cancer and hypertension. The day was celebrated under the theme "My Health is My Responsibility". According to the Hon. Minister of Health, Dr. Jane Ruth Aceng, the National Physical Activity Day is aimed at encouraging the population to adopt physical activity as a routine in their lifestyles in order to prevent Non-Communicable Diseases. It will also be used to equip members of the public with more information about the importance of physical activities in prevention and control Non-Communicable Diseases (NCDs). This decision by government to earmark a national fitness day comes after a study by the Ministry of Health indicated that one in every four Ugandan adults has an altered heart function in form of raised blood pressure. The launch was followed by a 10 km walk led by the President accompanied by various dignitaries including the Minister of Health, Hon. Dr. Jane Ruth Aceng, Minister of State for Health (General Duties), Hon. Sarah Achieng Opendi, Minister of State for Health (Primary Health Care), Permanent Secretary Ministry of Health, Dr. Diana Atwine and other senior government officials.

Cutaneous and Gastrointestinal Anthrax Outbreak Caused by Handling and Consumption of Meat from a Dead Cow in Kaplobotwo Village, Kween District, Uganda, April, 2018

Esther Kisaakye[1], Kenneth Bainomugisha[1], Lilian Bulage[1], Alex R. Ario[1]

[1]Uganda Public Health Fellowship Program, Kampala, Uganda

Summary

On 20-04-2018, 7 people were admitted with symptoms suggestive of cutaneous anthrax after handling meat from a dead cow, one of the four cows that died in a single kraal in Kween District, eastern Uganda.

We investigated to; confirm the existence, determine the scope and magnitude of the outbreak, identify possible exposures and recommend evidence-based control measures. We line listed 48 human case-persons (Attack Rate=21%) without deaths. Case-persons presented with signs and symptoms suggestive of either cutaneous (14/48), gastrointestinal (16/48), or a combination of two forms of anthrax infection (18/48). Males [AR=26% (33/127] and age group >18 years [AR=31% (30/96)] were the most affected. We conducted a retrospective cohort study and found out that handling/getting in contact with meat was a risk factor for cutaneous anthrax while eating meat from dead cow was a risk factor for gastrointestinal anthrax. We recommended treatment of all case-persons; vaccination of healthy animals; community education; supervised burial of carcasses; and prophylaxis to burial team.

Background

Anthrax is an acute zoonotic bacterial disease that is irregularly distributed worldwide in places where repeated outbreaks occur and is caused by *Bacillus anthracis*. Anthrax is transmitted to humans through getting in contact with/handling or eating meat of infected/dead livestock or their products (Dragon and Rennie, 1995). Historically anthrax has been described as occurring in four forms; cutaneous (CTN), inhalation (INH), gastrointestinal (GIT), and injection anthrax depending on the route of exposure (Hicks et al., 2012). On 20th April 2018, 7 people were admitted to Ngenge HCIII, after reportedly skinning, carrying, and eating a dead cow at Kaplobotwo village, Kween District, Eastern Uganda. They all presented with blisters, oedema and gram spots that are typical of an anthrax infection. Additionally, four cows were reported to have died within the same kraal in Kaplobotwo village, Kween District. We conducted an investigation to; confirm the existence of the outbreak, determine the scope and magnitude of the outbreak, identify possible exposures and recommend evidence-based control measures.

Methods

We defined a suspected anthrax case as; (1) onset of itching / reddening / swelling of skin areas and any of the following: skin lesions (e.g., papule, vesicle or eschar) and lymphadenopathy for cutaneous presentation and (2) onset of abdominal pain and any of the following: diarrhea, vomiting, abdominal swelling, lymphadenopathy, pharyngitis and oropharygeal lesions for gastrointestinal presentation; in a person residing in Kaplobotwo village; Kween District from 6th April onwards. A confirmed case was defined as a suspected case with PCR-positivity for *B. anthracis* from a clinical sample i.e. swab from skin lesions/vesicles and blood. We conducted active case-finding to generate a line list at health facilities including clinics and in the affected villages. We collected 6 swabs and 8 blood samples from 8 suspected cases. We also conducted environmental assessments, trace back investigations, and a retrospective cohort study to identify the potential exposures of the outbreak.

Findings

Descriptive epidemiology: We line listed 48 human case-persons, of which 3 were confirmed, and 45 were suspected. The mean age of the case-persons was 29 years, range of 1 to 84 years, with overall attack rate (AR) =21% (48/234); and case-fatality rate=0%. Case-persons presented with signs and symptoms suggestive of either cutaneous (14/48), gastrointestinal (16/48), or a combination of two forms of anthrax infection (18/48). The epidemic curve showed a typical point-source pattern with symptom onset starting on 13th to 25th April 2018 (Figure 2). Males [AR=26% (33/127] and age group >18 years [AR=31% (30/96)] were the most affected.

Figure1: Pictures of the affected case-persons

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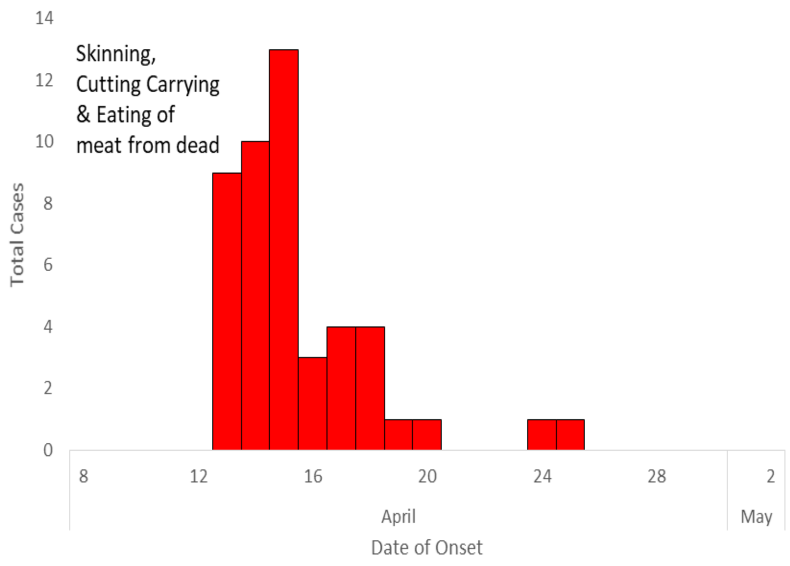

Figure 2: Point source anthrax outbreak in Kaplobotwo village, Kween District

Retrospective cohort study: 80% of 10 people who participated in skinning dead cow, compared to those who didn't (RR=4.2,95% CI=2.6-6.7) and 90% of 10 people who participated in cutting dead cow, compared to those who didn't (RR=4.9,95%CI=3.2-7.5) developed CTN. 57% of 37 people who participated in carrying cut meat compared to those who didn't (RR=4.9,95%CI=2.7-9.0) and 80% of 10 people who participated in cleaning waste from slaughter site compared to those who didn't (RR=4.2,95%CI=2.6-6.7) developed CTN. 35% of 95 people who ate meat compared to those who didn't developed GI anthrax (RR=∞,95%CI=∞–∞,Fisher's exact p<0.00). Boiling meat for >60 minutes was protective (RR=0.49;95%CI=0.26-0.92).

Trace forward, environmental, and laboratory investigation findings

On 11th April 2018, a cow suddenly died at the home of resident X, one of the members of Kaplobotwo village. A total of 15 village members participated in slaughtering or dissecting, skinning, and carrying the dead cow's meat on the same day. According to the village LC1 chairperson, almost the entire village ate the dead cow's meat. Also, a portion of it (3 thighs and the cow's head) was sold to neighbouring villages-Tukumo and Rikwo. In Tukumo village, the meat was sold to a bar, a restaurant and individual families. However, we couldn't trace all the exposed persons in this village because of the fact that the meat was distributed along the road. In Rikwo, the meat was sold to a bar, boiled by the bar owner and sold to his customers when ready for consumption. There was no case among his customers. At this point, one family of two people bought directly from the supplier of the implicated meat from Kaplobotwo village and both the two family members developed GIT symptoms after consuming the meat. In total 10 cows suddenly died in Kaplobotwo village within the same time frame. Three case-persons tested positive for anthrax by PCR

Discussion

In Uganda, over the years, anthrax has been occurring among animals with occasional leakage to humans. For humans, the major sources of exposure to *B. anthracis* are direct or indirect contact with infected animals or contaminated animal products (Hicks et al., 2012). This anthrax happened after the village members participated in the skinning, cutting, carrying and eating of meat from a cow that had suddenly died and whose cause of death was suspected to have been anthrax. The slaughter of anthrax-infected animals and the disposal of butchering waste and carcasses in environments where ruminants live and graze, combined with limited vaccination, provides a context that permits repeated anthrax outbreaks in animals and zoonotic transmission to humans (Rume, 2018). Since the affected sub-county is located along the Moroto highway that crosses up to the border point between Kenya and Uganda, movement of animals along, in and out of the sub-county is highly possible.

Conclusion, Public Health Actions, and Recommendations

This was a point source out break with a mixture of cutaneous & gastrointestinal anthrax forms likely caused by skinning, cutting, carrying, and eating meat from a dead cow. We educated the community about anthrax, treated all the sick case-persons identified in the community, supervised the burial of dead carcasses, and upon our recommendation the entire village vaccinated healthy animals on a private arrangement. We recommended vaccination of all healthy animals in Ngenge sub-county and surrounding areas and burial of carcasses under supervision of local and healthy leaders.

References

Awoonor-Williams, J., Apanga, P., Anyawie, M., Abachie, T., Boidoitsiah, S., Opare, J., Adokiya, M.N., 2016. Anthrax outbreak investigation among humans and animals in Northern Ghana: Case report. Int J Trop Health 12, 1–11.

Dragon, D.C., Rennie, R.P., 1995. The ecology of anthrax spores: tough but not invincible. Can. Vet. J. 36, 295.

Hicks, C.W., Sweeney, D.A., Cui, X., Li, Y., Eichacker, P.Q., 2012. An overview of anthrax infection including the recently identified form of disease in injection drug users. Intensive Care Med. 38A, 1092–1104.

Ndiva Mongoh, M., Dyer, N.W., Stoltenow, C.L., Hearne, R., Khaitsa, M.L., 2008. A review of management practices for the control of anthrax in animals: the 2005 anthrax epizootic in North Dakota–case study. Zoonoses Public Health 55, 279–290.

Rume, F.I., 2018. Epidemiology of Anthrax in Domestic Animals of Bangladesh (PhD Thesis). University of Dhaka.

Continues on Page 6

Continued from Page 5

A Suspected Intussusception Outbreak among Children, Kampala District, March 2018.

Carol Nanziri[1], Godfrey Nsereko[1], Dan Kadobera[1], Alex Riolexus Ario[1]

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Summary

Intussusception is a common cause of small bowel obstruction in children under 2 years, characterized by colicky abdominal pain, vomiting, and bloody diarrhea. A social media report from a children's clinic in Wakiso District reported a 3 fold increase in cases seen the previous year 2017. We conducted an investigation to verify the existence of an outbreak, determine the scope, cause and risk factors associated with the outbreak, and recommend measures to control this outbreak. A suspected case was defined as occurrence of surgery for intussusception in any child under 5 years of age at a Kampala District Hospital from January 2016 to March 2018. We reviewed surgical records for children less than 5 years of age who had surgery for intussusception between January 2016 and March 2018 from 5 hospitals in Kampala District. We compiled a line list of demographic and surgical data for 130 intussusception cases. 103/130 (78%) cases were under 12 months with the median age of 6 months (range 0-60). The male to female ratio was 1.5:1. There was a total of 6 deaths with 4 occurring in other districts outside Kampala. There was no evidence of an outbreak in Kampala District and no specific pattern of intussusception cases seen throughout each year. We recommend establishment of routine surveillance to monitor safety of rotavirus vaccine.

Background

Intussusception is the invagination of one segment of the bowel into a distal segment. It can result in obstruction, vascular compromise, and necrosis of the intestine, and can lead to death if untreated. Approximately two-thirds of cases occur in children less than 1 year, with a peak incidence from 3 to 6 months of age. Diagnosis is made by air or liquid contrast enema, abdominal ultrasound, or during surgery or autopsy. In 1999, a first generation oral rotavirus vaccine, Rotashield, was withdrawn from the US market because of a significantly increased risk of intussusception occurring after its administration (1)(2). However, preclinical safety trials for the current World Health Organization (WHO) pre-qualified rotavirus vaccines, Rotarix and RotaTeq, identified no vaccine attributable intussusception risk (3) (4). Recent studies from the US, Australia, Brazil, and Mexico, however, have shown 1- to 5-fold increased risk of intussusception following vaccination with Rotarix and RotaTeq (5) (6) (7) (8) (9) . Following a social media report on the 16th March 2018 of increased intussusception cases from a children's clinic in Wakiso district, we conducted an investigation to verify the existence of an outbreak, determine the scope, cause and risk factors associated with the outbreak, and recommend measures to control this outbreak.

Methods

We defined a case as a surgical operation for intussusception on any child less than 5 years of age in a Kampala District hospital between January 2016 and March 2018. Kampala is a centrally located metropolitan District mostly bordered by Wakiso District in the South, North and West and only Mukono District in the East. This investigation focused on Kampala District because the clinicians in the Wakiso District Children's clinic referred all suspected case patients to Hospitals in Kampala (i.e Nakasero and Mulago Hospitals). Wakiso district population is known to seek medical services in Kampala district due to its metropolitan location. We conducted a surgical records review in 5 Major referral hospitals including Mulago National Referral, Naguru, Case, Nsambya and Nakasero Hospitals. We compiled a line list with demographic, surgical and outcome data from case persons between January 2016 and March 2018. We did a descriptive analysis by person, place and time.

Findings

Time Distribution

No of intussusception cases fluctuated throughout the year with no specific pattern

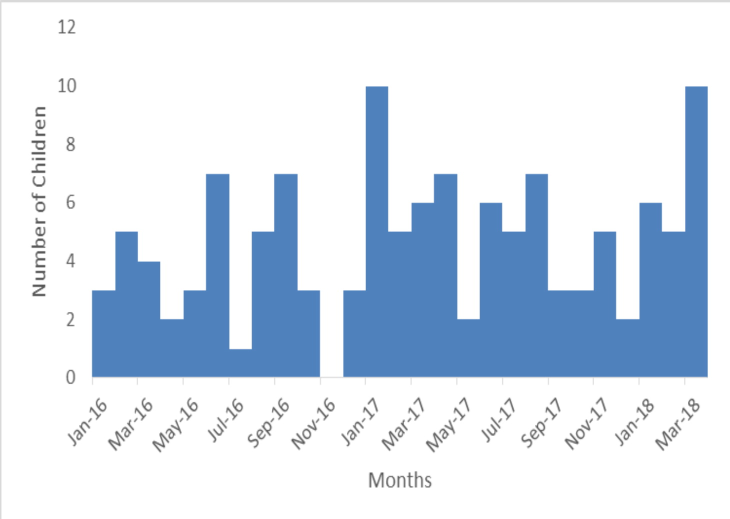

Figure 1: Children (< 5 Years) diagnosed with Intussusception by Month in 5 Hospitals in Kampala District from January 2016 to March 2018.

Person distribution

103/130 (78%) cases were under 12 months old with the median age of 6 months (range 0 - 60 months). The male to female ratio was 1.5: 1.

Continues on Page 7

Continued from Page 6

Table 1: Distribution of Intussusception by age between January 2016 and March 2018

Age in Months	Number of cases	Percentage
0 to 12	102	78%
13 to 60	28	22%
Total	**130**	**100%**

Table 2: Distribution of Intussusception cases by Sex between January 2016 and March 2018

Sex	Number of cases	Percentage
Male	77	59%
Female	53	41%
Total	**130**	**100%**

Place Distribution

Kampala District had 30% (39/130) cases of Intussusception followed by Wakiso district with 29% (38/130) cases. Other districts; Mukono (10/130-8%) Jinja (5/130-4%), Buikwe (4/130-4%) Mityana (3/130-2%), Mubende (3/130-2%) and the rest 21%.

Discussion

The monthly rate of intussusception cases fluctuated throughout the year with no visible pattern. There were several peaks of 5 cases every after 2 months with the highest peak of 10 cases in January 2017 and March 2018. These findings differ from studies done in Ethiopia and Sub tropical China that showed seasonal variability with cases presenting during wetter months (10) (11). This could be due to the short 2 year period of records studied compared to a longer 4 to 5 year period used in these studies. Other studies found no seasonal variability of intussusception among children less than a year old. This investigation did not establish the association of Rota Vaccine to intussusception. The male to female ration in this investigation was 1.5:1. This reflects no clear difference in occurrence of intussusception by sex. A similar study carried out in Chennai city of India found a male to female ratio of 1.8:1 (12). 78% of the children with intussusception were under 1 year of age. These findings are similar to studies done in Ethiopia and Kenya which found over 60 percent of children with intussusception were younger than one year old (13) . This has been associated with more frequent lower respiratory tract infections as maternal antibodies wane after 5 months of age. For this reason all vaccines are given before 12 months of age and mostly before 6 months of age. Although Rota Virus vaccine has been associated with an increased risk of intussusception in children under 4 months of age, this investigation was not able to verify its use among the children seen. Never the less, since it has been available for use in most of Kampala's Private Hospitals for several years, its contribution to intussusception in this situation cannot be completely ignored.

Conclusion and recommendations

There was not enough evidence to establish presence of an intussusception outbreak in Kampala. We recommend increased public awareness for early diagnosis and treatment. Collection of rotavirus vaccine data among all cases of intussusception in the country will be useful to assess impact of rotavirus vaccine on intussusception.

References:

1. Murphy TV, Gargiullo PM, Massoudi MS, Nelson DB, Jumaan AO, Okoro CA, et al. Intussusception among infants given an oral rotavirus vaccine. N Engl J Med. 2001 Feb 22;344(8):564–72.

2. Peter G, Myers MG, National Vaccine Advisory Committee, National Vaccine Program Office. Intussusception, rotavirus, and oral vaccines: summary of a workshop. Pediatrics. 2002 Dec;110(6):e67.

3. Vesikari T, Matson DO, Dennehy P, Van Damme P, Santosham M, Rodriguez Z, et al. Safety and efficacy of a pentavalent human-bovine (WC3) reassortant rotavirus vaccine. N Engl J Med. 2006 Jan 5;354(1):23–33.

4. Ruiz-Palacios GM, Pérez-Schael I, Velázquez FR, Abate H, Breuer T, Clemens SC, et al. Safety and efficacy of an attenuated vaccine against severe rotavirus gastroenteritis. N Engl J Med. 2006 Jan 5;354(1):11–22.

5. Buttery JP, Danchin MH, Lee KJ, Carlin JB, McIntyre PB, Elliott EJ, et al. Intussusception following rotavirus vaccine administration: post-marketing surveillance in the National Immunization Program in Australia. Vaccine. 2011 Apr 5;29(16):3061–6.

6. Patel MM, López-Collada VR, Bulhões MM, De Oliveira LH, Bautista Márquez A, Flannery B, et al. Intussusception risk and health benefits of rotavirus vaccination in Mexico and Brazil. N Engl J Med. 2011 Jun 16;364(24):2283–92.

7. Weintraub ES, Baggs J, Duffy J, Vellozzi C, Belongia EA, Irving S, et al. Risk of intussusception after monovalent rotavirus vaccination. N Engl J Med. 2014 Feb 6;370(6):513–9.

8. Yih WK, Lieu TA, Kulldorff M, Martin D, McMahill-Walraven CN, Platt R, et al. Intussusception risk after rotavirus vaccination in U.S. infants. N Engl J Med. 2014 Feb 6;370(6):503–12.

9. Tate JE, Mwenda JM, Armah G, Jani B, Omore R, Ademe A, et al. Evaluation of Intussusception after Monovalent Rotavirus Vaccination in Africa. N Engl J Med. 2018 19;378(16):1521–8.

10. Gadisa A, Tadesse A, Hailemariam B. Patterns and seasonal variation of intussusception in children: A retrospective analysis of cases operated in a Tertiary Hospital in Ethiopia. Ethiopian medical journal. 2016 Jan 1;54.

11. Guo W, Zhang S, Li J, Wang J. Association of Meteorological Factors with Pediatric Intussusception in Subtropical China: A 5-Year Analysis. PLOS ONE. 2014 Feb 28;9(2):e90521.

12. Intussusception in children - UpToDate [Internet]. [cited 2018 Mar 26]. Available from: https://www.uptodate.com/contents/intussusception-in-children/print

13. Gargano LM, Tate JE, Parashar UD, Omer SB, Cookson ST.

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Continued from Page 7

Malaria Outbreak in Nwoya District, April 2018

Godfrey Nsereko[1], Denis Okethwangu[1], Joyce Nguna[1], Dan Kadobera[1], Alex Riolexus Ario[1]

[1]Uganda Public Health Fellowship Program-Field Epidemiology Track

Summary

Malaria is still a major cause of ill-health and deaths globally. On 18 April 2018, the Health Officer (DHO) of Nwoya district reported an upsurge in the number of malaria cases, which exceeded action thresholds. The Ministry of Health (MoH) set up a response team to determine magnitude of the outbreak, identify risk factors for transmission, and recommend evidence-based control measures. We defined a confirmed case as a positive test result of Plasmodium falciparum by Rapid Diagnostic Test or microscopy from 1-02-2018 to 25-05-2018 in a resident or visitor of Nwoya District. We reviewed outpatient data in all health facilities. In a case -control study we compared potential exposure risk factors between 107 case-persons and 107 asymptomatic controls matched by village. We conducted entomological assessment on vector-density and behavior, and assessed household environment. We line-listed 4,750 confirmed case-persons and 2 deaths. The attack rate (AR) was higher in females (69/1,000) than in males (36/1000); children ≤5 years had the highest AR (77/1000). The overall AR was 65/1000. The epidemic curve showed a propagated outbreak beginning in late March after start of heavy rains. 29% (31/107) of case-persons and 15% (16/107) of controls were not sleeping under a Long Lasting Insecticide-treated Net (OR=2.3, 95%CI=1.1-4.9); 40% (43/107) of case-persons and 27% (29/107) of controls did not use curtains on doors and windows during evenings (OR=2.3, 95%CI=1.1-4.7); 26% (28/107) of case-persons and 16% (16/107) of controls had standing water around households for 3-5 days following rainfall (OR=2.2, 95%CI=1.0-4.9). 30% (32/107) of case-persons compared with 44% (47/107) of controls wore long-sleeve cloths during evening hours (OR=0.54, 95% CI=0.30-0.96). Anopheles gambiae sensu latu species was the predominant vector. Indoor resting density was 4 vectors/household/night and the container larval density was 17%. Heavy rains that caused flooding precipitated the outbreak. Not implementing protection measures against mosquito bites were exposure risk factors. We recommended health education on protection measures against mosquito bites; larviciding active breeding sites.

Background

Uganda ranks sixth among high mortality malaria rates in Africa, and has one of the highest reported malaria transmission rates in the world. *Plasmodium falciparum,* which accounts for 99 % of the cases (MoH, 2014), is the dominant parasite species .*Anopheles gambiae*, a highly efficient vector, along with *Anopheles funestus* are the two main vectors. These vectors are predominantly anthropophagic (feed exclusively on humans), endophilic (rest indoor) and endophagic (feed indoor) Malaria transmission in Uganda exhibits seasonality based on the rainfall patterns. On 18 April 2018, the Health Officer of Nwoya District reported to the National Malaria Control Program an upsurge in the number of malaria cases that had exceeded the action thresholds. Two sub-counties (Anaka, Koch-Goma and Anaka T/C) reported the highest number of confirmed malaria cases in the district. The Ministry of Health set up a response including officials from the Uganda Public Health Fellowship Program (PHFP), and Nwoya District Health Office to investigate this upsurge. We aimed to determine magnitude of the outbreak, identify risk factors for transmission, and recommend evidence-based control measures.

Methods

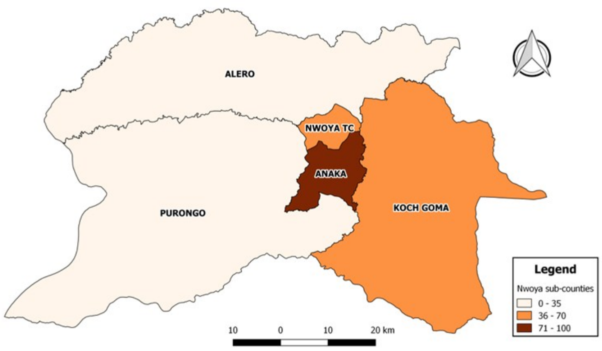
We defined a confirmed case as a positive malaria result on mRDT or microscopy from 1 February, 2018 onwards in a resident or visitor of Anaka Sub-county, Koch Goma Sub-county and Anaka Town council in Nwoya District, Uganda. We found cases by reviewing outpatient health records by reviewing outpatient health records in health facilities in the affected sub counties. In the case-control study, we compared potential exposures between 107 case-persons and 107 asymptomatic controls matched by neighborhood. We determined vector density and behavior using the Pyrethrum Spray Catch (PSC) method. PSC was done daily in randomly selected houses between 24th and 28th May 2018, from 7:00am and 12:00pm. Consent was obtained from households and the procedures explained to the house owners. We also conducted larval scooping in swamps and water-logged areas to identify both active and potential breeding sites. We examined environmental and human exposure factors that may have catalyzed the upsurge in malaria cases during the period.

Findings

We line listed 4,750 confirmed case-persons. Of all confirmed case-persons, 3115 (66%) were women. Two deaths from severe malaria were identified during the period in the district.

Among the line listed cases, females, an attack rate (AR) of 69/1,000 compared to males (AR=36/1,000). Children less than 5 years of age had an attack rate of 77/1,000 and were the most affected age group while adults above 25 years (32/1000) of age were least affected.

The overall attack rate for the 3 sub-counties was 65/1000. Anaka Sub-county was the most affected (AR = 84/1,000) followed by Anaka Town Council (AR=63/1,000) and Koch Goma Sub-county with an attack rate of 57/1,000.



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Among parishes, Todora parish in Anaka Sub-county had the highest attack rate (114/1,000), followed by Coo Rom parish (AR=108/1,000) in Koch Goma Sub-county and Ogom Parish (81/1,000) in Town Council.

Table 1: Distribution of cases by Parish

Sub-county	Parish	Cases	Population	Attack rate/1,000
Anaka	Todora	620	5452	114
	Pabali	299	3835	78
	Ywaya	119	3035	39
Town Council	Ogom	523	6493	81
	Ceke	492	8532	58
	Akago	150	2696	56
	Labyei	182	3657	50
Koch Goma	Coo Rom	768	7079	108
	Kal	459	7968	58
	Amar	160	5861	27
	Agonga	120	5366	22

The epidemic curve is propagated and shows an increase in malaria cases from late March. The upsurge occurred about 4 weeks after the first rains occurred

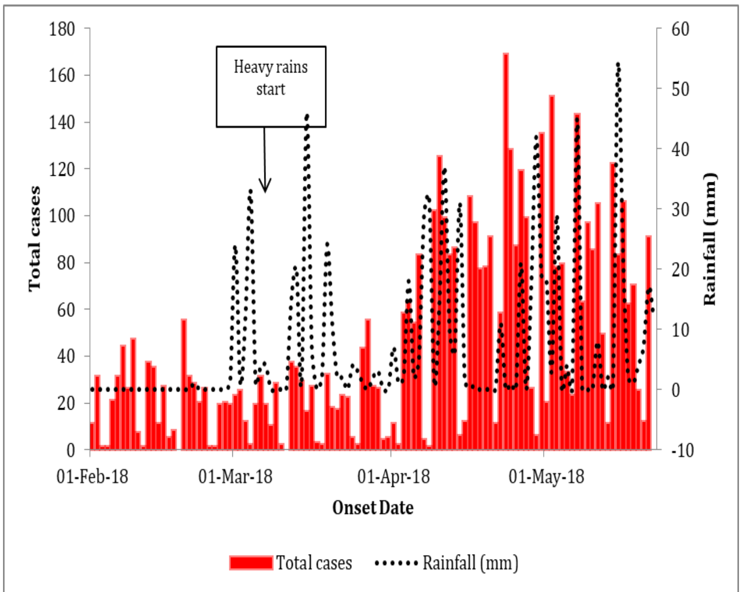

Figure 2: Epidemic curve of confirmed malaria cases and rainfall data in Anaka, Koch Goma and Town Council sub-counties, 1 February 2018 to 21 May 2018

Adult Vector Density, Larval Density and Indoor Resting Density

The assessment shows malaria vectors *Anopheles gambie sensu lato* and *Anopheles funestus* as the most common vectors found inside the sampled households. The average indoor resting density (IRD) of malaria vectors was found to be 4 mosquitoes per household per night. *Anopheles gambiae sensu latu* species had a higher indoor resting density (IRD=2.3) than *Anopheles funestus* species (IRD=1.4). A search for potential and active breeding sites for malaria vectors showed a container larval density of 17%.

Case-Control Study

Not sleeping under a LLIN, not drawing curtains on doors and windows, and presence of water logging areas for 3-5 days following rainfall were significantly associated with malaria infection, with the odds of >2. Wearing long clothes during evening hours was significantly protective against malaria infection.

Table 2: Exposure Status among Cases and controls

Exposure	No. of Participants		% exposed			
	Case (n=107)	Control (n=107)	Case	Control	OR M-H	95% CI
Did not use curtains on doors/ windows in evenings	43	29	40	27	2.3*	1.1–4.7
Did not sleep under LLIN before symptom onset	31	16	31	15	2.3*	1.1 – 4.9
Had standing water around HH for 3-5 days following rainfall	28	16	26	15	2.2*	1.0 – 4.9
Wore long-sleeve cloths during evening hours	32	47	30	44	0.50*	0.30 – 0.90
Having empty containers around HH	14	6	70	30	2.4	0.80 – 7.9
Engaging in late outdoor activities	37	42	47	53	0.80	0.40 – 1.4
Entering bed to sleep after 9pm	73	64	53	47	1.3	0.70 – 2.3
HH neighbor had malaria before case-person's onset	84	70	55	45	1.6	0.90 – 3.1
HH does not have LLIN	12	9	57	43	1.3	0.50 – 3.7
Available LLINs are not adequate for HH size	70	58	55	45	1.4	0.80 – 2.5
Sleeping in mud-walled house	109	102	52	48	1.4	0.20 – 1.0
Sleeping in grass-thatched house	104	100	51	49	0.90	0.30 – 3.0
Having overgrown bushes around HH	84	72	54	46	1.5	0.80 – 2.7
No Indoor Residual Spraying (IRS) of HH in 2017	49	52	49	51	0.8	0.50 – 1.5

Discussion

There was a strong seasonal transmission pattern with peaks observed from late March throughout April during the heavy rainfall period. Nwoya District has over the years experienced heavy rainfalls during the period from March to May (worldweatheronline, 2018). Malaria case data reveals a corresponding increase in cases 4-5 weeks following the first episodes of rainfall. During the rainfall periods, temporary pools of water are formed in areas with swamps, open abandoned containers, ditches and potholes along the road side among others. In 2017, a lesser upsurge of malaria cases was observed during the same period following Indoor Residual Spraying (IRS) in the district. Our findings in this study point to no significant protection of IRS sprayed households and a high indoor resting density of malaria vectors. The potency of the last IRS diminished 6-9 months after spraying, thereby rendering indoor walls and surfaces of houses as convenient feeding and resting places for malaria vectors. The Uganda National Malaria Control Program, at the center of implementation of the 5 year malaria reduction strategic plan, has emphasized IVM as one of the key strategies to fast track malaria elimination (MOH, 2014, 2015). As with our findings, not sleeping under LLIN in high transmission areas is recipe for increased human-vector contact and therefore malaria disease (Srivastava and Dhariwal, 2016). Drawing of curtains on doors and windows early enough to prevent or minimize mosquito entry into the house and wearing long clothes in evening hours are simple to use and cost-effective strategies can be incorporated into routine social behavior change communication massages in the fight against malaria .

Conclusion and Recommendations

Heavy rains that caused flooding precipitated the outbreak. Not implementing protection measures against mosquito bites were exposure risk factors We recommended health education on protection measures against mosquito bites; larviciding active breeding sites

References

MoH (2014) *UGANDA Malaria Indicator Survey (MIS)*. Available at: https://dhsprogram.com/pubs/pdf/mis21/mis21.pdf (Accessed: 3 May 2018).

MOH, M. of H. (2014) *THE UGANDA MALARIA REDUCTION STRATEGIC PLAN 2014-2020*.

MOH, M. of H. (2015) 'Health Sector Development Plan 2015/16 - 2019/20', *RoU*, (September), p. 110. doi: 10.1093/intimm/dxu005.

Srivastava, P. and Dhariwal, A. (2016) *Compendium On Entomological Surveillance & Vector Control in India*. Available at: http://nvbdcp.gov.in/Doc/Compendium-Ent.VC-DrPKS.pdf (Accessed: 7 June 2018).

worldweatheronline (2018) *Nwoya, Gulu, Uganda Weather Averages | Monthly Average High and Low Temperature | Average Precipitation and Rainfall days | World Weather Online*. Available at: https://www.worldweatheronline.com/nwoya-weather-averages/gulu/ug.aspx (Accessed: 7 June 2018).

Crimean-Congo Haemorrhagic Fever Outbreak in Kakumiro and Mubende Districts, Central Uganda, May – August 2018

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Summary

Crimean–Congo haemorrhagic fever (CCHF) is a viral haemorrhagic fever typically spread by tick bites or contact with body fluids of infected livestock or animals. Onset of symptoms is less than two weeks following exposure and may include fever, muscle pains, headache, vomiting, diarrhoea, and skin bleeding. Those affected are often farmers or people who work in slaughterhouses. Diagnosis is by detecting antibodies, the virus's RNA, or the virus itself. Following a death report of a suspected Viral Haemorrhagic Fever (VHF) case person at Mubende hospital on the 23rd of May 2018, the Uganda Virus Research Institute (UVRI) confirmed the case positive for CCHF virus by both RT-PCR and immunoglobulin (IgM serology). We formulated a Rapid Response Team (RRT) to conduct a quick outbreak investigation, carry out a rapid risk assessment and initiate immediate control measures. We defined a confirmed case as a positive CCHF test by both RT-PCR and immunoglobulin (IgM) serology in a resident of Kakumiro and Mubende District since the 1st of May 2018. We reviewed patient records at Kakumiro health centre IV, Nkooko health centre III and Mubende regional referral Hospital. We designed a standardised case and contact investigation questionnaire, and trained a team of Village Health Teams (VHTs) to perform active case finding and contact tracing. We also collected human, livestock blood samples and ticks for CCHF virus testing. One confirmed case (AR = 0.31/100,000) with a Case Fatality Rate (CFR) of 100% was reported from Lubumbo village in Nkooko subcounty, Kakumiro District. We identified 32 contacts, 11/32 (34%) were relatives, 9/32(28%) were Health workers and 12/32 (38%) were community members. We also calculated Weighted Risk scores (WRS) and found 6/32 (19%) relatives with a WRS above 9 points. However, none of them developed symptoms. Although the case patient owned no livestock, IgM seropositivity of 23% was found in the neighbourhood livestock but insignificant in ticks. The cause of this outbreak was probably exposure to CCHF virus-infected ticks and livestock meat. We recommended spraying of livestock with acaricides and disinfection of infected livestock owners' homes.

BACKGROUND

Crimean-Congo haemorrhagic fever is a viral haemorrhagic fever transmitted by ticks and caused by the Crimean-Congo Haemorrhagic Fever Virus (CCHFV) of the genus *Nairovirus* of the *Bunyaviridae Family*. It is the most widespread tick-borne virus in the world and is responsible for severe outbreaks in humans. Numerous wild and domestic animals, such as cattle, goats and

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are critical determinants for the establishment and maintenance of CCHF endemicity (3). Transmission also occurs by close contact with bodily fluids of infected persons or animals. Cases commonly occur in agricultural workers, slaughterhouse workers and veterinarians. The incubation period is usually one to three days following a tick bite and five to six days, with a maximum of 13 days following contact with infected blood or tissues (4). Symptoms are sudden, with fever, muscle ache, dizziness, neck pain and stiffness, backache, headache, sore eyes and photophobia (sensitivity to light). Nausea, vomiting, diarrhoea, abdominal pain and sore throat may occur, followed by sharp mood swings and confusion and later bleeding from body orifices(5). Mortality rate is between 10% and 40% in the second week of illness (4). The main approach to care in supportive and control measures include raising awareness of the risk factors, monitoring of contacts, active search of infective animals, vectors and use of acaricides. There is currently no safe and effective vaccine widely available for human use(6). On 23rd May 2018, Kakumiro District health office received a report of death of a suspected Viral Haemorrhagic Fever case person at Mubende hospital. On the 22nd May 2018, a 35-year-old male, a resident of Lubumbo village in Nkooko Sub-county reported at Kakumiro HC IV with a history of sudden onset of high fever, severe headache, body pain and vomiting of blood. He visited two other private clinics 3 days earlier and had treatment without improvement. A few hours later, Mubende Regional Referral Hospital admitted him in isolation, took a blood sample for CCHF testing and sent it to UVRI for CCHF testing. The medical team treated him with intravenous fluids and antipyretics but he died a few hours later on the night of 23rd May 2018. A day later, relatives took his body from hospital and buried him on the 24th of May 2018. A day later, the 25th May 2018, UVRI reported positive CCHF-PCR results of the dead patient to the Hoima Epidemiology and Surveillance (EPI/IDSR) regional office. A District rapid response team (RRT) was organised quickly conducted an outbreak investigation and initiate immediate control measures.

METHODS

A confirmed case was any person that tested positive for CCHF by RT-PCR or immunoglobulin (IgM) serology from the districts of Mubende and Kakumiro since the 1st of May 2018. We defined a probable case as; sudden onset of fever >38°C (100.4°F) with any one of the following symptoms; loss of appetite, general body weakness, headache, vomiting, abdominal pain, diarrhoea, myalgia and/or joint pains and sudden-onset of unexplained bleeding or sudden death in a resident of Kakumiro and Mubende Districts since the 1st of May 2018. We defined a contact as any person exposed to a confirmed case-patient in any of the following ways. Touching blood or other body fluids of the patient; touching patient's clothes or linen; sleeping in the same household; direct physical contact with patient during the illness; direct physical contact with the corpse during burial preparation or funeral; or breastfed by a confirmed case-patient. We reviewed medical records at facilities in the districts for active case search. We developed a contact investigation questionnaire and follow up tool for descriptive epidemiology. Weighted risk scores (WRS) are grades of exposure to disease that are used in VHF outbreaks to gauge the magnitude and risk of exposure.

RESULTS

Case Description: A 35-year-old male peasant farmer from Lubumbo village in Rubumbo Parish of Nkooko Sub-county in Kakumiro District. On 19th May 2018, he reported to a private clinic in Rutooma village with a 3-day history of vomiting blood, a high-grade fever of 39 degrees Celcius, severe headache and jaundice. Two days later, on the 22 of May 2018, he presented to Kakumiro Health Center in severe pain, delirium, jaundice, anaemia and bleeding from the mouth. At about 10:30 pm on the same day, Mubende RRH received him in semi-conscious state with mouth and nose bleeding. He was isolated and managed on intravenous fluids. He died later in the night at about 1:00am, on the 23rd of May 2018. An unsafe burial was performed on 24th of May 2018. On the 25th of May 2018, UVRI Entebbe confirmed his test results as positive for CCHFV by RT-PCR. His home was disinfected and thirty-two (32) contacts were line listed though none developed symptoms. All case patient relatives had WRS above 9 points but were negative for CCHFV. 25/42 contacts were Male, 11/32 were relatives and 9/32 were health workers. The RRT team assigned WRS as follows; 1 for attending a funeral of the deceased; 2 for having slept in case-patients' homes;3 for having touched or washed their clothes or utensils; 3 for having had direct contacts with their bodies; 4 for touching confirmed case-patient's body or bodily fluids (such as blood, saliva, excreta) with PPE and 5 for touching their bodily fluids without PPE. We grouped them as WRS of 0-2, 3-5, 6-8 and 9-10 points. We also took blood samples and ticks from 59 animals including 22 cows, 32 goats and 7 sheep in Lubumbo village for CCHF serology testing.

Place distribution:

22/32 (69%) contacts were from Lumumbo village in Nkooko Sub-county for Kakumiro District. 4/32 (13) were health workers from Kakumiro town council and 4/22 (13%) were health workers from Mubende RRH.

Environmental and Veterinary Investigations

The case patient had a history of contact with raw goat meat about 2 weeks prior to onset of symptoms. He owned no livestock but there was livestock like cattle, goats and sheep in the village which had 23% CCHF IgM seropositivity but insignificant for tick tests.

DISCUSSION AND CONCLUSION

There is unrestricted movement of both animals and persons across district boundaries. This movement probably propagated transmission of the virus into Kakumiro District. Since the neighbouring districts of Kyankwanzi and Kiboga had reported CCHF outbreak in January 2018(7), it is not surprising that Kakumiro District reported CCHF in May 2018.

The case patient was a peasant farmer and did not own any livestock. However, the community livestock grazes at free-lance across different fields in his neighbourhood. He probably got exposed to tick from infected livestock in the neighbourhood (8). The district reported no other case patient during this outbreak. None of the relatives, health workers of community members who got in contact with him got infected.

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This may be because of the mass media campaigns and community health education done by the nearby districts during the previous CCHF outbreaks reported in January 2018. The community members were quick to suspect VHF and minimise body contact with the patient. The medical teams were quick to suspect VHF too and used personal protective equipment (PPE) and disinfectants to minimise their exposure. The district had additional mass media sensitisations on avoiding handling ticks with bare hands and use of protective gear such as gloves, boots and clothes to minimize exposure to livestock. The RRT also disinfected the deceased's home. However, farmers have not sprayed their livestock with acaricides and the outbreak is likely reoccur. The outbreak of CCHFV in Kakumiro District was possibly caused by exposure to infected livestock. We recommend continued community health education on prevention of CCHF exposures, signs and symptoms, safe burial, spraying of livestock and seeking immediate medical care.

References:

1. Transmission | Crimean-Congo Haemorrhagic Fever (CCHF) | CDC [Internet]. [cited 2018 Jun 8]. Available from: https://www.cdc.gov/vhf/crimean-congo/transmission/index.html

2. Al-Abri SS, Abaidani IA, Fazlalipour M, Mostafavi E, Leblebicioglu H, Pshenichnaya N, et al. Current status of Crimean-Congo haemorrhagic fever in the World Health Organization Eastern Mediterranean Region: issues, challenges, and future directions. International Journal of Infectious Diseases. 2017 May 1; 58:82–9.

3. global distribution of Crimean-Congo haemorrhagic fever | Transactions of The Royal Society of Tropical Medicine and Hygiene | Oxford Academic [Internet]. [cited 2018 Jun 8]. Available from: https://academic.oup.com/trstmh/article/109/8/503/1910424

4. Crimean-Congo haemorrhagic fever [Internet]. World Health Organization. [cited 2018 Jun 8]. Available from: http://www.who.int/news-room/fact-sheets/detail/crimean-congo-haemorrhagic-fever

5. WHO | Crimean-Congo haemorrhagic fever (CCHF) [Internet]. WHO. [cited 2018 Jun 8]. Available from: http://www.who.int/emergencies/diseases/crimean-congo-haemorrhagic-fever/en/

6. Heymann DL. Control of Communicable Diseases Manual. American Public Health Association; 2015. 729 p.

7. Crimean-Congo haemorrhagic fever outbreak in central Uganda [Internet]. Outbreak News Today. 2017 [cited 2018 Jun 8]. Available from: http://outbreaknewstoday.com/crimean-congo-hemorrhagic-fever-outbreak-central-uganda-98860/

8. Crimean-Congo haemorrhagic fever [Internet]. World Health Organization. [cited 2018 Jun 19]. Available from: http://www.who.int/news-room/fact-sheets/detail/Crimean-congo-haemorrhagic-fever

Rift Valley Fever Outbreak Caused by Handling a Dead Calf: Kiruhura District, 2017-2018

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Executive summary

Rift Valley fever (RVF) is a viral zoonosis that causes severe disease in animals and humans. The disease results in significant economic losses due to death and abortions among RVF-infected livestock. On 7th December 2017, the Uganda Ministry of Health received an alert of one suspected Viral Hemorrhagic Fever case-patient from Kiruhura District. Laboratory results from UVRI indicated that the case-patient was PCR- positive for Rift Valley Fever. We investigated to determine the extent, identify risk factors, and recommend control and prevention measures. All case-persons had a previous exposure to sick animals either from direct or indirect contact with the blood or organs of infected animals.

Background

Rift Valley Fever (RVF) is a zoonosis that affects animals and humans. Most of human infections result from direct or indirect contact with the blood or organs of infected animals. The virus may be transmitted to humans through handling of animal tissue during slaughtering or butchering, assisting with animal births, conducting veterinary procedures, or from the disposal of carcasses or fetuses. Occupational groups such as herders, farmers, slaughterhouse workers, and veterinarians are therefore at higher risk of infection. RVF virus has an incubation period of 2-6 days following infection[1]. RVF symptoms and signs in persons are typically fever, myalgia, and malaise; in a minority of cases retinitis, encephalitis, hemorrhagic fever. Death may occur as a result of RVF infection with an overall mortality rate of ≈1%[2]. Lab-confirmation of RVF is by either detection of RVF nucleic acid by reverse-transcriptase polymerase reaction (RT-PCR) or demonstration of serum IgM/IgG antibodies by ELISA

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On 7 December, 2017, the Uganda Ministry of Health (MoH) through Public Health Emergency Operational Centre (PHEOC) received an alert of a suspected VHF from Kiruhura District. This was a 24-year-old male that presented with VHF symptoms of high grade fever, headache, blood in vomitus and bleeding from the nose. He hailed from Rushororo village, Kanyaryeru sub-county Kiruhura District. He had been admitted at Mbarara Regional Referral Hospital where a blood sample was drawn and shipped to UVRI for testing. Laboratory results from UVRI indicated that the case -patient was PCR- positive for Rift Valley Fever (RVF).

Ministry of Health sent a team consisting of epidemiologists, entomologists, laboratory technicians and veterinarians to investigate the outbreak. The set out to establish the scope and identify risk factors for the outbreak and recommend evidence-based interventions.

Methods

We defined a suspected case as acute onset of fever (>37.5°C), negative malaria test result, and at least two of the following symptoms; headache, muscle or joint pain, bleeding and any gastroenteritis symptom (nausea, vomiting, abdominal pain, diarrhea) in a resident of Kanyaryeru sub-county from 1st October, 2017 to 30 January, 2018.

A confirmed case was a suspected case with a laboratory confirmation by either detection of RVF nucleic acid by reverse-transcriptase polymerase reaction (RT-PCR) or demonstration of serum IgM or IgG antibodies by ELISA.

We used a standard case investigation form for VHFs to collect information from the case-persons. We conducted in-depth interviews with case-persons that were infected with RVF. We conducted active community case finding and contact tracing in Kanyaryeru sub-county and developed a line-list.

Blood samples from 9 suspected case-persons were collected and shipped to UVRI for testing. Blood samples from 146 cattle, 76 goats, 20 sheep from four selected farms in Kanyaryeru sub-county were transported to National Animal Disease Diagnostic and Epidemiology Centre (NADDEC) for testing.

The veterinary team investigated the evidence of RVF in animals in the affected area and collected blood samples from wild animals.

An environment assessment was conducted to identify possible risk factors that could be facilitating transmission of RVF. We observed physical features on affected farms in the affected sub-county.

Findings

We identified four confirmed case-persons. All affected case-persons were males with a median age of 24 years (IQR: 17-31.5). There was no death reported (CFR=0%). All case-persons originated from Rushororo village, Kanyaryeru sub-county Kiruhura District.

Epidemiological linkage

Case-person 1: On 25 November, 2017, a two-week-old calf on Farm X died of unknown cause. It was butchered by three farm workers and the meat consumed. After 2 days, a 24-year-old male (case-person 1) involved in butchering the dead calf presented with high grade fever and severe headache. He was admitted for one night at clinic X in Sanga town where he was treated for malaria. On 4th December, he developed nasal bleeding and was re-admitted at the same clinic. He was treated with IV Quinine, IV fluids for two days thereafter referred to Mbarara Regional Referral Hospital (MRRH). At MRRH, the patient's condition worsened with symptoms such as hematemesis (blood or coffee grounds in vomit and black stools (melena), extreme weakness, sore throat, hiccups, joint pains and muscle pains for 3 days. A blood sample was drawn and shipped to UVRI for testing. Laboratory results from UVRI indicated that the case-patient was PCR-positive for RVF.

During contact tracing, farm workers that participated in the slaughter of the calf and had history of sickness in that period, had their blood samples drawn for testing. The following case-persons were identified after blood testing.

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Case-Person 2: On 28 November, 2018, a day after butchering the dead calf, a 24 years-old male who was involved in the butchering process presented with fever and headache, however he didn't seek medical care. The investigation team collected his blood sample and the test result indicated both anti-RVF specific IgM and IgG.

Case-person 3: On 29 November, 2017, two days after butchering the calf, an 11 years-old male who assisted in carrying offals from the dead calf developed symptoms of high grade fever and headache. His blood test result indicated anti-RVF specific IgM antibodies.

Case-person 4: On 18 November, 2017, eight -days before the death of the calf, a 39 years-old male developed symptoms. This indicated that most probably he had a different exposure or source of infection. Upon testing, anti-RVF specific IgG antibodies were detected which indicated a previous exposure to RVF virus.

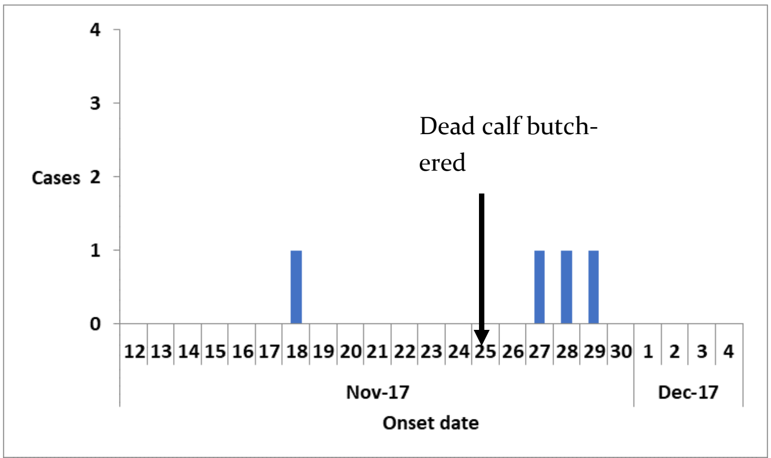

Figure1: Epi-curve showing RVF confirmed cases in Kiruhura District, November, 2017

This was a point source outbreak with exposure on 25 November, 2017. The index case-patient developed symptoms on 27, the second case-patient and third case-patient developed symptoms on 28 and 29 respectively. However, the case-person that developed symptoms on 18 November, 2017 had unknown exposure.

Laboratory Investigations

We tested 9 suspected case-persons and four turned positive for RVF. To monitor viremia, subsequent blood testing from case-persons was conducted and two of the confirmed cases recovered while the other two were still positive for RVF at the time of investigation. Of the four farms sampled, 44% (64/146) of cattle, 46% (35/76) of goats and 45% (9/20) of the sheep tested positive for RVF. Among wild life, 10% (1/10) of Zebras, 100% (1/1) of Etopi and 100% (1/1) of Impala tested positive for RVF.

Environmental/Veterinary investigations

We purposively selected one farm where the confirmed case-persons were working and the other three farms in close proximity with this farm denoted as X. Between November, 2017 and January, 2018, a total of 4 sudden deaths and 4 still births had been reported among goats while among cattle, reports of still births and one sudden death had occurred on Farm X. Farm X shares a border with Lake Mburo National Park and it was observed that wild animals freely interacted with the domestic animals during grazing.

Discussion

In this outbreak, human infections were associated with handling dead meat or organs from infected animals. All the infected herdsmen were involved in slaughtering of the calf that had died of unknown cause and most probably had been infected with RVF virus. This is similar to other outbreaks that have occurred in other parts of the country, where the infected persons have had a history of either handling animals that have died of unknown cause or consuming raw animal products.

It is noteworthy that RVF outbreaks are strongly linked to excessive/ heavy rainfalls and prolonged flooding, which increases habitat suitability for vector population thus influencing the risk of disease emergence, transmission and spread. The onset of RVF outbreaks appears to be also associated with dry spell events as seen in this outbreak [3].This outbreak occurred after a long dry spell and most probably domestic animals could have been exposed to Rift valley virus as they grazed in the nearby forested area around the affected farms.

Continued on Page 15

Continued from Page 14

This is supported by studies conducted in Kenya which indicated that the highest RVFV circulation was detected after herds passed through bony forested areas[4]

Conclusion

This was an RVF outbreak in humans and animals affecting Kanyaryeru sub-county in Kiruhura District caused by interaction of domestic and wild animals from lake Mburo national game park. The index case-person was probably infected through contact with infected dead calf that was butchered on 25 November, 2017.

Recommendations

The Ministry of Agriculture, Animal Industries and Fisheries (MAAIF) should ensure enforcement of laws prohibiting the sale and consumption of either sick or dead animals that have died of un known cause. Control of movement of animals from the affected areas should be considered and moreso, interaction between domestic and wild animals should be minimized through law enhancement by wild life authorities.

Enhanced surveillance of RVF in animals and humans in Kiruhura District should continue to identify any other affected farms and persons.

Mass education of the communities about RVF. The communities should report any usual events such as sudden deaths, abortions, still births observed on farms.

References

1. Gerdes, G., *Rift valley fever.* Revue scientifique et technique -Office International des Epizooties, 2004. **23**(2): p. 613-624.
2. LaBeaud, A.D., et al., *Interepidemic Rift Valley fever virus seropositivity, northeastern Kenya.* Emerging infectious diseases, 2008. **14**(8): p. 1240.
3. FAO, *Rift Valley Fever (RVF): Emergency Prevention System (EMPRES) for Transboundary Animal and Plant Pests and Diseases.* 2016.
4. Owange, N.O., et al., *Occurrence of rift valley fever in cattle in Ijara district, Kenya.* Preventive veterinary medicine, 2014. **117**(1): p. 121-128.

POLICY BRIEF

Introduce Measles Mumps Rubella (MMR) vaccine into Uganda's Routine Immunization Schedule

Doreen Birungi, Benon Kwesiga and Alex Riolexus Ario

Summary

Uganda gives one dose of measles vaccination to children at 9 months or at first contact after that age with a monovalent measles vaccine. There is no vaccination against Rubella and Mumps in the routine immunization schedule. Introduction of MMR will therefore offer a new opportunity for an integrated approach to enable comprehensive measles, mumps and rubella prevention.

Background

Vaccination against specific diseases reduces the incidence of the disease, and its overall burden on the population. High immunization coverage can lead to a complete blockage of transmission for Vaccine Preventable Diseases (VPD). For measles in particular, Uganda gives one dose of vaccination to children at 9 months or at first contact after 9 months with a monovalent measles vaccine. Measles has been targeted for elimination due to its high public health impact on morbidity and mortality and its control has been implemented through routine vaccination, periodic measles supplemental immunization activities (SIAs) and monitoring through case-based surveillance. Unfortunately, there is no vaccination against Rubella and Mumps in the routine immunization schedule yet outcomes due to these infections are detrimental. Outcomes such as permanent deafness, Congenital Rubella syndrome may result due to infection with these diseases.

Descriptive data analysis of a five-year period (2012 - 2016), indicates that the proportion of rubella positivity in the measles case- based surveillance system was three times that of measles, indicating the high circulation of rubella. Rubella positivity increased by 12% from 2012 to 2016. Rubella disease caused by rubella virus is a preventable public health problem which presents as mild in both children and adults.

Continued on Page 16

Continued from Page 15

When it occurs during the first trimester of pregnancy, infection with rubella virus is associated with development of Congenital Rubella Syndrome (CRS) in the unborn babies (1); This may include congenital heart disease, loss of hearing or eyesight and intellectual disabilities. The risk of CRS may go as high as 90% in rubella infected persons (2). In 2016, over 75% of the reported rash like febrile illness diagnosed as measles suspected cases turned out to be rubella, this laboratory evidence of rubella infection indicates that there is high circulation of rubella in Uganda.

Context and Importance of the Problem

Measles, mumps and rubella outbreaks continue to occur globally. In a study conducted in the United Kingdom between 2000 and 2006, complications of mumps included permanent deafness, and orchitis in over 6% of mumps cases. Other complications include pancreatitis and meningitis (3). In Uganda, a cluster of mumps was investigated in a children's home in Wakiso District where 19 cases were registered in June 2017. Other sporadic mumps cases still occur among children and usually go uninvestigated. Orchitis among males who have reached puberty may lead to fertility problems. Encephalitis, which is the inflammation of the tissue covering the brain and spinal cord (meningitis) may also result from complications of mumps. In women, it may result in inflammation of the ovaries (oophoritis) and/or breast tissue (mastitis).

Uganda registered measles outbreaks in districts of Kayunga, Lyantonde, Kampala, Wakiso, Lwengo, Kibuku in 2017. Additional districts that have confirmed measles outbreaks since the beginning of 2018 include; Nakaseke, Luwero, Mityana, Butambala, Iganga, Kamuli, Butambala, Hoima, Namutumba, Mbale, Lwengo, Kasese, Luwero, Kamwenge, Jinja. In most of these outbreaks, children < 5 years of age were the most affected, with highest incidence among children less than 1 year of age.

Critique of Policy Options

World Health Organization (WHO) recommends introduction of rubella vaccine in countries that have achieved high coverage (>80%) of the first-dose measles-containing vaccine .In Uganda, National Supplementary Immunization Activities (SIAs) which were conducted in 2009, 2012 and 2015 achieved an administrative coverage of 104%, 100% and 95%, respectively. Additionally, according to Uganda EPI administrative data (2016), measles vaccination coverage was 90%, which surpassed the WHO target of 80%. This gives Uganda an option to adopt the combined MMR vaccine rather than the currently administered monovalent measles vaccine. Availability of a combined vaccine that protects the body against the three infections is an opportunity which should be embraced by Uganda National Immunization Technical Advisory Group (UNITAG) for consideration and forwarded to Uganda National Expanded Program on Immunization for implementation. Combined MMR vaccine induces immunity less painfully than three separate injections at the same time and more efficiently than three injections given on three different dates. Administering combined vaccines reduces the chances of drop-out as compared to spreading out single vaccines. In addition, when single vaccines are administered, children keep vulnerable for longer while waiting for other separate jabs. With MMR, children have protection against mumps, measles and rubella from the first jab onwards. With single vaccines, they remain open to infection for weeks or months, giving the diseases more opportunity to take root among their age group.

In 2012, the Cochrane Library published a systematic review of scientific studies and concluded that, "Existing evidence on the safety and effectiveness of MMR vaccine supports current policies of mass immunization aimed at global measles eradication and in order to reduce morbidity and mortality associated with mumps and rubella." In a UK study during 2000-2006, the risk of mumps reduced by over.70% when a patient received one dose of the MMR vaccine. The risk of mumps orchitis was reduced by 28%(3).

Policy recommendations

In order to close the immunity gap that is propelling the constant outbreaks of Measles, Mumps and Rubella, introduction of a combined MMR vaccine will offer a new opportunity to enhance comprehensive measles, mumps and rubella prevention and control as observed in countries where MMR has been introduced.