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EMERGING INFECTIOUS DISEASES

CLINICAL AND PUBLIC HEALTH ISSUES

CONTENT

Special Issue Editor: Ed Zijlstra

EMERGING INFECTIOUS DISEASES

Tropical Medicine is full of surprises; there is never a dull moment. After the biggest surprise of all, the HIV pandemic that affected the lives of many and that has changed medicine in many parts of the world but especially in the Tropics, several new diseases have cropped up that caused havoc. Only recently an Ebola epidemic went completely out of control and caused great concern world-wide. One never forgets the scene on BBC World showing a patient in Sierra Leone who escaped in a panic from the treatment facility and who was chased by health workers in protective gear, while bystanders watched the scene with fear and disbelief. This is Tropical Medicine for you: how to practise medicine in the tropics taking all the difficulties into account and these were huge in this case. It is heartening to see that Médecins sans Frontières (MSF), once again, was on the spot immediately and did an excellent job. On the other hand, the international community including the World Health Organization (WHO) was slow in responding. It is interesting to note how difficult it was to make predictions on the extent of the epidemic that was feared to affect 1.4 million people (reported and unreported cases) by January 2015 in a worst-case scenario by the Centres for Disease Control (CDC). Now the epidemic seems to be slowing down with 13,000 cases by November 2014 instead of the predicted 20,000 by the WHO. This is good news, but as The Economist wrote (February 7th 2015): ... 'it will be harder to catch the world's attention next time.'

Influenza never fails to hit the news either as avian flu outbreaks, or as the seasonal flu, or in flu pandemics showing the seemingly unlimited potential of viruses to (re-)emerge in new viruses that threaten human health world-wide. Here the role of animal reservoirs is clearly demonstrated making it difficult to control this infection effectively; one can only hope for new vaccines as antivirals have their limitations.

Other outbreaks were more or less readily contained such as Severe Acute Respiratory Syndrome (SARS) and perhaps the Middle East Respiratory Syndrome (MERS). Here also the importance of animals is demonstrated with dromedary camels acting as an intermediate host for MERS in Saudi Arabia. These animals are the symbol of many Arab countries and of major economic importance, thus adding to the difficulties for control.

The Dengue, Chikungunya and West Nile virus infection epidemics are examples of arthropod-borne infections. This brings another factor into the equation, namely climate change and global warming that have been implicated in the spread of these mosquito vectors and therefore the viruses they carry.

Currently, we have inadequate knowledge of (micro-)biology, zoology and ecology to predict new outbreaks of whatever nature and how to quickly respond and contain these, let alone to provide protection by vaccines or other control methods.

THE CHAPTER OF EMERGING INFECTIOUS DISEASES IN TROPICAL MEDICINE IS NOT LIKELY TO BE CLOSED IN THE FORESEEABLE FUTURE

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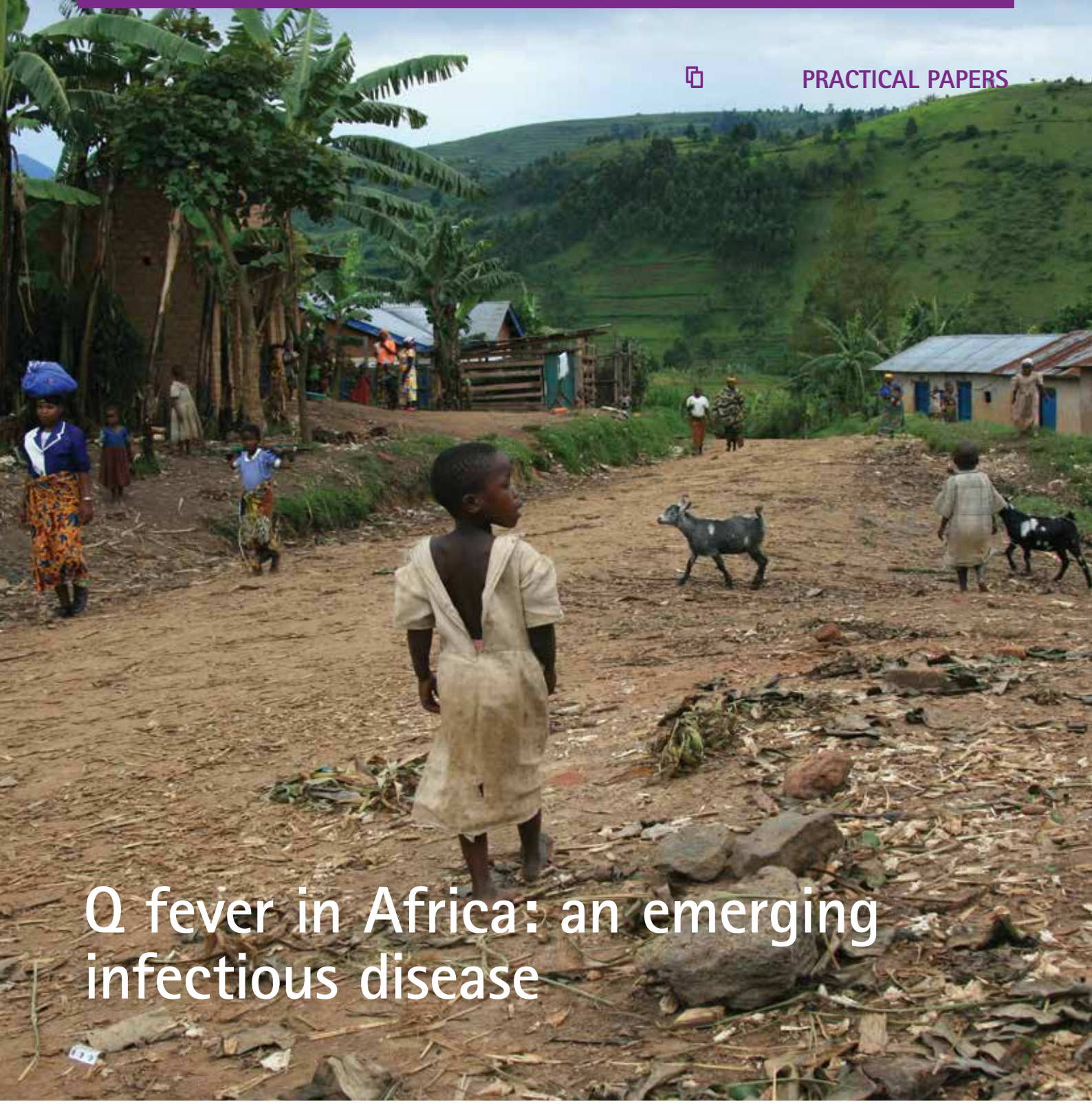
Q fever in Africa: an emerging infectious disease



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Busanza, Uganda

Q fever is a bacterial zoonotic disease that was first described in Australia, in 1937. Regular outbreaks among humans have since been described in Europe, North America, the Middle East and Australia (Figure 1). Studies among patients with febrile illness or pneumonia, and seroprevalence studies among humans and animals have demonstrated the worldwide occurrence of the causative bacterium *Coxiella burnetii.* In the large majority of outbreaks, small ruminants (sheep or goats) were identified as the source but other animals have been implicated, including cattle, domestic cats, dogs, pigeons, and wild rabbits. New Zealand is the only country in the world where studies have been done, but where the bacterium and the disease were found to be absent. From 2007 to 2010, the Netherlands faced the largest Q fever epidemic that was ever described and this has placed Q fever again high on the agenda as an emerging, or re-emerging, zoonosis.[1] The present paper focuses on the extent of the problem of Q fever in sub-Saharan Africa.

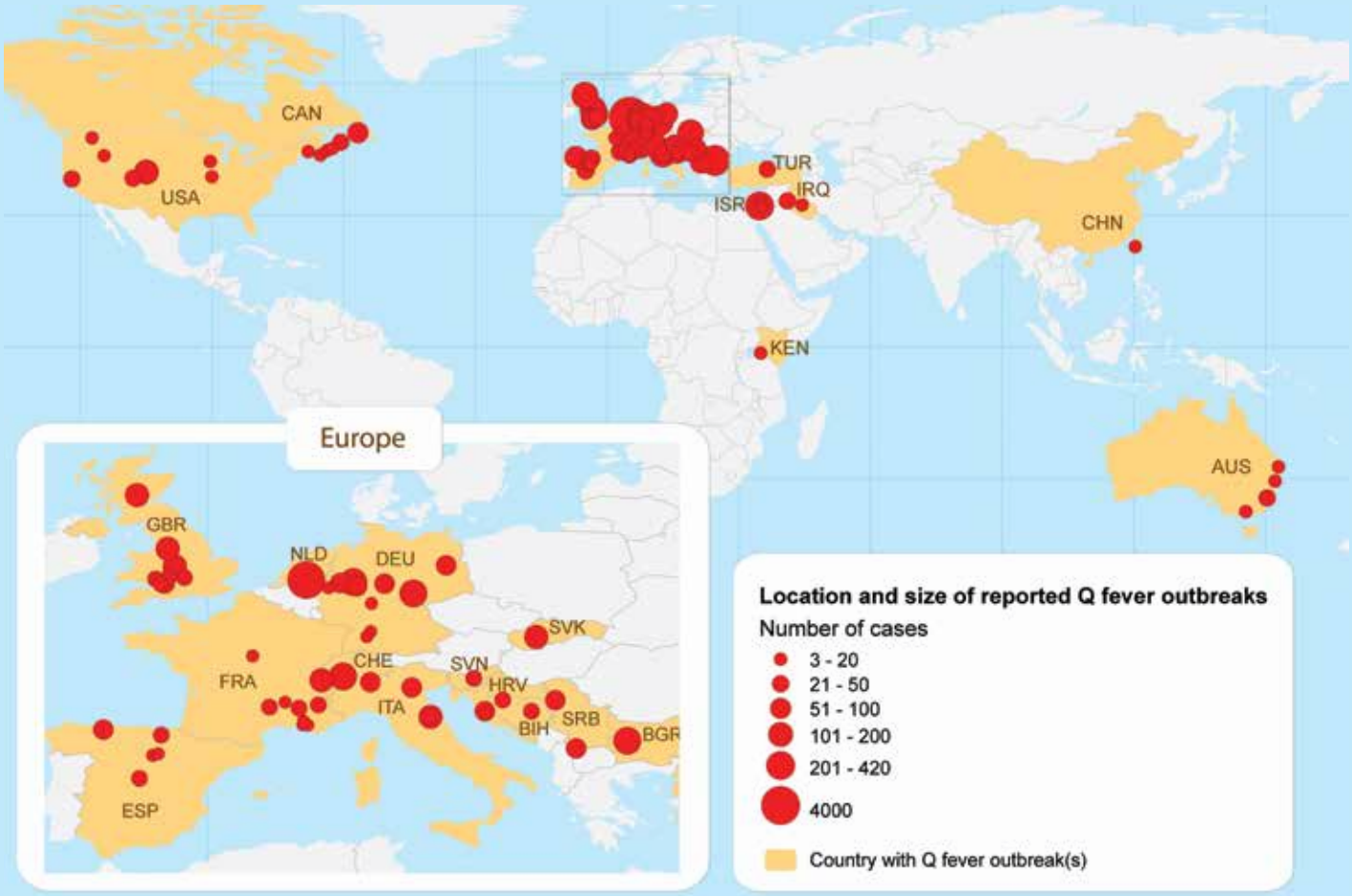
CAUSES OF FEVER IN AFRICA

Until recently, the paradigm in much of sub-Saharan Africa was that malaria is the overwhelming cause of fever and that patients with febrile illness must receive presumptive treatment with artemisinin-based combination therapy (ACT). However, the epidemiology of malaria is changing with substantial decline in disease prevalence and incidence in a number of African countries. For the African continent it was estimated that in 2007, there were 656 million fevers among 0-4 year old children, 182 million were likely to have sought treatment in a public sector clinic of which 78 million were likely to have been infected with *Plasmodium falciparum*.[2] Therefore, 57% of the 182 million children presenting with fever to government-supported clinics do not have malaria infection, and in some countries, that proportion is greater than 90%. These findings are supported by country-specific studies. For example, in the Gambia, during 22 weeks follow-up of a cohort of 800 children in the 2008 malaria season, only 11% (24/224) of febrile episodes detected were due to malaria.[3]

The official World Health Organization (WHO) policy is that all suspected cases of malaria should be diagnostically confirmed before treatment, with microscopy or a malaria rapid diagnostic test (RDT). This will allow for the restricted use of ACT for those who actually have malaria. However, the question remains what to do with febrile patients who test negative for malaria. Indiscriminate use of antibiotics must be avoided and there is an urgent need for cheap point-of-care rapid tests to diagnose patients that have a bacterial infection. A study in Tanzania among hospitalised febrile patients showed that 5.0% (24/483) had acute Q fever and 8.4% (38/450) rickettsial infection.[4] These conditions were not clinically diagnosed in any patient and the most common diagnoses among subsequently identified cases of Q fever and rickettsiosis were malaria and pneumonia. Patients therefore did not receive appropriate treatment.

While acute Q fever may present as febrile illness, pneumonia, or hepatitis, approximately 2% of acute Q fever patients develop chronic Q fever, a very serious condition with endocarditis and

Figure 1. Q fever worldwide



vascular infection as the main presentations. In cohort studies in Africa, Q fever accounted for 2-9% of febrile illness hospitalisations, but also for 1-3% of infective endocarditis cases.[5]

C. BURNETII IN ANIMALS AND HUMANS

Data on Q-fever in African countries are limited but it is clear that infection with *C. burnetii* occurs throughout Africa with seroprevalence of antibodies in humans from 1% to >20%.[5,6] In a study in Ghana, 16.9% of 219 2-year-old children and 8.9% of 158 healthy adults were positive for IgG phase II antibodies against *C. burnetii*, suggesting previous infection.[7] It is a remarkable finding from several studies in Africa that seroprevalence of antibodies against *C. burnetii* is higher among children than among adults, while it is the opposite in studies in Europe. In a study in the Gambia, 63/796 (7.9%) 1-15 year old children tested positive for *C. burnetii* antibodies.[8] A veterinary survey among 566 sheep and goats from the same area showed a seroprevalence of antibodies against *C. burnetii* of 17.5%.[9] This suggests that there is considerable exposure to *C. burnetii* in children in rural Africa and that Q fever must be considered as a cause of acute febrile illness. A systematic review showed a small ruminant seroprevalence in Africa ranging from 11-33%.[5] In ruminants, the infection is often asymptomatic but abortions and reduced reproductive efficiency may occur, with subsequent socioeconomic consequences for humans.[5,10]

CONTROL MEASURES

Most emerging infectious diseases are zoonoses, and the majority of emerging infectious disease events are caused by bacteria or rickettsiae.[11] Q fever can be considered a prototype bacterial zoonotic infectious disease that is hugely underdiagnosed. Improved recognition and individual patient management would require a rapid point-of-care diagnostic test that is currently not available. Preventive measures are also difficult to implement. In many pastoral and mixed crop-livestock systems in sub-Saharan Africa, people live very closely with livestock populations. Livestock play a crucial role in the livelihoods of the majority of Africans providing meat, milk, traction, nutrients for crops (e.g. manure) and cash income. In fact, it has been suggested that ownership of small ruminants and other animals can be a key factor for poor households to jump the poverty line.[12]

CONCLUSION

Q fever presents an important but underappreciated threat to human and animal health throughout Africa. Children in rural sub-Saharan Africa become exposed to *C. burnetii* early in life and Q fever, which is difficult to distinguish from malaria, may develop and remain untreated in a considerable proportion of them.

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REFERENCES

1. van der Hoek W, Dijkstra F, Schimmer B et al. Q fever in the Netherlands: an update on the epidemiology and control measures. Euro Surveill 2010;15(12):pii=19520.
2. Gething PW, Kirui VC, Alegana VA et al. Estimating the number of paediatric fevers associated with malaria infection presenting to Africa's public health sector in 2007. PLoS Med 2010;7(7):e1000301.
3. Ceesay SJ, Casals-Pascual C, Nwakanma DC et al. Continued decline of malaria in The Gambia with implications for elimination. PLoS One 2010;5(8):e12242.
4. Prabhu M, Nicholson WL, Roche AJ et al. Q fever, spotted fever group, and typhus group rickettsioses among hospitalized febrile patients in northern Tanzania. Clin Infect Dis 2011;53(4):e8-e15.
5. Vanderburg S, Rubach MP, Halliday JE et al. Epidemiology of Coxiella burnetii infection in Africa: a OneHealth systematic review. PLoS Negl Trop Dis 2014;8(4):e2787.
6. Tissot-Dupont H, Brouqui P, Faugere B et al. Prevalence of antibodies to Coxiella burnetii, Rickettsia conorii, and Rickettsia typhi in seven African countries. Clin Infect Dis 1995;21:1126-33.
7. Kobbe R, Kramme S, Kreuels B et al. Q fever in young children, Ghana. Emerg Infect Dis 2008;14: 344-6.
8. Van der Hoek W, Sarge-Njie R, Herremans T et al. Prevalence of antibodies against Coxiella burnetii (Q fever) in children in The Gambia, West Africa. Trop Med Int Health 2013;18:850-3.
9. Klaasen M, Roest HJ, van der Hoek W et al. Coxiella burnetii seroprevalence in small ruminants in The Gambia. PLoS One 2014;9:e85424.
10. Perry BD, Grace D, Sones K. Current drivers and future directions of global livestock disease dynamics. Proc Natl Acad Sci USA 2013;110:20871-7.
11. Jones KE, Patel NG, Levy MA et al. Global trends in emerging infectious diseases. Nature 2008;451:990-3.
12. Peacock C. Goats—A pathway out of poverty. Small Ruminant Res 2005;60:179-86.

Ebola virus disease

Ebola virus disease is caused by five distinct, yet closely related viruses. The Ebola virus group belongs to the filoviridae family, constituting an important class within the causative agents of the viral haemorrhagic fever group of diseases. We will briefly discuss the epidemiology of Ebola virus disease, highlighting the current ongoing outbreak in West Africa, and briefly touch upon pathophysiology, clinical features, prevention, containment as well as current and future treatment options.

EPIDEMIOLOGY

Ebola virus disease is caused by five distinct but closely related viruses, with four of them originating from Central Africa and Zaire ebolavirus being responsible for the majority of outbreaks to date and being considered the most virulent of the Central African strains [1]. Together with Marburg virus, the Ebola virus group belongs to the Filoviridae family, constituting an important group within the causative agents of the viral haemorrhagic fever group of diseases.

The first recorded outbreaks of Ebola virus disease which led to the identification of the Ebola viruses took place almost simultaneously in 1976, in both Uganda and Zaire (now the Democratic Republic of Congo, DRC) [1,2]. During those and the subsequent (almost 30) outbreaks on record [2] until the recent events in West Africa changed the game completely, the basic pattern always seems to follow similar chains of events. Regularly, the outbreak would begin somewhere in a remote rainforest area, with a group of hunters venturing into the forest, hunting and slaughtering a primate such as a chimpanzee or gorilla (or a range of other bush meat sources such as antelope). Part of the animal would be eaten during the hunting trip; and days after their return to their village, one or several of the hunters would fall ill, with all or most of them succumbing to the disease within days. Following ritual burials, whose preparations would possibly lead to intense contact with the body and bodily fluids of the deceased by several (up to many) people, secondary and then tertiary cases would start to crop up. In due course, authorities would be notified, and outbreak control teams would move into the area, sealing off the afflicted village or region. The outbreak would come to an end after having killed between 40 to 90% of the patients; usually several dozens of people up to more than 200 (with a maximum of 224 deaths amongst 425 sick people recorded in Uganda in 2000) [3]. The survival rates would be increasing towards the end of an outbreak when medical assistance would become available, and after the virus would have been passed on to a second, third and maybe fourth generation of patients, following the initial zoonotic transmission step; with very few deaths amongst the latter generations of patients and an increasing number of apparently healthy infected individuals turning seropositive.

This basic pattern has been broken (whilst there was a concomitant smaller outbreak in 2014 in a remote region of the DRC [4]) with the current, still ongoing eruption of Zaire Ebola virus disease in West Africa; where the virus surfaced 1000s of kilometers away from its 'classical' habitat and geographic location in the greater Central African rainforest belt region. Towards the end of 2013, a rapidly increasing number of cases of what turned out to be Ebola virus disease (with a clinical picture featuring intractable watery diarrhoea as main characteristic, rather than the frank bleedings in severely diseased individuals leading to the baptizing of Ebola as a viral haemorrhagic fever) [5] hit Guinea [6,7], with further cases rapidly emerging from the neighbouring countries of Liberia [7] and Sierra Leone [7,8]. Only several months into this outbreak, the full dimension of the outbreak was recognized [6]. By that time, cases had spilled over to Senegal [9], Nigeria [9] and Mali [9] yet were contained by the respective authorities and responsibly acting health care workers in an unprecedented effort. As well, first cases of repatriated/evacuated health care workers were

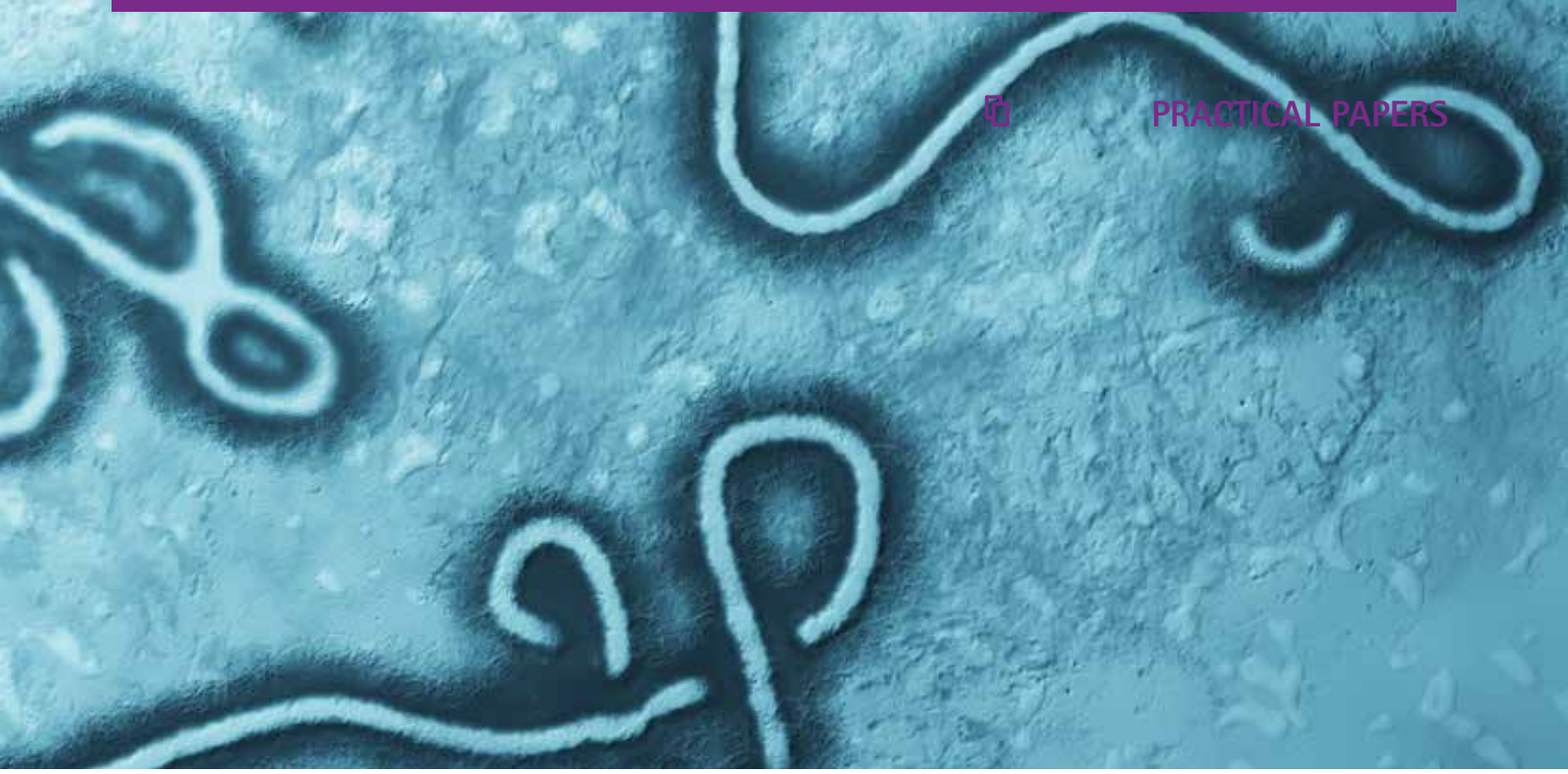

PHOTO SHUTTERSTOCK

recorded in Europe and the USA. At the time of writing, at the beginning of February 2015 and about 14 months into the outbreak, 22,525 cases and 9,004 deaths (as of 6 February) have been reported from those three countries, with the brunt being borne by Sierra Leone [10]. Few additional cases have been recorded in North America and Europe (none on other continents) [11-13]; Mali, Senegal and Nigeria have been declared Ebola-free, and incident case numbers are falling rapidly and steadily in Guinea and Liberia, and now also in Sierra Leone, in reverse order of the evolution of the outbreak.

TRANSMISSION

Transmission to man in the first zoonotic step in the transmission chain before human-to-human (often nosocomial transmission) would occur, was for long thought to be confined to bush meat sources, mainly primates. What became clear soon was that another main (primary) animal reservoir existed, as primates were obviously disease-prone themselves. For many years, the search for the primary host (initially focusing on rodents as main suspects) was puzzlingly unsuccessful, until various fruit bat species were identified as virus reservoir [1]. With regard to the ongoing outbreak, it was the fruit bat reservoir (either through consumption of infected animals as bush meat or through consumption of what fruit bats had feasted on before) that is considered as the primary outbreak source now in West Africa.

PATHOPHYSIOLOGY

The structure of the filoviridae is simple, with a protein shell encasing the viral genome. The outer surface of the virus is dotted with 195-kD glycoprotein spikes, which on contact fuse with human cell membranes, preferably dendritic cells. After membrane fusion, the viral genome is integrated into the host genome, and massive viral replication in all host tissues enfolds [1]. Destruction of the host organs leads to multi organ failure and very frequently to internal and external bleedings in due course, with bacterial sepsis as a common complication at late stage disease [1].

DISEASE AND DIFFERENTIAL DIAGNOSIS

In the early stage of disease, following an incubation period of 2-21 days (in a small proportion of patients, this may be prolonged) signs and symptoms are unspecific, often mimicking a flu-like illness. Sudden onset of fever, prostration, headache and throat pain, myalgias and arthralgias, possibly a generalized rash and gastrointestinal symptoms such as diarrhoea (initially or consistently non-bloody, as characteristic for the ongoing outbreak rather than frank bleedings), nausea, and vomiting may be followed by a rapid deterioration of the patient, with multi organ failure, internal and external bleedings, and (hypovolaemic/haemorrhagic) shock ensuing. Death occurs frequently, mostly with Zaire Ebola virus, and more at the beginning of an outbreak rather than towards its end; which may be in part owed to the proposed decline of virulence through human-to-human passage, and in part to improved medical care at the end of an outbreak [1,5,6,8].

The differential diagnosis is broad and encompasses malaria, bacterial sepsis (often a complication in later stages of Ebola virus disease), typhoid fever, leptospirosis, rickettsiosis, amoebiasis, and many others; as well as – with few characteristic features attributable only to a number of cases, such as orchitis in men; few reliable clinical features indicating a diagnosis of Ebola rather than other locally endemic VHFs (such as lassa fever or yellow fever).

LABORATORY DIAGNOSIS

A standard laboratory test would be an ELISA to determine antibody levels (IgM, then IgG) from early on in the disease [1]. However, the current gold standard is diagnosis by RT-PCR [1]. The one main challenge is the development

of reliable, rapid POC tests; the other is the problem of the extreme contagiousness of blood and other bodily fluids, which renders laboratory personnel (particularly in unsuspected cases) at highest risk of infection, and which has led to the high safety level requirement for specimen handling.

TREATMENT – ESTABLISHED AND EXPERIMENTAL

To date, there is no established specific therapy. Main element of warranting survival of patients is early recognition, aggressive rehydration, low-threshold antibiotic therapy to control concomitant bacterial sepsis, and empirical antimalarial treatment in unconfirmed Ebola cases. The chances for survival are determined not only by the virulence of the infecting strain but also by host factors, time lapse between onset of symptoms and initiation of supporting therapeutic measures, and in general to the level of access to routine intensive care measures including organ-supportive therapy such as mechanical ventilation and haemodialysis [1,11-13].

However, a wide range of experimental therapies [14] had been tested earlier in often very small cohorts of monkeys, indicating efficacy, and which are now being fast-tracked through early stages of clinical development with the goal of being made available once proven safe and once available in the large quantities required. Amongst the various therapeutic approaches, monoclonal antibodies against viral surface structures are the most promising. There is also renewed interest in the administration of reconvalescent serum to patients with active disease, based mainly on anecdotal evidence; it is obvious how difficult it will be to conduct a controlled high-standard phase III trial on this or any other method within an outbreak situation.

PROPHYLAXIS, PREVENTION AND HYGIENE MEASURES REQUIRED TO CONTAIN EBOLA

To date, there is no marketed vaccine, which would be safe, effective, efficacious and ready to be administered on a mass scale in order to curb the ongoing outbreak. However, not dissimilar to a range of specific therapeutics, a number of vaccine candidates (with several prototypes involving viral vectors carrying gp195 fragment encoding RNA into the host cells in the lead) is currently fast-tracked in public-private partnership efforts through phase 1 safety and immunogenicity trials in Europe, the USA and Africa). For the time being, disease prevention through early recognition of ongoing transmission and transmission risk on individual level is paramount. Avoidance of contact with bodily fluids (sweat, semen remaining virus-positive weeks after cure of infected males) is key to containment of the disease. Key to successful containment is early patient recognition in and outside the epidemic setting, discouragement (if unavoidable with reinforcement) of unsafe cultural (bush meat consumption, traditional burial practices) and hygienic practices, strict hygiene protocol adherence including (safe usage and disposal of) protective clothing and equipment and consumables, strict laboratory safety measure implementation and isolation of patients [15] (Figures 1, 2).

OUTLOOK

Academic institutions around the world (such as the Dutch University Medical Centers) have braced themselves to contain Ebola in the case of suspect patients presenting themselves unexpectedly, or being referred as suspect or confirmed cases; as well as that there was a firm, although delayed outbreak response in the hard-hit West African region. With the likelihood of this outbreak trailing on at low level for years, or the disease becoming endemic and having to be accounted for continuously in the near future in the general differential diagnosis of the febrile patient, a sustained, concerted, long-term effort of the international community, both political and financial, is required to regain control over Ebola virus disease on a global scale.

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REFERENCES

1. Feldmann H, Geisbert TW. Ebola haemorrhagic fever. Lancet 2011;377:849-62.
2. Del Rio C, Mehta AK, Lyon GM 3rd, Guarner J. Ebola Hemorrhagic fever in 2014: The tale of an evolving epidemic. Ann Intern Med 2014;161:746-8.
3. http://www.who.int/mediacentre/factsheets/fs103/en [last accessed on 9 February 2015]
4. Maganga GD, Kapetshi J, Berthet N, et al. Ebola virus disease in the Democratic Republic of Congo. New Engl J Med 2014;371:2083-91.
5. Chertow DS, Kleine C, Edwards JK, et al. Ebola virus disease in West Africa – Clinical manifestations and management. N Engl J Med 2014;3712054-7.
6. Bah EI, Lamah MC, Fletcher T, et al. Clinical presentation of patients with ebola virus disease in Conakry, Guinea. N Engl J Med 2015;372:40-7.
7. WHO Ebola Response Team. Ebola virus disease in West Africa – the first 9 months of the epidemic and forward projections. N Engl J Med 2014;371:1481-95.
8. Schieffelin JS, Schaffer JG, Goba A, et al. Clinical illness and outcomes in patients with ebola in Sierra Leone. N Engl J Med 2014;371:2092-100.
9. http://www.who.int/csr/don/archive/disease/ebola/en [last accessed on 9 February 2015]
10. http://apps.who.int/gho/data/view-ebola-sitrep.ebola-summary-20150206/en [last accessed on 9 February 2015]
11. Kreuels B, Wichmann D, Emmerich P, et al. A case of severe ebola virus infection complicated by gram-negative septicaemia. New Engl J Med 2014;371:2394-401.
12. Lyon GM, Meeta AK, Varkey JB, et al. Clinical care of two patients with ebola virus disease in the United States. New Engl J Med 2014;371:2402-9.
13. Wolf T, Kann G, Becker S, et al. Severe ebola virus disease with vascular leakage and multiorgan failure: treatment of a patient in intensive care. Lancet December 19, 2014 [epub ahead of print].
14. De Clercq E. Ebola virus (EBOV) infection: Therapeutic strategies. Biochem Pharmacol 2015;93:1-10.
15. Missair A, Marino MJ, Vu CN, et al. Anesthetic implications of ebola patient management: a review of the literature and policies. Anesth Analg Dec 30, 2014 [epub ahead of print].

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Figure 1

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Figure 2

Figure 1. Health care workers preparing for entering the Ebola isolation ward in full Personal Protection Equipment (PPE) at the Lion Heart Medical Centre (LHMC) in Yele, Tonkolili District in Northern Province, Sierra Leone.

During the ongoing outbreak, the LHMC continues to operate as a local hospital, maintaining basic health care services, whilst a part of the hospital has been set apart and fitted out as a holding centre for patients suspected of ebolavirus infection.

Figure 2. Desinfection and exit area of the Ebola isolation ward at the LHMC, Yele, Sierra Leone.

Meticulous attention to safety and hygiene protocols in endemic settings as well as in overseas centres caring for repatriated suspected and confirmed Ebola cases is the key to contain an outbreak and to prevent nosocomial spread.

Emerging infections: chikungunya and dengue virus infections

An outbreak of chikungunya virus in the Caribbean has been ongoing since December 2013. Chikungunya virus and dengue virus both are arboviruses, they share an overlap in geographical distribution, most likely due to a shared vector. In general, dengue cases can be complicated by severe haemorrhage, whereas chikungunya can be complicated by long lasting arthralgias. Local health care workers and physicians taking care of returning travellers need to be able to differentiate between both viruses based on the clinical picture and diagnostic tests. This article includes an overview of clinical aspects, pathophysiology and current epidemiology of chikungunya and dengue virus.

INTRODUCTION

The Dutch government recently warned travellers to the Caribbean for the presence of chikungunya virus (CHIKV). An arthropod borne virus (arbovirus) that is able to cause fever, myalgia, arthralgia and headache in humans. So far, 181 returning Dutch travellers tested positive for CHIKV between September and November 2014, almost half of them returning from the Caribbean [1]. Although case fatality rate is very low, CHIKV is accompanied by a high morbidity with a subsequent large personal and social impact [2]. Another endemic arbovirus in this region, easily mistaken for CHIKV in the acute phase, is the dengue virus (DENV). DENV is the most prevalent arbovirus worldwide with a distribution covering all continents. Mortality fluctuates depending on multiple factors one of which is the virulence of the circulating DENV strain [3]. This article covers CHIKV and DENV: two viruses with a typical presentation, but with an overlap in clinical symptoms and geographic distribution and therefore sometimes difficult to differentiate. A brief overview of the recent CHIKV epidemic is given as well.

ARTHROPOD BORNE VIRUSES

Many viruses are transmitted by arthropod vectors. The majority of viruses transmitted by these arthropod vectors (such as mosquitoes, ticks and sandflies) belong to the families of *Bunyaviridae, Flaviviridae* and *Togaviridae*. Vertebral animals act as reservoir, but for CHIKV, DENV and the Yellow Fever virus, humans act as reservoir as well. These viruses are known to be able to cause outbreaks in civic areas. DENV, yellow fever and west nile virus are in the *Flaviviradae* families. CHIKV is nested under the *Togaviridae* family. All of them have mosquito vectors [4].

CHIKUNGUNYA

CHIKV was discovered in the 1950s during an outbreak in the southern province of Tanzania and is mostly spread by mosquito vectors of the *Aedes* species. The 2005-2006 outbreak in the Indian Ocean resulted in newly initiated clinical research and insights. Two transmission cycles are described: a sylvatic in Africa and human-mosquito-human in Asia, the Indian Ocean and Africa. The incubation period is about two to ten days. Clinical features of CHIKV are divided in an acute and a late phase. In the acute phase, patients report onset of fever, polyarthralgia, backache, headache and fatigue. Polyarthralgia (mainly, but not limited to the peripheral joints) is reported in 87-98% of the cases and is therefore the most characteristic symptom of CHIKV. In half the cases, cutaneous manifestations are reported and are characterized by a macular or maculopapular rash on the extremities, trunk and face. Digestive symptoms are reported in 15-47% of the cases. Due to previous symptoms, limitation of normal daily activity during the acute phase is present in more than 60% of the subjects [2]. During acute illness, a high viral load can be found, accompanied by lymphopenia and/or moderate thrombocytopenia. Arthralgia and musculoskeletal pain are described as long-lasting signs. Frequency ranges between 12% and 66% in 1 year follow-up and depends highly on the area where the outbreak occurred. In children the main characteristics appear to be of dermatological origin: hyperpigmentation, generalized erythema, rash

Figure 1. Area where DENV is prevalent. Based on WHO data. Map © OpenStreetMap contributors, OpenstreetMap.org

Figure 2. Area of current CHIKV outbreak in the Caribbean. Based on CARPHA and PAHO data.

and vesiculobullous lesions, as well as neurological symptoms (like encephalitis, seizures, encephalopathy). The mortality rate is low (<0,1%). Current treatment for CHIKV is directed to symptoms of the virus and consists of paracetamol or non-steroidal anti-inflammatory drugs (NSAIDs) [2,5]. In December 2013 the first autochthonous cases and subsequent emergence of CHIKV were identified in the Western hemisphere (Caribbean). Current countries where CHIKV is present include France and Italy in Europe, part of middle and south Africa, Asia and Middle America/the Caribbean [6].

DENGUE

Symptoms of DENV were first described around 1780 when outbreaks occurred in Indonesia, Egypt and Philadelphia concurrently. These first episodes indicate a worldwide spread of the mosquitoes able to transmit the virus. Until 1953 DENV was reported as a non-fatal disease characterized by high fever and severe bone and back pain. From then on, an increased number of cases complicated by haemorrhage and shock were reported in the Southeast Asia region, spreading around this region in the 80s and 90s. Current spread of DENV is reported in figure 1. Four serotypes exist: DEN-1 to -4. The incubation period is about three to eight days. In younger ages DENV presents as nonspecific febrile illness. Clinical symptoms in adolescents and adults are characterized by a rapid rising temperature ≥39°C lasting for about 5 days. A biphasic pattern is described as well. Concurrent are severe headache, retro-orbital pain, myalgia, arthralgia, nausea and vomiting. Rash is reported as well, initially maculopapular, becoming diffusely erythematous. The 'islands of white in a sea of red' typically occur: small areas of skin are spared. Some subtle haemorrhagic events occur usually after 3-4 days, and vary from petechiae, epistaxis, gingival bleeding and a positive tourniquet test. People usually recover after 7-10 days. The World Health Organization (WHO) revised Dengue Guidelines in 2009 and now includes a classification for severe dengue, where severe plasma leakage, severe haemorrhage and/or severe organ impairment occurs. DENV is a clinical consideration when a patient lives in or travels to a DENV endemic area and has fever with at least two of the following criteria: nausea or vomiting, rash, aches and pains, positive tourniquet test, leukopenia, and possibly any warning sign. These warning signs include abdominal pain or tenderness, persistent vomiting, clinical fluid accumulation (e.g pulmonary symptoms), mucosal bleed, lethargy or restlessness, liver enlargement >2cm, an increased hematocrit and rapid decrease in platelet count in laboratory tests. Criteria for severe DENV are severe plasma leakage (leading to shock, fluid accumulation with respiratory distress), severe bleeding and/or severe organ involvement (e.g with liver failure, impaired consciousness)[7]. Earlier infected persons are prone to develop severe disease after infection with another strain; this might be due to antibody enhancement [3,5,8].

DIFFERENTIATING BETWEEN CHIKUNGUNYA AND DENGUE

A key aspect in patients or returning travellers from malaria and CHIKV and DENV endemic countries, is first ruling out malaria. Differentiating between CHIKV and DENV is not always easy due to the overlap in presenting clinical symptoms. Arthralgia is typical for CHIKV, whereas the more 'flu like' symptoms can point to DENV. Long-lasting and recurrent polyarthralgia is typically associated with CHIKV.

LABORATORY DIAGNOSTICS

These include direct detection of the virus by PCR, viral antigens or antibodies. Depending when the patient presents, different diagnostic tests are helpful in confirming the diagnosis. Detecting virus by PCR or virus culture is (only) possible in the early stage (due to viraemia) whereas detecting antibodies will only be reliable if performed after a few days (IgM) to weeks-months (IgG). Care must be taken with DENV, since four serotypes exist, where only one CHIKV serotype exists. Therefore, a negative DENV IgM never rules out an acute DENV, but neither does a positive IgG, since the IgG can be positive due to an earlier infection with another subtype. In secondary DENV infection the IgG response may be much faster, whereas the IgM response is only moderate, or even absent. Supplemental

Table 1 Comparison of Chikungunya and Dengue virus infections

	Chikungunya	Dengue
Vector	*Aedes aegypti* *Aedes albopictus*	*Aedes aegypti* *Aedes albopictus*
Incubation	2-10 days	3-8 days
(Main) characteristics	Acute onset of fever Peripheral joint polyarthralgia Cutaneous manifestations Late and/or recurrent arthralgias	Acute onset of fever lasting several days Headache, myalgia Rash
Laboratory	Lymphopenia Thrombocytopenia	Thrombocytopenia Signs of plasma leakage/dehydration

to clinical examination is a standard laboratory test with full blood count for detecting thrombocytopenia and renal function with electrolytes for detecting possible dehydration or electrolyte disturbances. Although not distinctive these results are helpful in defining the severity of illness [4,9].

RECENT OUTBREAK OF CHIKUNGUNYA

In 2007 the first autotochthonous cases of CHIKV on the European mainland were confirmed in Italy with a traveller returning from India. In late 2013, patients in the Caribbean (St Maarten) were tested positive for CHIKV. Since then and ongoing, the Caribbean Public Health Agency (CARPHA) has been tracking confirmed and suspected cases of CHIKV. Combined data of the Pan American Health Organization (PAHO) and CARPHA shows 21,724 confirmed cases until January 2015 and a total of about 855,054 suspected cases [10][11]. See figure 2 for the current outbreak area of CHIKV in the Caribbean. Note: PAHO defines a CHIKV case as a definite case if, next to fever, diagnostic test is positive (virus culture, PCR or IgM/IgG test). This IgM measurement, in combination with possible false positive results due to cross-reactive antibodies, can lead to an overestimation of CHIKV cases.

CONCLUSION

Both CHIKV and DENV are arboviruses, with the same vector and are present in the same regions. There is an overlap in clinical presentation making it hard to differentiate based on signs and symptoms. Diagnostic tests will be conclusive when interpreted according to the stage of infection. Since DENV has the potential of developing into complicated disease, differentiation between CHIKV and DENV is important. The current outbreak in the Caribbean should make health care workers aware of CHIKV virus in travellers or inhabitants returning from the outbreak area. Both viruses present with fever, arthralgia and skin manifestations. A patient with predominant symmetrical arthralgia can point to CHIKV. Both virus infections require supportive therapy, though DENV can act as a severe disease with haemorrhagic complications.

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REFERENCES

1. Voorkom besmetting met chikungunya in Caribisch gebied. Rijksinstituut voor Volksgezondheid en Milieu; 2014 [22-1-2015]; Available from: http://rivm.nl/Documenten_en_publicaties/Algemeen_Actueel/Nieuwsberichten/2014/Voorkom_besmetting_met_chikungunya_in_Caribisch_gebied.
2. Thiberville SD, Moyen N, Dupuis-Maguiraga L, Nougairede A, Gould EA, Roques P, et al. Chikungunya fever: epidemiology, clinical syndrome, pathogenesis and therapy. Antiviral Res. 2013 Sep;99(3):345-70.
3. Mairuhu AT, Wagenaar J, Brandjes DP, van Gorp EC. Dengue: an arthropod-borne disease of global importance. Eur J Clin Microbiol Infect Dis. 2004 Jun;23(6):425-33.
4. Cleton N, Koopmans M, Reimerink J, Godeke GJ, Reusken C. Come fly with me: review of clinically important arboviruses for global travelers. J Clin Virol. 2012 Nov;55(3):191-203.
5. Chen LH, Wilson ME. Dengue and chikungunya infections in travelers. Curr Opin Infect Dis. 2010 Oct;23(5):438-44.
6. Chikungunya virus. Center for Diseases Control and Prevention; 2015 [26-1-2015]; Available from: http://www.cdc.gov/chikungunya/geo/index.html
7. Organization WH. WHO guidelines dengue 2009 2009. Available from: http://whqlibdoc.who.int/publications/2009/9789241547871_eng.pdf
8. Chen R, Vasilakis N. Dengue--quo tu et quo vadis? Viruses. 2011 Sep;3(9):1562-608.
9. Hassing RJ, Heijstek MW, van Beek Y, van Doornum GJ, Overbosch D. [First case of chikungunya diagnosed in the Netherlands]
10. Chikungunya voor het eerst gediagnosticeerd in Nederland. Ned Tijdschr Geneeskd. 2008 Jan 12;152(2):101-3.
11. Chikungunya update #52. Caribbean Public Health Agency; 2015; Available from: http://carpha.org/DesktopModules/Bring2mind/DMX/Download.aspx?Command=Core_Download&EntryId=1450&language=en-US&PortalId=0&TabId=109
12. Cleton NB, Reusken C, van Gorp EC. [The chikungunya epidemic in the Caribbean: implications for travellers and physicians]
13. De chikungunya-epidemie in de Cariben: implicaties voor reiziger en arts. Ned Tijdschr Geneeskd. 2014;158:A7918.

On a personal note, about Ebola

Interview with Bart Waalewijn

PHOTO MASANGA HOSPITAL

PHOTO SHUTTERSTOCK

Amsterdam Central Station. It's 16.00 hours and in exactly 1 hour and 17 minutes Bart Waalewijn will leave on a train for Brussels to catch a flight (probably the cheapest flight he could find) to Sierra Leone, where he will work at Masanga hospital (www.masangahospital.org). Who is Bart Waalewijn and why would anyone go to Sierra Leone as it is in the midst of an Ebola epidemic?

Bart, can you tell us a bit more about yourself? Who is Bart Waalewijn?
Sure. In a nutshell I am a young medical doctor in tropical medicine and international health. I am married to Pauline and last year I became a father.

Why are you going to Sierra Leone?
This trip is a follow-up on my previous visit in December 2014. Since late 2013 I have been posted in a district hospital in Sierra Leone and lived there with my family. A facility with one hundred beds, an emergency ward, 500 deliveries and 1200 operations a year. Due to the Ebola crisis our hospital was forced to reduce its activities. Fortunately the whole situation is improving and we expect to resume normal activities soon. I will join my colleague Jurre van Kesteren who is already there.

What will you be doing there?
Our mission in short is to safely reopen the hospital, with an upgraded screening and triage for those Ebola cases still left in the country. Also I am checking the status of the hospital. With support we are currently improving it with projects for solar energy, water supply and a protective fence. I will explore what is the best way to continue our surgical training programme. This Norwegian initiative CapaCare aims at improving the quality and quantity of surgically trained health care workers in the districts. Unfortunately this programme and its trainees have also been hit tremendously by the Ebola outbreak. Finally we will lobby at the Ministry of Health and Sanitation to be on the national grid for the post-Ebola recovery plan. The country will soon present these plans to rebuild its infrastructure, and we would like to be part of this national approach.

Why the choice for tropical medicine and international health?
As a young boy I grew up in Africa, so I guess my interest is partly based on this experience. As I started medical school in Utrecht I also tried to follow elective courses in tropical medicine. It's such a different and often courageous approach to medicine. It is holistic, very broad but still focused on the actual needs in low-resource settings. There are several diseases we hardly see anymore in the West. The need to think ahead, to be creative is really stimulating. For me it's rewarding to play my part in the development of low-resource settings.

Of course the adventure of a totally different culture, amazing nature etcetera has been part of this choice. I remember the theme of a symposium with the title: adventurer, idealist or missionary? For me I think it is a mixture.

Greatest inspiration?
Ha, this is a difficult one as I can think of many inspiring people. I can think of Nelson Mandela, Albert Schweitzer and others, but mostly for me this would be Jesus. The example he set in the way how one can live, taking care of others and at the same time being very clear about injustice etcetera. We live in a world where there are huge challenges and tensions, Jesus provides tools which even apply for us now, and that's inspiring.

With all that we know, or actually do not know yet about Ebola, are you afraid?
Well, the fact that we were evacuated early in August and the huge media storm last year caused a bit of stress. During the early weeks of the epidemic we were hardly prepared, but had to deal with some suspected cases. Looking back I feel relieved that those cases turned out to be negative; things could have been totally different. When we returned to Sierra Leone in December the insurance part became a problem, of course at that time we were very alert. After my experience in December, this trip should not be too stressful. I received a training last year and with certain common sense precautions I don't think it's too dangerous to go there. But of course, any fever or illness will cause

stress: is this Ebola? The bad news is that, while the area around Masanga hospital was free of Ebola until recently, in January 2015 there was a confirmed case in the village. I just hope that this one case will remain the only one.

If you could say anything about Ebola, what would it be?
To be honest, I am a little bit tired of Ebola. It's a lesson for us and the whole world always to be alert. Fragile states and weak health systems have become, once again, more visible due to this Ebola crisis. General infection and prevention methods remain the cornerstone for systems to function well and that is true for Ebola, but also for HIV, hepatitis, diarrhoea and many other diseases!

An important message to upcoming doctors in tropical medicine and international health?
Be prepared to think out of the box and be flexible. There will be times when you feel exhausted or drained, and think: does this all make sense? Don't let these frustrations take over, the overall impact you can make and the stimulating moments you will have are simply too important. The Dutch training in tropical medicine and international health is unique in the world, and many times I have seen jealous doctors from other countries asking me about this training. Let us do the things we are good at, and enjoy what is coming!

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Middle East respiratory syndrome coronavirus; epidemiology and diagnosis

ABSTRACT
In 2012 the discovery of the Middle East respiratory syndrome coronavirus and the subsequent emergence of Middle East respiratory syndrome (MERS) were reported. Since then almost 1000 cases have been diagnosed, in several countries all within, or related to travel from, the Middle East. Apart from dromedary camel-to-human transmission, nosocomial and within family transmission have been reported. The estimated case fatality rate in diagnosed cases of approximately 40%, and the so far limited human-to-human transmission, warrant a global response. This should include active monitoring of the extent and origins of the ongoing epidemic as well as the development and implementation of preventive and therapeutic intervention strategies.

INTRODUCTION
In 2012 the New England Journal of Medicine reported the isolation and identification of a novel coronavirus from a patient who had died with severe pneumonia and renal failure [1]. The patient presented with fever, cough and shortness of breath and 11 days after admission to a private hospital in Jeddah, Saudi Arabia, he died from progressive respiratory failure. Isolation and characterization of the causative agent, MERS coronavirus (MERS-CoV), resulted from a collaborative effort between Dr Zaki, the treating physician involved, and the department of Viroscience of Erasmus Medical Center in Rotterdam. Retrospective studies have later traced this case back to a cluster of 11 patients (including 10 health care workers) with severe lower respiratory tract infection admitted to an intensive care unit in Zarga, Jordan, in March & April 2012 [2]. The second patient diagnosed with MERS-CoV infection was a patient from Qatar who had been transported to the United Kingdom for intensive care treatment [3]. Genetic analysis of the viruses from both patients revealed an almost 100% homology, which resulted in the beginning of the monitoring of the ongoing MERS epidemic.

VIROLOGY & SARS
MERS-CoV, as the name suggests, belongs to the coronavirus family, which is a large group of single stranded RNA viruses that may cause a variety of diseases in animals, whereas some members may cause relatively mild upper respiratory tract infections in humans [4]. MERS-CoV was first discovered using

a pan-coronavirus reverse transcription- polymerase chain reaction (RT-PCR) assay. Phylogenetic analysis showed that MERS-CoV belongs to subgroup 2c of the lineage *Betacoronavirus* [5]. Two of the five currently known human coronaviruses (CoV-OC43 and CoV-229E) cause relatively mild upper respiratory infections or common colds in humans. Another recently discovered human coronavirus may cause more serious respiratory infections especially in young children. In 2003 SARS-coronavirus (SARS-CoV) was discovered as the cause of the first emerging pandemic of the 21st century: severe acute respiratory syndrome (SARS). Within months after its emergence in Guangdong Province in mainland China, SARS-CoV had infected over 8000 individuals with a case fatality rate of approximately 10% and a total spread over 26 countries on five continents, putting emphasis on the emerging potential of coronaviruses [6]. Although the reservoir of SARS-CoV was found in bats, several carnivore species, like civet cats sold for human consumption on live animal markets, were intermediate hosts that allowed animal-to-human transmission [7]. An extensive collaborative international effort coordinated by World Health Organization (WHO), resulted in early containment of what could have be a large pandemic.

EPIDEMIOLOGY AND THE CURRENT OUTBREAK

According to the latest ProMed reports almost 1000 laboratory confirmed cases of MERS-CoV have been reported to the WHO, including at least 209 deaths (case fatality rate of approximately 40%). For the current outbreak the affected countries in the Middle East include Iran, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia , United Arab Emirates and Yemen. The largest number of infections occurred in Saudi Arabia [8]. Furthermore, import cases have been reported from countries in Africa, Europe, Asia and the United States of America. Analysis of local (often small) outbreaks of MERS-CoV revealed several unique epidemiological characteristics of this disease. In the beginning of the pandemic a strong predominance for male patients was notified with a male to female ration up to 3.3:1. In following MERS-CoV outbreak studies this ratio decreased with a slightly increased number of males being infected compared to females [9]. Overall 63.5% of infections reported to the WHO are male with a median age of 47 years [8]. Furthermore, there is a strong suggestion that seasonality plays a role in MERS-CoV infection incidence since during spring time in the Middle East highest infection rates were reported in 2012 and 2013 [10].

ZOONOTIC TRANSMISSION

Of all cases reported to the WHO only 1 in 4 is currently considered a primary case, the result of direct zoonotic transmission from animal to human [10]. Recently, studies from several groups point to dromedary camels as the MERS-CoV (intermediate) reservoir. The virus has been isolated from dromedary camels, and genomic analyses show that MERS-CoVs in dromedary camels are virtually identical to those identified in humans [11,12]. Furthermore, serological surveys show a high number of seropositive dromedary camels, originating from multiple countries, also outside of the Middle East [10,13]. The exact route of transmission from dromedary camels to humans remains unknown, but preliminary results from experimental studies and RT-PCR detection in respiratory tissues and camel milk suggest that respiratory secretions and milk from infected dromedary camels play a role [14]. In contrast to humans, MERS-CoV has been detected in the upper respiratory tract, making direct aerosol transmission to humans also a good possibility [15]. This is further confirmed by the detection of MERS-CoV in air samples from a camel barn owned by an infected patient [16]. As was the case for SARS-coronavirus, an intermediate host most likely resulted in the animal to human transmission. Dromedary camels most likely acquired MERS-CoV from reservoir bats (exact species yet unknown) and the virus apparently has spread efficiently within dromedary camel populations [7].

HUMAN–TO–HUMAN TRANSMISSION

Human-to-human transmission of MERS-CoV occurs often clustered within family settings and in hospitals. Multiple infection clusters have been reported in families living closely together with an average of secondary cases originated from the index case varying between 10 and 20% of the exposed group [10]. Furthermore, the importance of human-to-human transmission in MERS-CoV outbreaks is emphasized by the high number of health care related outbreaks, for instance in Saudi Arabia more than 25% of the reported cases are health care workers [8,17]. Risk analysis of health care related outbreaks revealed that infected personnel often were involved in aerosol

generating procedures such as intubation, airway suctioning, and sputum induction [9]. Based on the analysis of the patterns of spread of MERS-CoV among family clusters or health care related outbreaks there is a strong suggestion that transmission occurs through droplets or physical contacts [7].

SYMPTOMS AND SIGNS

MERS-CoV infection clinically presents itself as a typical severe respiratory infection. Typical symptoms include fever, cough and breathing difficulties, myalgia, nausea, vomiting and diarrhoea [18]. Furthermore, as was the case for the index patient in 2012, renal failure is documented in many MERS-CoV patients. However, thus far it is unknown if renal insufficiency is the result of treatment and hypoxia or directly associated with MERS-CoV infection. Recently the identification of apparently asymptomatic cases has increased and in Saudi Arabia, where the largest numbers of cases were registered, almost 30% of confirmed cases only reported asymptomatic to mild disease [8].

DIAGNOSIS

According to the WHO guidance, patients should be tested for MERS-CoV infection if they develop pneumonia or pneumonitis and fever with a history of travel to or residence in the Arabian Peninsula in the 14 days before disease onset; or in case of known contact with a known confirmed or suspected MERS case [19]. According to the MERS case definition a confirmed case requires a positive RT-PCR test on at least two specific genomic targets or a single positive target accompanied by sequence analysis [19]. Cases with only one single RT-PCR positive test are considered probable MERS-CoV cases. Samples with the highest viral load, and thereby most suitable for RT-PCR detection, are those taken from the lower respiratory tract. However, oronasal swabs can also be used in the acute phase of the disease [9]. Commercially available serological assays can especially be of use in analysis of cluster outbreaks and the detection of asymptomatic secondary cases. However, no official recommendations are currently available regarding serological tests, and validation has been difficult because of limited availability of human convalescent sera [9,19].

CONCLUSION

Until now almost 1000 MERS cases have been reported with a case fatality rate of approximately 40%, All these cases have occurred either within, or travelling from Middle East countries. MERS-CoV infection causes clinical symptoms mainly related to acute respiratory distress. Although the source of the emerging epidemic can probably be traced back to contacts with dromedary camels as the intermediate host species, family clusters and health care related outbreaks indicate that human-to-human transmission is also significant. Although the number of persons infected by SARS-CoV was higher compared to those currently affected by MERS-CoV infection, the SARS outbreak was rapidly controlled whereas MERS-CoV is still spreading two years after its discovery. With about 1 out of every 4 cases being direct zoonotic infections there is an ongoing need for strengthening infection control measures among humans in order to prevent further adaptation of MERS-CoV to its novel human host.

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REFERENCES

1. Zaki AM, van Boheemen S, Bestebroer TM, et al. Isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia. N Engl J Med. 2012 Nov 8;367(19):1814-20. doi: 10.1056/NEJMoa1211721 [doi].
2. Hijawi B, Abdallat M, Sayaydeh A, et al. Novel coronavirus infections in Jordan, April 2012: epidemiological findings from a retrospective investigation. East Mediterr Health J. 2013;19 Suppl 1:S12-S18.
3. Bermingham A, Chand MA, Brown CS, et al. Severe respiratory illness caused by a novel coronavirus, in a patient transferred to the United Kingdom from the Middle East, September 2012. Euro Surveill. 2012;17(40):20290.
4. Lu R, Yu X, Wang W, et al. Characterization of human coronavirus etiology in Chinese adults with acute upper respiratory tract infection by real-time RT-PCR assays. PLoS One. 2012;7(6):e38638. doi: 10.1371/journal.pone.0038638 [doi];PONE-D-12-04432 [pii]. Pubmed PMID: PMC3376151.
5. van Boheemen S, de Graaf M, Lauber C, et al. Genomic characterization of a newly discovered coronavirus associated with acute respiratory distress syndrome in humans. MBio. 2012;3(6) doi: mBio.00473-12 [pii];10.1128/mBio.00473-12 [doi]. Pubmed PMID: PMC3509437.
6. Peiris JS, Yuen KY, Osterhaus AD, et al. The severe acute respiratory syndrome. N Engl J Med. 2003 Dec 18;349(25):2431-41. doi: 10.1056/NEJMra032498 [doi];349/25/2431 [pii].
7. Raj VS, Osterhaus AD, Fouchier RA, et al. MERS: emergence of a novel human coronavirus. Curr Opin Virol. 2014 Apr;5:58-62. doi: S1879-6257(14)00011-X [pii];10.1016/j.coviro.2014.01.010 [doi]. Pubmed PMID: PMC4028407.
8. WHO. Middle East respiratory syndrome coronavirus (MERS-CoV) summary and literature update-as of 11 June 2014. 2014 Jun 11.
9. Al-Tawfiq JA, Memish ZA. Middle East respiratory syndrome coronavirus: epidemiology and disease control measures. Infect Drug Resist. 2014;7:281-7. doi: 10.2147/IDR.S51283 [doi];idr-7-281 [pii]. Pubmed PMID: PMC4226520.
10. Raj VS, Farag EA, Reusken CB, et al. Isolation of MERS coronavirus from a dromedary camel, Qatar, 2014. Emerg Infect Dis. 2014 Aug;20(8):1339-42. doi: 10.3201/eid2008.140663 [doi]. Pubmed PMID: PMC4111206.
11. Reusken CB, Messadi L, Feyisa A, et al. Geographic distribution of MERS coronavirus among dromedary camels, Africa. Emerg Infect Dis. 2014 Aug;20(8):1370-4. doi: 10.3201/eid2008.140590 [doi]. Pubmed PMID: PMC4111168.
12. Reusken CB, Haagmans BL, Muller MA, et al. Middle East respiratory syndrome coronavirus neutralising serum antibodies in dromedary camels: a comparative serological study. Lancet Infect Dis. 2013 Oct;13(10):859-66. doi: S1473-3099(13)70164-6 [pii];10.1016/S1473-3099(13)70164-6 [doi].
13. Reusken CB, Farag EA, Jonges M, et al. Middle East respiratory syndrome coronavirus (MERS-CoV) RNA and neutralising antibodies in milk collected according to local customs from dromedary camels, Qatar, April 2014. Euro Surveill. 2014;19(23).
14. Adney DR, van Doremalen N, Brown VR, , et al. Replication and shedding of MERS-CoV in upper respiratory tract of inoculated dromedary camels. Emerg Infect Dis. 2014 Dec;20(12):1999-2005. doi: 10.3201/eid2012.141280 [doi]. Pubmed PMID: PMC4257817.
15. Azhar EI, Hashem AM, El-Kafrawy SA, et al. Detection of the Middle East respiratory syndrome coronavirus genome in an air sample originating from a camel barn owned by an infected patient. MBio. 2014;5(4):e01450-14. doi: mBio.01450-14 [pii];10.1128/mBio.01450-14 [doi]. Pubmed PMID: PMC4120199.

Septic arthritis in a two-year-old boy with complete epiphysiolysis of the femoral head

SETTING

Saint Theresa hospital is a district hospital in the Copperbelt, a region in the north of Zambia known for its copper mining. Patients are mostly farmers and the majority are poor. The nearest city is located 25 kms away. Annually, this hospital provides health care to 23,000 patients, and has a capacity of 100 beds. There is no X-ray facility available in the hospital; once a week patients are transported to another hospital for imaging.

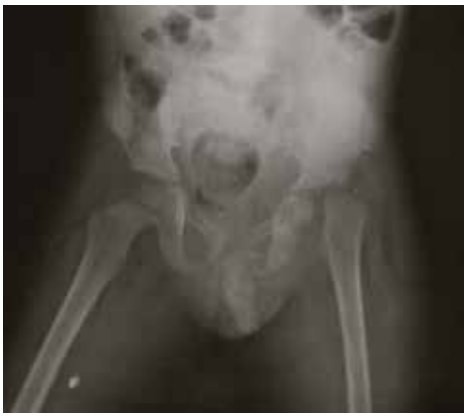

Figure 1

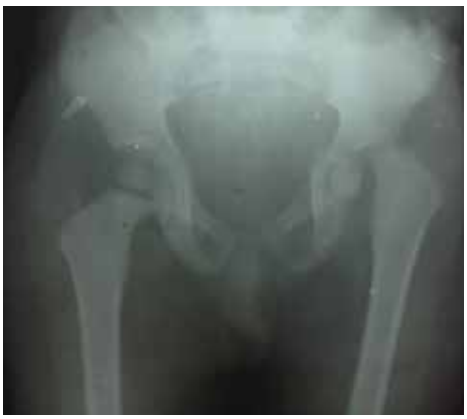

Figure 2

CASE REPORT

A two-year-old boy complained of lower back pain after a fall. Because the X-ray of the lumbar spine showed no signs of a fracture, and no other abnormalities were seen during examination the parents were advised to let the child rest at home. After a week of watchful waiting the child returned to the physiotherapist, the pain had increased and he was not able to walk anymore. Moreover, the child had a fever and a cough. He was therefore sent to the hospital.

During physical examination he appeared to be low-weight for his age, pale and irritable; rhonchi were heard when auscultating the lungs. He was able to stand up, but unable to walk. The WBC was 9500/mm^3. Because of the combination of fever, cough and abnormal breath sounds, empirical antibiotic treatment for pneumonia was started. However, a few days later the chest X-ray showed no abnormalities. Subsequently the child experienced pain in the left hip; he still could not walk. Therefore, it was suspected that the child could suffer from septic arthritis of the left hip and the antibiotics were changed into cloxacillin and ceftriaxone. After seven days of antibiotic treatment, the child remained painful and feverish. The WBC at that time was 2500/mm^3. An X-ray of the left hip was done and it showed a complete epiphysiolysis of the femoral head (figure 1). Retrospectively, the left hip could also be seen on the lumbar spine X-ray taken on presentation. At that time the left hip joint showed no abnormalities.

Consult online was asked for advice on further treatment.

ADVICE FROM THE SPECIALISTS

Two specialists responded within a day. They both agreed that this was presumably a case of septic arthritis and they emphasized that this condition is difficult to diagnose in young children. In most cases, it is associated with osteomyelitis of the femoral head. Furthermore, the increased intra-articular pressure due to the infection, can compromise the blood supply to the femoral head, resulting in avascular necrosis and epiphysiolysis.

Their advice was to perform an arthrotomy as soon as possible. This enables decompression of the joint, debridement of the infected tissue and irrigation of the joint space. This should result in reduction of fever and by releasing the pressure, necrosis will hopefully be prevented. The specialists warned that necrosis might already have taken place. Their advice was also to place the child in traction and to continue antibiotic treatment.

TREATMENT AND FOLLOW-UP

The next day, arthrotomy was performed, with extensive irrigation of the joint. No intra-articular pus was found, but it was suggested that pus might already have turned into debris. A drain was left in the joint space. The child was placed in traction for 4 weeks and antibiotic treatment was continued. Pain and fever subsided. After a period of 4 weeks, a new X-ray unfortunately did not show much improvement in the position of the femoral head (figure 2). The child started to mobilize, which was again painful. Since there were no signs of infection anymore, and because of his overall good general condition, he was discharged from the hospital. Mother and child have never returned to the outpatient clinic, so unfortunately there is no information on the current condition of the child.

DISCUSSION

When a child presents itself with acute pain in the lower limb area without a prior trauma, the main differential diagnosis includes transient synovitis (coxitis fugax), septic arthritis and Legg-Calvé-Perthes disease [1]. Of all acute non-traumatic hip pathologies, transient synovitis (coxitis fugax) is the diagnosis with the highest incidence; however, differentiation between septic arthritis and transient synovitis of the hip in children is essential. Transient synovitis is self-limiting, whereas septic arthritis is treated with operative drainage and antibiotics, and can lead to osteonecrosis (and epiphysiolysis), growth arrest, and sepsis.

Both septic arthritis and transient synovitis present with pain during weight bearing as a cardinal feature. However, findings related to the involved joint may be subtle, especially in young children. In addition to pain other clinical features include fever, malaise, poor appetite, irritability and tachycardia and these can be present within the first few days of infection [1].

In order to distinguish septic arthritis from other non-traumatic hip pathologies, Kocher et al. [2,3] described four predicting factors for septic arthritis: a history of fever, non-weight-bearing, an erythrocyte sedimentation rate (ESR) of at least forty millimetres per hour, and a serum white blood-cell count of more than 1200 cells /mm^3 [1]. In this case, there was no ESR done, but the child did meet with two predicting factors, namely fever and non-weight-bearing. This means a predicting probability of 57.8%. In the advanced stage, the white blood cell count was raised to 2500 cells/mm^3, which suggests a predicting probability of 95% [2,3].

Currently, the most common cause of septic arthritis of the hip joint in children is Staphylococcus aureus; however, in sub-Saharan countries, Salmonellae have a high prevalence [4]. Children with HIV are more at risk, as well as children with sickle cell disease [4]. The diagnosis septic arthritis can be confirmed with an ultrasound-guided aspiration of synovial fluid. This should be performed as soon as possible, when septic arthritis is suspected. Antibiotic treatment should start right after aspiration. If septic arthritis is highly suspected, for example as it was in this case, when there is already osteonecrosis seen on the X-ray, irrigation of the joint should be performed as soon as possible [1].

The functional prognosis of septic arthritis with osteonecrosis is poor. This child will presumably have a dislocated joint and severe limb shortening. In the above-mentioned case, we tried to prevent this with long-duration of traction, but unfortunately, without a satisfactory outcome. Eventually, a painless ankyloses may develop, which would probably be the best possible scenario. There are no therapeutic options in children, and the final situation should be awaited for at least ten years [1,4].

In conclusion, septic arthritis does not run a typical course in young children, which makes it a disease difficult to diagnose with potentially major complications, especially in a low-resource setting.

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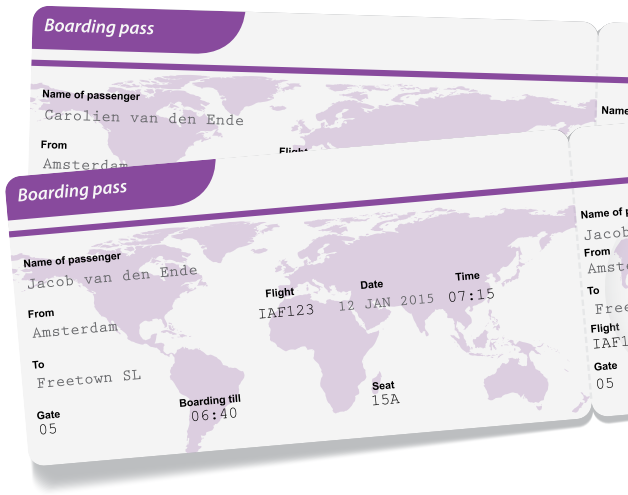
REFERENCES

1. Rutz E, Spoerri M. Septic arthritis of the paediatric hip – A review of current diagnostic approaches and therapeutic concepts. Acta Orthop. Belg 2013; 79: 123-134.
2. Mininder S, Kocher MS, Zurokowski D, Kasser JR. Differentiating Between Septic Arthritis and Transient Synovitis of the Hip in Children: An Evidence-Based Clinical Prediction Algorithm. J Bone Joint Surg Am 1999;81:1662-70.
3. Mininder S; Kocher MS. Validation of a clinical prediction rule for the differentiation between septic arthritis and transient synovitis of the hip in children. J Bone Joint Sur 2004;8:86-A (8):1629-35
4. Christopher BD, Lavy CB. Septic arthritis in Western and sub-Saharan African children - a review. Internat Orthopaed 2007;4:31(2):137-44

Ready to go: young doctors facing health challenges in a changing world



On December 19th yet another group of enthusiastic young medical doctors participated in the closing ceremony of the 136th Netherlands Tropical medicine and hygiene Course (NTC). [1] They finished a three-month intensive course at the Royal Tropical Institute (*Koninklijk Instituut voor de Tropen, KIT*) learning about health problems in low-income countries, public health and organizational aspects relevant to address health issues.

DOUBLE GRADUATION CEREMONY

Fifteen out of the 23 participants of the NTC finished their training for 'tropical doctor'. They dedicated the past years to ensure they are equipped to work in low- and middle-income settings, mostly for a period of 2-5 years. The NTC is the final part of their training, and many of them immediately left for work in challenging settings; such as Ebola-struck Sierra Leone where three of the group are now working. [2] One of the recent graduates went to South Sudan, a country where especially the health system is bearing the scars of decades of conflict.

> THEIR MISSION IS SIMILAR TO OURS AT KIT: TO BRING BETTER HEALTH TO THOSE PARTS AND PEOPLE IN THE WORLD THAT ARE FACING THE HIGHEST BURDENS OF DISEASE

TROPICAL DOCTOR FOR LIFE?

The training for tropical doctors is aimed at a career in the Netherlands after a period abroad. The training for tropical doctors has been adapted to the current needs and our doctors are no longer prepared for "just" clinical work in low- and middle-income countries. We see many of our alumni, former 'tropical doctors' returning and delivering (transcultural) health care in the Netherlands. Prisca Zwanikken, director of the courses at KIT and trained as a tropical doctor herself sees that many alumni stay active in the tropical medicine scene: "We welcome former tropical doctors as teachers in our courses, meet them in advisory committees, we collaborate in research projects or consultancies. Once a doctor is 'infected' by the work in the tropics, it's a lifelong 'addiction', they get hooked for life. Their idealism persists and hearts remain connected to the parts of the world where they have worked. It's almost genetic: we see offspring of tropical doctors returning to our classrooms as the new generation of global health care professionals. It's also a pleasure: we regularly welcome alumni participating in our advanced short courses to update their knowledge on public and international health."

SHARED MISSION

Lisanne Gerstel, trained as a medical doctor and intervention epidemiologist, is now coordinating and teaching NTC students. "It's an honour to be part of the professional journey of these dedicated and brave health professionals. Many leave comfort, friends and family behind to work for a local salary in countries where day-to-day life brings challenges like unreliable electricity, a lack of medical equipment and scarce human resources. Their mission is similar to ours at KIT: to bring better health to those parts and people in the world that are facing the highest burdens of disease." The tropical doctor training has been professionalized considerably since it started many decades ago. In 2014 the AIGT (Dutch acronym for Medical Doctor in International Health and Tropical Medicine) was accredited; this is a two-and-a-half year medical specialization of which the NTC forms part. [3] After a period of working in low-and middle-income countries these doctors bring their

experience and knowledge to the Dutch setting of medicine and public health.

REWARDING STUDENTS

Gerstel: "NTC participants are fantastic students for us as teachers. So eager, so committed and curious. They imagine themselves in the field in just a few weeks' time and are incredibly ambitious to make a difference in a challenging context. I cannot imagine any other group that is so keen to absorb new knowledge, pose critical questions about practical use of new skills and broaden their views." Messages from the field also reciprocate teacher enthusiasm: "We benefit daily from the skills we learned during the NTC. It is great to be able to apply almost all the knowledge", says Carolien van den Ende who has just started working in Sierra Leone.

> WE BENEFIT DAILY FROM THE SKILLS WE LEARNED DURING THE NTC. IT IS GREAT TO BE ABLE TO APPLY ALMOST ALL THE KNOWLEDGE

A SPECIAL MIX

The NTC brings together an international mix of health professionals. Additional to aspiring tropical doctors, the course attracts international students from low- and middle-income countries like Myanmar, Belarus, Sudan, Egypt, Indonesia, and Pakistan. These students follow a one-year Master in International Health (MIH) programme at KIT. [4] They left their families and loved ones behind to invest in their abilities to contribute to international health. Their programme includes training at various partner institutes in the tropEd network and afterwards they will return home, with more knowledge and skills, which are very much needed in their settings.

INTERCULTURAL AND INTERACTIVE APPROACH

Gerstel: "Our learning approaches prepare people for a professional life in diverse and often challenging contexts. Therefore we include discussions, debates, case studies, role plays, simulations and serious games. It's intense but we believe interactive learning is the best way to prepare people for the world outside. Turning theory into practice. All our participants have relevant work experience which is brought and used in the classes. As a participant, you will be asked to discuss and solve problems derived from real working situations. An added advantage is the mixed group of Dutch and international students. Students learn with and from each other. The exchange of differences in communication and views between countries offers students great insights to use in their future workplaces."

For more information on the NTC and other Masters' programmes and short courses, visit www.kit.nl/health/study

Are you interested in supporting a health professional from a low- and middle-income country to become a leader in health? Visit www.kit.nl/study-fund to explore the opportunities.

Follow the day-to-day life of recent graduates on their blogs: Niek Versteegde in Tanzania (www.stichtingvsh.nl); Jacob and Carolien van den Ende in Sierra Leone (www.this-is-sierra-leone.org)

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REFERENCES

1. The NTC is jointly organized by the Vrije Universiteit Medical Centre (VU) and the University Hospital of the University of Amsterdam (UvA)
2. www.nos.nl/artikel/2010744-we-willen-echt-het-verschil-maken.html
3. The AIGT (training medical doctors in international health and tropical medicine) is organized by the Netherlands Society for Tropical Medicine and International Health, www.nvtg.org
4. The Master in International Health course is organized jointly with TropEd, the network in education in international health (http://www.troped.org)

COLOPHON

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Integrated research programme leads to results in tackling skin disease in Suriname

'Leishmaniasis in Suriname' is an integrated programme addressing the biological, clinical and anthropological aspects of the parasitic skin disease cutaneous leishmaniasis, a medical and social problem in Suriname that is on the rise. Patients encounter a number of problems that keep them from receiving proper treatment. One of those is geographical: the disease is contracted via bites of infected sand flies, which are predominantly active in the Suriname hinterland. Treatment and medical research facilities are mainly found in the capital, making it a long and expensive trip for most patients. On January 15th dr. Sahienshadebie Ramdas received her doctorate at the University of Amsterdam, for her in-depth study of medical-anthropological aspects of the disease and its patients.

PERCEPTIONS AND TREATMENT OF CL: A MEDICAL-ANTHROPOLOGICAL PERSPECTIVE

Apart from a lack of knowledge and resources, patients tended to use unorthodox, painful, and ineffective local remedies. One local belief is that a cruel disease must be treated with a cruel cure leading some to take damaging self-treatment such as pouring battery acid into the skin wounds. This would only cause more damage and pain. Dr Sahienshadebie Ramdas collected data using qualitative research methods with an ethnographic approach. She investigated perceptions and treatment of cutaneous leishmaniasis from a medical anthropological perspective.

RESEARCH POPULATION

205 CL patients at the Dermatology Service in Paramaribo (mostly male, 89%, working and/or living in the hinterland) participated through short questionnaires with a range of aspects related to living and working conditions, perceptions and explanations of CL, treatment seeking, self-treatment, stigma, illness severity, and prevention. In addition, qualitative inquiries were carried out in five different villages in the hinterland of Suriname: two Maroon, two indigenous and one Brazilian gold diggers' village. The study reports painful self-treatment practices and a pressing need for CL information and education campaigns. CL in Suriname is rarely stigmatized– unlike some other countries in the world – and confined to the most severe cases.

THE PROBLEM OF SELF-TREATMENT

Self-treatment contributes to serious problems: aggravation of the sores and late treatment seeking. Ramdas found that the majority of the patients (88.3%) had been walking around with their sore(s) for at least one to three months. The remainder had had their sore(s) for a longer period, exceeding four to six months, and in some cases even longer, up to three years. In the photograph below, a gold digger shows his sores that he tried to self-treat for six months.

Of the 205 CL patients the majority (79%) attempted self-treatment prior to visiting the Dermatology Service. This despite the fact that many thought CL was a very serious (89%) and very dangerous (86%) illness. CL is viewed as "difficult", "cruel", "stubborn", "filthy" and "expensive" because of its symptoms, its gruesome appearance, difficulty in curing, and costly treatment. The Medical Mission – a private, non-profit, primary health care organization – provides health care in the hinterland free of charge. Yet, self-treatment practices, advised by close family members, friends, colleagues, comprise 'cruel' treatments such as herbal treatments with strong and/or poisonous plants and leaves, 'hot' treatments such as dripping hot liquids onto the sore, or pressing hot objects to the sore, and harmful treatments with household and industrial chemicals, insecticides, a veterinary larvicide (Smeerex) and a poisonous herbicide (Gramoxone) (see Ramdas 2012). Most Brazilian gold diggers attempt self-injecting practices with the biomedical drug Pentamidine Isethionate.

OCCUPATIONAL CONTEXT: GOLD DIGGERS

Life in a hostile, remote and forested environment, with long distances between hinterland and the capital city, 'invite' the use of the 'natural' pharmacy as a first aid. Most patients work in the gold and lumber sector and leaving their work to find biomedical treatment is not an option as they will not get paid during their absence.

Although Medical Mission provides free medical treatment, they often lack the necessary drugs and waiting periods can be long before the medicine arrives. Economically, most CL patients have a weak position. With an average salary of only US $200-300 per month, sometimes far less, CL patients said there is usually "just enough" to cover their monthly expenses. Some have financial debts; having a CL sore then becomes a financial burden, especially if biomedical treatment must be sought in the capital city. The high costs of biomedical treatment, travel and living in the capital city add to that burden. Apart from these, fear of biomedical treatment contributes to self-treatment. Many patients tried to cure their sores "in whatever way possible" to avoid the regular biomedical treatment through injections. Insufficient information about the injections and the drug (Pentamidine Isethionate), the side-effects of the medication, and frightening stories about the painful

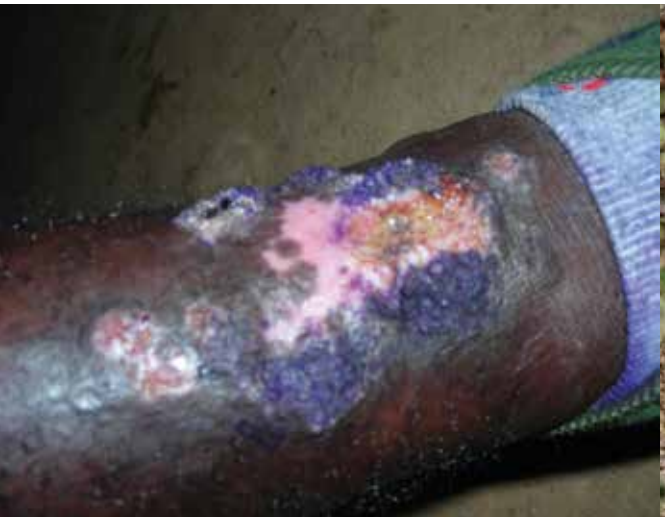

Figure 1. Sores on a leg of a gold digger after six months self-treatment
Source: Collection Ramdas, S., Klaaskreek, district Brokopondo, Suriname

Figure 2. A gold digger at work

effects of the injections create fear of biomedical treatment and encourage self-medication.

SURPRISING: NEAR ABSENCE OF STIGMA IN SURINAME

Rather surprisingly, CL patients in Suriname experience far less stigma than patients in some other countries like Pakistan, Afghanistan, Peru, and countries in the Mediterranean Region. The grave international concern about CL-related stigma (Kassi et al. 2008;Reitinger et al. 2005; WHO 2008) does not apply to Suriname. Data from this study shows that most CL patients (83.9%) did not experience any overt negativity related to their illness; people reacted 'normally', 'as usual' to their symptoms. The data also shows that although some patients spoke about negative reactions, these reactions were mostly related to a combination of aesthetics, course, concealability, origin, and peril (Jones et al. 1984). Not knowing the cause of the illness and fear of contagion was mostly felt by the patients themselves, which led to them taking precautions when coming into contact with others or even withdrawing from certain situations or encounters. It was only at this level of analysis that some aspects of anticipated and internalised stigma were found. A possibly crucial aspect contributing to low CL stigma in Suriname in general, and to low aesthetic stigma in particular, both during and after CL illness, may be related to regional differences in parasite species that lead to different symptomatic profiles (lesions in the face), and therefore to a less destructive form of CL in Suriname than in other parts of the world.

PRESSING NEED FOR CL EDUCATION

Besides self-treatment, Ramdas concludes that many CL patients and others in the hinterland do not know many aspects of the illness such as the cause of the illness, how it spreads and develops and if, and how it can be prevented. Lack of knowledge leads to a multitude of (guessed) explanations, while uncertainties and worries remain. The study identified a pressing need for CL education and information programmes on a national level in general, but in particular aimed at hinterland communities and other specific groups such as hunters, woodcutters, tourists and others who visit the rainforest. The Medical Mission could and should play a crucial role in this, in collaboration with the Dermatology Service and the Bureau of Public Health. Traditional health professionals should be part of the local CL prevention campaigns.

IMPACT

The Leishmaniasis programme has yielded results that will prove useful for future prevention efforts, as well as having impact themselves. "These five years have seen a remarkable output," says Dr Schallig : "Thanks to our PhD students and the multi-disciplinary research team, we have been able to find out a lot more about the disease and the context of its occurrence. We now know that there is more than one parasite species causing the disease – which explains why some patients did not respond to the medicine. Attention to the work of our PhD-students in local media helped to identify more patients, inform the local Surinamese population as to how leishmaniasis is contracted and how it can be treated effectively."

AFTER EFFECTS

Schallig: "With the project finished, we have established a significant research infrastructure, including a biomolecular lab in Paramaribo. Through this programme we learned a lot more about leishmaniasis from a medical, biological and anthropological point of view. However, the work is not yet done. We will continue to work with our partners at AMC, University of Amsterdam, the Anton de Kom University and Surinamese health authorities. In future we hope to find the financial resources to develop alternative and more effective treatment, design and implement an effective screening and control programme, and continue to foster local research and education programmes."

©

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REFERENCES

1. Jones E, Farina A, Hastorf A, Markus H, Miller D & Scott TRA 1984 Social stigma: the psychology of marked relationships. New York: Freeman and Company.
2. Kassi, M, Afghan AK, Rehman R& Kasi PM 2008 Marring leishmaniasis: the stigmatization and the impact of cutaneous leishmaniasis in Pakistan and Afghanistan. PLOS Neglected Tropical Diseases 2(10): e259.
3. Ramdas, S 2012 Cruel disease, cruel medicine: self-treatment of cutaneous leishmaniasis with harmful chemical substances in Suriname. Social Science & Medicine 75(6): 1097-05. 2015 Perceptions and treatment of cutaneous leishmaniasis in Suriname: A medical-anthropological perspective. Doctoral dissertation, University of Amsterdam.
4. Reitinger, R, Aadil K, Kolaczinski J, Mohsen M & Hami S 2005 Social impact of leishmaniasis in Afghanistan. Emerging Infectious Diseases 11(4): 634-36.
5. World Health Organization 2008 Report of the consultative meeting on CL, Geneva, Headquarters 30 April to 2 May 2007. Geneva: WHO Document Production Services.

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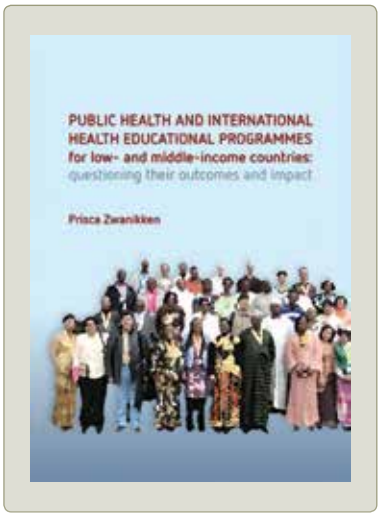
i. KIT has been active in Suriname for the last 20 years. With partners Academic Medical Centre, Amsterdam (AMC), the Dermatological Service, Paramaribo, the Ministry of Health, Suriname and Anton de Kom University, KIT has been able to make remarkable progress in studying the parasitic skin disease cutaneous leishmaniasis within the context of an interdisciplinary programme. Besides dr Ramdas, dr. Ricardo Hu and dr. Alida Kent also received their PhD in the field of leishmaniasis.
ii. The programme received a five-year funding grant through the Netherlands Organization for Scientific Research / Foundation for the Advancement of Tropical Research – Science for Global Development (project W016531300) and ran from 2008-2013.
iii. Research coordinator in Parasitology at KIT and programme leader

QUESTIONING THE OUTCOMES AND IMPACT...



On January the 23rd of this year Prisca Zwanikken, KIT's educational programme director and former NVTG board member, defended her PhD research at the University of Maastricht. Her research addresses the topical issue of human resources for health (HRH) in low- and middle-income countries (LMICs). Many publications have highlighted the need to train more human resources to address the global shortage of health workers. Many educational institutes have answered to that call, offering master's programmes and trainings to provide health workers in LMICs with more skills to address the public health challenges in their countries. But what about the impact of such trainings, are they meeting the real needs? Has the study enabled the graduates to improve health management or policymaking? And, how has it affected their professional career development? These and other questions about the outcomes and impact of public and international health educational programmes for low- and middle-income countries have been addressed in Zwanikkens' doctorate research over the last three and a half years.

The study proved to be unique, as previous studies had hardly addressed the outcome and impact of a Master degree in Public Health. This may come as a surprise, given an increasing interest of donors, policymakers and management in measuring and demonstrating the effect of interventions. For many years a positive effect was assumed, however now, with this research there is evidence at hand. The outcome of the study, covering six Masters in Public Health in Sudan, the Netherlands, Mexico, China, Vietnam & South Africa was primarily positive. As Zwanikken indicates: "We always say that our alumni are doing well, and are making a contribution to improving health worldwide. These studies offer us the evidence to support that claim. Master programmes contribute to careers of graduates and the students attribute their success to a certain degree to the educational programmes."

The research provides valuable insights into the dynamics of professional development of senior health professionals from LMICs. Prisca Zwanikken demonstrates in her research the crucial role of continuous education, not only in technical terms, but also in developing leadership in public and international health. Alumni become agents of change, with the potential of changing health and health policy all over the world. The alumni inspired Zwanikken to conduct her research, and continue to do so in her day-to-day work of "educating future leaders in health around the world."

MASTER PROGRAMMES CONTRIBUTE TO CAREERS OF GRADUATES AND THE STUDENTS ATTRIBUTE THEIR SUCCESS TO A CERTAIN DEGREE TO THE EDUCATIONAL PROGRAMMES

The doctoral thesis 'Public health and international health educational programmes for low- and middle-income countries: questioning their outcomes and impact' is available at:
http://pub.maastrichtuniversity.nl/2c077571-6d65-428e-8e00-7893b4026a07

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NVTG

Membership of the **Netherlands Society for Tropical Medicine and International Health** (NVTG) runs from January 1st to December 31st and may commence at any time. Membership will be renewed automatically unless cancelled in writing before December 31st. Membership includes MT and International Health Alerts. An optional subscription to TM&IH carries an additional cost.

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