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Infectious disease risk from the Syrian conflict



Eskild Petersen^{a,*}, Susan Baekeland^b, Ziad A. Memish^c, Hakan Leblebicioglu^d

^a ProMED-mail Moderator, Parasitic Diseases, Department of Infectious Diseases, Aarhus University Hospital, Skejby, Aarhus, Denmark

^b ProMED-mail Correspondent, Human, Animal and Plant Diseases, Carnet, Normandy, France

^c Ministry of Health, Riyadh, College of Medicine, Al Faisal University, Riyadh, Kingdom of Saudi Arabia

^d Department of Infectious Diseases and Clinical Microbiology, Ondokuz Mayıs University Medical School, Samsun, Turkey

ARTICLE INFO

Article history:

Received 3 June 2013

Accepted 4 June 2013

Corresponding Editor: Andy Hoepelman,
Utrecht, The Netherlands

Keyword:

Syrian conflict

Leishmaniasis

Hepatitis

Rabies

MERS-CoV

1. Introduction

The breakdown of health care in Syria under the present conflict has been highlighted in ProMED reports on the increasing risk of leishmaniasis^{1–4} and rabies.⁵ However, these reports merely reflect the drastic deterioration in health care. A recent report from Médecins Sans Frontières⁶ highlights not only the destruction of health care facilities and the difficulties in treating injured people, but also describes the absence of childhood immunizations in many areas, lack of pharmaceuticals including antibiotics, and the lack of access to clean water and surge in diarrhea cases. Furthermore, medical facilities and staff have been deliberately targeted;⁷ the Independent International Commission of Inquiry on Syria wrote in a report this month, “Medical personnel and hospitals have been deliberately targeted and are treated by parties to the conflict as military objectives.”^{8,9} The conflict is expected to reverse the recent gains seen in the falling infant mortality rate and increased childhood immunization rate.¹⁰ Under these circumstances a surge in infectious diseases in both Syria and neighboring countries can be expected.

2. Middle East respiratory syndrome coronavirus (MERS-CoV)

A novel coronavirus with a high mortality has been described in Saudi Arabia, Qatar, Abu Dhabi, and Jordan.¹¹ So far, the virus infection has shown a high mortality, and person to person transmission has been seen within a family.¹² As at July 8, 2013, 80 cases have been diagnosed, with a fatal outcome in 45 deaths.²⁸

A recent case diagnosed in Italy was infected in Jordan, as were some of the first cases.¹³ Thus the MERS-CoV may also exist in Syria, and the refugee camps pose a particular threat to airborne transmission. At present the reservoir of the infection is not known and neither are its transmission potential and the proportion of mild cases.

3. Upper respiratory tract, gastrointestinal, and skin infections

Hepatitis A virus, enterovirus, and bacterial infections due to *Salmonella*, *Shigella*, and *Escherichia coli* will appear due to contaminated water. Upper respiratory tract infections will increase and epidemics of influenza are to be expected. The crowded living conditions combined with a lack of health care facilities will result in an increase in tuberculosis. In 2009 it was estimated that Syria had 26 (range 22–31) new cases of tuberculosis per 100 000 population.¹⁴ Influenza is a threat and if introduced will probably spread rapidly in the refugee camps.

Infections with common soil helminths such as *Ascaris* are expected to increase and cholera is an imminent risk. Skin infections like scabies are expected to be prevalent.

Schistosoma haematobium is found in the governorate of Al-Raqqah in Syria, whereas Turkey and Lebanon are free of schistosomiasis and there are only a few foci found in Jordan.¹⁵ With the poor sanitary conditions in the refugee camps, contamination of fresh water sources from infected refugees is a risk.

4. Measles and other vaccine-preventable infections

The childhood vaccination program is not functioning in areas affected by the war, but the United Nations Children's Fund (UNICEF) has supported vaccination in refugee camps and populations living close to refugee camps against measles and polio.¹⁶ A measles and polio vaccination campaign began in late November 2012. As of December 12, 2012, 948 000 children

* Corresponding author. Tel.: +45 7845 2817; fax: +45 7845 2870.

E-mail addresses: eskildp@dadlnet.dk, eskild.petersen@gmail.com (E. Petersen).

[†] ProMED-mail is a program of the International Society for Infectious Diseases <http://www.isid.org>.

had been vaccinated against polio and over 772 000 against measles, with the campaign still in progress.¹⁶ The Ministry of Health of Jordan in collaboration with the World Health Organization, UNICEF, and the United Nations High Commissioner for Refugees (UNHCR) completed a vaccination campaign against measles at the Zaatari refugee camp in April 2013, immunizing 98% of the target population of some 90 000 people – mainly new arrivals – between the ages of 6 months and 30 years.¹⁷

5. Vector-borne infections

5.1. Leishmaniasis

Several reports indicate that cutaneous leishmaniasis in on the increase. Cutaneous leishmaniasis is caused by *Leishmania tropica*, and 30 000 cases were reported in 2008.¹⁸ Visceral leishmaniasis is rare but is found in Aleppo and from there towards the Turkish border. The reservoir for *L. tropica* is small rodents and for *Leishmania infantum* is dogs.¹⁷

5.2. Dengue fever

Dengue is endemic in the western and southern regions of Saudi Arabia,¹⁹ and the presence of the vector for dengue fever, *Aedes albopictus*, was reported from Lebanon and Syria for the first time in 2007.²⁰

There is a real risk of the emergence of dengue fever in Syria under the present conditions.

5.3. Malaria

Syria was endemic for malaria until recently. In the World Malaria Report for 2005 only limited transmission in a few areas in the northeastern part of the country towards the border with Turkey and Iraq was reported.²¹ Malaria in Turkey has been largely controlled, and in 2011 only four relapses of *Plasmodium vivax* were reported; Turkey aimed to interrupt malaria transmission by 2012.²² Thus the risk of large outbreaks of malaria is limited, as transmission has almost been controlled in Syria and neighboring countries. However, a transmission potential exists and a febrile patient with no specific symptoms should be investigated for malaria.

6. Zoonoses

6.1. Rabies

There is little doubt that rabies circulation in animals, especially dogs, is increasing in Syria, with an expected increased risk of rabies in the human population too. Rabies in dogs appears widespread, as is apparent from information gathered on the Israeli side of the Syrian border.²³ From 2005 to 2012 Syria reported between two and 16 outbreaks in animals annually and 16 human cases.²⁴

6.2. Crimean-Congo hemorrhagic fever (CCHF)

CCHF is a viral zoonotic disease transmitted by ixodid ticks and has been increasing in Turkey;²⁵ livestock has been identified as the source of infection in one study.²⁶

6.3. Brucellosis

Breakdown in veterinary public health systems will result in the re-emergence of brucellosis.²⁷ Brucellosis is common in cattle and sheep in Jordan and is also seen in goats.¹⁵ With a lack of veterinary control, brucellosis will increase in Syria.

7. Conclusions

Many of the infections like leishmaniasis, tuberculosis, and brucellosis have a long incubation time and refugees will have these infections with them, with the risk of reintroducing them in neighboring countries. An increase in cases of leishmaniasis has already been reported from Syria and will most probably also be seen in the refugee population.

Epidemics of bacterial meningitis and gastrointestinal infections like hepatitis A, enterovirus, and *Giardia* can be expected.

Conflict of interest: No conflict of interest to declare.

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