Human Animal Infections and Risk Surveillance (HAIRS) group

Qualitative assessment of the risk that Crimean-Congo haemorrhagic fever (CCHF) virus presents to the UK human population

Updated April 2021
Qualitative assessment of the risk that CCHF virus presents to the UK human population

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About the Human Animal Infections and Risk Surveillance group

This document was prepared by Public Health England (PHE) on behalf of the joint Human Animal Infections and Risk Surveillance (HAIRS) group.

HAIRS is a multi-agency cross-government horizon scanning and risk assessment group, which acts as a forum to identify and discuss infections with potential for interspecies transfer (particularly zoonotic infections).


Information on the risk assessment processes used by the HAIRS group can be found at HAIRS risk assessment process.
Version control

Date of this assessment: April 2021

Version: 3.0

Reason for the assessment or update: Further locally acquired CCHF human cases described in Spain and detection of adult *Hyalomma* ticks on a human and a horse in 2 separate locations in England in 2018, with no history of travel

Completed by: HAIRS Secretariat and members

Non-HAIRS members consulted: Kayleigh Hansford, PHE

Date of previous risk assessment: December 2018

Date of initial risk assessment: April 2017
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Summary

Overview

Crimean-Congo haemorrhagic fever (CCHF) is not present in the UK, nor are there any identified established populations of Hyalomma ticks, the vectors of CCHF virus (CCHFV).

In 2016, Spanish authorities reported the first autochthonous clinical cases of CCHF in Spain and in South-Western Europe. Ticks in Spain had first been found to carry CCHFV in 2010, therefore the occurrence of CCHF human cases there was not an unexpected event. Since 2016 and as of March 2021, 7 human cases of CCHFV infection have been reported in Spain.

An adult male Hyalomma rufipes tick was detected in the UK in September 2018 on a horse with no history of travel. This suggests possible moulting for the first time of an imported Hyalomma nymph (via a migratory bird) to an adult, despite UK climate constraints previously considered to be a limiting factor for tick development. Additionally, an adult male Hyalomma marginatum tick (not feeding) was found on a human at a bird reserve in Norfolk in 2018. This is likely the result of a moulted nymph and the first evidence of H. marginatum moulting in the UK. This concurs with other reports in northern Europe during 2018 of Hyalomma being found outside their endemic range during the warm summer.

No locally acquired human cases of CCHF have been reported in the UK, nor has CCHFV been found in any potential tick vector species found within the UK.

Assessment of the risk of infection in the UK

Probability: Very low
Impact: Very low to low

Level of confidence in assessment of the risk

High

Actions and recommendations

Monitoring for new evidence as to the presence of Hyalomma species in the UK should be continued.

Ensure all submissions of Hyalomma ticks to PHE’s Tick Surveillance Scheme are followed up to assess whether they are locally acquired, or travel associated.

Continue close monitoring of situation in Europe for further geographical expansion of tick vector species.
Step 1: Assessment of the probability of infection in the UK human population

This section of the assessment examines the likelihood of an infectious threat causing infection in the UK human population. Where a new agent is identified there may be insufficient information to carry out a risk assessment and this should be clearly documented. Please read in conjunction with the Probability Algorithm following the boxes shaded green in Annex A. Where the evidence may be insufficient to give a definitive answer to a question the alternative is also considered with the most likely outcome shown in solid colour and the alternative outcome in hatched colour. The text alternative to the Probability Algorithm can also be found in Annex B.

Is this a recognised human disease?

**Outcome:** Yes

**Quality of evidence:** Good

Yes. CCHF was first described in the Crimea in 1944, where an outbreak of an acute febrile illness with a high incidence of shock and bleeding occurred among soldiers and agricultural workers. In 1969, it was recognised that the virus causing this disease was identical to a virus that had been isolated from a child in the Congo in 1956 (1). Humans are the only animal species known to manifest clinical CCHF disease (2).

CCHF virus (CCHFV) is a member of the family Bunyaviridae, in the genus Nairovirus (1). CCHFV exhibits great sequence diversity. From analysis of its S, L and M segments, phylogenetic trees have been constructed containing lineages (or genotypes, Gt) I-VI. CCHFV is thought to have originated in Africa 1,000 to 5,000 years ago, although strain Ap92 found in Greece is also considered an ancient lineage. The virus was introduced to Central and South Asia in the Middle Ages but spread into Europe is considered a more recent event, likely via a single introduction into central Russia. Westward spread has since taken place, with further spread considered likely (3, 4).

CCHF has a widespread geographical distribution. It is endemic in many countries in Africa, the Middle East, Eastern Europe and Asia, with the geographical distribution of cases corresponding to those areas where *Hyalomma* are found (2). In the WHO European Region, locally acquired cases of human infections have been reported from Albania, Armenia, Bulgaria, Georgia, Greece (single case in 2008 (5)) Kazakhstan, Kosovo, Russia, Serbia, Spain, Tajikistan, Turkey, Turkmenistan, Ukraine, and Uzbekistan. Globally, there have been case reports, virological or serological evidence of human infection in at least 62 countries (2, 6).
Spain reported its first autochthonous cases in August 2016, the first in Western Europe, following their first detection of CCHFV infected ticks in 2010 (7 to 9). Since then, a total of 7 confirmed cases have been reported, including one case of nosocomial transmission in 2016 and 3 fatalities (one each in 2016, 2018 and 2020). A CCHFV seroprevalence study carried out in 2017 to 2018 in Castile-León, a Spanish region where CCHF cases had been reported, found evidence of past exposure to CCHFV of between 0.58% and 1.16% in healthy blood donors (results varied dependent on assay used) (10). CCHFV genotypes Africa III and Europe V have been detected both in human cases (11) and in different tick species (Hyalomma lusitanicum and Dermacentor marginatus) collected from various wild ungulate hosts (red and fallow deer; Eurasian wild boar) across south-west Spain (12), showing the wide spatial presence of CCHFV in this region. Authorities state there is a moderate likelihood of future cases in known CCHF risk areas, although the impact should be low given expected small number of cases and availability of adequate means of isolation and control of cases (13).

CCHF disease has varying manifestations from asymptomatic infection through to fulminant haemorrhage. The incubation period is always less than 14 days (typically 3 to 7 days), although this duration varies based on several factors including viral dose and route of exposure; it is often shorter following nosocomial infection (14). The onset of symptoms is sudden, with fever, severe headache, dizziness, photophobia, malaise, myalgia and back pain reported. Sore throat, nausea, vomiting and diarrhoea may also feature. Hepatomegaly and lassitude develop after 2 to 4 days (1, 15, 16). The haemorrhagic forms of the disease are more diverse than other viral haemorrhagic fevers, starting with a petechial rash and progressing through extensive bruising and cutaneous ecchymoses (bleeding under the skin), to excessive bleeding (16). Cerebral haemorrhage has also been described (17). In fatal cases, death occurs from haemorrhage, multi-organ failure and shock, usually between days 5 and 14 of illness (1). Reported overall case fatality rates have varied from 5% to more than 40%, though this disparity is likely skewed by small sample sizes and failure to detect and report less severe cases (1).

CCHFV is maintained in several ixodid (hard) tick species and these are responsible for spreading the virus to a wide range of wild and domestic animals. Illness has not been reported in these mammals, but there is evidence of transient viraemia for up to 15 days (18). Some mammals, and probably some avian species, act as amplifying hosts that can subsequently infect ticks feeding on them (1, 19).

Human disease from an animal source follows exposure to blood or body fluids of infected animals (particularly livestock), via tick bites, or following contamination due to crushing a tick (1, 15). Meat is generally not a potential source of exposure to CCHFV, as post-slaughter acidification will normally inactivate virus present (14). There have, however, been reported human cases of infection following the consumption of raw meat and liver (20) from freshly slaughtered infected animals. Pre-slaughter stress in animals...
can reduce the extent of post-slaughter acidification. Whether the virus can be transmitted via milk is uncertain (21), but unpasteurised milk has been suggested as a possible route of exposure (22).

While CCHFV has been detected in many tick species, only some ticks have been confirmed as competent vectors (23). Ticks of the genus *Hyalomma* are the principle source of human infection and the key *Hyalomma* vector(s) involved vary geographically (1). Some species of the genus *Dermacentor* and *Rhipicephalus* have also been shown to be capable of transmitting CCHFV (19), but their role in maintaining active foci is debated (24). In Spain, CCHFV has been detected in *H. lusitanicum*, *H. marginatum*, and *D. marginatus* (12, 25, 26).

Infection within generations of key *Hyalomma* vectors is maintained by transstadial (between stages) and transovarial transmissions that is by vertical transmission. The virus can be maintained for extended periods via these routes, even in the absence of susceptible vertebrate hosts (19).

**Is this disease endemic in the UK?**

**Outcome:** No

**Quality of evidence:** Good

No. The virus has not been found in UK mammals. Relevant tick species have been detected in the UK; there have been 2 reports of UK acquired *Hyalomma* ticks on hosts without a history of travel (27, 28), and occasional reports of importations via migratory birds (23) or imported animals (29). A distribution map for *H. marginatum* in Europe is shown below.
Qualitative assessment of the risk that CCHF virus presents to the UK human population

Figure 1. Hyalomma marginatum distribution in Europe as of March 2021 (Map source: ECDC)
Qualitative assessment of the risk that CCHF virus presents to the UK human population

The map in Figure 1 shows the current known distribution of *Hyalomma marginatum* in Europe at ‘regional’ administrative level, as of March 2021. Two hundred and forty-one new reports were submitted since October 2020. Whilst CCHF has not been found in UK mammals, relevant tick species have been detected in the UK; there have been 2 reports of UK acquired *Hyalomma* ticks on hosts without a history of travel and occasional reports of importations via migratory birds or imported animals.

Historical tick records from the UK (30) have demonstrated that importations of *H. marginatum* have occurred via migratory birds, although a study in 2004 (31) collected 38 ticks from more than 10,000 birds examined, and none were *Hyalomma*. A subsequent UK study carried out in the spring of 2010 and 2011 examined 971 migratory birds of 29 species (23). From 53 infested birds of 9 species, 68 ticks were recovered. These were mostly *Ixodes* species (54/68, 79%), but 21% (14/68) were *H. marginatum*. The *H. marginatum* were found on 4 species of bird and all ticks were negative for CCHFV by PCR (23).

As of March 2021, 11 *Hyalomma* ticks have been received by PHE’s passive Tick Surveillance Scheme (TSS) (see Table 1 below).

<table>
<thead>
<tr>
<th>Tick species</th>
<th>Year</th>
<th>Host species</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>H. marginatum</em></td>
<td>2009</td>
<td>Horse</td>
<td>[32]</td>
</tr>
<tr>
<td><em>H. lusitanicum</em></td>
<td>2016</td>
<td>Dog</td>
<td>[29]</td>
</tr>
<tr>
<td><em>H. lusitanicum</em></td>
<td>2017</td>
<td>Human</td>
<td>TSS data</td>
</tr>
<tr>
<td><em>H. truncatum</em></td>
<td>2017</td>
<td>Human</td>
<td>TSS data</td>
</tr>
<tr>
<td><em>H. lusitanicum</em></td>
<td>2018</td>
<td>Dog</td>
<td>TSS data</td>
</tr>
<tr>
<td><em>H. rufipes</em></td>
<td>2018</td>
<td>Horse</td>
<td>[28]</td>
</tr>
<tr>
<td><em>H. marginatum</em></td>
<td>2018</td>
<td>Human</td>
<td>[27]</td>
</tr>
<tr>
<td><em>H. lusitanicum</em></td>
<td>2019</td>
<td>Human</td>
<td>TSS data</td>
</tr>
<tr>
<td><em>H. lusitanicum</em></td>
<td>2019</td>
<td>Human</td>
<td>TSS data</td>
</tr>
<tr>
<td><em>H. aegypticum</em></td>
<td>2019</td>
<td>Human</td>
<td>TSS data</td>
</tr>
<tr>
<td><em>H. aegypticum</em></td>
<td>2020</td>
<td>Human</td>
<td>TSS data</td>
</tr>
</tbody>
</table>

All but the *H. rufipes* (on a horse) and the *H. marginatum* (on a human) were linked to overseas travel to *Hyalomma*-endemic regions. The detection of an adult male *H. rufipes* tick on a horse in Dorset and an adult male *H. marginatum* tick on a human in Norfolk, both with no history of travel, were possibly the result of importation of a nymph on a
Qualitative assessment of the risk that CCHF virus presents to the UK human population

migratory bird, and subsequent moulting to an adult during the unusually warm summer of 2018 (27, 28). CCHFV was not detected in either tick (or the 2 ticks imported on dogs (Table 1)). To date there is no evidence that any imported Hyalomma ticks have led to established populations in the UK.

Travel associated human CCHF cases have very rarely been confirmed in the UK. Only 2 laboratory-confirmed clinical cases have been diagnosed; one imported from Afghanistan in 2012 (33) and the other from Bulgaria in 2014 (34). No onward transmission resulted from either case.

**Are there routes of introduction into the UK?**

| Outcome: Yes |
| Quality of evidence: Satisfactory |

Yes, via tick infested bird migration and animal movements. The latter route does not appear to have been commonly documented (18), although in the UK Hyalomma species have been detected on an imported horse (32), 2 travelling dogs (29) and humans (TSS data) (Table 1).

The risk of CCHF introduction into Western Europe, including via animal movement, has been assessed and is considered a very low risk (35).

Livestock were, until January 2021, traded between EU member states and the United Kingdom on an Intra Trade Animal Health Certificate (ITAHC), which has no specific requirements for CCHF freedom and no testing or tick treatment requirements. Horses were moved – until January 2021 – using either an ITAHC, or an owner health attestation, or on a commercial document for registered horses. Importation from outside the EU is strictly controlled, with few countries approved for trade in live ruminant livestock (206/2010/EU) and few approved bodies for trade in exotic ruminants. None of the approved third countries have endemic CCHF. Horses can, however, enter the UK from many third countries – including the Middle East and North Africa – and from January 2021 the EU, and there are no tick treatment requirements on the Export Health Certificate.

Jameson and others (23) estimated that there could be tens of thousands of H. marginatum being imported annually via birds migrating from Africa. However, no established populations are known to have resulted from importation of this nature. Additionally, it has previously been considered that there is a climatic limitation with the UK being too wet or too cold during the summer potentially preventing Hyalomma development from nymph to adult. However, during periods with increased summer temperatures such as those experienced during 2018 (36), nympha l moulting may take
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place in the UK, as suggested by the 2018 detections of a male *H. rufipes* on an horse in Dorset and a male *H. marginatum* on a human in Norfolk; both with no history of travel. CCHFV was not detected in either tick (27, 28).

Gale and others modelled the absolute risk of CCHFV infections of livestock through immature ticks via migratory birds as being very low (37). An assessment of the risk ticks on northward migrating birds present to Great Britain was conducted in Spain and examined 564 birds. Overall, 65 *Hyalomma* tick species were found on 26 birds (2.2%), none of which were positive for CCHFV (38). Tick infestation rates on birds entering the UK is estimated at <1%, and such migratory birds are considered more likely to have originated in north Africa or southern Europe. The conclusion was that migratory birds present an extremely low but not negligible risk of CCHFV being introduced into Great Britain.

*Hyalomma lusitanicum* has been imported into the UK on 4 occasions (2016 to 2019) on dogs and humans, each with a recent history of travel to Portugal, Spain, Menorca or Malta (29) (TSS data). These importations are considered likely to be extremely rare events. The role of this tick species in transmission of CCHFV is unclear, though it was found to harbour CCHFV in Spain (7).

Spur-thighed tortoises (*Testudo graeca*) imported into the UK have been found to be infested with *Hyalomma aegyptium* (39), a species known to be infected with CCHFV in Turkey and Syria; however, this tick species is not known to be associated with virus transmission.

**Are effective control measures in place to mitigate against these routes of introduction?**

| **Outcome:** No |
| **Quality of evidence:** Satisfactory |

Effective control of introduction is not possible due to the role of migratory birds. There are no statutory controls for ticks on imported livestock or other hoof-stock. There are no tick controls in the PETS passport scheme or for commercial pets. Tick treatment in pets is voluntary, but it is recommended to all pet owners by the British Small Animal Veterinary Association (BSAVA) whether their cat or dog is travelling or not (40). There are no controls for wild birds.

The presence of a viraemia due to CCHFV in an animal species would most likely be silent, thus importation of infected animals could pass any veterinary pre-movement inspection. However, there are controls on trading of livestock animals within and between EU member states and on importation from outside the EU, relating to the
disease-free status of the establishment and the region, albeit not specifically related to CCHF. Importation from many CCHFV-endemic countries is not allowed, due to EU legislative requirements, based on the status of other more important livestock diseases in the country.

**Do environmental conditions in the UK support the natural reservoirs or vectors of disease?**

**Outcome:** No/Yes

**Quality of evidence:** Poor/Satisfactory

There have been no established *Hyalomma* tick populations detected in the UK, despite presumed frequent incursions via migratory birds. This is considered to be likely due to a climatic limitation, with the UK being too wet or too cold during the summer for *Hyalomma* development (19). The recent detections of locally acquired *Hyalomma* ticks with no history of travel suggests that increased summer temperatures (36) may support nymphal moulting in the UK following introduction via migratory birds. However, the lack of establishment of this tick in other parts of Europe with similar climatic conditions (for example see Figure 1) suggests that survival in the UK may be restricted.

**Will there be human exposure?**

**Outcome:** No, not currently

**Quality of evidence:** Good

Not at the current time. There is no evidence to suggest CCHFV is present in the UK and, to date, only a limited number of imported *Hyalomma* species have been detected, with no indication of establishment.

**Outcome of probability assessment**

The probability of human infection with CCHFV in the UK population: very low
Step 2: Assessment of the impact on human health

The scale of harm caused by the infectious threat in terms of morbidity and mortality: this depends on spread, severity, availability of interventions and context. Please read in conjunction with the Impact Algorithm following the boxes shaded green found in Annex C. Where the evidence may be insufficient to give a definitive answer to a question the alternative is also considered with the most likely outcome shown in solid colour and the alternative outcome in hatching. The text alternative to the impact algorithm can be found in Annex D.

Is there human-to-human spread of this pathogen?

**Outcome:** No/Yes

**Quality of evidence:** Good

The most common route of acquisition of CCHF is tickborne or via animal contact.

However, person-to-person spread can occur via contact with the blood and/or body fluids of infected persons (1, 15). Nosocomial transmission is known to occur and has been well-documented in many countries (41), including in Spain in 2017 (42, 43), but has not occurred in the UK. Possible sexual transmission and vertical transmission have also been described (44, 45, 46).

Is there zoonotic or vector-borne spread of this pathogen?

**Outcome:** Yes

**Quality of evidence:** Good

Yes, both. It is a tickborne infection, but disease may also be acquired via contact with blood or body fluids of infected animals (1).

For zoonoses or vector-borne diseases, is the animal host or vector present in the UK?

**Outcome:** No

**Quality of evidence:** Satisfactory
No. The virus is not found in UK animals and there are no established *Hyalomma* tick populations in the UK.

The incidents of locally acquired adult *Hyalomma* ticks during 2018, on a human and a horse with no history of travel, suggests moulting of nymphs has taken place in the UK in these instances. Winter temperatures in the UK would not be a limiting factor for continued survival of adults which may therefore result in questing of adult *Hyalomma* next spring. It is possible that future human exposure to *Hyalomma* ticks in the UK could occur following warm summers permissive for nymphal moulting following importation of ticks.

**Is the UK human population susceptible?**

**Outcome:** Yes  
**Quality of evidence:** Good

Yes. There is no reason to suspect that the UK population is any different in susceptibility to CCHFV than populations in endemic countries. Two UK travellers to date have acquired confirmed clinical CCHF overseas, as have a number of other tourists; more than twenty travel-related cases have been documented to date in the literature (47, 48).

**Does it cause severe disease in humans?**

**Outcome:** Yes  
**Quality of evidence:** Good

Yes. Although asymptomatic infection occurs, it is not clear what proportion of infections lead to overt clinical disease. However, when it occurs, CCHF can be a severe illness with a high mortality. In endemic countries, the case fatality rate is very variable, ranging from 5% to more than 40% (1). In a series of travel-related infections, 12/21 (57%) had a fatal outcome (47).

**Would a significant number of people be affected?**

**Outcome:** No  
**Quality of evidence:** Satisfactory
Qualitative assessment of the risk that CCHF virus presents to the UK human population

The burden of disease due to CCHFV even in endemic countries appears to be comparatively low, although there is great variation in surveillance, detection and reporting.

In the UK, it is unlikely that a significant number of cases would occur from environmental exposures.

There are robust and tested procedures for managing and caring for patients with viral haemorrhagic fevers (49). There has been no transmission to healthcare workers involved in the care of patients with any viral haemorrhagic fever in the UK (50).

**Are effective interventions (preventative or therapeutic) available?**

<table>
<thead>
<tr>
<th>Outcome: Yes</th>
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<tbody>
<tr>
<td>Quality of evidence: Satisfactory</td>
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</table>

Preventive measures in endemic countries focus on tick avoidance (51), minimising contact with blood or body fluids of livestock animals (52), and infection prevention and control measures in healthcare settings (41).

There is no internationally available vaccine.

The use of the antiviral ribavirin for treatment may be beneficial, provided it is commenced early in the course of illness, but the quality of studies reporting its use has been inconsistent (1). Ribavirin has also been suggested as post-exposure prophylaxis following percutaneous exposure (53).

Intensive public messaging about preventive measures would take place in response to the first detection of a locally acquired human case or the first detection of established populations of *Hyalomma* ticks in the UK.

**Outcome of impact assessment**

The impact of CCHV on human health in the UK: Very low to low
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Annex A: Assessment of the probability of infection in the UK population algorithm

- Is this a recognised human disease? NO
- Is this a zoonosis or is there zoonotic potential? NO
- Is this disease endemic in the UK? NO
- Are there routes of introduction into the UK? NO
- Are effective control measures in place to mitigate against these? YES
- Do environmental conditions in the UK support the natural reservoirs/vectors of disease? NO
- Will there be human exposure? NO
- Are humans highly susceptible? NO
- Is this disease highly infectious in humans? NO

Very Low

Low

Moderate

High
Annex B: Accessible text version of assessment of the probability of infection in the UK population algorithm

Outcomes are specified by a ✓ (tick) beside the appropriate answer. Where the evidence may be insufficient to give a definitive answer to a question, the alternative is also considered with the most likely outcome shown with ✓✓ (2 ticks) and the alternative outcome(s) with a ✓ (tick).

Question 1: Is this a recognised human disease?
Yes: go to question 3 ✓ (tick)
No: go to question 4

Question 2: Is this a zoonosis or is there zoonotic potential
Yes: go to question 3
No: probability of infection in UK population is very low

Question 3: Is this disease endemic in the UK?
Yes: go to question 7
No: go to question 4 ✓ (tick)

Question 4: Are there routes of introduction into the UK?
Yes: go to question 5 ✓ (tick)
No: probability of infection in UK population is very low

Question 5: Are effective control measures in place to mitigate against these?
Yes: probability of infection in UK population is very low
No: go to question 6 ✓ (tick)

Question 6: Do environmental conditions in the UK support the natural reservoirs or vectors of disease?
Yes: go to question 7 ✓ (tick)
No: probability of infection in UK population is very low ✓ (tick)

Question 7: Will there be human exposure
Yes: General population or high-risk groups: Go to question 8
No: probability of infection in UK population is very low ✓ (tick)
Qualitative assessment of the risk that CCHF virus presents to the UK human population

Annex C: Assessment of the impact on human health algorithm

This question has been added to differentiate between those infections causing severe disease in a handful of people and those causing severe disease in larger numbers of people. “Significant” is not quantified in the algorithm but has been left open for discussion and definition within the context of the risk being assessed.
Annex D: Accessible text version of assessment of the impact on human health algorithm

Outcomes are specified by a ✓ (tick) beside the appropriate answer. Where the evidence may be insufficient to give a definitive answer to a question, the alternative is also considered with the most likely outcome shown with ✓ ✓ (2 ticks) and the alternative outcome(s) with a ✓ (tick).

Question 1: Is there human-to-human spread?
Yes: go to question 4 ✓ (tick)
No: go to question 2 ✓ (tick)

Question 2: Is there zoonotic or vector borne spread?
Yes: go to question 3 ✓ (tick)
No: impact on human health in the UK is very low

Question 3: Is the animal host or reservoir present in the UK?
Yes: go to question 4
No: impact on human health in the UK is very low ✓ (tick)

Question 4: Is the population susceptible?
Yes: go to question 5 ✓ (tick)
No: impact on human health in the UK is very low

Question 5: Does it cause severe human disease?
Yes: go to question 8 ✓ (tick)
No: go to question 6

Question 6: Is it highly infectious to humans?
Yes: go to question 9
No: go to question 7

Question 7: Are effective interventions available?
Yes: impact on human health in the UK is very low
No: impact on human health in the UK is low

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Question 8: Would a significant number of people be affected?
Yes: go to question 10
No: go to question 9 ✓ (tick)

Question 9: Are effective interventions available?
Yes: impact on human health in the UK is low ✓ (tick)
No: impact on human health in the UK is moderate
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Public Health England exists to protect and improve the nation’s health and wellbeing, and reduce health inequalities. We do this through world-leading science, research, knowledge and intelligence, advocacy, partnerships and the delivery of specialist public health services. We are an executive agency of the Department of Health and Social Care, and a distinct delivery organisation with operational autonomy. We provide government, local government, the NHS, Parliament, industry and the public with evidence-based professional, scientific and delivery expertise and support.

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