West Nile virus:

A contingency plan to protect the public's health

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CONTENTS

Foreword

West Nile virus no longer respects the geographical boundaries that once restricted it to the Old World. In 1999 this mosquito-borne disease arrived in the city of New York, and its rapid spread across the United States of America, where it caused the death of 284 people in 2002 alone, focused the minds of health professionals and scientists. Here was evidence that the virus could swiftly become endemic in new territories with the most serious consequences for human health.

While the chances of West Nile virus arriving in the United Kingdom have been assessed as 'low', the possibility cannot be ruled out. In my Annual Report for 2002 I recommended action in a number of areas to prepare for this unlikely event. In particular, I called for a contingency plan that would define the roles and responsibilities of the numerous parties who would be involved in tackling the disease in the event of an UK-acquired case of West Nile virus infection. This report sets out that strategy and contains important information for all those who might be called on to play a role in limiting the impact of West Nile virus.

Inevitably, given its method of transmission, any effort to tackle West Nile virus will require the close liaison of veterinary and health services at the local, regional and national level. This report maps out how such co-operation will be achieved in practice through the formation of an inter-disciplinary Incident Control Team to take the lead locally, and the creation of a central Government team drawn from the Department of Health, the Department for the Environment, Food and Rural Affairs, and the Health Protection Agency to provide policy advice nationally.

It is not known how West Nile virus was introduced into New York City, but factors such as climate change, long-haul travel and changes in land-use can facilitate the spread of infectious diseases in unpredictable directions. We have received advance warning that West Nile virus, which was limited in its geographic distribution, has mobilised.

This contingency plan sets out measures:

- to enhance surveillance for the virus
- to alert clinicians to the symptoms of West Nile fever; and
- to control mosquito populations

In many of these areas action has already been taken, whilst in others, it will be initiated only if and when a diagnosis of West Nile virus infection is made.

Sir Liam Donaldson
Chief Medical Officer for England

1. Introduction

1. West Nile virus (WNV) belongs to the flavivirus family, which includes other harmful viruses such as:

- Yellow fever virus
- Dengue virus
- Japanese encephalitis virus

2. WNV is a zoonotic arbovirus, meaning a virus that can be transmitted between animals and man by arthropods. In this case the disease is transmitted by mosquitoes. The natural host is birds, and many species of birds have been shown to carry the virus. WNV is maintained and amplified by continuous cycling between birds and mosquitoes. WNV has been isolated from mosquitoes, animals (both wild and domesticated) and people in Africa, Europe, the Middle East and west and central Asia.

The spread of West Nile virus

3. WNV was first isolated in 1937 from a woman in Uganda with a fever. Until the very end of the century, the infection was confined to territories in the Old World (e.g. Africa, Israel, India and Egypt), but in the 1990s it began to show signs that it was breaking free of its traditional boundaries. Recently, outbreaks of the disease were reported in Europe (e.g. Romania, Russia, France and Italy), before WNV made its sudden and unexpected appearance in the city of New York in 1999.

4. In 2002, WNV was declared endemic in the United States of America. In that year alone 4156 people were infected with WNV and 284 died as a result. The virus has spread across the North American continent into Canada and the Caribbean. Recent reports suggest it has also spread to Central America.

Transmission of West Nile virus

5. Infections of people and horses occur when they are bitten by infected mosquitoes. Some mosquitoes prefer to bite birds or animals but can also bite people. The factors that influence the transmission of the virus are:

- population density of mosquitoes
- mosquito species
- mosquito biting preference
- climatic conditions
- presence of susceptible birds

6. Mammals (such as people and horses) rarely have viruses in their blood for long enough to infect an insect vector and contribute to onward transmission. They are therefore considered to be 'dead end' or incidental hosts.

7. Transmission of WNV from infected animals to those handling them is considered to be a low risk, but people handling infected animals are advised to take suitable precautions to prevent infection.

Person-to-person transmission

8. WNV has been transmitted from person to person via blood transfusion and organ transplantation. In 2002 in the United States of America, a total of 23 people acquired WNV infection after receiving blood components. Guidance has now been issued by the UK National Blood Service to manage the risks.

9. Transmission of WNV from a mother to her unborn child (via intra-uterine transmission) has been reported, and an infant was reported as infected when the mother's breast milk was found to be positive for WNV.

Laboratory-acquired transmission

10. Laboratory–acquired infection of laboratory workers with WNV has also been reported.

West Nile virus in the United Kingdom

11. In the United Kingdom there are suitable bird species to act as hosts for WNV. There are also species of mosquitoes that could act as vectors for the virus. The native *Culex pipiens* mosquito would be the most likely vector for WNV. Despite hosts and vectors for the disease being present, the risk of acquiring WNV infection in the United Kingdom has been assessed as low. This is because the mosquito populations are relatively small and their biting behaviour does not generally favour transmission of WNV. Also, surveillance to date has not isolated WNV from birds or mosquitoes, nor has it been associated with any clinical disease amongst birds.

Assessing the risk

12. The prevention and control of infectious diseases is critically dependent on sound disease surveillance. In the case of WNV, surveillance of birds and mosquitoes, in addition to human health surveillance, may indicate where WNV transmission is likely to occur. Experience of WNV in Europe (where it is endemic in animal populations in many places) led the European Commission's Scientific Committee on Veterinary Measures relating to Public Health to recommend, in April 2003, that European countries free of WNV outbreaks *"should implement a passive surveillance strategy based on notification of clinically expressed encephalitis in humans and horses, followed by a documentation of the aetiological agent"*.

13. The Department of Health asked the Trypanosomiasis And Land-use in Africa research group at the University of Oxford, who have expertise in disease early- warning systems, for their assessment of the likelihood of WNV occurring in the United Kingdom based on climatic modelling. This assessment mapped areas with habitat similarities to those regions from which WNV is reported in Europe. Very few regions in the United Kingdom are predicted to be similar to any WNV region.

Surveillance of people

14. Surveillance for WNV infection in people has already commenced in the United Kingdom. To investigate whether there have been previously undiagnosed cases of WNV in the United Kingdom, the Health Protection Agency carried out a retrospective study of cases of encephalitis where the causative organism was not identified. This study did not identify any cases of WNV infection in the United Kingdom.

15. Clinicians and Regional Epidemiologists have been reminded to consider WNV infection as a possible cause of viral encephalitis or meningitis, when other causes have been excluded.

16. In the United Kingdom, organ and tissue donors are carefully screened before donation. The National Blood Service has recommended that all potential donors who have travelled to any part of North America should not give blood for 28 days after leaving (or for 28 days after the onset of any symptoms consistent with WNV infection).

Surveillance of birds

17. The detection of WNV in animals and birds is often an indicator of, and precedes, cases occurring in people. In countries where outbreaks of WNV have occurred, high bird mortality has been found to correlate strongly with WNV activity and has indicated where human disease is likely to occur. Although the European Commission Scientific Committee recommended that surveillance of birds is only required for countries with reported WNV outbreaks, surveillance for WNV in dead birds is being undertaken in the UK as an additional precautionary measure.

18. The Veterinary Laboratory Agency in England and Wales has undertaken routine passive surveillance of wild bird cadavers submitted to regional offices in the United Kingdom for several years. In 2002, this surveillance was enhanced to include both virus isolation and antigen detection for WNV in birds across a range of species, including *Corvidae* e.g. rooks, magpies. WNV has not been detected in any of the birds tested to date.

19. In addition to this surveillance, the Centre for Environment and Health, Oxford has undertaken research for the presence of antibodies against WNV in migratory and non-migratory birds in the United Kingdom. The results showed antibody against WNV in some of the birds tested, including native non-migratory birds. The presence of antibody against WNV in these birds would suggest that they have been exposed to WNV in the UK. However, WNV has not been isolated and there is no evidence of clinical disease due to WNV in birds in the United Kingdom. Proposals for further detailed studies are under appraisal.

Surveillance of mosquitoes

20. Data on the distribution of mosquitoes in the United Kingdom to date is limited. This is provided largely by amateur enthusiasts and recent distribution mapping carried out by the University of East London. Mosquito surveillance for WNV is not considered to be a good tool for predicting human disease, because the proportion of mosquito pools in wild populations that test positive is very low even when transmission rates are high. However, it is useful to know what species of mosquitoes are present so that biting behaviour, and hence health risk, can be assessed. Limited targeted surveillance of mosquitoes (density and distribution) is therefore also in place.

21. The Department of Health commissioned research in 2003 to evaluate the population size, species, biting behaviour and temporal and spatial characteristics of mosquitoes in three areas: Cambridgeshire, Essex and Kent, to find out if mosquitoes in these areas are carrying WNV. The Health Protection Agency at Porton Down carried out tests for the presence of WNV in mosquitoes taken from these areas and the results were negative.

Surveillance of horses

22. WNV infection in horses can cause equine viral encephalomyelitis, a notifiable disease in all European Union Member States and in the United Kingdom under the Infectious Diseases of Horses Order 1987. To guard against the risk of WNV being brought into the UK, all horses imported from outside the European Union are accompanied by veterinary health certificates and checked by an official veterinarian at a border inspection post. WNV infection is considered in the differential diagnosis of any equine encephalitis, and any animal exhibiting clinical signs of WNV infection could be detected at this stage.

Further information

- Health Check: On the State of Public Health. Annual Report of the Chief Medical Officer, 2002. Department of Health. Available at: *www.publications.doh.gov.uk/cmo/annualreport2002/index.htm*
- Department of Health. Getting Ahead of the Curve: A Strategy for Combating Infectious Diseases (including other aspects of health protection), a Report by the Chief Medical Officer. 2002. Available at: *www.publications.doh.gov.uk/cmo/idstrategy/index.htm*
- Information for the public on blood transfusion risks and giving blood after visiting the United States or Canada can be found at: *www.blood.co.uk/pages/west_nile_flash.html*
- Further information on surveillance of people can be found on the Health Protection Agency's website at: *www.hpa.org.uk/infections/topics_az/west_nile/menu.htm*
- Further information on surveillance of birds can be found at: *www.defra.gov.uk/animalh/diseases/surveillance_reports*
- Further information on the Trypanosomiasis And Land-use in Africa research group, University of Oxford can be found at: *www.tala.ox.ac.uk/index.htm*
- The Department for Environment, Food and Rural Affairs has a contingency plan, known as 'STEED', to deal with specified equine disease
- European Commission, Health and Consumer Protection Directorate-General. Opinion of the Scientific Committee on Veterinary Measures Relating to Public Health on West Nile Virus (WNV) - adopted 14-15 April 2003.

2. Diagnosis, Patient Care and the Protection of Healthcare Professionals

Key issues:

Diagnosis of people is by laboratory testing at the Health Protection Agency, at Porton Down, in accordance with internationally agreed testing protocols.

Although WNV infection can occasionally be fatal, around 90% of people infected with the virus will experience no symptoms or will develop only a mild self-limiting 'flu-like illness.

There is currently no treatment for this disease.

Laboratory testing

23. The Health Protection Agency is collaborating with the Veterinary Laboratory Agency and the Centre for Environment and Health to validate and standardise laboratory methods for the detection and confirmation of WNV infection in people, birds and horses. Protocols for laboratory testing for WNV have been agreed based on diagnostic tests carried out in the United States of America and Europe.

24. The Health Protection Agency team at Porton Down is responsible for testing human samples and the Veterinary Laboratory Agency is responsible for testing samples from birds. Diagnostic algorithms are available on the relevant agency's web-site.

Clinical signs

Clinical signs of WNV in people

25. In the majority of cases, infection with WNV causes no symptoms, and fewer than 1% of infections lead to severe illness. However, an acute viral infection can develop leading to West Nile fever (WNF). This is most often a mild, self-limiting 'flu-like' condition lasting 3 to 6 days. Diarrhoea, abdominal pain, pharyngitis, conjunctivitis, rash and lymphadenopathy have also been described.

26. WNV infection can lead to encephalitis, meningitis or meningoencephalitis. Other symptoms may include ataxia and extrapyramidal signs, cranial nerve abnormalities, myelitis, optic neuritis, polyradiculitis, seizures, severe muscle weakness, acute flaccid paralysis, myocarditis, pancreatitis and fulminant hepatitis. Some patients may also suffer longer-term symptoms, such as movement disorders and sensory symptoms.

27. In a small percentage of cases of WNV infection, the disease is fatal. The fatality rate tends to increase with age, and the most significant risk factor for developing severe disease is being over 50 years of age.

Clinical signs of WNV in animals

Birds

28. WNV infection is usually asymptomatic in birds. However, the virus can cause encephalitis, with accompanying fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness and paralysis. Infection with WNV can lead to bird fatalities, and in most of the outbreaks involving human disease, mass wild bird die-offs were noted preceding, or at the same time as, infections in people.

Horses

29. WNV can produce a serious, often fatal, disease in horses and there is a much higher incidence of overt clinical disease in equine species than in people (by approximately 30 fold). Clinical signs may include pyrexia, generalised weakness, muscle tremor, ataxia, head shaking, flaccid paralysis of the lower lip, hind limb paralysis, recumbence and sudden death.

Patient care

30. Patients should be admitted to hospital and, if possible, isolated within a single room (including Intensive Treatment Unit if required). Exposure to body fluids such as blood, stools and urine should be kept to a minimum.

31. Patients with brain inflammation should receive the standard treatment for encephalitis or meningoencephalitis that may include the administration of intravenous sedation, treatment for convulsions and respiratory support.

Protection of Healthcare Professionals

32. All healthcare workers should be provided with information, instruction and training about the risks of exposure to WNV and the precautions to be taken if they are likely to be exposed to the virus.

33. Staff must use good basic hygiene practices including hand washing, and avoid hand-to-mouth contact and contact with other mucous membranes. Exposure to body fluids should be minimised.

34. WNV is readily inactivated by sunlight, heat and desiccation. Boiling or autoclaving will disinfect objects that are soiled by infective or potentially infective secretions or excretions. Where heat cannot be used, detergents or chemical disinfectants should be used.

35. The risk of infection from the body of a person who has died from WNV is considered to be low. The bodies of those known or suspected to be infected with WNV must not be embalmed unless a thorough risk assessment has been carried out and a higher level of precautions can be followed.

Further information

- Confirmation of WNV in people is by laboratory testing by the Health Protection Agency at Porton Down (Tel: 01980 612 100). Further information on diagnostic testing of people can be found on the Health Protection Agency's website at: *www.hpa.org.uk/infections/topics_az/west_nile/menu.htm*
- Confirmation of WNV in birds is by laboratory testing by Veterinary Laboratory Agency (Tel: 01932 357 840). Further information on protocol and forms for testing can be found at: *www.defra.gov.uk/animalh/diseases/surveillance_reports*
- Guidance on veterinary investigation procedures can be found on the Defra website: *www.defra.gov.uk*
- The Chief Medical Officer's Update 29 'Unusual disease diagnosis' (February 2001) can be found at: *www.dh.gov.uk/assetRoot/04/01/36/51/04013651.pdf*
- WNV is a biological agent, subject to the Control of Substances Hazardous to Health (COSHH) Regulations 2002, and is classified as a Hazard Group 3 agent. Further information can be found on the Health and Safety Executive website at: *www.hse.gov.uk*
- Further information on post-mortem examination is given in Health Service Advisory Committee (HSAC) guidance "Safe working and the prevention of infection in the mortuary and post-mortem room". (2003, ISBN: 0-7176-2293-2)
- Further Health and Safety Executive guidance is listed in the bibliography.

3. Public Health Action in Partnership

Key issues:

Public health action will be based upon risk assessment nationally and locally and be taken by health, veterinary and environmental agencies working in partnership.

The public will need to protect themselves against being bitten by mosquitoes.

People over 50 years of age, and particularly those over 70 years old, are most at risk of developing serious disease as a result of infection with WNV.

Working together

36. Partnership working between the public health and veterinary authorities at the national, regional and local levels is essential. The handling of an incident will build upon the existing infrastructure for dealing with any incident of communicable (zoonotic) disease that can affect both animals and people.

37. Mosquito control measures may be needed to reduce/eliminate the vector for WNV. As these may involve the use of pesticides or otherwise impact upon the environment, the involvement of agencies such as the Environment Agency, the Health and Safety Executive and English Nature, as well as local government, will be crucial to assess all the potential risks and consequences of control measures.

National responsibilities

38. The Chief Medical Officer, in dealing with an outbreak of WNV, will convene a central Government team who's essential role is to provide rapid policy advice and guidance to assist those with responsibility for controlling the outbreak locally, and to co-ordinate the national response to any outbreak. The central Government team will be drawn from the Department of Health, the Department for the Environment, Food and Rural Affairs, and the Health Protection Agency.

Local responsibilities

39. The primacy of local statutory responsibility for the control of communicable disease is fully recognised in this plan. Responsibility for protecting public health locally rests with the Directors of Public Health located in the Primary Care Trusts.

40. In practice, the function of leading the local public health response to known or suspected cases of communicable disease, including human WNV infection, will usually be delegated to the local 'Proper Officer', usually the Consultant in Communicable Disease Control located within the Health Protection Agency's Health Protection Units in England and Wales. Local

authorities and Regional Directors of Public Health also have formal responsibilities for ensuring that local arrangements for the control of communicable disease are appropriate and effective.

41. Major incidents and outbreaks of communicable disease are usually managed through the combined efforts of key people with the skills to solve the problem performing as a team. This team, known as an **Incident Control Team**, is usually led by the local Consultant in Communicable Disease Control or the Director of Public Health, and is convened as soon as an outbreak or major incident is known or suspected. It is the task of whoever leads the team to ensure that the team is appropriately constituted to provide all the requisite expertise.

Incident Control Team

42. The Incident Control Team should seek support from the Regional Epidemiologist of the Health Protection Agency and from the Veterinary Laboratory Agency. Representatives from the local authority, the Health and Safety Executive and the State Veterinary Service should also be included within the team. The Incident Control Team will also require the advice of a mosquito control expert and an environmental adviser. The Incident Control Team should consult the Health Protection Agency or Department of Health as to appropriate experts to contact. In view of the importance of good and timely communications, an experienced press officer should be included on the Incident Control Team to co-ordinate information and ensure consistency in health advice to the public.

The key tasks for the Incident Control Team are to:

- **Ensure appropriate patient care**
- **Examine the available evidence and undertake a local health risk assessment**
- **Determine the action needed to control the spread/limit the incidence of the disease**
- **Define the measures needed to control the source of infection**
- **Identify any additional expert assistance that might be required**
- **Allocate personnel and other resources necessary to manage the outbreak**
- **Communicate with the public, press and other organisations, and keep the Department of Health and Defra informed of progress**
- **Monitor the effectiveness of the measures taken**
- **Report upon the handling of the outbreak to the relevant United Kingdom Health Department**

The public's responsibility

43. Experience from outbreaks elsewhere shows that there is low compliance by the public in taking action to avoid mosquito bites.

Key actions that the public can take to protect themselves to minimise the risk of infection with WNV are to:

Avoid being bitten by mosquitoes, particularly at dawn and dusk by:

- **Wearing long-sleeved shirts, socks and long trousers, particularly at dusk and throughout the evening**
- **Sleeping in screened accommodation**
- **Spraying rooms with knock-down insecticide each evening after sundown to eliminate mosquitoes that entered during the day; and**
- **Protecting exposed skin with insect repellent and using nets to protect beds/cots**

Use insect repellent

- **Repellents containing 30% N,N-diethyl-m-toluamide (DEET) or less are recommended**
- **Follow manufacturer's instructions**
- **Take special care when applying repellent to children**

(Background information on the use of insect repellents can be found in the following paragraphs)

Remove domestic breeding sites for mosquitoes

- **Drain water butts, garden troughs and other areas of standing water on the premises**

Travellers to areas where WNV is endemic should especially avoid being bitten by mosquitoes

The use of insect repellents

44. Insect repellents are used to prevent bites from mosquitoes and other biting pests, and may aid in lowering disease transmission from them. DEET is the most effective and best studied insect repellent currently available to the public. DEET is available in the United Kingdom in a variety of formulations and concentrations, including aerosol and pump-spray products intended for application to the skin as well as for treating clothing. Liquid, cream, lotion and stick products are available for direct skin application.

45. Advice on the health aspects of the use of DEET has been provided by the Committee on Toxicity of Foods and Consumer Products and the Environment and also by the Biocides Consultative Committee who have reviewed the toxicity data of DEET-containing products. The Committee on Toxicity concluded that the risk of severe effects due to DEET was considered to be extremely remote.

46. In the context of preventing infection with WNV, current advice is that topically applied DEET at concentrations lower than 30% with applications at the frequency recommended by the manufacturer is the most appropriate strategy to prevent mosquitoes biting. Use of products containing concentrations greater than 30% give no additional protection.

Further information

- Further information on insect repellents can be obtained from:
  www.advisorybodies.doh.gov.uk/cotnonfood/bccdeet.htm

- Health advice for travellers is available from the Department of Health website at:
  www.dh.gov.uk/PolicyAndGuidance/HealthAdviceForTravellers/fs/en
  and the Health Protection Agency website at:
  www.hpa.org.uk/infections/topics_az/west_nile/menu.htm

- Additional information for the public (as it becomes available) will be provided on the Department of Health web-site at:
  www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/WestNile/fs/en

4: Environmental Control

Key Issues:

Action to control mosquitoes will only be taken if a health risk assessment indicates that it is necessary. The environmental impact of any action proposed will be carefully considered.

The Advisory Committee on Pesticides has approved certain pesticides for controlling mosquito populations if there is a need to protect public health from the risk of WNV infection.

Control of mosquito populations

47. If there is an outbreak of WNV infection at a time when mosquitoes are active, measures to control mosquito populations, by either targeting their breeding sites or, more rarely, killing adult mosquitoes, will be considered. The action required will be determined by **health risk assessments** locally and nationally.

48. Factors that should be considered in the risk assessment before deciding on mosquito control measures include:

- the degree of risk that biting mosquitoes pose to people in the area
- the population density of biting mosquitoes in the area
- the extent of WNV activity in local mosquito populations
- whether it is early or late in the mosquito season
- the location of mosquito breeding sites
- the number of people who live nearby
- the extent of local WNV presence in birds, horses, other animals and people

49. Mosquito breeding sites can be targeted by:

- draining temporary non-natural water areas, e.g. water butts, garden troughs and used tyres
- eliminating areas of natural standing water where mosquitoes breed
- using pesticides to kill mosquito larvae (larvicides) and adult mosquitoes (adulticides)

Use of Pesticides

50. The Advisory Committee on Pesticides has approved certain pesticides for controlling mosquito populations if there is a need to protect public health from the risk of WNV infection. Only those pesticides and application methods approved by the Advisory Committee on Pesticides, as being suitable for use to control mosquitoes, shall be used.

51. Following an environmental risk review of approved pesticides that could potentially be used in the event of an outbreak of WNV in the United Kingdom, the Advisory Committee on Pesticides has advised on the most suitable products for use and methods of application.

52. The Advisory Committee on Pesticides recommended extensions to the use of approved *Bacillus thuringiensis var Israelensis* (Bti) larvicides, and three specified adulticides, specifically for use in the event of an outbreak of WNV. In making their recommendations the Advisory Committee on Pesticides had regard to the potential for pesticide resistance. The conditions applied to the extensions of use are set out in **Appendix 1**.

53. The Department of Health is seeking the agreement of the approval holders of the recommended pesticides, and their marketing companies, to supply these products for WNV control purposes. For those that agree, the Registration Authority, which is the Health and Safety Executive's Biocides and Pesticides Unit, will amend relevant approval conditions to give the necessary extensions and conditions to allow for use in WNV control. Specific labels providing the conditions will be readily 'downloadable' in the event of them being needed. The Health and Safety Executive's Biocides and Pesticides Unit is also drafting advisory information for specific use of pesticides against WNV.

Larvicides

54. The advice of the Advisory Committee on Pesticides is that larvicides containing the biological control agent Bti are acceptable with regard to the safety of operators, bystanders and the environment, and should be used in preference to adulticides.

55. Larvicides are preferred because they:

- Control mosquito populations before they become blood-feeding adults
- Can be applied directly to mosquito breeding areas
- Have less environmental impact than adulticides

56. The method of application for larvicides is a course spray onto water. This minimises inhalational exposure.

Adulticides

57. The Advisory Committee on Pesticides also reviewed potential adulticides, and advised that these should only be considered as a last resort when there is an imminent risk of WNV transmission. Furthermore, they advised that adulticides should only be used in accordance with current statutory approvals, and subject to additional special conditions.

58. If an adulticide has to be used, then 'Mostyn DTP15' (HSE 7244) should be used as the preferred product. Two other adulticides, 'Mostyn HCT7' (HSE 6575) and 'Mostyn 8/64 TFC' (HSE 7105), could potentially be used, but only *in extremis*.

59. The method of application for approved adulticides is 'cold fogging', also referred to as 'ultra low volume'. 'Cold fogging' refers to the use of water–based products, and the 'fog' is the fine spray created in use. The Advisory Committee on Pesticides recommended 'cold fogging' be used wherever feasible to avoid exposure to solvents, rather than 'thermal fogging', in which solvent-based products are used.

Further information

- Details of the Advisory Committee on Pesticides' recommendations can be found in the minutes of the relevant meetings on their website:
www.pesticides.gov.uk/acp_home.asp

Action Plan

The risk of WNV spreading to the United Kingdom is considered to be low. It is not impossible however that this could occur. This section contains an action plan to deal with such an eventuality.

The key action areas are:

- **Laboratory diagnosis**
- **Public health action**
- **Surveillance**
- **Environmental control**

Action Area A: Laboratory Diagnosis

- Specimens (serum and/or cerebrospinal fluid) from people for diagnostic testing are to be sent to the Health Protection Agency at Porton Down, the reference laboratory for WNV. Each case should be discussed with staff in the laboratory first, so that appropriate specimens are obtained.
- Results of diagnostic investigations on patient specimens are to be reported back to the clinician and to the Health Protection Agency Communicable Disease Surveillance Centre for notification and surveillance purposes.
- Bird samples are to be submitted to a Veterinary Laboratory Agency laboratory following consultation with the Veterinary Laboratory Agency, Weybridge.
- Submission of samples from horses are to be discussed with the local Animal Health Office.
- Specimens from animals must only be submitted according to Defra veterinary investigation procedures.
- Further information can be found in **Chapter 2**.

Action Area B: Public Health Action

Public health action will be based upon risk assessment nationally and locally and be taken by health, veterinary and environmental agencies working in partnership. Further information can be found in Chapter 3.

Actions at national level

- If a case of United Kingdom-acquired infection is confirmed, the Chief Medical Officer will:
  - Cascade medical advice to clinicians
  - Publish on his website key messages for the public on how to protect themselves
  - Provide advice for the public through NHS Direct and through the media
- The Chief Medical Officer will inform the Chief Veterinary Officer of any confirmed, or strongly suspected, case of United Kingdom-acquired WNV infection in a person.
- If a case of United Kingdom-acquired WNV infection in a person is confirmed, the Chief Medical Officer will convene a central Government team, in consultation with the Chief Veterinary Officer and the Health Protection Agency, to undertake a risk assessment with input of independent expert advice on mosquito control measures, pesticide use and its environmental impact.
- The Chief Veterinary Officer will inform the Chief Medical Officer of any confirmed or strongly suspected case of WNV infection in horses, birds or other animals. If such a case is reported to the Veterinary Laboratory Agency or to the Divisional Veterinary Manager, they should inform Defra, the Department of Health and the Health Protection Agency.
- The Department of Health press office will liaise closely with the press offices of Defra and the Health Protection Agency to ensure accuracy and consistency in the information and advice provided to the public and the media. The Incident Control Team will identify a press lead to co-ordinate the delivery of public information locally working in liaison with the Department of Health Press Office and the Health Protection Agency.
- If a case of United Kingdom-acquired human WNV infection occurs during the season when mosquitoes are active, health officials will issue regular reminders of the basic precautions the public can take to protect themselves. Information should be particularly targeted at people over 50 years and especially those over 70 years, who are most at risk of developing disease from WNV infection.
- In addition to their core central function, the central Government team will also take the following key actions:
  - Alert Ministers, other Government Departments and the Devolved Administrations. Alert Regional Directors of Public Health and Primary Care Trusts if the first indications of a major incident are received nationally

- Liaise with other Government Departments and the Health Protection Agency and other agencies at national level on surveillance and control measures
- Advise local Incident Control Teams on the use of pesticides and control measures
- Co-ordinate press communications between Departments
- Communicate key health control measures to health and veterinary professionals and to the public

Actions at local level

- Primary Care Trusts, Strategic Health Authorities, the Health Protection Agency and local authorities should prepare local contingency arrangements to deal with WNV. Plans should be multi-agency and include details of liaison locally with the State Veterinary Service, the Environment Agency and English Nature.
- Clinicians must notify the relevant Consultant in Communicable Disease Control of any strongly suspected or confirmed case of United Kingdom-acquired human WNV infection, with no relevant history of travel outside the United Kingdom.
- If a case of United Kingdom-acquired WNV infection in a person is notified to the Health Protection Agency, it should inform the Department of Health and the local 'Proper Officer', who is usually the Consultant in Communicable Disease Control.
- The Consultant in Communicable Disease Control must immediately:
  - Inform and liaise with the local Divisional Veterinary Manager, the Health Protection Agency Communicable Disease Surveillance Centre and the local authority environmental health department
  - Form an Incident Control Team. (The Consultant in Communicable Disease Control should also consider forming an Incident Control Team if WNV is isolated from animals or mosquitoes even when clinical disease is not present in people)

Actions by the public

- As WNV has been isolated abroad from day-biting mosquitoes, reducing exposure to bites at any time is a sensible precaution, therefore the public should:
  - Avoid being bitten by mosquitoes, particularly at dawn and dusk
  - Use insect repellent
  - Remove domestic breeding sites for mosquitoes
  - Travellers to areas where WNV is endemic should especially avoid being bitten by mosquitoes

Action Area C: Surveillance

Prospective surveillance will only be undertaken if a risk assessment indicates that it is necessary. Such surveillance will build on that already in place to assess the risks of WNV in the UK (see Chapter 1).

Actions in the event of an United Kingdom-acquired case of WNV infection in a person occurring:

- The Health Protection Agency Communicable Disease Surveillance Centre is responsible for human health surveillance in England and Wales. The Health Protection Agency team at Porton Down is responsible for testing human samples, and the Veterinary Laboratory Agency is responsible for surveillance of, and testing samples from, birds.
- WNV infection will be included in the differential diagnosis of all cases of viral encephalitis in people and horses in order to actively search for further cases.
- There will be annual reminders to clinicians and Regional Epidemiologists to be particularly vigilant for WNV during the months of July to October when cases are most likely to occur.
- Increased passive surveillance of dead birds will take place.
- Active mosquito surveillance (density and distribution) will take place.
- Active surveillance in birds will take place.
- Monitoring of mosquito breeding and biting behaviour in the area where the case occurred will take place.
- Possible active surveillance using sentinel domestic birds (chickens and ducks)

If WNV is detected in horses, birds, other animals or mosquitoes within the United Kingdom in the absence of any disease in people:

- A risk assessment will be undertaken at national level in collaboration with independent expert advisers.

Action Area D: Environmental Control

Action required to control mosquitoes will be determined by health risk assessments both nationally and locally. Further information can be found in Chapter 4.

Actions at national level:

- The Chief Medical Officer's central Government team will liaise with the Advisory Committee on Pesticides on the use of pesticides to control mosquito populations.
- The Environment Agency will provide guidance on the preferred hierarchy of mosquito control measures to minimise adverse effects upon the environment and wildlife.

Actions at local level:

- The local Incident Control Team will consult the Environment Agency, English Nature and wildlife trusts prior to any mosquito source reduction or use of pesticides, as to the potential impact on environmentally important waters (as defined by the Environment Agency) or wildlife sites of special interest. The Incident Control Team will liaise with the central Government team on the use of pesticides.

- Pesticides for the control of mosquitoes should only be used by properly trained personnel and in accordance with a specific health and safety risk assessment of the use of the pesticide in each particular location and circumstance.

- Only those pesticides approved by the Advisory Committee on Pesticides as being suitable for use to control mosquitoes in the event of risk to public health from WNV will be used, and only using the approved application methods. Larvicides containing the biological control agent Bti are the preferred products and the adulticides should only be used as a last resort.

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APPENDIX 1

Advisory Committee on Pesticides: Conditions for the Use of Pesticides as Part of a WNV Control Strategy

The Advisory Committee on Pesticides recommended extensions to the use of approved Bti larvicides, and three specified adulticides, specifically for use in the event of an outbreak of WNV. The conditions applied to the extensions of use are set out below.

1. The use patterns of appropriate Bti-containing larvicidal products may be extended to include all appropriate larval habitats necessary for control of mosquito larvae, but only for the purposes of a proposed strategy to control WNV.

2. The use of adulticides should be considered as a last resort in the proposed WNV control strategy, and that 'Mostyn DTP 15' (HSE 7244) should be considered the preferred product if their use becomes necessary. Other identified adulticide products (as identified in recommendations 3 and 4) may be utilised *in extremis*. Use of 'Mostyn DTP 15' in the proposed WNV control strategy is subject to the conditions set out in recommendation 5.

3. The conditions of approval for 'Mostyn HCT 7' (HSE 6575) may be extended to include outdoor use in all areas proposed by DH, but only for the purposes of a proposed strategy to control WNV, and subject to the conditions set out in recommendation 5.

4. The conditions of approval for 'Mostyn 8/64 TFC' (HSE 7105) may be extended to include use outdoors by ULV, but only for the purposes of a proposed strategy to control WNV, and subject to the conditions set out in recommendation 5.

5. The following conditions apply to any adulticide product used for the purposes of a proposed strategy to control WNV:

   i) Training of pest control operators in WNV mosquito control, including use of ultra low volume (ULV) and fogging equipment. Normal training providers should be utilised.

   ii) A safe system of work including the use of suitable respiratory protective equipment (RPE) by operators and the exclusion of members of the public, other bystanders, domesticated animals and non-target wildlife (in so far as is reasonably practicable) from the area under treatment. This should be developed at an appropriate level within the organisation responsible for carrying out a treatment.

   iii) Records should be kept of the calibration of ULV applicators, so as to demonstrate that machines have been set up and maintained properly, to ensure in so far as is practicable, that suitable droplet spectra are sustained.

iv) A buffer zone of up to 300 m (appropriate buffer zone to be indicated on the product label) should be employed with respect to water that cannot be protected by a physical barrier (such as a tarpaulin), and to apiaries and sensitive arthropod sites. This buffer zone can be reduced to 200 m when 'Mostyn DPT15' is used.

v) Applications should be restricted to around dusk, when mosquitoes are active and foraging bees are no longer present.

vi) Stable atmospheric conditions should be present (low wind speed (< 6 km h-1), wind direction should be taken into account where possible to avoid application upwind of sensitive sites (taking buffer into account) and no application during rain or intermittent showers).

vii) The relevant approval holders should add clarification to the product labels to indicate that dilution with water for the purposes of ULV application nullifies the label phrase 'Avoid all contact with plant life'.

6. Extension to the approval conditions for 'Deltamost SC' (HSE 6653) to enable its use in a proposed strategy to control WNV cannot be granted at this time, given the absence of outdoor space spray (ULV or fogging) application rates.

7. That extension to the approval conditions for 'Alphamost SC' (HSE 7272), to allow widespread outdoor use, and thus enable its use in a proposed strategy to control WNV, is unacceptable.

8. The Environment Agency should consider the relative environmental importance of potential sites that may be subject to mosquito source reduction and advise the Department of Health of the hierarchy developed, for inclusion in the Department of Health's proposed strategy to control WNV (e.g. there will be far less concern about draining a water butt compared to a water body within a SSSI).

9. In advance of any mosquito source reduction involving environmentally-important water bodies (including ponds, lakes, wetlands, marshlands, pools, ditches and vernal water bodies) consent must be gained from the appropriate regulatory body. Clearly defined contact points should be provided in the Department of Health's guidance concerning the proposed strategy for control of WNV.

10. In addition, according to county plans, local authorities should consider potential impacts on their county wildlife sites and seek advice from wildlife trusts where required, bearing in mind their duties to consider protected species (e.g. great crested newts etc.), which may occur outside of statutory sites and county wildlife sites.

11. In the overall proposed strategy to control WNV, mosquito source reduction measures should be considered as preferable to chemical control. Where chemical control becomes necessary, larvicides should be used wherever possible. Adulticides should only be used as a last resort.

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