



# Rabies: Guidance on Prophylaxis and Management in Humans in Scotland

Health Protection Network  
Scottish Guidance

July 2013



**The Health Protection Network (HPN)** is a network of existing professional organisations and networks in the health protection community across Scotland. It aims to promote, sustain, and coordinate good practice. The HPN supports a systematic approach to development, appraisal and adaptation of guidelines, seeking excellence in health protection practice.

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### **All other proposals for reproduction of large extracts should be addressed to:**

Health Protection Network  
Health Protection Scotland  
Meridian Court  
5 Cadogan Street  
Glasgow G2 7HF

Tel: +44 (0) 141 300 1100

Email: [nss.hpsenquiries@nhs.net](mailto:nss.hpsenquiries@nhs.net)

### **Designed and typeset by:**

Graphics Team, Health Protection Scotland

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## Foreword

On behalf of the Alliance for Rabies Control, I would like to extend our sincere congratulations to the members of the Rabies Guidance Development Group and Health Protection Scotland for publishing these important and life-saving guidelines to help protect individuals that are at risk of exposure to rabies. As mentioned in this document, rabies is a disease that continues to take the lives of between 50 000 to 70 000 people every year. Clearly, none of these victims should have died because the rabies vaccines that are produced and available today are among the most, if not the most, efficacious vaccines ever developed. In fact, there have been only a very few reported true 'treatment failures', wherein a patient exposed to rabies that subsequently received the correct World Health Organisation (WHO) recommended post-exposure prophylaxis regimen in a timely manner still succumbed to rabies. Thus, one can logically ask the question, 'If the current rabies vaccines and biologicals are so effective, why do people still die of rabies?' One of the main reasons for this tragic circumstance is because there is a lack of educational awareness about how to prevent rabies both in the general public and also amongst health care professionals. Therefore, these guidelines are critically important and timely for health care professionals treating patients that may be at risk of contracting the most deadly disease known to mankind.

While post-exposure prophylaxis is the only means to prevent rabies after an exposure to rabies has occurred, the value of administering pre-exposure rabies vaccination to a person or persons living or working in high risk environments is all too often overlooked. The rabies vaccines currently recommended by WHO for pre-exposure vaccination are safe and have long been used by persons living or working at continuous or frequent risk of exposure, for example rabies researchers and veterinarians working in regions where rabies is endemic. The option of administering pre-exposure vaccination should be carefully considered for persons whose vocation or travel plans will put them at potential risk of exposure. Although the majority of rabies victims died after being exposed to an infected animal in a developing country in Asia or Africa, the risk of contracting rabies in industrialised countries cannot be overlooked, and the role that bats play as vectors of the disease. Due to the extremely high case fatality rate of rabies, every evaluation by a health care professional regarding whether a patient should receive either pre- or post-exposure prophylaxis must be considered to be a life or death decision for the patient in question. These updated guidelines are therefore critically important for all health care professionals living in Scotland. They should be reviewed and become part of the reference material for all health care professionals consulting with patients that may have been exposed or have the potential to be exposed to rabies in the future.

The Alliance for Rabies Control commends the Rabies Guidance Development Group for all of their hard work during the preparation of these guidelines and looks forward to a time when human rabies cases no longer occur anywhere in the world.

A handwritten signature in black ink that reads "Deborah J Briggs." The signature is written in a cursive style with a large initial 'D'.

**Dr Deborah J Briggs,**

Executive Director,  
Alliance for Rabies Control (<http://www.rabiescontrol.net>)  
WHO Expert Consultation on Rabies

*December 2010*

## Acknowledgements

Health Protection Scotland wish to express their appreciation to everyone whose efforts made this guidance possible. In particular to the members of the Guidance Development Group, HPS Graphics, stakeholders, and external reviewers who contributed to and reviewed the content of this guidance.

## Abbreviations

<b>BCT</b>	Bat Conservation Trust
<b>BLV</b>	Bat Lyssavirus
<b>CMO</b>	Chief Medical Officer
<b>CPHM</b>	Consultant in Public Health Medicine
<b>EBLV</b>	European Bat Lyssavirus
<b>EH</b>	Environmental Health
<b>EHO</b>	Environmental Health Officer
<b>GP</b>	General Practitioner
<b>HDCV</b>	Human Diploid Cell Vaccine
<b>HPNS</b>	Health Protection Nurse Specialist
<b>HPS</b>	Health Protection Scotland
<b>HRIG</b>	Human Rabies Immune Globulin
<b>HPA</b>	Health Protection Agency
<b>HPN</b>	Health Protection Network
<b>HPU</b>	Health Protection Unit
<b>ID</b>	Infectious disease
<b>i.d.</b>	Intradermal
<b>i.m.</b>	Intramuscular
<b>MHRA</b>	Medicines and Healthcare Regulatory Authority
<b>NHS</b>	National Health Service
<b>PCEC</b>	Purified Chick Embryo Cell (PCEC) rabies vaccine
<b>PrEP</b>	Pre-exposure prophylaxis
<b>PEP</b>	Post-exposure prophylaxis
<b>PRPE</b>	Potentially Rabies Prone Exposure
<b>RVNA</b>	Rabies Virus Neutralising Antibody
<b>SGHD</b>	Scottish Government Health Directorate
<b>SFE</b>	Statement of Financial Entitlements
<b>SNBTS</b>	Scottish National Blood Transfusion Service
<b>SNH</b>	Scottish Natural Heritage
<b>WHO</b>	World Health Organization



# 1. About this document and the guidance development process

This guidance is the outcome of the review process undertaken throughout 2012/2013 to update the Health Protection Network (HPN) 2010 *Rabies: Guidance on Prophylaxis and Management in Humans in Scotland*. Some recommendations have changed since 2010, in the light of new evidence and expert consensus.

This guidance represents the view of a multidisciplinary group, a Guideline Review Group (GRG) convened by the HPN in Scotland for this purpose in 2012, and working together for the course of one year.

## Aim and scope of the guidance

This document aims to provide updated user-friendly, evidence-based and expert opinion recommendations on immunisation against rabies, both before and after a potentially rabies prone exposure, including:

- who should receive pre-exposure prophylaxis (PrEP);
- what PrEP should consist of, including primary course and boosters;
- who should receive post-exposure prophylaxis (PEP);
- what PEP should consist of, including active and passive immunisation; and
- the administrative and financial arrangements.

The guidance does not provide advice on the clinical management of cases, or of the handling of animals, except where the latter affects the management of potential human exposure.

## Who is the guidance intended for?

This guidance is relevant to all healthcare professionals who come into contact with patients with rabies or suspected of having rabies and it is therefore expected that the guidance will be of value to:

- General Practitioners (GPs)
- Front-line Hospital staff
- Infectious Disease (ID) Physicians and Microbiologists
- Travel Health Medicine Practitioners
- Consultants in Public Health Medicine (CPHM)
- Health Protection Scotland Consultants
- Health Protection Nurses
- Occupational Health Practitioners
- Animal Health Veterinary Laboratory Agency and other Government bodies.

It may also be of interest to those with repeated potential exposure to potentially rabid animals through paid or voluntary work, and to their employers or charitable bodies.

## Development Process

The development of this guidance was based upon the method outlined by the HPN - <http://www.hps.scot.nhs.uk/about/guidancedevelopment.aspx> - in the light of current reviews of the SIGN 50, NICE Guidelines manual and the ECDC methodologies. A team of health professionals and technical experts known as the Guidance Review Group (GRG) – membership in Appendix 1 – followed the systematic framework referred to above.<sup>1</sup>

Recommendations given in this guideline resulted after careful review and consideration of the evidence available and principles of best practice. The evidence base for this guideline was synthesised from that collated using an explicit search strategy devised by the GDG to identify relevant guidelines from English speaking countries, only supplemented by supporting literature to cover identified evidence gaps. The search covered MEDLINE, EMBASE, CINAHL and various public health databases, meta-search engines, and internet, from 1990 to August 2010. The evidence base was updated during the course of development of the guideline, and the search was supplemented by reviewing references and key guidelines identified from WHO, CDC, the European Union, and from personal databases of the guideline development group members. Further details on the search strategy can be requested from HPS – contact found through the HPN website <http://www.hps.scot.nhs.uk/about/contactus.aspx>.

The GDG appraised selected guidance documents with the AGREE instrument and supporting literature using basic appraisal principles. The GDG found that the conventional grading systems available do not correspond to the range of literature and evidence supporting this document. As a result of this, it was unanimously decided not to grade the recommendations given in the guideline. Reference to supportive evidence has been given, though, where relevant literature was found.

## Professional judgement and compliance to the guidance

Professionals involved in the investigation and management of rabies in humans in Scotland are expected to take this guidance fully into account when exercising their professional judgment. The guidance does not, however, override the individual responsibility of professionals to make decisions appropriate to the circumstances of the individual incidents and cases, in consultation with partner agencies and stakeholders.

Implementation of this guidance is the responsibility of the health protection community across Scotland. Professionals are reminded that it is their responsibility to implement the guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should therefore be interpreted in a way which would be inconsistent with compliance with those duties.

## Changes in this edition

This guidance, was revised in 2013 and updates:

- Changes to the Pets Travel Scheme
- New table on pre-exposure prophylaxis for travellers
- Changes to arrangements for supply of HRIG
- New link to the updated Green Book Chapter on rabies.

## Comments on the published guidance

Comments on this guidance should be sent to the HPN Steering Group via its national coordinator or administration, submitting the form available at the <http://www.hps.scot.nhs.uk/about/guidancedevelopment.aspx> or in Appendix 3: HPN guideline feedback form on page 28, to the following email address [NSS.HPN@nhs.net](mailto:NSS.HPN@nhs.net).

Sometimes a comment after publication may highlight a potential error in guidance. This might be in either the interpretation or the presentation of the evidence considered by the GDG/TEG. In these cases the Chair of the Health Protection Network and the advisors they approach will consider whether the potential error:

- may result in harm to patients / the population;
- undermines the conclusions on which the recommendations were based;
- indicates serious problems with our quality-assurance procedures.

If one of these criteria is met, the comment will be referred to the HPN Guidance Executive, which decides what action to take. If the Guidance Executive does not accept that an error has been made, the individual or organisation that made the comment will be notified. If the Guidance Executive accepts that an error has been made, a note will be put on our website, and the versions of the document on the website will be amended. Depending on the nature and significance of the error and the time since publication, registered stakeholders may also be notified in writing.

Comments or new evidence that are not an error but should be considered at the time when review of the document is due, will be collated and taken into consideration in due course.

## Review and update

This guidance should be reviewed in 3 years (June 2016) or sooner if new evidence becomes available. It is envisaged that the HPN will oversee this process.

## 2. Introduction to Rabies in Humans

### 2.1 Background and Risks

Rabies is an acute viral infection that is almost universally fatal in people without PrEP or PEP. Transmission is usually through contact with saliva via the bite of an infected animal, or through broken skin, or mucous membrane.

Dogs are the main transmitter of rabies virus to humans worldwide. Less commonly rabies can be caused by other *Lyssaviruses* including European bat *Lyssaviruses* (EBLV) and Australian bat *Lyssavirus* (ABLV). In Scotland most requests for advice follow potential exposure to bats.

The World Health Organization (WHO) has estimated the annual reported number of human rabies deaths globally to be at least 55 000. Most deaths occur in developing countries, particularly in Africa and South East Asia.<sup>1</sup> Visitors, workers in, and travellers to, these areas are at particular risk.

Indigenously acquired rabies is exceptionally rare in the UK. The first, and to date only, death in 100 years from UK acquired rabies occurred in a bat-worker in Scotland in 2002.<sup>2</sup>

European bat *Lyssavirus* type 2 (EBLV-2) is now known to be enzootic in Daubenton's bats (*Myotis daubentonii*) in the UK, albeit at low but fluctuating levels and the occasional presence of the virus in other species cannot be ruled out. In 2008, 3% of Daubenton's bats tested in Scotland were positive for antibodies to EBLV-2.<sup>3</sup> In Scotland two Daubenton's bats have been identified as positive: one in 2008 where viral genetic material was amplified from a saliva swab from a live bat as part of the Scottish Natural Heritage (SNH) active surveillance,<sup>3</sup> and one in 2009 where virus was isolated from a bat carcass as a result of passive surveillance undertaken by the Veterinary Laboratories Agency.<sup>4</sup>

The number of people experiencing 'potentially rabies prone exposures' (PRPE) and requiring PEP includes not only those exposed to potentially rabid animals abroad, or in the UK as a result of their occupation, but members of the public, volunteers, and professionals with potentially rabies prone exposures to indigenous bats. As well as receiving PrEP, it is vital that people who frequently handle bats wear appropriate personal protection.

The incubation period for rabies depends upon the size of the inoculum and the distance of the inoculum from the victim's central nervous system. The incubation period has been reported to be as short as a few days, and as long as a few years.<sup>5</sup>

## 2.2 Changes to PETS Travel Scheme Rules as of 1 January 2012

The Pet Travel Scheme is the system that allows pet dogs, cats and ferrets to enter the UK without quarantine as long as they meet the legislation.

The UK does not allow dogs, cats and ferrets that have not been vaccinated against rabies to enter the UK.

In order to harmonise with European regulations for travel with animals within the EU, the UK PETS travel scheme rules (<http://www.defra.gov.uk/wildlife-pets/pets/travel/pets/>) were modified effective from 1 January 2012. Under the new regulations, there is no longer a requirement to demonstrate an antibody response in an animal once it has completed a full vaccination course before that animal can travel to and from the UK.

The estimated increased risk of introduction of classical rabies into the country in an animal compliant with new legislation is negligibly small.

These changes to the PETS Travel Scheme are not an indication for pre-vaccination of veterinarians in the UK against rabies. It does reinforce the need to conduct a thorough risk assessment in the event of a bite or scratch from an animal recently imported from an EU country where terrestrial rabies is still being reported; even if that animal has been appropriately vaccinated. The likelihood of a vaccinated animal being able to transmit rabies is remote, however the risk assessment needs to take into account the animals behaviour, whether healthy or unwell, or showing evidence of neurological disease

## 3. Pre-exposure Prophylaxis

### 3.1 Primary Course

#### 3.1.1 Indications

PrEP is indicated for people with:

- continuous exposure:
  - laboratory workers who routinely handle rabies virus material.
- frequent exposure:
  - those who, in the course of their work, regularly handle imported animals and bats e.g.:
    - at animal quarantine centres
    - at zoos
    - at animal research and acclimatisation centres
    - at ports
    - carrying agents authorised to carry imported animals
    - veterinary and technical staff of Animal Health
    - certain inspectors appointed by Local Authorities (LA) under the Animal Health Act.1981 (but not dog wardens for whom the risk of exposure is low and for whom prompt PEPI is likely to be more appropriate)
  - those who frequently handle bats in the UK
  - those who live in or visit enzootic areas who by the nature of their activity are at special risk of contact with rabid animals (e.g. animal sanctuary volunteers, trappers, veterinary staff or zoologists)
  - health workers who are likely to come into close contact with a patient with rabies.

PrEP should also be considered for people with:

- infrequent exposure:
  - travellers and workers who plan to visit an enzootic area especially
    - those without access to prompt medical advice, rabies vaccine and immunoglobulin. (Advice is available for health professionals from TRAVAX (<http://www.travax.nhs.uk>) and the general public from Fitfortravel (<http://www.fitfortravel.nhs.uk>)
    - those who may be exposed to rabies because of their travel activities (e.g. cycling, running)
    - children, who may be at particularly high-risk because they lack awareness of the need to avoid animals or to report an animal bite.
    - PrEP is not indicated for members of the general UK population not described above, for example people with occasional potential exposure to indigenous bats.

Please see Table 1: Preexposure prophylaxis for travellers on page 8

### 3.1.2 Dosage and Schedule

A primary course of vaccination consists of:

- Three doses of 1.0ml rabies vaccine given intramuscularly (i.m.) into the deltoid muscle (or anterolateral thigh in infants) on days 0, 7 and 28, in all age groups
- Alternatively the third dose can be given from day 21 if time is short.

Rabies vaccines currently licensed in the UK:

- Human Diploid Cell Vaccine (HDCV). (Rabies Vaccine BP® - Sanofi Pasteur MSD)
- Purified Chick Embryo Cell (PCEC) Rabies Vaccine. (Rabipur® - Chiron/Novartis)

These vaccines may be used interchangeably for primary courses, boosters, and PEP.

Whilst intramuscular administration of rabies vaccine is preferred, using the intradermal route has also been shown to work if vaccine is administered by a suitably qualified individual who is familiar with the technique. Giving rabies vaccine intradermally is not covered by the manufacturers product licence but would be on the prescribers' own responsibility. Further details on consideration for use of the intradermal route can be found in the Green Book Chapter 27 [7].

TABLE 1: Preexposure prophylaxis for travellers

Risk of rabies according to geographical location <sup>1,2</sup>	Definition	Who to consider vaccinating
High risk <sup>3</sup>	Where rabies is widespread and HRIG or modern cell-culture rabies vaccines may not always be readily available. Consider vaccinating:	<ul style="list-style-type: none"> <li>• Those who may not be able to access promptly (&lt;24 hours) a major medical centre for advice, rabies vaccine and HRIG.</li> <li>• Those travelling for extended periods (&gt;1 month).</li> <li>• Those at higher risk of contact with animals and bats, including cave explorers, cyclists/runners, zoologists, botanists, volunteers in animal sanctuaries and veterinary surgeons.</li> <li>• Those working or living in remote areas.</li> <li>• Children, who may lack awareness of the need to avoid animals or to report an animal bite.</li> </ul>
Low risk <sup>3</sup>	Where there is a low risk of rabies in terrestrial animals, but bat rabies maybe present. Consider vaccinating:	<ul style="list-style-type: none"> <li>• Those undertaking remote travel and who are likely to come into regular contact with animals, particularly wild animals.</li> <li>• Individuals who will regularly handle, or have contact with, <b>imported</b> animals (e.g. working at quarantine centres and ports).</li> <li>• Those frequently handling bats.</li> <li>• Cave explorers.</li> <li>• Laboratory workers handling rabies virus material.</li> <li>• Health workers who are likely to come into close contact with a patient with rabies.</li> </ul>
No risk <sup>3</sup>	Where there is no risk of rabies in terrestrial animals, but bat rabies maybe present. Travellers at very low risk of disease. Consider vaccinating:	<ul style="list-style-type: none"> <li>• Cave explorers.</li> <li>• Those frequently handling bats.</li> <li>• Individuals who will regularly handle, or have contact with, <b>imported</b> animals (e.g. working at quarantine centres and ports).</li> <li>• Laboratory workers handling rabies virus material.</li> <li>• Health workers who are likely to come into close contact with a patient with rabies.</li> </ul>

1. List of high, low and no risk countries <http://www.hps.scot.nhs.uk/giz/publicationsdetail.aspx?id=46633>

2. Travax website <http://www.travax.nhs.uk/>

3. Please see <http://www.travax.nhs.uk/diseases/vaccine-preventable/rabies/rabies-risk-classification.aspx>



## 3.2 Boosters: indications, dosage, and schedule

### Boosters should be considered for people with:

- continuous exposure, who should have their antibody titre checked every six months and receive a booster if their antibody titre falls below an acceptable level. Laboratories have their own standards for what constitutes an acceptable level for protection against continuous exposure (usually 0.5IU/ml)<sup>6</sup>
- frequent exposure, who should receive a single booster 12 months after their primary course. In line with current evidence, they should ideally have their antibody titre checked every 3-5 years and receive a booster if antibody titre is below the acceptable level of 0.5 IU/ml.<sup>6,7</sup> In the absence of testing boosters should be administered every 3-5 years.

### Boosters are not routinely required for people with:

- infrequent exposure, who do not require routine boosting or serologic testing after their primary course<sup>i</sup>

Most people who receive a three dose i.m. course of cell-cultured rabies vaccine will still have detectable neutralising antibody many years later, without any boosting.<sup>8,9</sup>

Measuring Rabies Virus Neutralising Antibody (RVNA) titres when indicated will allow an accurate determination that there has been an adequate immune response, and prevent unnecessary boosting which can in some incidents lead to clinical problems.<sup>10,11</sup>

If the primary course was administered to any other schedule or using a product of doubtful potency, advice on boosters should be sought from Health Protection Scotland (HPS).

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i Guidance in England, Wales and Northern Ireland currently states that while routine boosting is not recommended, a booster dose can be considered at 10 years post-primary course if travelling again to a high risk area.<sup>7</sup>

## 3.3 Administrative arrangements

### 3.3.1 Entitlement to PrEP

The Chief Medical Officer's (CMO) letter of November 2002 (SEHD/CMO(2002)11) stated:

'Pre-exposure immunisation with human diploid rabies vaccine should be offered and is available free from the NHS, to a number of groups of people listed in the Health Departments' 1996 Immunisation Against Infectious Disease, section 27.3 and 27.4, including licensed bat handlers. In addition Health Departments now recommend that those regularly handling bats, not just licensed bat handlers, should be immunised against rabies'.<sup>ii</sup>

### 3.3.2 Charging for PrEP

The National Immunisation Policy – Immunisation against infectious disease 2006 - The Green Book<sup>7</sup> (updated 28 November 2012) – notes that bat workers should not be charged for vaccinations. The Scottish Government policy is clear that bat workers should not be charged for vaccination. For these individuals, and where there is an identified employer, the employer should cover the cost of vaccination. Where there is no identified employer, the individual may approach their GP practice for vaccination, who should provide it free of charge.

The Statement of Financial Entitlements (SFE)<sup>12</sup> in its present form clearly says that vaccinations against rabies (for certain groups, but not including travellers) are included in 'Additional Services'. Remuneration is paid to the GP by the Health Board through the global sum and so there should be no charge to the patient.

Annex J of the SFE states the eligibility for vaccination of the following groups at special risk (Names of the organisations and posts asterisked \* have been updated for the purpose of this guidance):

1. at kennels and catteries approved by DEFRA\* for the quarantine of imported dogs, cats, etc
2. at quarantine premises in zoological establishments
3. by carrying agents authorised to carry imported dogs, cats, etc
4. at approved research and acclimatisation centres where primates and other imported mammals are housed
5. in laboratories handling rabies virus
6. at seaports and airports where they are likely to come into contact with imported animals or animals on ships or aircraft, eg HM Revenue and Customs\* and police officers

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ii [http://www.sehd.scot.nhs.uk/cmo/CMO\(2002\)11.pdf](http://www.sehd.scot.nhs.uk/cmo/CMO(2002)11.pdf)

7. as veterinary and technical staff of DEFRA staff employed by the Animal Health Veterinary Laboratory Agency\*
8. as inspectors appointed by Local Authorities under the Diseases of Animals Act or employed otherwise who, by reason of their employment, encounter enhanced risk
9. those who regularly handle bats, including on a voluntary basis and where an area is declared to be rabies-infected by the Scottish Government
10. persons directly involved in control measures carried out under the direction of the Consultant in Public Health Medicine\* (Communicable Disease and Environmental Health) together with veterinary surgeons engaged in private practice within the infected area and their ancillary staff.

Any person, of whatever age, who is in one of the categories specified in Annex J is entitled to receive rabies vaccination free of charge either from their employer or from their GP practice.

The SFE does not stop employers with occupational health services vaccinating their staff for any condition, including seasonal flu and rabies. If these individuals are vaccinated by an occupational health service or privately the immunisation including vaccine costs will rest with the employer or the individual.

If vaccinated by the GP practice the patient may have to pay a prescription charge if they are required to do so normally.

GPs are free to charge travellers and those patients not on their list, for private prescriptions and private vaccinations.

### **3.3.3 Procurement of vaccine**

The CMO letter of November 2002 (SEHD/CMO(2002)11) stated:

'GPs should order vaccine through stock order scheme or write prescriptions for individuals in the usual way.'

GPs should prescribe the vaccine, according to its license, on the GP 10 for patients who are entitled to free PrEP. This would incur prescription charges where appropriate. In these circumstances the cost of the vaccine will come from the prescribing budget. For those not eligible for free vaccination, GPs should use a private prescription. Stock order scheme can be used to order rabies vaccine for active PEP.

### 3.3.4 Charging for titres

People in the continuous or frequent exposure group, and who fall under one of the categories specified in Annex J [12] are entitled to have their RVNA titres checked free of charge. They should request this service from their employer, or in cases where there is no clear employer, through their GP practice.

For titres accessed through an occupational health service or privately, the cost will rest with the employer or the individual. In General Practice, the cost of testing is provided under general NHS reference laboratory services and samples should be sent to the local NHS lab for onward transmission. Laboratories in the UK who undertake private testing are:

**Biobest Laboratories Ltd**

Charles Darwin House,  
The Edinburgh Technopole,  
Milton Bridge,  
Nr Penicuik,  
EH26 0PY

**Tel:** 0131 440 2628

**Website:** <http://www.biobest.co.uk/>

**VLA Weybridge**

The Sample Reception Area,  
Veterinary Laboratories Agency,  
New Haw,  
Addleston,  
Surrey,  
KT15 3NB

**Tel:** 01932 357345/335

**Website:** <http://www.vla.defra.gov.uk/>

## 4. Post-exposure Risk Assessment and Management

### 4.1 Risk Assessment

#### 4.1.1 Principles

Anyone who presents to any non-medical person or organisation (for example the Bat Conservation Trust (BCT)) worried that they might have had a 'potentially rabies prone exposure' (PRPE) should be very strongly advised to seek medical advice to allow a prompt risk assessment to be carried out.

People with a PRPE usually present to primary care (GP or practice nurse) or A&E (front-line hospital staff). Unless the health professional is confident about being able to perform a full, expert risk assessment, the person should be referred to their local Infectious Disease (ID) department for management. A list of the regional Infectious Disease Units in Scotland is included in Appendix 2: Contact details on page 27.

The risk assessment is based upon:

- the likelihood of the animal carrying rabies, which depends upon its:
  - species
  - behaviour
  - origin
  - state of health or laboratory results
  - vaccination status.
- the likelihood of the exposure allowing transmission of rabies virus, which depends upon the likelihood of saliva or neural tissue coming in contact with:
  - a breach in the patient's skin, or
  - the patient's mucous membranes.
- the person's vaccination status:
  - fully vaccinated, if they have:
    - had a well documented appropriate course of PrEP or PEP
    - had a previously documented rabies antibody titre of at least 0.5IU/ml.
  - not fully vaccinated, if they have:
    - never received PrEP or PEP
    - had incomplete/inadequate PrEP.

If in doubt, patients should be managed as not fully vaccinated. Individuals who are immunosuppressed or have HIV, may require different PEP management and specialist advice should be sought in that event.

This guidance addresses the risk assessment of PRPE to bats in the UK or abroad, and to terrestrial mammals abroad separately.

## 4.1.2 Bats

The species of bat does not affect the decision on whether to administer PEP. Although only Daubenton's bats have been identified with EBLV in the UK, it is possible that any species of bat may be infected. While smaller bats with smaller teeth are less likely to inflict wounds, any bat may do so.

Even though infected bats are more likely to behave abnormally, the bat's state of health does not affect the decision on whether to administer PEP. *Lyssavirus* infected bats can be apparently healthy. Any bat that is active by day, or is found in a place where bats are not usually seen – for example in an inhabited room or on an open lawn, or is unable to fly, is more likely to be rabid than an apparently healthy bat. Such bats are more easily approached. It is unusual for a member of the public to have a PRPE to a healthy bat. If the bat has died, laboratory investigation may confirm rabies infection. Bats are a protected species and cannot be destroyed to determine rabies status.

Bats may carry *Lyssavirus* anywhere in the world (with the exception of New Zealand). The part of the world where the PRPE occurred does not therefore affect the decision on whether to give PEP. Contact with bats, their saliva or neural tissue constitutes a PRPE even in countries which are free of classical rabies. In the UK, bats are the only wild animal reservoir of *Lyssavirus*.

The nature of the exposure is critical to the risk assessment and the outcome of PEP. Was there a possibility of contact between the bat's saliva or neural tissue and the patient's skin or mucous membrane? What was the exact nature of the contact?

### 4.1.2.1 Categories of PRPE with bats (Figure 1)

There are three categories of PRPE with bats:

- I No significant risk:** This would occur if it is certain that there has been no direct physical contact with the bat's saliva or neural tissue, or if the person was protected by a barrier capable of preventing such contact, such as a boot, shoe, or appropriate protective clothing. Contact with bat droppings, blood and urine do not constitute a risk<sup>13, 14</sup> although the use of appropriate personal preventive measures should be emphasised in such settings.
- II Low-risk:** Where there has been no observed direct physical contact, but it is likely to have occurred, for example a bat found in room of sleeping person.
- III High-risk:** Single or multiple trans-dermal bites or scratches & bruising. Minor bites without breaking of the skin (covered areas of arms, trunk, and legs). Major bites (multiple or on face, head, finger or neck). Contamination of mucous membrane with saliva or neural tissue.

### 4.1.3 Terrestrial animals in enzootic countries or regions

#### a) What is the likelihood of the animal carrying rabies?

- What animal was it, and how was it behaving?

The main risk comes from wild carnivores, and stray companion dogs and cats. All carnivores shedding rabies virus through their saliva are most likely to be in the terminal phase of illness, and therefore are likely to be behaving abnormally, although apparently normal behaviour is not a guarantee of insignificant risk.

Although the risks from herbivores such as cattle, horses, deer, rodents and primates are much lower than wild animals, cats and dogs, they can transmit the virus, and exposures to them may constitute a risk.

- Is the animal's state of health known? If so, what is it? If not, can it be ascertained?

PEP should be commenced as soon as possible if indicated after PRPE but if 15 days have elapsed since the PRPE to a cat or dog which remains well and is behaving normally (i.e. does not have clinical rabies), PEP can be abandoned. The animal's vaccination status may suggest rabies infection is unlikely but cannot be completely relied on.

- Was the animal indigenous to the country, or imported?

This information is important in interpreting whether it was from a country or region that is free of terrestrial rabies or where rabies is enzootic (see below).

- Was the country or region at high-risk, low-risk, or no risk of classical rabies?

A country may be considered at negligible risk of classical rabies when all the following apply:

- rabies in animals is notifiable
- an effective system of disease surveillance in animals is in operation
- all regulatory measures for the prevention and control of rabies in animals have been implemented including effective importation procedures
- no case of indigenously acquired classical rabies infection has been confirmed in man or any animal species during the previous two years according to the Office International des Epizooties definition of a rabies free country. (This status would not be affected by the isolation of a BLV such as EBLV-1 or EBLV-2.)
- no imported case in carnivores has been confirmed outside a quarantine station for the previous six months.

The management algorithm (Figure 1 on page 17) uses the geographical classifications of 'no risk,' 'low-risk,' and 'high-risk' to inform decisions on the need for Human Rabies Immune Globulin (HRIG) and/or vaccine. The latest country classification is listed on the HPS website <http://www.hps.scot.nhs.uk/giz/publicationsdetail.aspx?id=46633> and on Travax (<http://www.travax.nhs.uk>). Travax also gives additional regional detail, case numbers and outbreak information.

## b) How likely is the exposure to be rabies prone?

- Was there contact between the animal's saliva and the patient's broken skin or mucous membrane? What was the exact nature of the contact?

### 4.1.3.1 Categories of PRPE with terrestrial animals (Figure 2)

There are three categories of PRPE with terrestrial animals:

- I **No significant risk:** Touching or stroking an animal with no realistic possibility of transdermal transfer of the animal's saliva.
- II **Low-risk:** Licks of the skin or other contact with saliva (e.g. feeding animals), minor scratches, bruising or abrasions without bleeding, minor bites without breaking of the skin (covered areas of arms, trunk, and legs). All bites, licks and scratches from herbivores, rodents, and primates.
- III **High-risk:** Single or multiple transdermal bites or scratches, licks on broken skin, major bites (multiple or on face, head, finger or neck).  
Contamination of mucous membrane with saliva (i.e. licks).

## 4.2 Management

### 4.2.1 Principles

Post-exposure management usually consists of immediate wound care (if there is a wound) and risk assessment for appropriate PEP. PEP comprises active immunisation with rabies vaccine, with or without passive immunisation with Human Rabies Immune Globulin (HRIG).

The more severe the wound, the closer the wound to the brain and the longer the time period between exposure and presentation, the more urgent the need for prompt management, as, once a person shows symptoms of infection the outcome is almost invariably fatal.

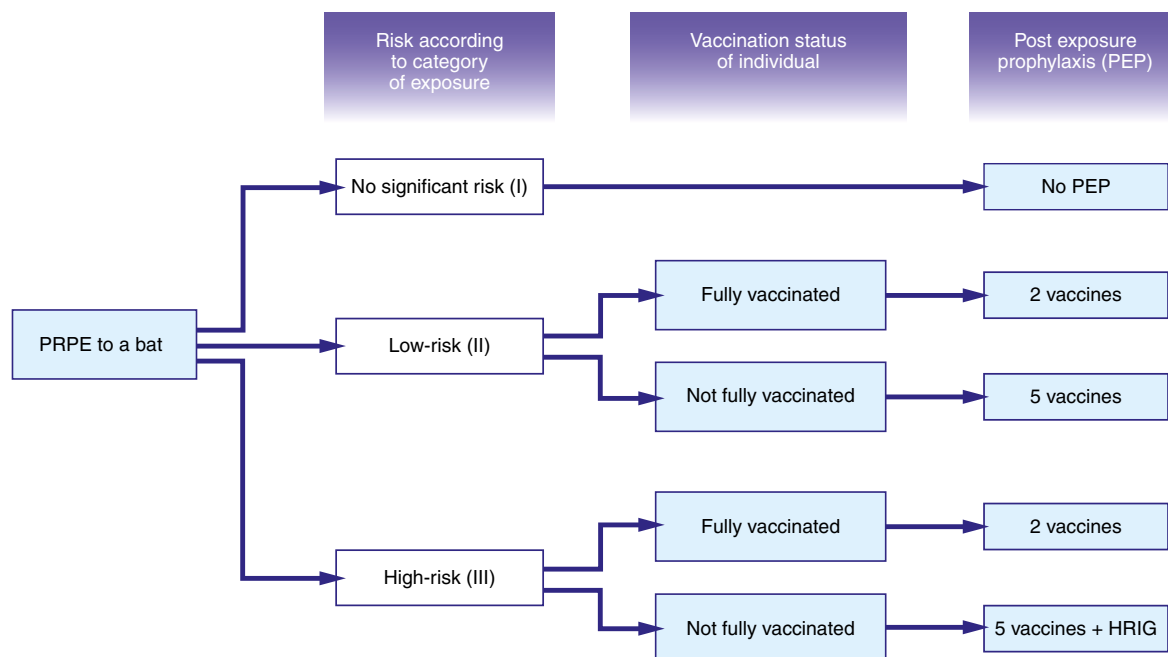
The mainstay of PEP is rabies vaccine. HRIG may provide short term immunity in the first seven days after the commencement of active immunisation. After seven days the antibody level induced by active immunisation (vaccine) is many orders of magnitude greater that can be provided by passive immunisation (HRIG).

HRIG is indicated for individuals who have had a high-risk exposure and are not previously fully vaccinated. HRIG is not indicated if more than seven days have elapsed since commencement of active PEP immunisation.



## 4.2.2 Summary of management

FIGURE 1: Management of 'potentially rabies prone exposure' (PRPE) to a bat



### Notes

#### Risk according to category of PRPE to a bat

- I. **No significant risk:** This would occur if it is certain that there has been no direct physical contact with the bat's saliva or neural tissue, or if the person was protected by a barrier capable of preventing such contact, such as a boot, shoe, or appropriate protective clothing. Contact with bat droppings, blood and urine do not constitute a risk. Transmission by aerosol in bat caves is almost unheard of.
- II. **Low-risk:** Where there has been no observed direct physical contact, but it is likely to have occurred, for example a bat found in room of sleeping person.
- III. **High-risk:** Single or multiple trans-dermal bites or scratches & bruising. Minor bites without breaking of the skin (covered areas of arms, trunk, and legs). Major bites (multiple or on face, head, finger or neck). Contamination of mucous membrane with saliva or neural tissue.

#### Vaccination status of individual

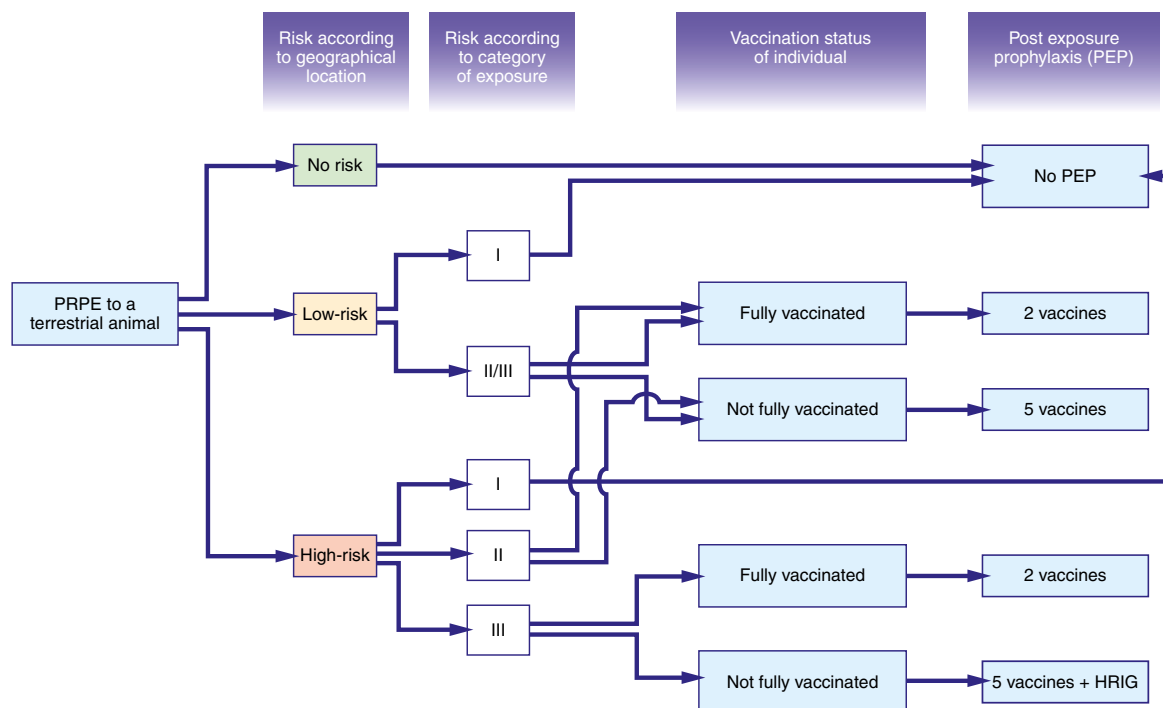
- **Fully vaccinated:** if they have had a well documented appropriate course of pre-exposure immunisation (PrEP) or post-exposure prophylaxis (PEP), or a previously documented rabies antibody titre of at least 0.5IU/ml
- **Not fully vaccinated:** if they have never received PrEP or PEP, or had incomplete/inadequate PrEP.

#### Post-Exposure Prophylaxis (PEP)

PEP should be administered as soon as practical after a PRPE, even if there has been a delay between the PRPE and presentation for evaluation.

- **2 vaccines:** A full dose of rabies vaccine given i.m. on days 0 and 3
- **5 vaccines:** A full dose of rabies vaccine given i.m. on days 0, 3, 7, 14 and 28
- **HRIG:** 20 IU/kg body weight for adults and children. Infiltrate as much as possible around the wound site even if the wound has healed. For multiple bites over a large area then dilute HRIG with saline to increase volume available.

FIGURE 2: Management of 'potentially rabies-prone exposure' (PRPE) to a terrestrial animal



## Notes

### Risk according to geographical location classified as 'No risk', 'Low-risk' or 'High-risk'

The latest country classification list can be found on the HPS website (<http://www.hps.scot.nhs.uk/giz/publicationsdetail.aspx?id=46633>). Travax (<http://www.travax.nhs.uk>) gives additional regional detail and information on outbreaks and cases.

### Risk according to category of PRPE to a terrestrial animal

- I. **No significant risk:** Touching or stroking an animal with no realistic possibility of transdermal transfer of the animal's saliva.
- II. **Low-risk:** Licks of the skin or other contact with saliva (e.g. feeding animals), minor scratches, bruising or abrasions without bleeding, minor bites without breaking of the skin (covered areas of arms, trunk, and legs). All bites, licks and scratches from herbivores, rodents, and primates.
- III. **High-risk:** Single or multiple transdermal bites or scratches, licks on broken skin, major bites (multiple or on face, head, finger or neck). Contamination of mucous membrane with saliva (i.e. licks).

### Vaccination status of individual

- **Fully vaccinated:** if they have had a well documented appropriate course of pre-exposure immunisation (PrEP) or post-exposure prophylaxis (PEP), or a previously documented rabies antibody titre of at least 0.5IU/ml.
- **Not fully vaccinated:** if they have never received PrEP or PEP, or had incomplete/inadequate PrEP.

### Post Exposure Prophylaxis (PEP)

PEP should be administered as soon as practical after a PRPE, even if there has been a delay between the PRPE and presentation for evaluation.

- **2 vaccines:** A full dose of rabies vaccine given i.m. on days 0 and 3
- **5 vaccines:** A full dose of rabies vaccine given IM on days 0, 3, 7, 14 and 28
- **HRIG:** 20 IU/kg body weight for adults and children. Infiltrate as much as possible around the wound site even if the wound has healed. For multiple bites over a large area then dilute HRIG with saline to increase volume available.

### 4.2.3 Wound care

Prompt wound care can substantially reduce the risk of rabies. As soon as possible after the incident the wound or site of exposure (e.g. mucous membrane) should be cleaned by thorough flushing under a running tap for several minutes and washing with soap or detergent and water. A virucidal agent such as povidone-iodine solution or 40-70% alcohol should be applied and the wound covered with a simple dressing.

Primary suture could cause further damage to the wound and may increase the risk of introduction of rabies virus to the nerves. It should be avoided or postponed.

### 4.2.4 Dosage, schedule and administration of active PEP

A course of active PEP consists of a full dose of 1.0 ml rabies vaccine given i.m. into the deltoid (or anterolateral thigh in infants) at either:

- 0 and 3 days, or
- 0, 3, 7, 14 and 28 days.<sup>iii</sup>

Day 0 is the date of the first administration which should be as soon as practicable after the risk assessment has indicated its necessity.

### 4.2.5 Dosage, schedule and administration of passive PEP

A passive course of PEP consists of 20 IU/kg of HRIG for adults and children, ideally as much as possible, given around the wound site, even if the wound has healed. If this is anatomically difficult, it can be given in the anterolateral thigh. If more than 5ml is administered (2ml in children under 20kg) HRIG should be administered in divided doses. If there are multiple bites over a large area then HRIG can be diluted with saline to increase the volume of solution for infiltration. HRIG should never be given at the same anatomical site as rabies vaccine.

HRIG should be given as soon as possible after it has been indicated by the risk assessment, preferably within 24 hours.

As the preparations of HRIG vary in potency and volume, it is critical to know:

- The potency of the batch to be used. Different manufacturers describe potency in different ways, and HRIG batches from the same manufacturer vary in potency
- Weight of patient
- Volume in vials (vials contain between 1-2mls, depending on batch and manufacturer of HRIG). The correct volume for each patient should be calculated and indicated on the supplied proforma, which is issued to the health care provider with the HRIG.

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<sup>iii</sup> WHO recommends 28 days and the Green Book states 30 days. The important point is that the first three doses are given as close as possible to the documented schedule - doses four and five are less critical. CDC only recommend a four dose schedule.

The following are examples of how to calculate dosage, and how many vials are needed:<sup>15</sup>

Child weight, 19kg; HRIG potency is 500 IU/1.1mls; vials contain 2.2mls

- Required units total =  $19 \times 20 = 380$  IU
- Administer  $(380 \times 1.1)/500 = 0.8$ mls
- Supply 1 vial

Adult weight, 85kg; HRIG potency is 500 IU/1.1mls; vials contain 2.2mls

- Required units total =  $85 \times 20 = 1700$  IU
- Administer  $(1700 \times 1.1)/500 = 3.7$ mls
- Supply 2 vials

Adult weight, 70 kg; HRIG potency is 150 IU/ml; vials contain 2 ml

- Required units total =  $70 \times 20 = 1400$
- Administer  $1400/150 = 9.3$ mls
- Supply 5 vials

### 4.3 Administrative Arrangements

Rabies vaccine used as part of PEP is provided free to the patient. GP's can obtain vaccine through stock order but it is recognised that not all community pharmacies will hold rabies vaccine and there maybe a delay in obtaining it via this route. Since PEP should be instituted as soon as possible after a PRPE, if delay is likely then patients should be referred to the local ID physician for immediate management.

HRIG currently available in Scotland is an unlicensed product, held at three national stock holding sites. It is recommended that all requests for HRIG are channelled through the local ID physician to ensure appropriate risk assessment, product dosing and administration. In addition there is accompanying unlicensed plasma product documentation which needs filled infor each treatment. The requesting clinician should contact their nearest site to arrange for supply and delivery of HRIG. This will be transported to the treating hospital with the cost recovery of the transport from the holding site.

Area	Site	Contact number (daytime)	Contact number (out of hours) & ask for EDC pharmacist
Aberdeen	Aberdeen Royal Infirmary	Vaccine Service Desk 01224 553223	08454566000
Edinburgh	Edinburgh Royal Infirmary	0131 242 2911	0131 536 1000
Glasgow	Gartnavel General Hospital	0141 211 3315	0141 211 3000

## 5. Roles and Responsibilities

### 5.1 General Practitioners, Practice Nurses, Occupational Health and front-line Hospital Staff

GPs, practice nurses and occupational health practitioners should be able to advise on the necessity for PrEP and administer primary and booster courses as appropriate. They should be aware which laboratories will perform serologic testing (see section 3.3.4 on page 12), and advise on this or offer this service as appropriate.

GPs, practice nurses, front-line hospital staff, or occupational health are likely to be the first point of medical contact for people who have had a PRPE. The health professional should seek the advice of an ID physician if there is any doubt as to whether the incident carries a risk of exposure to rabies. Unless the health professional is entirely clear on the protocol for risk assessment and administration of PEP the patient should be referred to the appropriate ID department for management and for all instances where HRIG is indicated.

### 5.2 Infectious Disease Physician/Consultant

The ID physician should, when consulted by a health professional, assist in the risk assessment of any PRPE. The ID physician will take on the management of patients requiring PEP as appropriate and after discussion with the referring health professional. Patients requiring HRIG should be managed by the ID physician. The ID physician should inform their NHS Board HPU of any information suggesting that the wider population might be at risk.

### 5.3 Consultant in Public Health Medicine

The CPHM has no responsibility in the management of individual occurrences of PRPE. If a member of the public asks for the advice of the CPHM regarding a PRPE, the CPHM should advise them to contact their GP immediately and ascertain if there is any wider risk to the general public. If a GP, or front-line member of hospital staff contacts the CPHM they should be directed to this guidance and, if necessary advised to seek the opinion of an ID physician. If the CPHM identifies any risk to the wider public they should decide on and ensure the implementation of appropriate measures to safeguard the public's health. The CPHM should consider the need to communicate advice to professional colleagues and members of the public, and, in consultation with their communications teams, the formulation of a reactive or proactive media strategy.

## 5.4 Health Protection Scotland

HPS's 'Fitfortravel' website provides the general public with advice on PrEP for travellers. Travax provides specialist advice to health care professionals and clinicians throughout the UK (registration required). HPS also advises health protection professionals and clinicians throughout Scotland on the indications for PrEP in non-travellers.

HPS has no responsibility in the management of individual occurrences of PRPE. If a member of the public asks advice from HPS regarding a PRPE, HPS should advise them to contact their GP immediately and ascertain if there is any wider risk to the general public. If HPS identifies any risk to the wider public they should inform the appropriate CPHM. If a GP, or front-line member of hospital staff contacts HPS they should be advised to access this guidance and if appropriate seek the opinion of an ID physician.

HPS does not currently have a surveillance system for incidents of PRPE and does not need to be informed of such incidents.

## 5.5 Other agencies

### 5.5.1 Bat Conservation Trust

The BCT is a charity whose aims include promoting awareness of bats. It works with other organisations to promote best practise when handling bats or dealing with bat issues.

BCT run a telephone helpline throughout the year with an additional out of office hours service from May – September. Helpline staff are often the first point of advice when someone comes into contact with a bat. Helpline staff do not give medical advice. They do advise callers on wound care and stress that that the caller MUST seek medical advice from their GP.

The BCT will also ascertain where the bat is and if still present what condition it is in (alive/dead). When a bat is still present staff will give advice on retaining the bat safely and or avoiding further risk to humans. They can then contact a local bat expert to:

- remove the bat,
- identify the species,
- observe the bat's behaviour and
- give any other information that might be helpful e.g. in assessing the risk, preventing further encounters.

## 5.5.2 Scottish Natural Heritage

Scottish Natural Heritage (SNH) is a non-departmental public body, funded by Scottish Government and responsible through Ministers to the Scottish Parliament. Its purposes are to promote the care and improvement, responsible enjoyment, greater understanding and appreciation, and sustainable use of the natural heritage, now and for future generations. Its mission is to promote 'All of nature for all of Scotland'.

SNH provides advice to members of the public and other interest groups on the management of bats and their roosts. Many of these enquiries come from home owners/occupiers with bats in their property. SNH employs licensed bat workers to visit (principally) domestic premises to collect the necessary information and provide advice to the occupants as required. Bat workers sometimes need to handle bats in the course of their work and are therefore required to have up-to-date rabies vaccinations and to wear the appropriate protective clothing as a condition of their employment.

Since 2003, SNH has taken the lead on a programme of active EBLV seroprevalence monitoring in Scotland, focussing primarily on Daubenton's bats. This study has provided annual national estimates of EBLV-2 seroprevalence in this species from a selection of sample sites and has detected a single bat with evidence of the virus. The information from this study is used to inform policy on the management of bat roosts and our advice to others.

## 5.5.3 Scottish Government

Scottish Government works to ensure that National Policies across the areas of animal and human health respond to the challenge of rabies and change in epidemiology and treatment. Implementation is across the Animal Health Agency, Local Authorities, NHS Boards, and other organisations.

In the case of a significant rabies incident the NHS Board must notify the Chief Medical Officer's team of the Scottish Government using the out of hours contact number if necessary.<sup>16</sup>



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# Appendix 1: Development of the guideline

## Rabies Guidance Review Group

**John Cowden, Health Protection Scotland (HPS)**

Consultant Epidemiologist (Chair)

**Sam Allan, Ayrshire & Arran NHS Board**

ID Consultant,

**Lynda Browning, Health Protection Scotland (HPS)**

Epidemiologist

**Julie Gallagher, Lothian NHS Board**

General Practitioner

**Fiona Genasi, Health Protection Scotland (HPS)**

Nurse Consultant

**Rachel Green, Scottish Blood Transfusion Service (SNBTS)**

Clinical Director

**Hilary Kirkbride, Health Protection Agency (HPA)**

Consultant Epidemiologist

**Alexandra Stirling\*, Scottish Government Health Directorate**

Senior Medical Officer

**Chris McGuigan, Tayside NHS Board**

Consultant in Public Health Medicine (CPHM)

**Cameron Stewart, Animal Health & Chair of Scottish Zoonoses Group**

Veterinary Officer,

**Anne Youngman, Bat Conservation Trust (BCT)**

Scottish Bat Officer,

**Alex Sánchez-Vivar, Health Protection Scotland**

National Coordinator of the Health Protection Network (HPN)

## Rabies Guidance Development Group

\*As above except Malcolm McWhiter represented the Scottish Government

## Appendix 2: Contact details

### Telephone numbers

Health Protection Scotland	0141 300 1100
Bat Conservation Trust helpline:	0845 1300 228

### Scottish National Blood Transfusion Service Centres:

West ( <i>Gartnavel General, Glasgow</i> )	0141 357 7802/3/4
South East ( <i>Royal Infirmary, Edinburgh</i> )	0131 536 5392
North East ( <i>Forresterhill, Aberdeen</i> )	01224 552 322

### Scottish Infectious Disease Units

Aberdeen Royal Infirmary, Aberdeen	0845 456 6000
Crosshouse Hospital, Kilmarnock, Ayrshire	01563 521 133
Gartnavel General Hospital, Glasgow	0141 211 3000
Monklands Hospital, Airdrie, Lanarkshire	01236 748 748
Ninewells Hospital, Dundee, Tayside	01382 660 111
Victoria Hospital, Kirkcaldy, Fife	01592 643 355
Western General Hospital, Edinburgh	0131 537 1000

### Websites

HPS	<a href="http://www.hps.scot.nhs.uk">http://www.hps.scot.nhs.uk</a>
HPS Rabies Geographical Country list	<a href="http://www.hps.scot.nhs.uk/giz/publicationsdetail.aspx?id=46633">http://www.hps.scot.nhs.uk/giz/publicationsdetail.aspx?id=46633</a>
TRAVAX	<a href="http://www.travax.nhs.uk">http://www.travax.nhs.uk</a>
Fitfortravel	<a href="http://www.fitfortravel.nhs.uk">http://www.fitfortravel.nhs.uk</a>

## Appendix 3: HPN guideline feedback form

### Section A – About the Document (Guideline)

<b>Guideline title:</b>	Rabies: Guidance on Prophylaxis and Management in Humans in Scotland
<b>Author:</b>	Health Protection Network
<b>Publisher:</b>	Health Protection Scotland
<b>Date of publication:</b>	July 2013

### Section B – About the Evaluation

<b>Reviewer's name:</b>	
<b>Reviewer's occupation:</b>	
<b>Reviewer's organisation:</b>	
<b>Reviewer's contact email address:</b> (optional)	
<b>Date of evaluation:</b>	

### Section C – Comments (please continue on a separate sheet if necessary)

**Does the Guideline meet your needs/inquiry at the time of evaluation?** (Please explain why this is the case)

**Is there anything lacking in the Guideline?** (Please explain)

**Do you have any other comments?**

An electronic version of this form can be downloaded here:  
<http://www.hps.scot.nhs.uk/about/guidancedevelopment.aspx>

Once completed please return this form to: [NSS.HPN@nhs.net](mailto:NSS.HPN@nhs.net)