



Feline Parvovirus (FPV) Procedures

1 What is feline parvovirus (FPV)?

Feline parvovirus is a virus that can cause severe disease in cats, especially kittens, and can be fatal. This disease is also known as feline infectious enteritis (FIE) and feline panleucopenia. It is an extremely resilient virus which can survive in the environment for long periods of time. Sadly the disease has a very high mortality rate and outbreaks can still be seen in some households with unvaccinated cats and kittens, rescue centres, pet shops and cat breeders. FPV does not affect humans. Canine parvovirus can infect cats.

2 How are cats infected with FPV?

The disease spreads easily both directly (faecal-oral contact) and indirectly (contamination of the environment or objects such as food dishes, bedding and hands by an infected animal). If the immune response is not adequate to protect the cat, the virus will enter the bloodstream and travel to the bone marrow and lymph glands, leading to a marked decrease in white blood cells. From there, the virus travels to the intestines where it destroys the rapidly dividing cells of the lining of the gut.

FPV can survive in the environment for up to a year and requires a disinfectant that is effective against it to kill it.

3 Which cats are vulnerable to FPV?

Kittens are most susceptible, especially when the protective antibodies they receive in their mother's milk have waned at between four and 12 weeks of age. Unvaccinated adult cats are also susceptible to this disease and allowing booster vaccinations to lapse can be risky.

4 What are the signs of FPV?

Not all cats infected with FPV show clinical signs of the disease, but some become seriously ill very quickly with an incubation period of two to 10 days.

Signs can include:

- Vomiting – they bring up froth or might just look wet around the lips
- A variable temperature – usually raised in the early stages and low later into the disease
- Seeming to be hungry or thirsty, but being unable to eat or drink – affected cats often sit hunched over a food or water bowl
- Watery diarrhoea, with or without blood

Despite the name 'infectious enteritis', the cats do not always have diarrhoea. Unfortunately, sometimes no obvious signs are present and the kittens/cats will suddenly die.

If a pregnant queen is infected with FPV, the brains of her unborn kittens may be damaged and this can affect the kittens' balance, resulting in them having a wobbly gait. At weaning these kittens may have problems feeding as their heads will bob up and down – these kittens have a condition called cerebellar hypoplasia. FPV infection has also been associated with fading kitten syndrome.

5 How is FPV diagnosed?

When a kitten has died or been euthanased on welfare grounds, diagnosis of FPV should be confirmed by gross post-mortem assessment and submission of samples of intestine for histopathology.

FPV can be present in the environment and commonly passes through healthy cats and kittens. Therefore, testing healthy cats or those with mild unrelated diarrhoea will frequently result in positive test results which are not significant, so it is not recommended to routinely test Cats Protection (CP) cats for FPV unless the vet has a strong clinical suspicion that the virus is causing disease.

In a sick cat or kitten showing signs suspicious of FPV, faecal samples can be sent to a veterinary laboratory for a PCR test to look for viral DNA - as long as the cat has not recently been vaccinated using a modified live FPV vaccine as this may give positive results simply because of vaccine shedding. ELISA-based faecal tests are available (at the vets or an external laboratory); however, the results are not always accurate and with the importance of confirmation of such a contagious virus within the rescue environment, they are not considered to be generally indicated within the CP situation. Blood tests for antibodies to FPV can be performed in sick cats, but they can be difficult to interpret, particularly in a cat that has been recently vaccinated. Blood tests to assess white blood cell count in sick cats can sometimes be useful.

6 Do FPV carrier cats exist?

Most cats will only shed FPV in their faeces for a couple of days; however, some may shed for up to six weeks and FPV can be detected in the faeces of apparently healthy cats. Cats may also shed after vaccination with a modified live FPV vaccine.

7 How is FPV treated?

There is no specific treatment for FPV, but if the disease is detected in time the affected cats can be treated symptomatically. Some cats recover with intensive care, including good nursing, fluid therapy and assisted feeding. In some cats who survive the disease, recovery can be prolonged and the damage caused by the disease may be permanent.

8 How can FPV be prevented?

As no specific treatment is available, it is far better to try to prevent such a devastating disease occurring in the first place. Although FPV is still a prevalent virus, vaccination offers a high level of protection against infection and subsequent disease.

Primary vaccination courses usually starts in kittens at eight or nine weeks of age (dependent on the brand of vaccine used – the manufacturer's data sheet should be followed), with a

second injection at 12 weeks of age. Adult cats coming into CP care should also receive a full primary course or, if already up to date with their vaccines, should receive annual boosters. The FPV vaccine is usually combined with other vaccines, such as cat flu (feline herpes virus, FHV and feline calici virus, FCV).

Care must be taken when vaccinating pregnant queens against FPV as some vaccines may adversely affect unborn kittens. Currently there are no FPV vaccines licensed for use in pregnant cats in the UK.

Good hygiene, isolation procedures and barrier nursing of infected cats are imperative to prevent spread of this disease to other susceptible cats.

Young kittens should not be cross-fostered onto another queen and older kittens should never be mixed with kittens that are not from the same litter or household as this is a common way for disease transmission to occur.

9 What action should be taken as soon as there is suspicion of parvovirus?

There are three different management scenarios related to feline parvovirus and each would be addressed slightly differently.

1. Apparently healthy cat(s) have been found to be shedding FPV – this usually occurs when faecal samples were tested for FPV without clinical suspicion of FPV disease – positive FPV faecal results should also be considered in light of the vaccination history, when using modified live FPV vaccines
2. There is a confirmed single case of parvovirus that has been confirmed by post-mortem results or positive faecal PCR in a cat showing specific signs of FPV, where the positive PCR result is unlikely to be due to recent vaccination with a modified live vaccine . There may also be cats (healthy in-contacts) that have been in contact with a cat that did become ill
3. There is evidence of horizontal transmission of disease due to FPV within the facility or there are multiple affected pens of cats that have come into CP care from the same source. This is defined as an outbreak situation

Guidelines applicable to ALL scenarios:

Strict and thorough barrier nursing must be carried out at all times once suspicion of FPV is raised to reduce the risk of transmitting this disease to other cats. The disease can remain infectious and be transmitted for many months on clothes and shoes. Refer to the section on barrier care for more details.

- Any cat showing signs of the disease should be separated from any healthy in-contact cats and receive immediate veterinary attention:
 - Samples should be sent externally to confirm diagnosis:
 - Post-mortem samples of intestines for histopathology will provide a definitive diagnosis if a cat has died or been euthanased on welfare grounds
 - In sick cats, faeces should be sent for PCR. Blood samples for haematology (white blood cell count) may also be useful .

- Concurrent pathogens should be considered, which may further complicate the disease and/or its management.
- The vet will prescribe the appropriate treatment for each individual case. Not all cats survive FPV, no matter how well treated. If, despite care, a cat appears unresponsive, does not improve within a few days or in the opinion of the vet is suffering, the cat should be euthanased and a post-mortem carried out to confirm the diagnosis if this is the first case. Some cats will rapidly deteriorate over just a few hours of showing the first signs, or may not show any signs at all before sudden death
- All suspect cases *must* immediately be isolated away from other pens of cats/kittens. Ideally this means moving them to isolation pens. If this is not possible, at least try to keep them separate from highest risk groups ie, kittens, pregnant queens, sick cats and elderly cats
- All in-contact cats would have been exposed to the disease and, if unvaccinated, are at risk of developing the disease so should be isolated until test results advise otherwise. Any in-contact cats should be closely monitored for clinical signs of the disease
- Clearly identify suspect cats, in-contact cats and confirmed cases with a sign on the pen and place footbaths – containing either an inorganic peroxygen compound (Virkon) at the appropriate dilution or bleach at a 1:10 dilution – at the entrance to the pens containing these cats. The footbaths should be changed twice daily or more frequently if they become excessively contaminated with organic matter
- Ensure all contact areas such as vans, cat baskets and reception areas are thoroughly cleaned and disinfected
- If possible, have just one person delegated to deal with the suspect cats, in-contact cats or confirmed cases only. This person should not handle any other cat/kitten in the facility or even go into the other areas of the facility
- Do not permit the public into the area
- Minimise movement of cats within the facility until confirmation is obtained. This includes putting any free-roaming and meet and greet cats in a pen or confining them to a room
- No cats should be homed while awaiting confirmation
- Stop any intake of cats into the facility for 10 days. The incubation period of FPV is two to 10 days, so cats that have been exposed may become ill up to 10 days after barrier care has been implemented. If no further cases arise during this 10-day period or the sample results come back negative for FPV, it can be assumed there has been no spread and other activities can return to normal, although barrier care of any cat known to have been shedding FPV must continue
- If confirmatory tests are negative for FPV, routine procedures can be reinstated
- Inform the CP veterinary department who will be able to advise

Additional guidelines for scenario 1 – healthy shedders

- If PCR was not the original test that identified FPV – ie if it was an ELISA-based test – then ideally some of the same faecal sample should be sent for PCR to rule out a false positive test result if the cat has not been recently vaccinated with a modified live vaccine. If the original faecal sample is no longer available send the next available single faecal sample for PCR testing. If this sample comes back negative for FPV, assume the cat does not have FPV and reinstate normal procedures
- Apparently healthy cats with a positive faecal PCR for FPV, whether recently vaccinated or not, should be kept isolated from other cats and be barrier nursed until a negative three-day pooled (per pen) faecal sample tested by PCR is obtained

- Normal homing and intake can resume 10 days after the cat(s) have been isolated and barrier nursing has been implemented, provided there have been no actual cases

Additional guidelines for scenario 2 – confirmed single case +/- healthy in contacts

- If laboratory results confirm FPV, definitely stop intake and homing of cats for 10 days from the date when barrier care was implemented
- If no further cases arise during this 10 day period and it is thus not an outbreak situation, then normal intake and homing can resume although barrier care of the sick cat and its in-contacts must continue. If further cases do arise, this would be considered an outbreak situation and the additional guidelines for scenario 3 should then be followed
- Avoid unnecessary movement of cats within the facility. This includes putting any free-roaming and meet and greet cats in a pen or confining them to a room
- Confirmed cases that recover, as well as healthy in-contacts should remain isolated with barrier care, until all of the following apply:-
 - faecal consistency is normal and the cat is otherwise well
 - the cat has received a full primary vaccination course and
 - the cat has remained in isolation for at least six weeks since the case was confirmed
- Pens should be emptied, cleaned and thoroughly disinfected using either an inorganic peroxygen compound (Virkon) at the appropriate dilution or bleach at a 1:10 dilution. Adequate contact time must be achieved before rinsing. This should be done daily for five days. If possible, also steam clean the infected areas daily for five days
- Ideally place only fully vaccinated cats in the previously affected area if possible. Avoid placing pregnant queens or kittens in the previously affected area if possible

Additional guidelines for scenario 3 - an outbreak of FPV in a branch or an adoption centre

- What is an outbreak? An outbreak is defined as evidence of horizontal transmission of FPV within the facility or when there are multiple affected pens of cats that have come into CP care from the same source
- When is an outbreak over? An outbreak can be considered over when there have been no further losses and/or new cases arising for six weeks. Because shedding of virus can occur for up to six weeks, strict bio security, disinfection, quarantine and population control should be maintained for at least six weeks after the last new case or death due to FPV. Speak with the CP veterinary department as each site will be considered on a case by case basis
- No cats should be homed from the site until the outbreak is over
- No new cats should be admitted to the site until the outbreak is over
- Close the facility to the public and stop entry of any unnecessary personnel to the site eg volunteers, work experience students
- Avoid unnecessary movement of cats within the facility. This includes putting any free-roaming and meet and greet cats in a pen or confining them to a room.
- If veterinary treatment is required urgently discuss the possibility of on-site treatment with the vet
- Confirmed cases that recover as well as healthy in-contacts should remain isolated with barrier care, until all of the following apply:-
 - faecal consistency is normal and the cat is otherwise well
 - the cat has received a full primary vaccination course and

- the cat has remained in isolation for at least six weeks since the last death or confirmed case
- Vaccination 'in the face of an outbreak'
 - Vaccinate all unvaccinated adult cats on the site with a modified live vaccine (MLV) that includes protection against FPV, subject to the cats' clinical condition and veterinary advice. This should be followed by second vaccination three weeks later
 - Consider vaccinating (off licence) all unvaccinated kittens between the ages of four and eight weeks with a modified live vaccine that includes protection against FPV. Combined vaccines which include FeLV should not be used earlier than the age stated on the manufacturer's datasheet. These kittens would then have their usual full primary course with CP vaccines when old enough, waiting to start at least two weeks after any vaccine given early
 - Kittens and cats over eight weeks of age should already have been vaccinated with the usual CP vaccine. Any which haven't had a vaccination should be vaccinated with the usual CP vaccine, unless they are unwell – it is not advisable to vaccinate unwell cats with any vaccine in the face of an outbreak. Unwell cats, especially kittens, should be isolated and carefully monitored, and vaccinated with the usual CP vaccine as soon as they are well enough
 - If there are ongoing cases, the FPV vaccine can be repeated two weeks later in those kittens which are still not old enough to start a primary course – but not in kittens under four weeks of age
 - The CP veterinary department can advise further
- What actions should be taken after an outbreak is over?
 - Acceptance of new cats can commence six weeks after the last new case or death due to parvovirus
 - Homing can begin six weeks after the last new case or death due to parvovirus
 - Speak to the CP veterinary department before starting intake or homing
 - Pens should be emptied, cleaned and thoroughly disinfected using either an inorganic peroxygen compound (Virkon) at the appropriate dilution or bleach at a 1:10 dilution. Adequate contact time must be achieved before rinsing. This should be done daily for five days. If possible, also steam clean the infected areas daily for five days
 - Ideally place only fully vaccinated cats in the previously affected area if possible. Avoid placing pregnant queens or kittens in the previously affected area if possible
 - After an outbreak is over, there is no longer any need to vaccinate cats or kittens between the ages of four and eight weeks. Return to using the usual CP vaccine in accordance with the manufacturer's datasheet

10 Barrier care

Disinfectants

- FPV is shed in faeces and other secretions and is long-lived in the environment. It is resistant to most chemical disinfectants, including chlorhexidine, quaternary ammonium compounds, betadine and others. Without suitable cleaning and disinfection the virus can last up to one year in the environment. Transmission of the virus is mainly by

indirect means eg carried on shoes, cat baskets, etc. This means that even totally indoor cats are not safe from infection

- The disinfectants effective against FPV include bleach and inorganic peroxygen compounds (Virkon). Please contact the CP Veterinary Department if you need assistance on choice of disinfectant
- Ensure that disinfectant instructions are followed carefully to ensure efficacy, including attention to prior cleaning, disinfectant dilution and contact time
- Bleach should be used at a 1:32 dilution if a cat is housed in the pen. When using bleach, the pen must be cleaned first using detergent. The bleach is then applied and left for a contact time of 15 minutes and then it must be rinsed off with water. A 1:10 dilution of bleach can be used when there is no cat housed in the pen. The bleach solution should be prepared daily

Virkon should be prepared daily according to the manufacturer's instructions, has a contact time of 10 minutes and must be rinsed with water

Protective clothing (personal protective equipment, PPE)

Protective clothing *must* be worn at all times while working with suspect, in-contact or confirmed cats. Protective clothing includes: disposable overalls, disposable apron, gloves, elbow protectors, disposable caps and over shoes. Use new disposable clothing for each pen – change apron, gloves and elbow protectors between each pen. It is important to remember protective clothing should always be worn even while feeding suspect, in-contact or confirmed cats.

Bedding and soft materials

- Bedding used should be disposable – for example, old towels which can be thrown away daily or soaked in bleach or Inorganic peroxygen compound (Virkon) and washed in the washing machine. If re-using bedding, ensure you keep the same bedding for the same cat
- Dispose of all bedding, soiled litter etc. carefully, in infectious waste where available
- Soft toys and scratching posts should be removed from the cat's environment

Litter trays

If possible use disposable litter trays and discard at least once daily. If disposable litter trays are unavailable, ensure that the standard litter trays are soaked separately in bleach or Inorganic peroxygen compound (Virkon) and returned to the same cat.

Food and water bowls

Disposable food bowls should be used and discarded daily. Water bowls should be soaked separately in bleach or Inorganic peroxygen compound (Virkon), thoroughly rinsed and returned to the same cat.

Principles of cleaning and handling/barrier nursing

- Ideally, only one person would provide solely for these cats' care and work only in that area of the facility

- If this is not possible, to reduce the risk of spreading the disease, cats which have FPV should be dealt with last after all the other cats have been cared for
- Particular attention should be paid to the cleaning and disinfection of litter trays, food/water bowls and bedding
- Sweep all debris into the litter tray and after cleaning and disinfecting, dispose of all items including PPE and cleaning cloths into a suitable disposal bag/bin liner. Do this while in the pen and seal the bag while still in the pen
- Use footbaths when entering or leaving the pen
- Any laundry should be washed completely separate from other materials and pre-soaked in a bucket of bleach or Inorganic peroxygen compound (Virkon)
- Mop, bucket, sweeping brush, dustpan and brush, and grooming equipment should all be soaked in bucket of bleach or Inorganic peroxygen compound (Virkon) after use
- Ideally each pen should have its own materials and equipment and they should not be used in any another area of the facility