

INFORMATION SHEET

Virulent Systemic Feline Calicivirus (VS-FCV)

Background Information

- Feline Calicivirus (FCV) is a common infection in cats caused by multiple different strains of calicivirus
- FCV causes flu-like symptoms and more severe disease in some cats
- A particularly virulent strain of FCV, called Virulent Systemic Feline Calicivirus (VS-FCV), more recently emerged. It has been reported worldwide, with one known outbreak in Sydney a couple of years ago
- VS-FCV is capable of causing severe generalised disease through severe vasculitis and ulcerations by epithelial cell cytolysis

VS-FCV Disease

What are the characteristics of the virus?

- All FCV strains are potentially pathogenic and need to be managed collectively
- VS-FCV is a recognised distinct disease variant with increased pathogenicity. Some specific strains described for some outbreaks such as Ari, Diva, Koas and Ukos-W
- However, VS-FCV has no definite diagnostic or virological features that would differentiate it from other strains
- Vasculitis and associated typical clinical feature is suggestive of the VS strain
- RT-PCR best used for diagnosis of FCV, but won't differentiate the VS strain. No reliance on PCR for diagnosis, it must be interpreted in combination with clinical presentation and epidemiologic data
- Un-enveloped virus means more resistant to environmental exposure and disinfection methods

- High mutation rate leads to the development of virulent strains and resistance against vaccines
- Can be associated with co-infection which can complicate the clinical presentation and management, and can confuse regular strains for VS. Other infections (particularly panleukopaenia, FHV-1, *Mycoplasma felis*, *Chlamydophila felis* and *Bordetella bronchiseptica*) need to be ruled out.
- Incubation period is 2–10 days
- Persistence in the environment at room temperature can be for up to 4 weeks, with longer persistence in cold conditions
- Caliciviruses are typically very species specific and do not represent a risk to people or other species of animals

Is there a specific risk profile?

- Shelter cats are particularly high risk
- Other intensively managed facilities, e.g. catteries, breeders, clinics
- Kittens appear to be more frequent shedders
- Clinical recovery and/or lack of symptoms does not mean the cat is not potentially shedding virus, although asymptomatic cats will generally excrete less virus
- F3 vaccine is not completely protective for disease and not protective for carriage
- Stress is an underlying risk factor: co-infection, crowding, social, nutritional, co-mingling, poor hygiene, poor ventilation, etc.
- Carriage of FCV strains common in all cats
- Shedding can persist up to 4 months in cats recovering from clinical infection

How is it transmitted?

- Highly contagious with cats hospitalised for more than 12 hr in the presence of an infected cat or in the same household having more than 90% chance to be infected
- Droplet as mainly URT, but potentially any excretion
- No true aerosolisation, but possible airborne spread <1m
- Cat-cat contact
- Fomites, especially hands, but including clothing, equipment
- Premises surfaces including floors, benches, cages
- Possibly also on cat's fur contaminated by excretions

What are the Clinical Signs? (* typical for VS-FCV when found concurrently)

- Fever
- Anorexia
- Limping
- **Oral ulcers***
- Upper respiratory signs
- Lower respiratory signs going from tachypnoea to dyspnoea
- **Oedema of face and limbs***
- **Ulcerative pododermatitis***
- Icterus
- Bleeding tendencies with melena, petechiations
- Sudden death

What is the mortality rate?

- Case fatality of 40%, ranging from 25 to 70% depending on strain and population described
- Mortality rate often higher in older cats (>1 yr old) than kittens (< 6 months old) with respective rates of about 60% and 15%

How to diagnose VS -FCV?

- PCR from oropharyngeal swabs or other fluids like pleural effusion
- Virus isolation from oropharyngeal swabs or tissues sampled
- Genetic sequencing can be done to identify specific strains
- Serum virus neutralizing titers
- IHC in tissue samples

What can work up of these cases identify?

- Pleural effusion and most likely a modified transudate with pyogranulomatous component which can make the disease appear similar to FIP initially
- Increased glycaemia due to associated pancreatitis and pancreatic necrosis
- Increased liver enzymes and bilirubin due to viral liver damage
- Decreased albumin and increased CK
- Neutrophilia common on CBC

How to treat?

- There is unfortunately no specific treatment, it is mainly supportive care
- Broad spectrum antibiotics (doxycycline or amoxyclav suggested) for secondary bacterial infection
- Nutritional management through feeding tube and enteral nutrition
- Intravenous fluids to be used with caution due to the vasculitis component of the disease and risk of aggravating respiratory symptoms of pulmonary oedema; favour the enteral route for rehydration if dyspnoea or tachypnoea present
- Interferon has been reported to be helpful in some case but the literature remains controversial on its use. It has been suggested to use them in the more severe cases and the risk benefit would be favorable as its use is not usually associated with marked side effects
- Sometimes glucocorticoids are needed to help with a potential immune-mediated component for the vasculitis associated with the viral infection. It still needs to be used with caution and on a case by case basis as it is not considered gold standard for treatment
- Gastrointestinal supportive care with anti-emetics, anti-acids, sucralfate for the GI ulcers
- Plan to be adjusted with each specific cases as they might present with various combinations of the symptoms listed above

Is vaccination protective?

- No the current vaccine does not really protect against the virulent strain unfortunately
- Interestingly, young unvaccinated animals tends to suffer from the mild form whether adult and vaccinated cats could be more likely to suffer from the more severe form

Infection Control Protocol

Suggestions on how to manage incoming cases if indicated

- Ensure all staff are aware of VS-FCV and its common clinical presentation
- All cats considered potentially at risk for carriage or transmission
- Suspect cases or cats in contact with known carriers triaged to a separate isolation facility
- All other cats dealt with case-by-case as individuals:
- Strict decontamination of consult room and equipment between cats
- Hand hygiene and personnel decontamination between cats
- Admitted cats: quarantine period of ~7 days with isolation/barrier methods from other admitted cats as much as possible. Careful monitoring for early clinical signs
- Minimise admissions: advocate home or similar care where possible
- Stop completely cat visits if highly suspect case or diagnosed VS-FCV case in hospital

Isolation of infected and suspect cats

- Separate premises: physical distance, doors, etc. provide barriers to transmission
- Dedicated equipment and clothing (e.g. scrubs, disposable aprons, boot covers)
- Separate management of bedding, laundry, feed, waste
- No clearly defined long term isolation period for recovered cats:
 - Up to 3 months likely for severe disease in vaccinated cats
 - Recovered cats: longer term housing? Fostering?
 - Vaccination will not reduce carriage or shedding

Movement control and workflow management

- Of all cats, not just infected/suspect
- Cats only to be managed ideally by specified staff who do not have contact with other cats (in hospital and if possible who do not have a cat of their own at home) or are trained to manage VS- FCV
- Physically contact healthy cats before infected/suspect cats if reduced staff to be caring for animals in hospital (especially overnights and week end shifts). This would mean for staff to go and check on cat in isolation just at the end of their shift
- Identify VS-FCV 'clean' and 'dirty' areas

- Manage staff and animal work flows to limit passage of potentially infected individuals, or contaminated materials or humans, through or into 'clean' areas
- If required, follow up with owners of animals which could have been exposed to an infected cat while in hospital and make sure they are not showing symptoms
- No hospital access for non-essential activities or personnel

Personnel

- Hand hygiene: based on "5 moments" principles and effective technique
- Use of disposable gloves, gowns, shoe covers for higher exposure risk activities, e.g. with infected cats
- Use of hand sanitisers: wash and alcohol gel stations readily accessible and functional
- Strict use of dedicated clothing (e.g. scrubs) whilst at the hospital
- Staff personal decontamination on leaving the hospital:
 - Hand hygiene
 - Removal of work dedicated clothing: scrubs, etc.
 - Decontamination of equipment (e.g. personal stethoscopes, notepads, footwear, phones, computer keyboards)
 - Recommend taking shower at work if staff has cat at home
- Advised not to be in contact with cats for 48 hrs after hospital contact where possible

Decontamination

- Initial cleaning of gross contamination
- 'Dirty' areas: Rigorous disinfection of all surfaces and equipment in contact with infected/suspect cats
- 'Clean' areas: strict adherence to routine decontamination protocols, with a recommended increase in frequency of application until the case cluster resolves
- Recommended disinfectants:
 - Peroxygens: potassium peroxymonosulfate (e.g. Virkon), accelerated peroxides
 - Halogens: hypochlorite (bleach), iodine
 - Alcohols: 70% v/v ethanol or propanol
- Ideally, have 10 min contact time for any disinfectant used. Where not practical, maximise contact.
- General chemical disinfectant protocols: correct concentration, stock vs working solutions, use of fresh solutions with clear re-constitution guidelines, minimise organic matter contamination

Additional Information

How many other outbreaks described in the literature?

- First recognised outbreak in 1998 in Northern California where it took the name of haemorrhagic fever
- Similar outbreaks reported across several states in the USA
- Outbreak described in England in 2003 and then several more in Europe
- First Australian outbreak reported in Sydney in June 2016. These might not have involved the same strain as the cats involved appeared not to suffer of marked systemic signs

Did outbreaks share similar features?

- Most often the case, the index case was a hospitalised shelter cat
- Adult vaccinated cats were affected predominantly and kittens appear to have less signs
- Spread was rapid through fomites and affected client cats as well as vet staff cats
- Often the spread was limited to the one clinic or shelter and there was no spread associated in the community
- Outbreak resolved usually on their own within 1 to 2 months, nobody knows how and why
- No reported transmission of disease from fully recovered cats, despite them shedding the virus

Message from the UQ VETS Team

This information sheet combines the clinical and infectious disease knowledge of its contributors:

- the **Small Animal Internal Medicine Team** headed by Dr Erika Meler, Veterinary Specialist and Researcher in Infectious Diseases
- the **Microbiology Team** led by Pr Rowland Cobbold, Associate Professor in Microbiology and Researcher in the field of One Health

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If you have a case you would like to discuss or have questions about Hospital Infection Control protocols, our team of Internal Medicine and Emergency Critical Care specialists will be happy to assist.

For any questions or queries on VS-FCV, please do not hesitate to contact UQ VETS Small Animal Hospital on (07) 5460 1788 or visit our website at <https://veterinary-science.uq.edu.au/>

Some references

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