**TITLE**

**DIAGNOSIS AND TREATMENT OF PYELONEPHRITIS IN CATS AND DOGS: A SCOPING REVIEW PROTOCOL**

Karolina Scahill1,2\*, Lena Pelander3, Marnie L. Brennan4, Isabelle Nesterud5, Britt-Marie Bergquist5, Carl Ekstrand6

1Evidensia Södra Djursjukhuset, Kungens Kurva, Sweden

2University of Edinburgh, College of Medicine and Veterinary Medicine, Edinburgh, United Kingdom

3 Department of Clinical Sciences, Swedish University of Agricultural Sciences, Uppsala, Sweden

4 Centre for Evidence-based Veterinary Medicine, The University of Nottingham, United Kingdom

5 SLU University Library, Swedish University of Agricultural Sciences, Uppsala, Sweden

6 Department of Biomedical Sciences and Veterinary Public Health, Swedish University of Agricultural Sciences, Uppsala, Sweden

\*Corresponding author: [karolina.a.scahill@evidensia.se](mailto:karolina.a.scahill@evidensia.se)

**Protocol and registration**

This protocol was written using the Preferred Reporting Items for Systematic Reviews and MetaAnalysis for Scoping Reviews (PRISMA-ScR) reporting guidelines (Tricco *et al*., 2018). It will be published on the slu.se website and will be registered at SYREAF ([www.syreaf.org](http://www.syreaf.org)).

**Funding**

This project has not been funded

**INTRODUCTION**

**Rationale**

International antimicrobial treatment guidelines of pyelonephritis in cats and dogs are mainly based on extrapolated data from human medicine due to the lack of clinical studies in animals (Weese *et al*, 2019). Likewise, national treatment guidelines in Sweden are based on pharmacokinetic simulation studies and on limited clinical experience (Pelander, 2016; Helso and Olsén, 2017). Clinical studies in cats and dogs are clearly needed and should ideally be informed using an evidence-based approach involving the systematic identification of available evidence (Lund *et al*, 2020). Moreover, to ensure that clinical research results are useful to end-users and to facilitate future evidence syntheses, the identification of standardized core outcome set (COS) involving all relevant stakeholders are recommended (Kirham *et al*., 2022). The results of this scoping review will inform the design of prospective clinical trials of pyelonephritis in cats and dogs including the development of a COS.

**Objectives**

The objective of this scoping review is to identify available evidence of pyelonephritis in cats and dogs and to identify gaps in the literature to prioritize future research. The primary objective is to answer the question: “What evidence is available about the definition of disease, diagnosis and treatment of pyelonephritis in cats and dogs”.

**METHODS**

**Eligibility criteria**

Language: All languages

Publication date: No limits

Study design: Peer reviewed articles. All study designs including case reports

Population: Domestic dogs and cats. Wild canine and feline species will be excluded.

Concept: Pyelonephritis. Acute and chronic. Diagnosis, definition, treatment.

Context: All settings, both primary and secondary care.

**Information sources**

To maximize veterinary journal coverage CAB Abstract, MEDLINE, Scopus and Web of Science Core Collection will be searched (Grindlay *et al*., 2012). Manual screening of references of included studies and reviews will also be performed. Grey literature will be searched in Open access Theses and Dissertations.

**Search strategy and selection process**

Information specialists (IN, BB) were consulted in the design of the search string (see below). The same string will be used in all searches, but formatting may vary depending on the database. Medical Subject Headings (MeSH) will be used. The search results will be checked for ten relevant sample publications to ensure search sensitivity. Results will then be imported to EndnoteTM 20 software (PDFNet SDK © PDFTronTM Systems Inc.) where duplicates will be removed. Remaining studies will be exported to Rayyan software tool (www.rayyan.ai) where titles and abstracts will be screened independently by two reviewers (KS and CE) according to the above eligibility criteria. A third reviewer (LP) will be consulted to resolve potential conflicts. Full text screening will be performed by the same reviewers. A calibration exercise will be performed before the (title/abstract and full text) screening process.

|  |  |
| --- | --- |
| Population | (cat OR cats OR feline OR Dog OR dogs OR canine OR canis OR felis) |

AND

|  |  |
| --- | --- |
| Concept/Context | pyelonephrit\* OR nephrit\* OR pyelitis OR pyonephros\* OR ((“Acute kidney injur\*” OR “Acute kidney failure” OR “Acute Renal failure”) AND (Infect\* OR Bacteri\*)) |

**Data extraction and items**

The same reviewers (KS and CE) will extract data from eligible studies by using a pre-defined table in Excel. The following data will be extracted:

Study characteristics: Authors, country, date, publication, study design, aims, methodology, funding

Population characteristics: Species, breed, age, severity of disease, comorbidities (e.g. CKD and IRIS stage), population size

Concept: Disease definition. Diagnostics (clinical signs, history, biochemistry/complete blood count, diagnostic imaging, urinary sediment and culture/sensitivity, follow-up diagnostics). Treatment (antimicrobial treatment – substance, duration, dose, any other treatments). Outcome (all reported outcomes).

**Data analysis and presentation of results**

A descriptive summary of collected data and identified research gaps will be presented and discussed. Critical appraisal or certainty assessment of the included studies will not be performed. The results will be used to inform a COS study and a subsequent prospective clinical study.

**REFERENCES**

Grindlay, D.J., Brennan, M.L., Dean, R.S., 2012. Searching the veterinary literature: a comparison of the coverage of veterinary journals by nine bibliographic databases. J Vet Med Educ vol. 39, pp. 404-412.

Helsmo and Olsén, Infektioner i urinvägarna hos Katter med CKD (2017). Information från Läkemedelsverket 2017;28(supplement):34-44.

Kirkham JJ, Williamson P. Core outcome sets in medical research. *BMJ Medicine*2022;**1:**e000284. doi: 10.1136/bmjmed-2022-000284

Lund H, Juhl CB, Nørgaard B, Draborg E, Henriksen M, Andreasen J, Christensen R, Nasser M, Ciliska D, Clarke M, Tugwell P, Martin J, Blaine C, Brunnhuber K, Robinson KA; Evidence-Based Research Network. Evidence-Based Research Series-Paper 2 : Using an Evidence-Based Research approach before a new study is conducted to ensure value. J Clin Epidemiol. 2021 Jan;129:158-166. doi: 10.1016/j.jclinepi.2020.07.019. Epub 2020 Sep 26. PMID: 32987159.

Pelander, L. Cystit och pyelonefrit. Information från Läkemedelsverket 2016;27(supplement):30-35.

Tricco, Andrea C, Erin Lillie, Wasifa Zarin, Kelly K O'Brien, Heather Colquhoun, Danielle Levac, David Moher, Micah DJ Peters, Tanya Horsley, and Laura Weeks. 2018. 'PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation', Annals of Internal Medicine, 169: 467-73.

Weese JS, Blondeau J, Boothe D, Guardabassi LG, Gumley N, Papich M, Jessen LR, Lappin M, Rankin S, Westropp JL, Sykes J. International Society for Companion Animal Infectious Diseases (ISCAID) guidelines for the diagnosis and management of bacterial urinary tract infections in dogs and cats. Vet J. 2019 May;247:8-25. doi: 10.1016/j.tvjl.2019.02.008. Epub 2019 Feb 26. PMID: 30971357.