



UK Health
Security
Agency

Characteristics of people with toxigenic *Corynebacterium (C.) ulcerans* exposed to animals in close-contact settings

A rapid systematic review

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Main messages

1. This rapid systematic review (search covering 1 January 2016 to 21 April 2026) identified and summarised evidence on the characteristics of people with confirmed toxigenic *Corynebacterium* (*C.*) *ulcerans* infection who were exposed to animals in settings involving close or direct contact. The search was limited to 2016 onwards due to a change in trends and incident testing that had been observed since this date.
2. Nine case reports were identified (1 to 9). Across the 9 studies, 10 cases with confirmed toxigenic *C. ulcerans* infection were described.
3. All cases were adults, aged between 44 to 76 years. Ninety percent of cases (9 out of 10) were women. All were reported in high-income countries: 4 in Japan (6, 8, 9), 2 in Australia (3, 7), 2 in the UK (1, 5), one in Italy (4), and one in Norway (2).
4. All the 10 cases reported close or direct contact with animals in household settings. Dogs were reported in 3 cases (1 to 3), cats in 3 cases (6, 8, 9), and both dogs and cats in 4 cases (4, 5, 7, 9). In 2 of these cases, additional contact with non-household animals (a semi-tame fox (5) and a stray cat (9)) was also reported.
5. All reported cases had one or more underlying health condition at the time of infection with toxigenic *C. ulcerans*. Diabetes was the most common condition, reported in 7 of the 10 cases (2, 3, 6 to 9). Different cardiovascular conditions (hypertension, ischaemic heart disease, coronary disease, end-stage heart failure, arrhythmia and hypertrophic cardiomyopathy) were also reported in 7 of the 10 cases (1 to 4, 6, 8, 9).
6. Only one of the 10 cases was reported to be immunocompromised, related to ongoing immunosuppressive therapy for arthritis (2); however, many of the others had multiple comorbidities associated with immunosuppression (3, 4, 6 to 9).
7. Diphtheria vaccination history or evidence of vaccination was reported for 5 of the 10 cases (2 to 5, 9). One case had received both childhood vaccination and adult booster before infection (3) and another confirmed they had not been vaccinated (4). In the 3 other cases, vaccination status was unknown and 2 of the 3 had no detectable protective diphtheria antibodies when tested (5, 9). One case had documented detectable protective diphtheria antibody levels 4 years before infection (2). Vaccination history or evidence of vaccination was not reported by every study.
8. The risk of bias assessment showed that the majority of the case reports were at moderate risk of bias due to incomplete reporting of diagnostic methods, failure to investigate the animal source of infection, and documentation of harms. As case

reports are based on selected individuals, findings may not be reliably generalised to the wider population and therefore represent a low level of evidence.

9. In summary, there was evidence from a limited number of cases to provide information on the characteristics of people with confirmed toxigenic *C. ulcerans* infection who were exposed to animals in settings involving close or direct contact. The findings suggested that underlying health conditions, particularly diabetes, were commonly represented among reported cases. However, as the evidence was limited to descriptive case reports without comparator groups, it was not possible to determine which groups were at increased risk or to confirm whether these characteristics increased the risk of *C. ulcerans* infection.

Purpose

The purpose of this rapid systematic review was to identify and summarise the available evidence on the characteristics of people with confirmed toxigenic *C. ulcerans* infection from animals in settings involving close or direct contact.

The review question was:

1. Which groups of people are at increased risk of toxigenic *C. ulcerans* infection from animals?

This rapid systematic review was commissioned to help inform guidance on the Public health management of toxigenic *C. ulcerans* in companion animals ([10](#)).

Methods

A rapid systematic review was conducted, following streamlined systematic methods to accelerate the review process. A literature search was undertaken to look for relevant observational (cohort, cross-sectional or case-control) or descriptive (case series or case reports), published or available as preprints. Three databases were searched: OVID Medline, OVID Embase, and Web of Science Preprint Citation Index. Searches were restricted to publications dated between 1 January 2016 and 21 April 2026 due to a change in trends and incident testing observed since 2016, as advised by topic experts. Backwards and forwards citation searching of primary studies included during full text screening was also performed.

Studies were included if they reported characteristics of people with confirmed toxigenic *C. ulcerans* infection from animals with confirmed or suspected toxigenic *C. ulcerans* infection, or where animals were the presumed source of exposure in close-contact settings. As

toxigenic strains of *C. ulcerans* produce diphtheria toxin and can cause diphtheria in humans; diphtheria vaccination status was reported where available.

A protocol was produced before the literature search was conducted, including the review question, the eligibility criteria, and all other methods. Full details of the methodology are provided in the protocol in [Annexe A](#).

There were no deviations from the protocol; however, one clarification was made. Studies that reported only minimal participant characteristics, for example age and sex only without comorbidities or other clinically relevant characteristics or outcomes, were excluded.

Screening on title and abstract was undertaken in duplicate by 2 reviewers for 20% of the eligible studies, with disagreements resolved by discussion. The remainder were screened by one reviewer in EPPI-Reviewer web version ([11](#)). The priority screening system was used to screen the original database search results, which uses machine learning to prioritise the order of references by their likelihood of inclusion based on prior screening decisions (all studies were screened by a human reviewer). Screening on full text was undertaken by one reviewer and checked by a second.

Data extraction was performed by one reviewer and checked by a second.

Risk of bias assessment was conducted in duplicate by 2 reviewers using JBI Checklist for case reports ([12](#)).

Evidence

In total, 2,577 studies were screened at title and abstract and 21 studies were screened at full text. Of these, 9 studies met the inclusion criteria. No studies were identified from citation searching of included studies. A PRISMA diagram showing the flow of studies through the systematic evidence summary is shown in [Annexe B](#), and studies excluded on full text screening are available with the reasons why in [Annexe C](#). Study characteristics are available in [Annexe D](#), and risk of bias assessments are available in [Annexe E](#).

Of the included 9 studies, all were case reports ([1 to 9](#)). Ten cases were reported across the 9 case reports. Of the 10 cases, 9 (90%) were women. All 10 cases were adults, aged between 44 to 76 years.

All cases were reported in high-income settings. Three studies were reported in Japan ([6](#), [8](#), [9](#)), 2 in the UK ([1](#), [5](#)), 2 in Australia ([3](#), [7](#)) one in Italy ([4](#)) and one in Norway ([2](#)).

Sources of exposure

Animal exposure

All cases reported close or direct contact with animals in household settings. Two of the 10 cases also reported additional contact with non-household animals (a semi-tame fox (5) and a stray cat (9)). Dogs were reported as the animal contact in 3 cases (1 to 3), household cats in 3 cases (6, 8, 9) and both dogs and household cats in 4 cases (4, 5, 7, 9).

Laboratory evidence supporting transmission

In half of the cases (5 out of 10), animal testing provided microbiological evidence supporting animal-to-human transmission. Animal testing was undertaken and detected toxigenic *C. ulcerans* (positive for the *tox* gene, which enables the bacteria to produce diphtheria toxin) in one or more household animals related to the 5 cases (3, 4, 6, 8, 9). In most of these cases, molecular typing showed that bacterial isolates from humans and animals were genetically identical or very closely related, supporting a likely transmission link. This included identical bacterial strain type such as sequence type ST331 (4) and sequence type ST337 (8). In some cases, additional genetic fingerprinting tests comparing bacterial samples from humans and animals using pulsed-field gel electrophoresis (PFGE) and ribotyping demonstrated matching patterns between human and animal isolates (6, 9) and whole genome sequencing providing further support for a probable transmission link (3).

In the remaining 4 cases the animal source was not confirmed because animals tested negative or were not tested (1, 2, 5, 7).

Routes of transmission

The exact route of transmission was not reported in any of the included studies. Where a likely route was proposed, it was associated with direct or close contact with household animals. This included activities such as petting and feeding household cats and dogs (5) and close direct contact with household cats or dogs (4, 6 to 9). The 2 cases that also reported additional contact with non-household animals (a semi-tame fox (5) and a stray cat (9)) did not state a potential route of transmission.

In one case, household animals tested negative but toxigenic *C. ulcerans* was detected in the household environment (including a feeding tray, blanket, furniture and a telephone receiver), suggesting possible indirect transmission through contaminated household surfaces linked to animal contact (9).

Characteristics of cases

A summary of reported cases with confirmed toxigenic *C. ulcerans* infection, who had exposure to animals in settings involving close or direct contact with confirmed or suspected toxigenic *C. ulcerans* infection, is presented in Table 1.

Table 1. Summary of cases with confirmed toxigenic *C. ulcerans*

Study	Age and sex	Human diphtheria vaccination status	Type of animal contact	Source of infection	Comorbidities and immune status
Chu and others, 2021 (1)	76, woman	Unclear whether vaccinated against diphtheria in childhood	Pet dogs	Suspected source: multiple pet dogs No animal testing conducted	Hypertension, ankylosing spondylitis Immune status: not reported
Helleren and others, 2026 (2)	74, man	Documented detectable protective diphtheria antibody levels before infection	Pet dog	Suspected source: 1 pet dog No animal testing conducted	Coronary disease, type 2 diabetes mellitus, Chronic Obstructive Pulmonary Disease (COPD) with obstructive sleep apnoea, psoriatic arthritis, history of colorectal cancer Immune status: Immunocompromised
Hillan and others, 2024 (3)	55, woman	Childhood primary vaccination; adult booster 11 years before infection	Pet dogs	Suspected source: 2 pet dogs Supported by genetic sequencing and molecular typing confirming highly related <i>C. ulcerans</i> strains in the dogs and the human	End-stage heart failure, type 2 diabetes mellitus, ischaemic heart disease, chronic kidney disease, hypertension, a blood clotting disorder (Factor V Leiden thrombophilia), COVID-19 infection Immune status: not reported

Study	Age and sex	Human diphtheria vaccination status	Type of animal contact	Source of infection	Comorbidities and immune status
Monaco and others, 2017 (4)	70, woman	Not vaccinated against diphtheria	Pet dog and cat	Suspected source: 1 pet dog Supported by genetic sequencing and molecular testing confirming identical <i>C. ulcerans</i> strains in the dog and the human	Hypertension, arrhythmia, history or myelodysplastic syndrome (6 years before) Immune status: not reported
Moore and others, 2015 (5)	67, woman	Vaccination status unknown by case. No detectable protective diphtheria antibodies	Pet cats, pet dogs and non-household semi-tame fox	Suspected source: one or multiple of the animals the case had contact with No animal testing conducted	Hypothyroidism Immune status: not reported
Otsuji and others, 2017 (6)	66, woman	Vaccination status unknown by case	Pet cat	Suspected source: 1 pet cat Supported by genetic sequencing and molecular typing confirming identical <i>C. ulcerans</i> strains in the cat and the human	Depression, diabetes, hypertension, hyperlipidaemia Immune status: not reported
Slinko and others, 2023 (7)	44, woman	Vaccination status unknown by case	Pet cat and dog	Suspected source: 1 pet dog Cat tested negative, dog not tested	Type 2 diabetes mellitus Immune status: not reported
Wake and others, 2021 (8)	63, woman	Vaccination status unknown by case	Pet cats	Suspected source: 4 pet cats Supported by molecular typing, confirming identical <i>C.</i>	Diabetes, hypertension Immune status: not reported

Study	Age and sex	Human diphtheria vaccination status	Type of animal contact	Source of infection	Comorbidities and immune status
				<i>ulcerans</i> sequence type in both the cats and the human	
Yasuda and others, 2018 (9) Case 1	67, woman	Vaccination status unknown by case. No detectable protective diphtheria antibodies	Pet cat, pet dog and stray cat	Suspected source: one or multiple of the animals the case had contact with Supported by detection of <i>C. ulcerans</i> in household environmental items Household cat tested negative and environmental swabs tested positive; no other animals tested	Liver cancer, hypertrophic obstructive cardiomyopathy, type 2 diabetes mellitus Immune status: not reported
Yasuda and others, 2018 (9) Case 2	66, woman	Vaccination status unknown by case	Pet cats	Suspected source: 2 pet cats Supported by genetic sequencing and molecular typing confirming identical <i>C. ulcerans</i> strain type in the cats and the human	Prediabetes Immune status: not reported

Underlying health conditions

Underlying health conditions were present among all the confirmed cases reported, with metabolic and cardiovascular conditions reported most frequently. Most cases had multiple comorbidities. One case died on day 3 after hospitalisation (6); the remaining cases in all the other studies recovered following treatment.

Metabolic disorders

Diabetes mellitus was the most frequently reported condition in 7 of the 10 cases (2, 3, 6 to 9). Where specified, type 2 diabetes mellitus was reported in 4 of these 7 cases (2, 3, 7, 9), prediabetes in one case (9) and diabetes type was not specified in the remaining cases (6, 8).

Cardiovascular conditions

Different cardiovascular conditions were reported in 7 of the 10 cases, with some cases having more than one cardiovascular condition. These included hypertension in 5 cases (1, 3, 4, 6, 8), ischaemic heart disease or coronary disease in 2 cases (2, 3), end-stage heart failure in one case (3), arrhythmia in one case (4), hypertrophic cardiomyopathy in one case (9) and hyperlipidaemia in one case (6).

Cancer and haematological disorders

Current or previous cancers or haematological disorders were reported in 3 of the 10 cases, including myelodysplastic syndrome (a blood/bone-marrow disorder) (4), history of colorectal cancer (2), liver cancer (9) and a clotting disorder (Factor V Leiden) in one case (3).

Other conditions

Other conditions were reported in one case each:

- chronic obstructive pulmonary disease (COPD) with obstructive sleep apnoea (2)
- chronic kidney disease (3)
- hypothyroidism (5)
- ankylosing spondylitis (1)
- depression (6)
- psoriatic arthritis (2)

Immune status

Only one of the 10 cases was specifically reported as immunocompromised, related to ongoing treatment with methotrexate and etanercept for psoriatic arthritis (2); however, many of the others had multiple comorbidities associated with immunosuppression (3, 4, 6 to 9).

Vaccination status

Diphtheria vaccination history or evidence of vaccination was reported for 5 of the 10 cases ([2 to 5](#), [9](#)). One of these had not been vaccinated ([4](#)), one case had received both childhood vaccination and an adult booster 11 years before toxigenic *C. ulcerans* infection ([3](#)). In the 3 other cases, vaccination status was unknown by the cases. Two of the 3 had no detectable protective diphtheria antibodies when tested ([5](#), [9](#)). One case had documented detectable protective diphtheria antibody levels 4 years before infection ([2](#)). Vaccination status was not reported for the remaining cases.

Contact tracing and public health management

Summary information on public health measures, testing strategies, and contact tracing approaches is reported below, to provide additional contextual information, as per the protocol.

Contact tracing of household and, where reported, healthcare contacts were reported for 7 of the 10 cases; no secondary human cases (no onward spread to other people) were identified in any of these studies ([1 to 5](#), [7](#), [9](#)).

Contact tracing approaches varied and included identification and monitoring of close contacts, as well as microbiological screening using throat or nose swabs. However, testing methods were not consistently described across studies. Public health actions included isolation of the case, giving antibiotic prophylaxis to contacts, and offering diphtheria vaccination or booster doses where appropriate. In several studies, contacts were actively screened, while in others they were advised to monitor for symptoms. Full details on public health practices, contact tracing and testing approaches are provided in [Annexe D](#).

Critical appraisal of the evidence

The 9 case reports ([1 to 9](#)) were rated as at moderate risk of bias. The rating was due to incomplete reporting of diagnostic methods or clinical timelines in some reports, not investigating or reporting on the animal source (a possible source of infection), or not reporting harms. Full assessments are provided in [Annexe E](#).

Health inequalities

The purpose of this rapid systematic review was to identify characteristics of people with confirmed toxigenic *C. ulcerans* infection, and therefore specific health inequalities were not predefined. Where relevant information was available, it was extracted; among the 10 reported cases, all had comorbidities, and 9 were female. Socioeconomic factors, occupation or ethnicity were rarely reported in the included studies.

Limitations

This rapid systematic review used streamlined systematic methods to accelerate the review process. Sources of evidence searched included databases of peer-reviewed and preprint research, but an extensive search of other sources was not conducted and most article screening was completed without duplication, so it is possible relevant evidence may have been missed.

The evidence identified in this review was only descriptive and consisted of case reports. These descriptive reports focus on selected cases, lack comparison groups and are not intended to identify risk factors. As a result, this did not allow assessment of whether reported characteristics were associated with an increased risk of *C. ulcerans* infection and the characteristics observed among cases cannot reliably be interpreted as independent risk factors for toxigenic *C. ulcerans* infection. The small number of cases (10 across 9 studies) further limits generalisability, and the findings may not apply to the wider population. Reporting of key characteristics including diphtheria vaccination status and immune status was inconsistent across the included studies, which further limited the ability to explore potential risk groups.

Evidence gaps

No cohort studies, case-control studies or cross-sectional studies were identified. No evidence was identified in children; however, it is unclear whether this reflects the underlying characteristics and rarity of infection in children.

All evidence identified came from household settings, no evidence from animal care or veterinary settings, rescue centres or kennels was identified. Information on immune status was limited and was not reported consistently across studies. Information on diphtheria vaccination and antibody levels was also limited. Whilst comparative studies were not required for inclusion, none were identified.

Conclusion

There was evidence available from 9 case reports reporting on the characteristics of people with confirmed toxigenic *C. ulcerans* infection who were exposed to animals in settings involving close or direct contact between 2016 and 2026. Nine of the 10 cases identified were women. Ages of the cases ranged from 44 to 76 years. All reported cases had one or more underlying health condition at the time of infection with toxigenic *C. ulcerans*. Diabetes mellitus was the most frequently reported condition, while cardiovascular conditions, including hypertension and coronary disease, were also common. Only a small number of

cases reported being immunocompromised, and immune status overall was inconsistently described across studies.

The findings of this rapid systematic review suggested that adults with close household animal contact and underlying health conditions, particularly diabetes, were common among the reported cases. However, the evidence base was small and limited to descriptive case reports without comparator groups. Therefore, it was not possible to determine which groups were at increased risk or to confirm whether these characteristics increased the risk of infection.

Acknowledgments

We would like to thank colleagues within the All Hazards Public Health Response division who either reviewed or input into aspects of the review.

Disclaimer

UKHSA's rapid systematic reviews and evidence summaries aim to provide the best available evidence to decision makers in a timely and accessible way, based on published peer-reviewed scientific papers, and papers on preprint servers. Note that the reviews:

- use accelerated methods and may not be representative of the whole body of evidence publicly available
- have undergone an internal independent peer review but not an external peer review
- are only valid as of the date stated on the review

In the event that this review is shared externally, note additionally, to the greatest extent possible under any applicable law, that UKHSA accepts no liability for any claim, loss or damage arising out of, or connected with the use of, this review by the recipient or any third party including that arising or resulting from any reliance placed on, or any conclusions drawn from, the review.

References

1. Chu Michael M and others. '[A Case of Life-Threatening Airway Obstruction Caused by Acute Diphtheria Infection in the United Kingdom](#)' *Cureus* 2021: volume 13, issue 11, page e19675
2. Hellen R and others. '[Severe Respiratory Diphtheria-Like Illness Caused by Toxigenic *Corynebacterium ulcerans*](#)' *Emerging Infectious Diseases* 2026: volume 32, issue 2, pages 285 to 287
3. Hillan A and others. '[Zoonotic transmission of diphtheria toxin-producing *Corynebacterium ulcerans*](#)' *Zoonoses and Public Health* 2024: volume 71, issue 2, pages 157 to 169
4. Monaco M and others. '[Respiratory diphtheria due to *Corynebacterium ulcerans* transmitted by a companion dog, Italy 2014](#)' *Infection* 2017: volume 45, issue 6, pages 903 to 905
5. Moore LSP and others. '[Corynebacterium ulcerans cutaneous diphtheria](#)' *The Lancet Infectious Diseases* 2015: volume 15, issue 9, pages 1,100 to 1,107
6. Otsuji K and others. '[The first fatal case of *Corynebacterium ulcerans* infection in Japan](#)' *JMM Case Reports* 2017: volume 4, issue 8, pages e005106
7. Slinko Vicki G and others. '[Several confirmed and probable zoonotic cases of toxigenic *Corynebacterium ulcerans*, Queensland, Australia](#)' *Communicable Diseases Intelligence* 2023: volume 47
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11. Thomas J and others. [EPPI-Reviewer: advanced software for systematic reviews, maps and evidence synthesis](#). EPPI Centre, UCL Social Research Institute, University College London; 2023
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Annexe A. Protocol

Review question

The review question is:

1. Which groups of people are at increased risk of toxigenic *C. ulcerans* infection from animals?

A search for primary evidence to answer this review question will be conducted from 1 January 2016 up to 21 April 2026.

Eligibility criteria

Table A.1. Inclusion and exclusion criteria

	Included	Excluded
Population	Humans (adults and children)	
Settings	All (no country restrictions)	
Context	Humans exposed to animals in settings involving close or direct contact (for example, households, care settings, veterinary settings, rescue centres, kennels)	
Exposure	Animals with confirmed or suspected toxigenic <i>C. ulcerans</i> infection or Where animals are the presumed source of exposure in close-contact settings	
Comparator	Not applicable	
Outcomes	Characteristics of people with confirmed toxigenic <i>C. ulcerans</i> [note 1] infection from animals in close-contact settings	
Language	English	Any other language
Date of publication	From 1 January 2016 to 21 April 2026	

	Included	Excluded
Study design	Observational studies including cohort studies, case-control studies and cross-sectional studies Descriptive studies including case series or case reports	Reviews (all types) Experimental studies Modelling studies Qualitative studies Mixed methods In-vitro/lab only experimental studies
Publication type	Peer-reviewed published research Preprints	Conference abstracts Editorials Letters News articles Grey literature

Note 1: confirmed toxigenic *C. ulcerans*: a person from whom toxigenic *C. ulcerans* is isolated from a clinical specimen (for example, wound, nasal, or throat swab), with laboratory confirmation that the strain carries the toxin gene (by PCR) and/or produces diphtheria toxin (for example, by Elek test) ([10](#)). Confirmation of transmission from a companion animal does not require testing of the companion animal to establish the source of transmission.

Identification of studies

The following databases will be searched for studies published from 1 January 2016 to 21 April 2026: Ovid Medline, Ovid Embase and Web of Science Preprint Citation Index.

The search strategy is presented in [Search strategy below](#).

Backwards and forwards citation searching will be carried out using references that are included at full text screening as seed papers. Citation searching will use Lens.org via CitationChaser.

Screening

Title and abstract screening will be undertaken in duplicate by 2 reviewers for at least 20% of the eligible studies, with the remainder completed by one reviewer. Disagreement will be resolved by discussion or with involvement of a third reviewer where necessary.

Screening on full text will be undertaken by one reviewer and checked by a second.

Data extraction

Summary information for each study will be extracted and reported in tabular form. Information to be extracted will include country, study period, study design, setting, exposure (animals with confirmed or suspected toxigenic *C. ulcerans* infection, or where animals are the presumed source of exposure in close-contact settings), participants (including demographic characteristics, co-morbidities/underlying chronic diseases, immunocompromised status, other relevant health-related factors), outcomes (characteristics of people with confirmed toxigenic *C. ulcerans* infection from animals in close-contact settings), and any relevant contextual data (public health practices, testing approaches, contact tracing methods and where reported, sources and route of transmission). This will be undertaken by one reviewer and checked by a second. Data that is only available in graphs or figures and not in text will not be extracted.

Risk of bias assessment

Two reviewers will independently complete a risk of bias assessment for included studies, with disagreements resolved by discussion or with a third reviewer. Primary studies will be assessed using the relevant JBI checklist ([12](#)).

Synthesis

Where studies are similar enough to combine and present data in a consistent format, a narrative synthesis will be produced to interpret the findings. The number of studies, the number of participants in each study, effect size and variance and a summary of the risk of bias across studies reporting each outcome will be summarised and presented. Alternatively, if studies present methodological differences that would make synthesis inappropriate, a narrative summary of each study will be provided.

Health inequalities

As this is an equity focused review, part of the purpose is to identify health inequalities and therefore these are not predefined.

Search strategy

Ovid Medline ALL (1 January 2016 to 21 April 2026)

1. exp Corynebacterium/ (10,831)
2. Corynebacterium Infections/ (2,414)
3. corynebacter* ulcerans.tw,kf. (264)

4. C ulcerans.tw,kf. (199)
5. culcerans.tw,kf. (2)
6. "c. ulcerans".tw,kf. (199)
7. "c.ulcerans".tw,kf. (2)
8. or/1-7 11630
9. limit 8 to (comment or editorial or letter or news or newspaper article) (368)
10. 8 not 9 (11,262)
11. limit 10 to dt=20160101-20260421 (2,225)
12. limit 10 to yr=2016-2026 (2,276)
13. 11 or 12 (2,282)

Embase (1 January 2016 to 21 April 2026)

1. exp Corynebacterium ulcerans/ (293)
2. Corynebacterium infection/ (667)
3. corynebacter* ulcerans.tw,kf. (273)
4. C ulcerans.tw,kf. (226)
5. culcerans.tw,kf. (2)
6. "c. ulcerans".tw,kf. (226)
7. "c.ulcerans".tw,kf. (2)
8. or/1-7 (1,038)
9. limit 8 to (conference abstract or conference paper or conference review or editorial or letter) (101)
10. 8 not 9 (937)
11. limit 10 to dd=20160101-20260421 (581)
12. limit 10 to yr=2016-2026 (545)
13. 11 or 12 (581)

Web of Science Preprint Citation Index (1990 to current)

Date of search: 21 April 2026

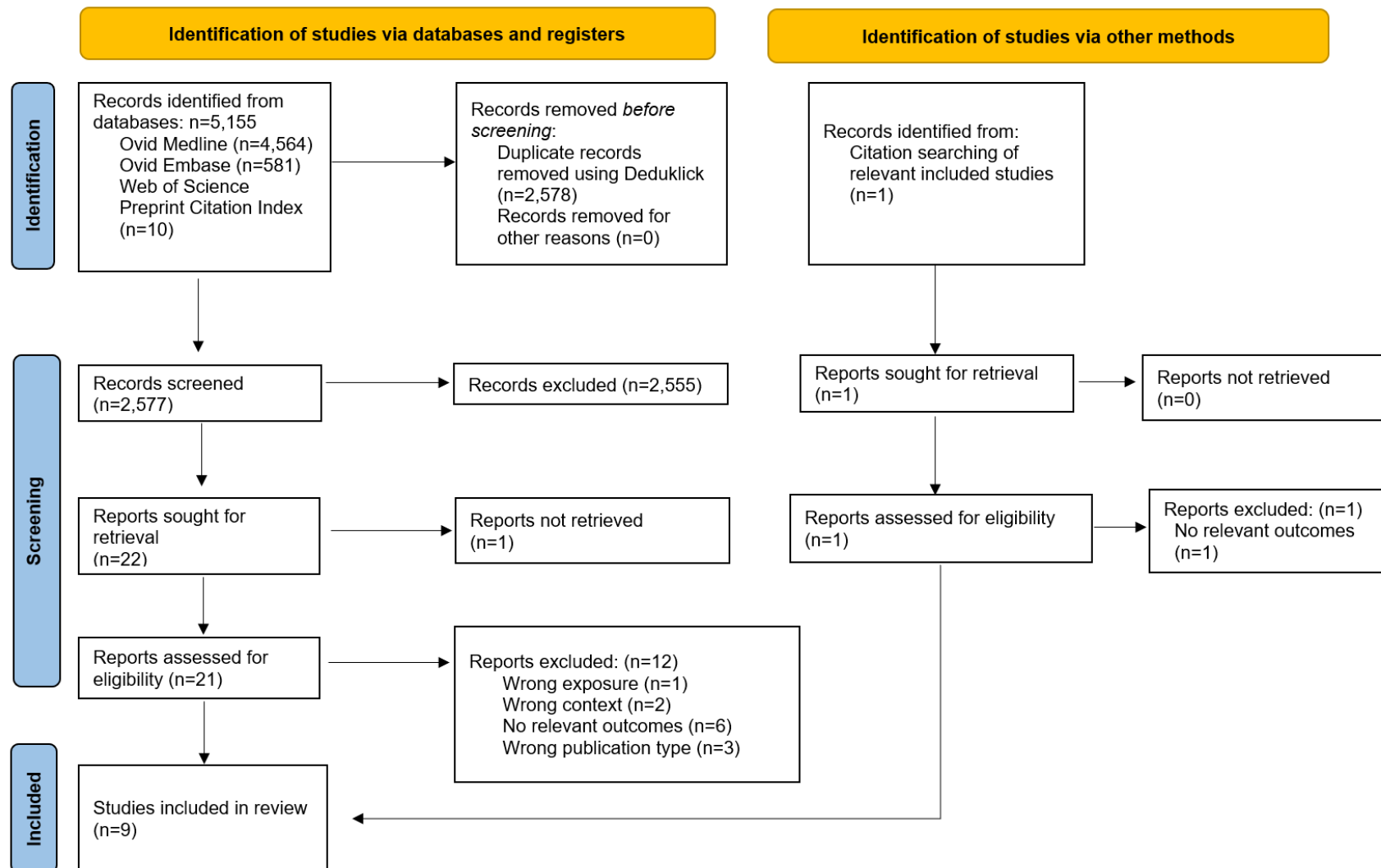
TS=("corynebacter* ulcerans") OR TS=("corynebacter* infection*") OR TS=("c ulcerans") OR TS=(culcerans)

Date limit: 2016 - 2026

Results: 10

Annexe B. Study selection flowchart

Figure B. PRISMA diagram



Text version of Figure B.1. PRISMA diagram

A PRISMA diagram showing the flow of studies through this review, ultimately including 9 studies.

From identification of studies via databases and registers, n=5,155 records identified from databases:

- Ovid Medline (n=4,564)
- Ovid Embase (n=581)
- Web of Science Preprint Citation Index (n=10)

From these, records removed before screening:

- duplicate records removed using Deduplick (n=2,578)
- records removed for other reasons (n=0)

n=2,577 records screened, of which n=2,555 were excluded, leaving n=22 papers sought for retrieval, of which n=1 was not retrieved.

n=1 studies were identified from citation searching of included studies (identification of studies via other methods).

Of the total n=22 papers assessed for eligibility, n=13 were excluded:

- wrong exposure (n=1)
- wrong context (n=2)
- no relevant outcomes (n=7)
- wrong publication type (n=3)

n=9 papers included in the review.

End of text version of Figure B1.

Annexe C. Excluded full texts

Wrong exposure (1 study)

Patil Sachin M and others. '[Prepatellar Bursitis with Abscess due to *Corynebacterium ulcerans*](#)' Case Reports in Orthopedics 2021: volume 2021, 3507672

Wrong context (2 studies)

Bernard KA and others. '[Increase in detection of *Corynebacterium diphtheriae* in Canada: 2006-2019](#)' Canada Communicable Disease Report 2019: volume 45, issue 11, pages 296 to 301

Gaillet M and others. '[Retrospective Study of Infections with *Corynebacterium diphtheriae* Species Complex, French Guiana, 2016-2021](#)' Emerging Infectious Diseases 2024: volume 30, issue 8, pages 1,545 to 1,554

No relevant outcomes (7 studies)

Chene L and others. '[Cutaneous diphtheria from 2018 to 2022: an observational, retrospective study of epidemiological, microbiological, clinical, and therapeutic characteristics in metropolitan France](#)' Emerging Microbes and Infections 2024: volume 13, issue 1, 2408324

Gower Charlotte M and others. '[The changing epidemiology of diphtheria in the United Kingdom, 2009 to 2017](#)' Euro Surveillance: Bulletin European sur les Maladies Transmissibles European Communicable Disease Bulletin 2020: volume 25, issue 11

Hoefer A and others. '[Molecular and Epidemiological Characterization of Toxigenic and Nontoxigenic *Corynebacterium diphtheriae*, *Corynebacterium belfantii*, *Corynebacterium rouxii*, and *Corynebacterium ulcerans* Isolates Identified in Spain from 2014 to 2019](#)' Journal of Clinical Microbiology 2021: volume 59, issue 3

Li L and others. '[Two cases of imported respiratory diphtheria in Edinburgh, Scotland, October 2019](#)' Epidemiology and Infection 2020: volume 148, issue 143, pages 1 to 4

Othieno R and others. '[A case of cutaneous toxigenic *Corynebacterium ulcerans* likely acquired from a domestic dog](#)' Access Microbiology 2019: volume 1, issue 7, e000025

Takahashi Y and others. '[Corynebacterium ulcerans pneumonia treated with venovenous extracorporeal membrane oxygenation: a case report](#)' International Journal of Infectious Diseases 2023: volume 126, pages 145 to 147

Characteristics of people with toxigenic *C. ulcerans* exposed to animals in close contact settings: a rapid systematic review

Yamamoto A and others. '[Clinical Characteristics of *Corynebacterium ulcerans* Infection, Japan](#)' Emerging Infectious Diseases 2023: volume 29, issue 8

Wrong publication type (3 studies)

Metz Amanda R and others. '[Notes from the Field: Toxigenic *Corynebacterium ulcerans* in Humans and Household Pets - Utah and Colorado, 2022-2023](#)' MMWR - Morbidity and Mortality Weekly Report 2024: volume 73, issue 23, pages 534 to 535

Monaco M and others. '[Erratum to: Respiratory diphtheria due to *Corynebacterium ulcerans* transmitted by a companion dog, Italy 2014](#)' Infection 2017: volume 45, issue 6, page 931

Neri G and others. '[Jugulodigastric lymph node inflammation derived from chronic atypical oropharyngeal phlogosis recurring annually after flu virus vaccination: A holistic vision and a clinical case solved after chlamydicidal antibiotic therapy](#)' International Journal of Immunopathology and Pharmacology 2012: volume 25, issue 4, pages 835 to 847

Annexe D. Data extraction tables

Table D.1. Demographics and details of included studies

Abbreviations: *C. ulcerans*: Corynebacterium ulcerans, MALDI-TOF: matrix-assisted laser desorption ionization-time of flight mass spectrometry (a laboratory method used to identify microorganisms based on their protein profile), PCR: polymerase chain reaction, PFGE: pulsed-field gel electrophoresis, ST: sequence type.

Study Country, time period	Study details	Participant characteristics (human)	Toxigenicity confirmation method (in human)	Exposure (animal- related)	Toxigenicity (in animal)	Outcomes (characteristics of people with confirmed toxigenic <i>C. ulcerans</i> infection)	Other contextual data (public health practices, testing approaches, contact tracing methods)
Chu Michael M and others 2021 (1) UK, not reported	Study design: Case report Exposure setting: Unclear	Total cases: 1 Age: 76 years Sex: Woman Occupation: Not reported Ethnicity: Caucasian Vaccination status: Unclear whether the patient had been vaccinated against diphtheria during childhood	Culture testing of nasal secretions confirmed <i>C. ulcerans</i> . Toxigenicity confirmed (method not specified) The patient had toxigenic <i>C. ulcerans</i> infection causing diphtheria	Animal: Dogs Type of contact: Multiple pet dogs Exposure level: Not reported Transmission route: Unknown as not reported Exposure certainty: Suspected Other potential exposure: Contaminated water supplies from a nearby recently flooded dairy farm	Animal infection status: Suspected Toxigenic status: not reported as not tested Animal testing: not reported	Co-morbidities / underlying chronic conditions: Hypertension Ankylosing spondylitis Ex-smoker. Health inequalities: Not reported Immunocompromised status: Not reported	Contact tracing methods: Any member of family or medical staff who had been in close contact and exposed to respiratory droplets within 10 days of the onset of symptoms in the case were traced. Public health practices: 30 family members and healthcare staff were advised to self-isolate. Healthcare staff specifically underwent swabbing and were offered tetanus, diphtheria, and polio booster vaccination and started on prophylactic clarithromycin for 1 week. Testing approaches: Each member of medical staff had a nasopharyngeal and oropharyngeal swab taken for diphtheria toxin testing.
Helleren R and others 2026 (2) Norway, January, 2024	Study design: Case report Exposure setting: Unclear - household suspected	Total cases: 1 Age: 74 years Sex: Man Occupation: Not reported Ethnicity: Not reported	Tox gene detected by PCR and toxin production confirmed by a modified Elek test	Animal: Dog Type of contact: Pet dog (1) Exposure level: not reported	Animal infection status: Not reported (animal appeared healthy; infection not confirmed) Toxigenic status: not reported as not tested	Co-morbidities / underlying chronic conditions: Coronary disease, type 2 diabetes mellitus, chronic obstructive pulmonary disease with obstructive sleep apnoea, history of colorectal cancer	Contact tracing methods: Not described (contacts monitored; no secondary cases detected) Public health practices:

Study Country, time period	Study details	Participant characteristics (human)	Toxigenicity confirmation method (in human)	Exposure (animal- related)	Toxigenicity (in animal)	Outcomes (characteristics of people with confirmed toxigenic <i>C. ulcerans</i> infection)	Other contextual data (public health practices, testing approaches, contact tracing methods)
		Vaccination status: Not explicitly reported (documented protective diphtheria antibody levels 4 years prior to infection)		Transmission route: Unknown as not reported Exposure certainty: Suspected but unconfirmed (no microbiological testing of animal)	Animal testing: not reported	(hemicolectomy - bowel surgery in 2019), psoriatic arthritis Health inequalities: Not reported Immunocompromised status: Immunocompromised since 2021 due to methotrexate and etanercept for psoriatic arthritis	Isolation precautions implemented; no secondary cases detected among close contacts or healthcare workers Testing approaches: Not reported
Hillan A and others 2024 (3) Australia, not reported	Study design: Case report Exposure setting: Household	Total cases: 1 Age: 55 years Sex: Woman Occupation: Not reported Ethnicity: Not reported Vaccination status: Primary vaccination in childhood and a subsequent booster of adult diphtheria or tetanus 11 years before the current illness	Tox gene detected by PCR (no toxin production test [for example, Elek test] performed as was not available)	Animal: Dog Type of contact: Close direct contact with pet dogs (2) Exposure level: Close direct contact with all household members Transmission route: Unknown as not reported - probable zoonotic transmission (exact route not specified) Exposure certainty: Probable (supported by genomic evidence) Other potential exposure: Preparing raw chicken at home	Animal infection status: Confirmed Toxigenic status: Positive (tox gene detected) Animal testing: Nose and throat swabs were collected from dogs; bacterial microscopy and culture were performed, and isolates were tested for the diphtheria toxin (tox) gene using PCR	Co-morbidities or underlying chronic conditions: End-stage heart failure, type 2 diabetes mellitus, ischaemic heart disease, chronic kidney disease, hypertension, Factor V Leiden mutation and clotting and stroke events, and COVID-19 infection 1 month prior. Health inequalities: Not reported Immunocompromised status: Not reported	Contact tracing methods: Five household contacts were identified as close contacts and underwent urgent assessment, including microbiological testing (nose and throat swabs) Public health practices: Household contacts were advised to monitor for symptoms and seek medical review and testing if symptoms developed. Public health authorities were notified for urgent investigation. The case was interviewed and provided with information regarding transmission risk and wound hygiene. Case isolation was recommended until completion of therapy and wound healing. Contact management included microbiological testing, provision of antibiotic prophylaxis, and administration of diphtheria toxoid booster vaccination where indicated. One symptomatic

Study Country, time period	Study details	Participant characteristics (human)	Toxigenicity confirmation method (in human)	Exposure (animal-related)	Toxigenicity (in animal)	Outcomes (characteristics of people with confirmed toxigenic <i>C. ulcerans</i> infection)	Other contextual data (public health practices, testing approaches, contact tracing methods)
							contact was temporarily excluded from occupational activities pending test results. Testing approaches: Nose and throat swabs were submitted for culture to assess <i>C. ulcerans</i> carriage in household contacts. All results were negative
Monaco M and others 2017 (4) Italy, 2014	Study design: Case report Exposure setting: Household	Total cases: 1 Age: 70 years Sex: Woman Occupation: Not reported Ethnicity: Not reported Vaccination status: Case had not been vaccinated for diphtheria	Tox gene detected by PCR and toxin production confirmed by a modified Elek test	Animal: Dog and cat Type of contact: Pet dog (Case was in contact with a cat that tested negative to <i>C. ulcerans</i>). Exposure level: Close household contact with an old dog suffering from mouth ulcers; also cared for daughter's cat for 2 weeks before the onset of illness (cat tested negative). Transmission route: Unknown as not reported - probable zoonotic transmission via direct contact with infected dog Exposure certainty: Probable (supported by genomic evidence - strain isolated from the dog was identical to the human isolate (ST331))	Animal infection status: Confirmed Toxigenic status: Positive (dog isolate contained tox gene) Animal testing: Culture and PCR (tox gene detection) (Nasal and throat swabs were taken; only the dog's nasal culture grew <i>C. ulcerans</i>, which carried the diphtheria toxin gene. Cat tested negative)	Co-morbidities / underlying chronic conditions: myelodysplastic syndrome (6 years ago), past history of high blood pressure and irregular heartbeats (taken medications) Health inequalities: Not reported Immunocompromised status: Not reported	Contact tracing methods: The patient's close household contact (husband and other family members including two children) was screened for <i>C. ulcerans</i>. Healthcare workers were placed under surveillance Public health practices: The patient's close household contacts were screened for <i>C. ulcerans</i> and were offered diphtheria vaccination or a booster dose according to their vaccination status. Healthcare staff were placed under surveillance and offered vaccination or an antibiotic course Testing approaches: Screening of household contacts is reported, but specific sampling methods are not described; no explicit testing method is reported for healthcare staff

Study Country, time period	Study details	Participant characteristics (human)	Toxigenicity confirmation method (in human)	Exposure (animal- related)	Toxigenicity (in animal)	Outcomes (characteristics of people with confirmed toxigenic <i>C. ulcerans</i> infection)	Other contextual data (public health practices, testing approaches, contact tracing methods)
Moore LSP and others 2015 (5) UK, not reported	Study design: Case report Exposure setting: Unclear - household suspected	Total cases: 1 Age: 67 years Sex: Woman Occupation: Not reported Ethnicity: Not reported Vaccination status: Case unable to recall whether they had had a diphtheria vaccination (case no detectable protective diphtheria antibodies)	Tox gene detected by PCR and toxin production confirmed by the Elek test	Animal: Cats (including fostered/feral cats), dogs and fox Type of contact: Close contact with pet cats (16) and dogs (6), and indirect/occasional exposure to a semi-tame fox Exposure level: Direct close contact with multiple companion animals and occasional wildlife exposure Transmission route: Unknown as not reported - probable zoonotic transmission via direct contact (petting and feeding) with dogs and cat and indirect contact with fox Exposure certainty: Suspected but unconfirmed (animal source unconfirmed and no microbiological testing performed)	Animal infection status: Unknown and not reported (animals were not tested) Toxigenic status: not reported as note tested Animal testing: Not performed (source animal uncertain and screening considered but deemed infeasible due to multiple potential animal contacts and practical limitations)	Co-morbidities / underlying chronic conditions: Hypothyroidism (on thyroid replacement therapy) Health inequalities: Not reported Immunocompromised status: Not reported	Contact tracing methods: Three household contacts and healthcare workers were screening for carriage of <i>C.</i> <i>ulcerans</i> ; no secondary carriers or cases identified. Public health practices: Vaccination status of household contacts and health-care staff was reviewed and tetanus- diphtheria-polio vaccination administered where appropriate Testing approaches: Screening of household contacted and healthcare staff performed; specific sampling and testing methods not reported.
Otsuji K and others 2017 (6) Japan, 2016	Study design: Case report Exposure setting: Household	Total cases: 1 (fatal; death on day 3 after hospitalisation) Age: 66 years Sex: Woman Occupation: Not	Tox gene detected by PCR, toxin production confirmed by western blot and functional activity demonstrated by a Vero cell cytotoxicity assay	Animal: Cats Type of contact: Close contact with pet cats (3) Exposure level: Direct household exposure to multiple cats	Animal infection status: Confirmed (<i>C. ulcerans</i> isolated from cat) Toxigenic status: Confirmed (Tox gene detected by PCR, toxin production confirmed)	Co-morbidities / underlying chronic conditions: Depression, diabetes, hypertension and hyperlipidaemia (under medication)	Contact tracing methods: Not reported Public health practices: Not reported

Study Country, time period	Study details	Participant characteristics (human)	Toxigenicity confirmation method (in human)	Exposure (animal-related)	Toxigenicity (in animal)	Outcomes (characteristics of people with confirmed toxigenic <i>C. ulcerans</i> infection)	Other contextual data (public health practices, testing approaches, contact tracing methods)
		reported Ethnicity: East Asian Vaccination status: Unknown (history of diphtheria vaccination unclear)		Transmission route: Unknown as not reported - probable zoonotic transmission via close contact with household cats Exposure certainty: Probable (supported by molecular evidence - identical PFGE and ribotyping profiles in patient and cat isolates)	by western blot and functional activity demonstrated by a Vero cell cytotoxicity assay) Animal testing: Swabs (nasal, throat, conjunctival, ear) collected; culture performed with identification by API Coryne system, followed by molecular characterisation (PCR, sequencing, PFGE, and ribotyping)	Health inequalities: Not reported Immunocompromised status: Not reported	Testing approaches: Not reported
Slinko Vicki G and others 2023 (7) Australia, 19 November 2018	Study design: Case report Exposure setting: Household	Total cases: 1 Age: 44 years Sex: Woman Occupation: Not reported Ethnicity: Not reported Vaccination status: Unknown (history of diphtheria vaccination unclear)	Tox gene detected by PCR and toxin type confirmed via whole genome sequencing	Animal: Dog (1) and cat (1) Type of contact: Close contact with a household cat and a dog. (Cat: healthy; no <i>C. ulcerans</i> isolated from nasopharyngeal swabs; dog: had an offensive-smelling ear discharge; euthanised and cremated prior to sampling [about 2 weeks before symptom onset]) Exposure level: Direct exposure to cat and dog in a household	Animal infection status: Not confirmed (cat: nasopharyngeal swab taken, <i>C. ulcerans</i> not isolated; dog: not sampled) Toxigenic status: Unknown (no animal isolates obtained) Animal testing: Not performed for dog (no sampling possible due to euthanasia and cremation); cat tested negative on nasopharyngeal swab culture	Co-morbidities / underlying chronic conditions: Type 2 diabetes mellitus Health inequalities: Not reported Immunocompromised status: Not reported	Contact tracing methods: Household, household-like and intimate contacts were identified (n=5), specific contact tracing methods not described. Public health practices: All household and household-like or intimate contacts identified were negative for <i>C. ulcerans</i> but were given erythromycin prophylaxis and offered a Diphtheria-Toxoid-containing vaccine Testing approaches: Nasopharyngeal and throat swabs cultures were tested in household and intimate

Study Country, time period	Study details	Participant characteristics (human)	Toxigenicity confirmation method (in human)	Exposure (animal- related)	Toxigenicity (in animal)	Outcomes (characteristics of people with confirmed toxigenic <i>C. ulcerans</i> infection)	Other contextual data (public health practices, testing approaches, contact tracing methods)
				Transmission route: Unknown as not reported - potential zoonotic transmission via direct contact with household cat or dog Exposure certainty: Suspected but unconfirmed (dog could not be sampled; cat tested negative)			contacts, but specific testing methods not reported; results were negative for <i>C. ulcerans</i>
Wake K and others 2021 (8) Japan, not reported	Study design: Case report Exposure setting: Household	Total cases: 1 Age: 63 years Sex: Woman Occupation: Not reported Ethnicity: Not reported Vaccination status: Unknown (history of diphtheria vaccination unclear	Tox gene detected by PCR and toxin production confirmed by Vero cell cytotoxicity test	Animal: Cats Type of contact: Close contact with household cats (6) Exposure level: Direct household exposure to cats Transmission route: Unknown as not reported - probable zoonotic transmission via direct contact with household cats Exposure certainty: Probable (supported by genomic evidence - strain isolated from the cat was identical to the human isolate (ST337))	Animal infection status: Confirmed (<i>C. ulcerans</i> isolated from 4 of 6 cats) Toxigenic status: Positive (tox gene detected in 4 cats) Animal testing: Nasal and eye swabs collected from all 6 cats; culture/identification by MALDI-TOF or RNA polymerase beta- subunit gene (rpoB) sequencing; PCR for tox gene; Vero cell cytotoxicity testing on isolates	Co-morbidities / underlying chronic conditions: Diabetes and hypertension Health inequalities: Not reported Immunocompromised status: Not reported	Contact tracing methods: Not reported Public health practices: Not reported Testing approaches: Not reported
Yasuda I and others 2018 (9)	Study design: Case report	Total cases: 2 (this row describes case 1)	Tox gene detected by PCR and toxin production confirmed	Animal: Dog and cats Type of contact: - Contact with pet dog, pet	Animal infection status: - Not confirmed (cat throat swab cultured -	Co-morbidities/underlying chronic conditions: Hepatocellular carcinoma, hypertrophic obstructive	Contact tracing methods: Not described (1 household contact monitored; no secondary cases detected)

Study Country, time period	Study details	Participant characteristics (human)	Toxigenicity confirmation method (in human)	Exposure (animal-related)	Toxigenicity (in animal)	Outcomes (characteristics of people with confirmed toxigenic <i>C. ulcerans</i> infection)	Other contextual data (public health practices, testing approaches, contact tracing methods)
Case 1 Japan, not reported	Exposure setting: Household	Age: 67 years Sex: Woman Occupation: Not reported Ethnicity: Not reported Vaccination status: Not explicitly reported (had no detectable protective diphtheria antibodies)	by Vero cell cytotoxicity assay	cat, and a stray cat. Exposure level: Direct contact with companion animals and close contact with stray cats Transmission route: - Unconfirmed; possible zoonotic transmission: companion animals tested negative, but <i>C. ulcerans</i> was detected in the domestic environment associated with the pet cat (feeding tray, furniture, blanket, telephone), suggesting indirect exposure via contaminated animal-associated surfaces. Exposure certainty: - Suspected (environmental contamination only; no animal infection confirmed)	negative; dog testing not reported, stray cats not tested; <i>C. ulcerans</i> detected only in household environment <i>C. ulcerans</i> detected in household environment only) Toxigenic status: Not confirmed in animals; environmental isolates positive for <i>C. ulcerans</i> (feeding tray, cat blanket, telephone receiver) Animal testing: Cat throat swab cultured (negative); environmental swabs positive for <i>C. ulcerans</i> by culture (by PCR), but toxigenicity (tox gene or toxin production) not tested	cardiomyopathy, and type 2 diabetes mellitus Health inequalities: Not reported Immunocompromised status: Not reported	Public health practices: Not reported Testing approaches: Throat swab culture performed on household contact (husband) but tested negative for <i>C. ulcerans</i>
Yasuda I and others 2018 (9) Case 2 Japan, not reported	Study design: Case report Exposure setting: Household	Total cases: 2 (this row describes case 2) Age: 66 years Sex: Woman Occupation: Not reported Ethnicity: Not reported	Tox gene detected by PCR and toxin production confirmed by Vero cell cytotoxicity assay	Animal: Cats Type of contact: Contact with 3 pet cats. Exposure level: Direct contact with pet cats Transmission route: -	Animal infection status: - Two of 3 pet cats infected (<i>C. ulcerans</i> isolated) Toxigenic status: Positive (tox gene detected in cat isolates) Animal testing:	Co-morbidities/underlying chronic conditions: Prediabetes Health inequalities: Not reported Immunocompromised status: Not reported	Contact tracing methods: Not reported Public health practices: Not reported Testing approaches: Not reported

Study Country, time period	Study details	Participant characteristics (human)	Toxigenicity confirmation method (in human)	Exposure (animal- related)	Toxigenicity (in animal)	Outcomes (characteristics of people with confirmed toxigenic <i>C. ulcerans</i> infection)	Other contextual data (public health practices, testing approaches, contact tracing methods)
		Vaccination status: Unknown (history of diphtheria vaccination unclear)		Probable zoonotic transmission via direct contact with household cats Exposure certainty: - Probable (supported by molecular evidence - ribotype of isolates from cats matched the human isolate)	Culture (via PCR) confirmed <i>C. ulcerans</i> in 2/3 cats. Isolates underwent rpoB sequencing, tox gene PCR, Vero cell cytotoxicity assay, and ribotyping. Cat and human isolates were toxigenic and genetically matched		

Annexe E. Risk of bias assessment

Table E.1. Risk of bias assessment for case reports

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Comments (including reason for no)
Chu Michael and others, 2021 (1)	Yes	Yes	Yes	Unclear	No	Yes	Yes	Yes	Q4: No details of <i>C. ulcerans</i> testing methods were reported Q5: Pet dogs were not investigated or reported as infected, despite being a possible source
Helleren R and others, 2026 (2)	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Q5: Pet dog was not investigated or reported as infected, despite being a possible source
Hillan A and others, 2024 (3)	Yes	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes	Q5: Lack of investigation into other potential sources Q7: Does not report any adverse events harms, or unintended effects, nor explicitly state that no adverse events occurred
Monaco M and others, 2017 (4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Moore LSP and others, 2015 (5)	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Q5: Animal source unconfirmed and no microbiological testing performed
Otsuji K and others, 2017 (6)	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Q2: No timeline of medical history or description of initial hospitalisation
Slinko Vicki G and others, 2023 (7)	Yes	Unclear	Yes	Yes	Unclear	Yes	Unclear	Yes	Q2: Limited information reported on timeline of case and hospitalisation Q5: Pet dog was not sampled due to euthanasia, despite being a possible source Q7: Does not report any adverse events harms, or unintended effects, nor explicitly state that no adverse events occurred
Wake K and others, 2021 (8)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Yasuda I and others, 2018 (9)	Yes	Yes	Yes	Yes	Unclear	Yes	Unclear	Yes	Q5: Stray cat was not tested, despite being a possible source Q7: Does not report any adverse events harms, or unintended effects, nor explicitly state that no adverse events occurred

Critical appraisal was done using the JBI checklist for case reports [\(12\)](#).

List of questions:

- Q1: Were patient's demographic characteristics clearly described?
- Q2: Was the patient's history clearly described and presented as a timeline?
- Q3: Was the current clinical condition of the patient on presentation clearly described?
- Q4: Were diagnostic tests or assessment methods and the results clearly described?
- Q5: Was the intervention(s) or treatment procedure(s) clearly described?
- Q6: Was the post-intervention clinical condition clearly described?
- Q7: Were adverse events (harms) or unanticipated events identified and described?
- Q8: Does the case report provide takeaway lessons?

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