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RECOVER Guidelines: First Aid in Dogs and Cats. Evidence and Knowledge Gap Analysis With Treatment Recommendations

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ABSTRACT

Objective: To systematically review the evidence on, to devise clinical recommendations for, and to identify critical knowledge gaps regarding the provision of first aid in dogs and cats.

Abbreviations: AC, activated charcoal; ALS, advanced life support; aOR, adjusted odds ratio; BG, blood glucose concentration; BLS, basic life support; CI, confidence interval; COPD, chronic obstructive pulmonary disease; CoSTR, consensus on science and treatment recommendation; CPA, cardiopulmonary arrest; CT, clinical trial; CWI, cold water immersion; ED, emergency department (human); EE, Evidence Evaluator; EMS, emergency medical services (human); ES, experimental study; FA, First Aid (Domain); FB, foreign body; FBAO, foreign body airway obstruction; GRADE, Grading of Recommendations, Assessment, Development, and Evaluation; IN, intranasal; LoS, length of hospital stay; OHCA, out-of-hospital cardiopulmonary arrest; OR, odds ratio; OS, observational study; PICO, Population–Intervention–Comparator–Outcome; RECOVER, Reassessment Campaign on Veterinary Resuscitation; ROSC, return of spontaneous circulation; SoI, syrup of ipecac.

Vincent J. Thawley, Deborah C. Mandell, and Jamie M. Burkitt-Creedon contributed equally to this work.

Design: Standardized, systematic evaluation of literature pertinent to first aid following Grading of Recommendations, Assessment, Development, and Evaluation methodology. Identified literature regarding prioritized questions in the Population–Intervention–Comparator–Outcome (PICO) format was reviewed independently by Evidence Evaluators, and findings were reconciled by Domain Chairs and Reassessment Campaign on Veterinary Resuscitation Co-Chairs to arrive at treatment recommendations commensurate with the quality of evidence and feasibility. This process was implemented using an evidence profile worksheet for each PICO question, including an introduction, consensus on science, treatment recommendations, justification of recommendations, and knowledge gaps. Treatment recommendations underwent a 4-week comment period among international veterinary stakeholders prior to finalization.

Setting: Transdisciplinary, international collaboration in university, specialty, emergency, and general practice.

Results: Sixteen PICO questions pertaining to first aid were addressed in this project. We separated 10 general first aid scenario PICO questions from those pertaining to allergy and anaphylaxis, reported elsewhere. These main first aid PICO questions resulted in 38 treatment recommendations regarding a variety of conditions for which prehospital care may improve morbidity and mortality in dogs and cats. Many recommendations are supported by low or very low quality of evidence (15) or based on expert opinion (18).

Conclusions: Uncertainty remains regarding optimal ways for bystanders to recognize specific conditions and provide first aid in the prehospital setting to dogs and cats. However, through comprehensive evidence evaluation and a consensus process that included considerations of safety and feasibility, the resulting treatment recommendations lay the foundation for clear, actionable guidance in small animal first aid. Additionally, a list of high-priority knowledge gaps was identified to guide collaborative clinical research to overcome a significant deficit in veterinary literature.

1 | Introduction

First aid is assistance provided to an ill or injured individual until full medical treatment is available. First aid can be initiated by anyone, and these prehospital interventions that preserve life, prevent further injury or illness, and promote recovery are key elements in the Chain of Survival [1, 2]. The International Liaison Committee on Resuscitation ("ILCOR") includes recommendations for first aid in its topic domains to better support the Chain of Survival alongside its evidence- and consensus-based recommendations regarding CPR [2, 3].

While limited recommendations for field treatment of working dogs [4] and best practice recommendations for prehospital care of companion dogs and cats [5] exist, no evidence- and consensus-based treatment recommendations for first aid in dogs and cats using a systematic and transparent evaluation framework such as GRADE (Grading of Recommendations Assessment, Development, and Evaluation) have been published. Therefore, at the time the Reassessment Campaign on Veterinary Resuscitation (RECOVER) initiative evaluated the evidence for the small animal CPR topic domains for the 2024 update, the initiative also endeavored to create the first evidence-based consensus guidelines on first aid in dogs and cats [6, 7]. Treatment recommendations produced following a systematic framework for evidence evaluation allow for standardization and optimization of preclinical treatment recommendations for specific conditions in dogs and cats, and can more clearly describe critical knowledge gaps for first aid provision in these species. The current First Aid (FA) Domain paper contains the consensus on science (evidence summary), treatment recommendations, and justification for treatment recommendations (CoSTRs) for 10 general first aid topics in dogs and cats.

2 | Methods

This project followed the 2024 RECOVER Guidelines methodology (Figure 1), published in detail elsewhere [8]. Where methodology was modified, for instance, to perform more recent literature searches to bridge time gaps between the original literature search and evidence analysis, such deviation is noted in Section 2.3 and in the individual Population–Intervention–Comparator–Outcome (PICO) subsection of the current paper, generally in the PICO's Consensus on Science section.

Briefly, these RECOVER First Aid treatment recommendations were generated using a modified version of the GRADE (Grading of Recommendations, Assessment, Development, and Evaluation) system for guideline generation in health care and were then further refined using a predetermined consensus process [9]. The FA Domain project started in 2018 with the generation of a list of prioritized questions pertaining to first aid, many of which were extrapolated from topics covered in contemporaneous human first aid guidelines [10, 11] and culminated with a consensus period and manuscript writing in 2026. A concise summary of the iterative evidence evaluation and consensus process is provided below.

2.1 | Defining PICO Questions

The RECOVER Co-Chair originally overseeing the FA Domain (D.F.) appointed content experts to serve as Domain Chairs for the FA Domain (D.M., V.T.). These Domain Chairs, together with the Co-Chair, generated research questions in the PICO format and identified three to five clinically relevant outcomes for each PICO question. PICO questions were rated as high, moderate, or

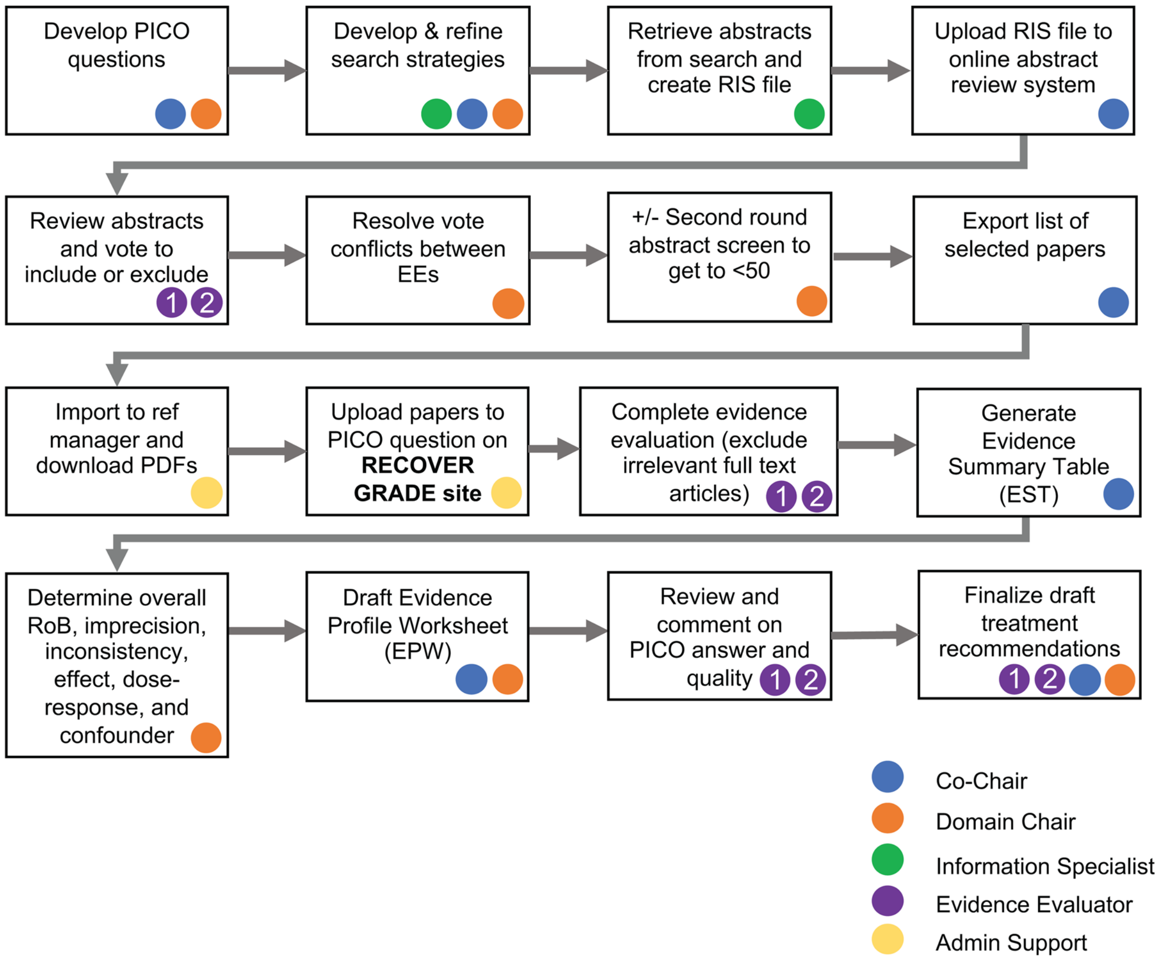

FIGURE 1 | Evidence evaluation process overview for the RECOVER First Aid Domain. GRADE, Grading of Recommendations Assessment, Development, and Evaluation; PICO, Population–Intervention–Comparator–Outcome; RECOVER, Reassessment Campaign on Veterinary Resuscitation; RIS, Research Information System.

lower priority. Fourteen of 28 initially proposed PICO questions were considered high priority; due to the limited number of volunteers available to conduct evidence evaluation and to generate treatment recommendations, only high-priority questions were investigated. During evidence synthesis, two additional PICO questions were added in late 2025. Thus, a total of 16 FA Domain PICO questions were addressed; 10 are presented in this paper and six in a companion paper focused specifically on preclinical and emergency room management of acute hypersensitivity reactions [12].

For each PICO question, Domain Chairs ranked the outcomes according to their clinical importance, so that treatment recommendations could be made based on the evidence pertaining to the highest priority outcome for which clinically relevant evidence was available. The most commonly included outcomes were survival to discharge, incidence of cardiopulmonary arrest (CPA), severity of clinical signs, and length of hospital stay (LoS), usually in this order of priority. Additional outcomes were investigated depending on the PICO question.

2.2 | Literature Search and Screening

Specialist librarians (Information Specialists) worked with RECOVER Co-Chairs to develop the search strategy for the project [13]. Literature search strings were developed for each PICO question using an iterative process among Information Specialists and Domain Chairs to optimize the number and type of articles returned in each search. Peer review of search strategies occurred using modified Peer Review of Electronic Search Strategy Guidelines and informal meetings [14]. Databases searched included PubMed, CAB Abstracts using the CAB Direct platform, and Scopus, and date coverage included the years 1966–2020. Articles written in non-English languages, letters, and other nonanalytical publications were excluded at the level of search strategies.

For each PICO question, two Evidence Evaluators (EEs) (e.g., specialist veterinarians, general veterinarians in emergency or specialty practice, or veterinary technician specialists in emergency and critical care) independently reviewed titles and abstracts of initially identified articles to eliminate irrelevant publications and to arrive at potentially relevant primary literature for further review[1]. Reviews, meta-analyses, case reports and case series, and non-peer-reviewed publications (e.g., proceedings) were excluded either during this title and abstract screening process or later at the full-text review stage. Domain Chairs or Co-Chairs resolved any conflicts between EEs by casting the tie-breaking vote on pertinent articles. Full texts of these potentially relevant publications were then reviewed for each PICO by the same EEs; first, they established the relevance of each publication for the PICO question, and if confirmed, they extracted relevant information from these publications for each predefined outcome.

2.3 | Evidence Evaluation and Treatment Recommendations

EEs used a purpose-developed, web-based evaluation platform to proceed through a predetermined, standardized set of questions to evaluate key aspects of evidence quality (e.g., risk of bias; indirectness of population, intervention, and outcomes). Based on EE responses, the evaluation platform generated a Summary of Findings Table for each outcome for every PICO question. EEs also provided a succinct overview and evidence summaries for their PICO question.

From the EEs' Summary of Findings Table and Evidence Summaries, the FA Domain Chairs or a RECOVER Co-Chair (J.B.) drafted Evidence Profile Worksheets for each PICO question. The Evidence Profile Worksheets included a structured summary (introduction, CoSTR, justifications for the treatment recommendations, and knowledge gaps for future study) and additional notes made during the evaluation of individual studies. Prior to completing each PICO's Evidence Profile Worksheet, the active Co-Chair (J.B.) executed a bridge literature search to identify new or missed relevant research, as the formal literature searches were ~5 years old at that time. Details of these bridge literature searches and notes on relevant identified publications are included in each PICO's Evidence Profile Worksheets, along with their CoSTR; these full Evidence Profile Worksheets are available elsewhere[2]. If additional pertinent publications were identified on the bridge search, the Co-Chair conducted an evidence quality evaluation (e.g., risk of bias, indirectness, imprecision, inconsistency) and reported the studies' qualities and findings separately from the two-EE GRADE-evaluated literature in the CoSTRs. The Evidence Profile Worksheets were then reviewed and edited by two Co-Chairs (J.B., D.F.), and then collectively reviewed and edited by the two FA Domain Chairs (D.M., V.T.) and two Co-Chairs (J.B, D.F.).

In accordance with the GRADE system, each treatment recommendation is written either as a *recommendation* where the RECOVER writing group found stronger evidence (or perceived risk/benefit relationship, where evidence was poor or not available) or as a *suggestion* where the writing group found weaker evidence (or perception of risk/benefit relationship, where evidence was not available) for or against the intervention. From the 10 PICO questions, the writing group proposed a total of 37 treatment recommendations.

2.4 | Consensus Process

Drafted versions of 37 First Aid treatment recommendations were made accessible[3] to the EEs, subject matter experts, and the international veterinary community at large for a 4-week comment period from March to April 2026. The RECOVER Initiative directly contacted emergency and critical care specialty groups and general veterinary societies worldwide to invite comments. After the 4-week comment period closed, comments were considered by the Co-Chairs and Domain Chairs, and relevant treatment recommendations were refined to create 38 finalized treatment recommendations for first aid in dogs and cats, which appear in this publication along with background information, consensus on science, justifications of treatment recommendations, and key knowledge gaps for each PICO.

3 | Results

3.1 | Hypoglycemia (FA-06)

In cats and dogs in the prehospital setting with symptomatic hypoglycemia (P), does administration of dietary forms of sugar (I), compared with no oral sugar supplementation (C), result in improved outcome (O)?

3.1.1 | Introduction

Human first aid guidelines recommend the administration of oral glucose for adults and children with suspected hypoglycemia, as long as they are able to follow commands and swallow [15, 16]. This practice is commonly recommended for dogs and cats with suspected hypoglycemia in the prehospital setting as an early intervention prior to seeking veterinary care [17, 18]. For this PICO, we attempted to determine whether oral sugar administration to dogs and cats with suspected hypoglycemia results in improved outcomes.

3.1.2 | Consensus on Science

3.1.2.1 | Outcomes 1 and 2: Survival to Discharge and Incidence of CPA. Because the identified studies did not distinguish between survival to discharge and incidence of CPA, these outcomes were combined.

For the two most critical outcomes of survival to discharge and incidence of CPA, we identified one clinical trial (CT; very low quality of evidence, downgraded for very serious risk of bias, serious indirectness, and imprecision) and one observational study (OS; very low quality of evidence, downgraded for serious risk of bias, very serious indirectness, and imprecision) that addressed the PICO question [19, 20]. A prospective, randomized CT by Venn et al. compared an outpatient treatment protocol to an in-hospital protocol for 40 client-owned dogs with parvovirus, all of which were initially stabilized, and all of which were treated for the study duration in the hospital. In the outpatient cohort, 1–5 mL of high-fructose corn syrup was given orally every 4–6 h as needed based on blood glucose measurements, while inpatient dogs received dextrose as a 25% IV bolus followed by 2.5%–7.5% supplementation in IV fluids. No difference in mortality was noted between the two groups, though this study was not designed to evaluate the effect of oral glucose administration specifically, and other varied protocol treatments likely affected results [19]. A study by Oxner et al. evaluated the administration of a crushed sugar cube placed sublingually, in addition to a standardized treatment bundle including IV dextrose administration, in hypoglycemic children with severe malaria [20]. Prior to initiating the standardized treatment bundle as a whole, mortality was 9%; after implementing the bundle ("Phase 1") and adding sublingual sugar to the existing IV dextrose treatment in hypoglycemic children ("Phase 2"), mortality decreased to 3.6% (95% confidence interval [CI] 1.5%–5.6%, $p = 0.06$) [20]. Before the addition of sublingual glucose, 83% of the malarial deaths reviewed were attributable to hypoglycemia (10 of 12 deaths). After adding sublingual glucose, hypoglycemia was the cause of death in only 43% of deaths for the next 6 months (16 of 37) [20].

3.1.2.2 | Outcome 3: Severity of Clinical Signs (Blood Glucose Concentration [BG]). For the critical outcome of severity of clinical signs (including BG), we identified two CTs (very low quality of evidence, downgraded for serious risk of bias, very serious indirectness, and imprecision), two OSs (very low quality of evidence, downgraded for serious risk of bias and very serious indirectness, and upgraded for large effect), and four experimental studies (ESs) (very low quality of evidence, downgraded for very serious indirectness and imprecision) that addressed the PICO question [21–28]. A CT in 227 infants with hypoglycemia by Harris et al. randomized babies to receive buccal dextrose gel ($n = 147$) or placebo gel (148) in addition to feeding and found that BG increased more with dextrose gel versus placebo. However, the difference was small (+3.0 mg/dL; 95% CI 0.7–5.3, $p = 0.01$), though it may have been confounded by the fact that all infants were also fed simultaneously [22]. Barennes et al. randomized 69 hypoglycemic children with malaria or respiratory infection to one of four methods to increase BG: oral dextrose ($n = 15$), sublingual dextrose at various concentrations (27), 8 mL of 30% dextrose given as an IV bolus (8), or water (11) [21]. No treatment failures (defined as failure for BG to reach ≥90 mg/dL) were noted in the sublingual or IV group, but there were 8 treatment failures (53%) in the oral sugar group and 9 (81.8%) in the water group ($p < 0.05$). More early treatment failures and fewer early BG increases were noted in the oral and water groups than in the sublingual and IV groups ($p = 0.004$) [21].

Regarding the two OSs, a retrospective OS by Makker et al. found a reduced need for neonatal intensive care unit admission when glucose gel was applied to the buccal mucosa prior to feeding in 804 newborn infants with hypoglycemia [23]. Sinclair et al. studied 791 adults with hypoglycemia documented by a paramedic and found that patients who could tolerate simple (48% vs. 20%, $p < 0.0001$) and complex (50% vs. 15%, $p < 0.0001$) oral carbohydrates were less likely to require transport to a hospital for care [24].

Of the four ESs, two were performed in healthy human volunteers and were considered the least impactful due to their small sizes and degree of indirectness. However, one ES was performed in healthy dogs and the other in diabetic people, and both of these studies are detailed here. In a study by Holt et al., 12 healthy, client-owned dogs were administered 1 mL/kg of corn syrup, 50% dextrose liquid, or water buccally. Both corn syrup and dextrose increased BG at 15 min and all time points thereafter up to 60 min, with a mean increase in BG of 49.45 (± 20.5) mg/dL (corn syrup) and 44.75 (± 12.9) mg/dL (50% dextrose) [27]. Slama et al. showed that administration of oral sugar in various forms increased the BG of diabetic adults with experimentally induced hypoglycemia, and that glucose and sucrose tablets, glucose and sucrose solutions, and cornstarch/glucose/maltose/oligo- and polysaccharide paste increased BG within 10 min to a greater extent than 40% dextrose gel or orange juice [28].

3.1.3 | Treatment Recommendations

In asymptomatic dogs and cats with hypoglycemia documented by a continuous glucose monitor or glucometer in the prehospital setting, we recommend feeding dietary carbohydrate (e.g., pet food) (strong recommendation, very low quality of evidence).

In dogs and cats with documented or suspected symptomatic hypoglycemia without active seizures in the prehospital setting, we suggest applying a viscous simple carbohydrate (e.g., corn syrup, glucose syrup) to the buccal mucosa between the maxillary premolars and the cheek, provided that this does not delay timely veterinary care (weak recommendation, very low quality of evidence).

In dogs and cats with active seizures, we recommend against oral or mucosal administration of any substance in the prehospital setting (strong recommendation, expert opinion).

In dogs and cats with documented or suspected hypoglycemia in the prehospital setting, we recommend against oral or mucosal administration of any substance if there is perceived risk to the caregiver (strong recommendation, expert opinion).

3.1.4 | Justification of Treatment Recommendations

Evidence was found regarding two different methods of oral carbohydrate administration: carbohydrates that are swallowed and those that are placed against an oral mucous membrane for mucosal absorption. Thus, the recommendations reflect these two different routes of administration.

Given the inherent danger of prolonged hypoglycemia and the potential for severe systemic consequences, including metabolic shock, neuroglycopenia, seizures, coma, and death, timely resolution of hypoglycemia is essential. Identified studies provide consistent evidence that oral carbohydrate administration can increase BG in hypoglycemic individuals more quickly than most clients can likely present an animal for veterinary care. Therefore, in asymptomatic dogs and cats in which hypoglycemia is noted on a continuous blood glucose monitor, we recommend immediate feeding followed by transport to a veterinary hospital if either clinical signs appear (e.g., lethargy, abnormal mentation, vomiting) or the BG does not achieve, at a minimum, normoglycemia within 20 min of feeding. Clients should follow instructions from their veterinarian when hypoglycemic episodes occur.

For symptomatic dogs and cats believed to be hypoglycemic (e.g., animals receiving insulin or oral hypoglycemic medications displaying lethargy, ataxia, or collapse), we believe oral mucosal administration of a viscous, simple carbohydrate substance is a reasonable prehospital step as long as the risk to the caregiver is considered low and it does not delay transport to a veterinary clinic. The evidence suggests that the BG increase associated with oral or mucosal administration of sugar may not be adequate to resolve life-threatening hypoglycemia, and so prehospital treatment should not delay transport to a veterinary facility for IV dextrose support, which is more consistently effective. The strongest clinical evidence suggests that sublingual or buccal administration of simple carbohydrate is adequately [27] and possibly more [21] effective compared to swallowed carbohydrate. Thus, application of a viscous, simple carbohydrate (e.g., corn syrup) to the buccal mucosa between the maxillary premolars/molars and the cheek may be as or more effective as encouraging the animal to swallow the material; it may also be less likely to cause aspiration. Because buccal administration of a simple carbohydrate carries potential risk to the caregiver, the committee concluded that care should be taken to assess that risk in an individual animal before administration. We recommend against oral or mucosal administration of any substance to seizing animals due to the risk of unintentional bite injury to the caregiver. These recommendations are aligned with the current first aid guidelines for people with mild hypoglycemia who can swallow and are able to follow directions [15, 16].

3.1.5 | Knowledge Gaps

While the literature suggests that oral administration of dietary sugar can contribute to improved BG in hypoglycemic patients and appears to have few adverse effects, data in the species of interest in a pre-veterinary hospital setting where IV access is not an option are lacking. There is no information at all available for cats, a species that is often more difficult to medicate orally; it is unclear where the risk–benefit relationship may fall for that species. Furthermore, dose–response studies are not available, and it is not clear what dose of which dietary form of sugar would be most efficient in improving outcomes for cats and dogs with symptomatic hypoglycemia. Additionally, studies investigating the effect of oral provision of amino acids, as well as intranasal (IN) glucagon, for the treatment of symptomatic hypoglycemia in dogs and cats are warranted.

3.2 | Non-Caustic Toxin Ingestion (FA-11)

In cats and dogs in the prehospital setting with non-caustic toxin ingestion (P), does emesis induction (e.g., with hydrogen peroxide, syrup of ipecac [SoI]) (I), compared to no emesis induction (C), result in improved outcome (O)?

3.2.1 | Introduction

Ingestion of non-caustic toxins is common in dogs and happens occasionally in cats. Gastrointestinal (GI) decontamination is one of the mainstays of toxic ingestion management; however, the role of prehospital decontamination in dogs and cats is unclear. SoI and hydrogen peroxide have both been used as at-home emetics; however, their safety and their impact on outcome compared to clinical veterinary decontamination measures are unknown. This PICO question was designed to determine whether prehospital emesis induction improved outcomes in dogs and cats following the acute ingestion of a non-caustic toxic substance.

3.2.2 | Consensus on Science

3.2.2.1 | Outcome 1: Survival to Discharge. For the most critical outcome of survival to discharge, two CTs (low quality of evidence, downgraded for very serious indirectness), 0 OSs, and 0 ESs were identified that addressed the PICO question [29, 30]. Both studies assigned treatment group based on date of presentation (i.e., odd vs. even). Kulig et al. studied the impact of emergency department (ED)-administered SoI followed by activated charcoal (AC) versus AC alone in 476 alert patients presenting for acute drug overdose with an average time to presentation of 3.3 h [29]. SoI did not affect survival in this study, though no patients in either of these treatment groups died [29]. A smaller study of 70 children under age 6 presenting to the ED while alert with acute, mild to moderate toxic ingestion had similar results: 32 were treated with emesis followed by AC, while 38 received AC alone, and no child died in either group [30].

In the bridge literature search for this question, additional studies were identified that supported these neutral findings regarding emesis induction for acute toxin ingestion. Pond and others performed a nonrandomized, controlled CT in 876 adults with acute drug overdose and found no difference in survival between patients who underwent gastric emptying and those who did not, though only two people in the study died, neither due to immediate effects of the toxin [31]. Additionally, a very large retrospective study using data from 752,602 young pediatric cases from a poison control group found that home use of SoI was not associated with adverse event rate (adverse events including death) [32].

3.2.2.2 | Outcome 2: Severity of Clinical Signs. For the critical outcome of severity of signs, there were three CTs (low quality of evidence, downgraded for very serious indirectness), one OS (very low quality of evidence, downgraded for serious indirectness and imprecision), and 0 ESs that addressed the PICO question [29, 33–35]. Only one of these studies involved the prehospital setting: Wax et al. performed a randomized CT in 103 children having eaten known or possibly poisonous berries whose caretakers had called the poison control center for advice [33]. Callers were randomly advised either to monitor at home with no other treatment ($n = 52$ children) or to administer SoI followed by home monitoring (51). The only differences in clinical course between the groups were significantly more vomiting, diarrhea, and sedation reported in the SoI group. No children in either group required hospital care, and all survived [33]. The study described above in 476 alert patients presenting to the ED for acute drug overdose showed no difference in clinical course whether the patients receiving AC had or had not received SoI in the ED [29]. A randomized controlled CT by Underhill et al. compared serum acetaminophen (paracetamol) concentrations following either gastric lavage, SoI administration, or AC alone following toxin ingestion; a no-treatment control arm was discontinued early for ethical reasons [34]. In this study, AC was superior to SoI and gastric lavage in reducing serum drug concentration; however, patients treated with SoI did experience decreasing drug levels over time, while drug levels continued to increase in 4 of 5 patients receiving no decontamination [34]. Finally, a retrospective study by Walton et al. of 36 clinically unaffected cats with possible exposure to an anticoagulant rodenticide found that whether vomiting was induced (n = 7 cats), AC alone was given (4), vomiting was induced followed by AC administration (10), or no GI decontamination was performed (15), there was no difference among the groups in resulting prothrombin times. None of the cats had been treated empirically with vitamin K [35].

In the bridge literature search for this question, additional studies were identified that support the lack of impact emesis has regarding clinical severity in acute toxin ingestion. Pond and others performed a nonrandomized, controlled CT in 876 adults with acute drug overdose and found no difference in improvement or deterioration between patients who underwent gastric emptying and those who did not, when adjusted for initial illness severity [31]. The only difference between the two groups was a delay in AC administration in patients undergoing gastric emptying (91 ± 52 min versus 55 ± 41 min; p = 0.0001) [31]. Additionally, the very large retrospective study using data from 752,602 young pediatric cases from a poison control group found that home use of SoI was not associated with adverse event rate (adverse events including death) [32].

3.2.2.3 | Outcome 3: Length of Stay. For the important outcome of LoS, two CTs included for other outcomes (low quality of evidence, downgraded for very serious indirectness), 0 OSs, and 0 ESs were identified that addressed the PICO question [30, 33]. As described above, Kornberg et al. compared 70 children <6 years old, 32 treated with SoI followed by AC with 38 receiving AC alone following mild to moderate acute oral toxin ingestion [30]. Patients receiving SoI experienced significant delay in receiving AC (mean 2.6 ± 0.1 h) compared to the AC only group (0.9 ± 0.1 h; p < 0.0001). Children receiving SoI were more likely to vomit AC than were those never receiving SoI (18/32 vs. 6/38, p < 0.001), and patients receiving SoI who were subsequently discharged spent significantly more time in the ED than those receiving only AC (4.1 ± 0.2 h vs. 3.4 ± 0.2 h; p < 0.05) [30]. Wax found that no child with possible toxic berry ingestion required medical attention, whether administered SoI in the home setting or not [33].

3.2.2.4 | Outcome 4: Harm to the Rescuer. No studies were identified that evaluated the important outcome of harm to the rescuer.

3.2.3 | Treatment Recommendations

We recommend against the routine prehospital administration of emetics to dogs and cats following acute toxin ingestion (strong recommendation, low quality of evidence).

We suggest the prehospital administration of emetics to dogs and cats following acute toxin ingestion if immediate access to a veterinary facility is not available, and emesis is recommended by a veterinarian or animal poison control center (weak recommendation, expert opinion).

3.2.4 | Justification of Treatment Recommendations

Although there is no evidence regarding the effect of prehospital emesis for non-caustic toxin ingestion in dogs and cats, there are ample, consistent, convincing data that emesis induction in acute drug overdose or poison ingestion does not shorten time in the ED or improve clinical outcomes in children or adults [29–34]. Additionally, prehospital emesis induction has the potential to delay hospital presentation and thus administration of AC, which appears to be more effective at GI decontamination in alert human beings than gastric emptying [30, 31, 34].

Additionally, home options for effective emesis induction are generally limited to SoI or hydrogen peroxide [36]. While oral hydrogen peroxide is effective in inducing emesis in dogs [36], there are reports in both dogs and cats of meaningful GI injury secondary to oral administration of hydrogen peroxide in doses relevant for emesis induction [37–39]. SoI can cause severe vomiting, diarrhea, sedation, and other adverse effects [33, 40]. Finally, regardless of the emetic drug, emesis induction can have adverse effects [41–43]. Given the absence of evidence that emesis induction is helpful in acute toxin ingestion and the potential for risks when inducing emesis, particularly in the home environment, the committee recommends against routine prehospital emesis induction for acute toxin ingestion in dogs and cats.

3.2.5 | Knowledge Gaps

There are many knowledge gaps surrounding prehospital toxin management in dogs and cats. There are no CTs comparing prehospital emesis induction versus no prehospital emesis for non-caustic toxin ingestion in dogs and cats with respect to toxin retrieval, resultant serum toxin levels, or clinical outcomes. Additionally, and potentially equally relevant, there are no studies to determine whether gastric emptying affects clinical outcomes at any time following acute toxin ingestion in alert dogs and cats. The risk:benefit ratio of various emetic agents for home use (e.g., SoI, hydrogen peroxide) in dogs and cats for various toxins is unknown.

3.3 | Heat-Related Illness and Heat Stroke (FA-07)

In cats and dogs in the prehospital setting with suspected heat injury or heat stroke (P), does active cooling before transport to a veterinary hospital (I), compared to no intervention before transport to a veterinary hospital (C), result in improved outcome (O)?

3.3.1 | Introduction

Heat stroke is a serious and potentially fatal emergency seen in people, dogs, and, less commonly, cats. Heat stroke results when the heat load from environmental conditions or exertion exceeds the individual's heat-dissipating mechanisms, and leads to CNS disturbances; systemic inflammatory response syndrome and multiple organ dysfunction are common sequelae [44]. First aid guidelines for the treatment of heat stroke in people include immediate, on-site cooling prior to transport to a hospital [2, 3]. As in people, heat stroke in dogs can be due to environmental (e.g., being left in a hot car) or exertional (e.g., running or working in warm weather) causes [45, 46]. Heat stroke is often fatal in dogs [45, 47–50]. Additionally, since dogs depend on evaporation from the respiratory tract for cooling, respiratory disease such as upper airway obstructive disorders may impair the dog's ability to dissipate heat in a way unique to their species. Environmental heat stroke leading to severe clinical signs has been seen in cats associated with enclosure in hot environments such as cars or clothes dryers [51], though reports of heat injury and associated outcomes are less available for cats. As heat-induced injury appears to be an important cause of morbidity and mortality in small animals, this PICO question was developed to determine whether prehospital/pre-transport cooling of dogs and cats with suspected heat stroke could improve outcomes.

3.3.2 | Consensus on Science

3.3.2.1 | Outcomes 1 and 2: Survival to Discharge and Incidence of CPA. Because the identified studies did not distinguish between survival to discharge and incidence of CPA, these outcomes were combined.

For the two most critical outcomes of survival to discharge and incidence of CPA, we identified 0 CTs, two OSs (very low quality of evidence, downgraded for serious risk of bias, very serious indirectness, and imprecision), and 0 ESs that addressed the PICO question [52, 53]. Sloan et al. evaluated 32 patients who sustained heat stroke while participating in a marathon. Twenty-two received prehospital cooling, while 10 were immediately transported for active cooling and treatment at a hospital. All 32 patients survived [52]. Vicario et al. retrospectively evaluated the relationship between speed of cooling and mortality in 39 people with heat stroke [53]. While they did not study prehospital cooling specifically, they found 4 of 27 (15%) patients who underwent more rapid cooling (to 38.9°C [102°F] within 1 h) died, while 4 of 12 patients (33%) who experienced delayed cooling (reaching 38.9°C [102°F] in >1 h) died ($p = 0.18$) [53].

During the bridge search for this PICO, a 2020 systematic review and meta-analysis regarding prehospital cooling for heat stroke was identified [54]. This meta-analysis included additional studies relevant to this outcome. For instance, one OS in 32 people with exertional heat stroke found that 2 of 32 died (6.3%, 95% CI 0.0%–14.6%), neither of which had been actively cooled prehospital, while all 11 patients actively cooled prehospital survived [55]. The bridge search also identified two novel, relevant studies on heat stroke in dogs that were not found in the initial literature search; pertinent results from these studies are reported here, though these papers did not undergo full GRADE evaluation [45, 56]. Drobatz and Macintire performed a retrospective study of 42 dogs with heat-induced injury and found that 13 of 27 (49%) dogs that survived had been cooled by their owners prior to transport, while only 3 of 15 (20%) dogs that died or were euthanized had been cooled in the prehospital setting (odds ratio [OR] 0.27, 95% CI 0.062–1.17, $p = 0.08$) [56]. A retrospective study of 54 cases of heat stroke in dogs by Bruchim et al. found that, when such history was known, 10 of 16 (39%) dogs that were actively cooled prior to presentation died or were euthanized compared to 17 of 28 (61%) that were not cooled prehospital (relative risk 0.63, 95% CI 0.35–1.12, $p = 0.17$) [45]. No evidence for this outcome was found for cats.

3.3.2.2 | Outcome 3: Severity of Clinical Signs (Including Duration of Hyperthermia). For the critical outcome of severity of clinical signs, we identified no CT, one OS (very low quality of evidence, downgraded for serious risk of bias, very serious indirectness, and imprecision), and no ES that addressed the PICO question [57]. Mok et al. conducted a retrospective cohort study in which one group of people ($n = 137$) with exertional heat stroke received chilled (4°C) IV fluids prehospital, while the other group (153) received ambient temperature IV fluids prehospital; both groups were also treated with ice sheets (these either are bedsheets soaked in water and then frozen, or a similar item) [57]. The group treated prehospital with 4°C IV fluids had lower peak (median 123.8 μmol/L [1.4 mg/dL]) and trough (median 79.6 μmol/L [0.9 mg/dL]) serum creatinine concentrations than the group treated with ambient temperature IV fluids (median peak 159.2 μmol/L [1.8 mg/dL], $p < 0.0001$; median trough 88.4 μmol/L [1.0 mg/dL], $p < 0.0001$). The chilled IV fluids group also had less severe hepatocellular injury as evidenced by liver values, including a lower peak alanine aminotransferase in those treated prehospital with chilled IV fluids (median 51 U/L, range 9–922 U/L) than in those treated with ambient temperature IV fluids (median 84 U/L, range 34–6147 U/L, $p < 0.0001$), and a quicker decline following the peak ($p = 0.0059$) [57].

The Zeller et al. retrospective study identified in the bridge search included 32 people with exertional heat stroke and found that those not cooled prior to hospital arrival had a greater chance of multiorgan failure than those cooled sooner [55]. Of the 16 people with moderate to severe clinical signs attributed to heat stroke, none had been cooled in the field, while 11 (69%) people suffering only mild clinical signs had been cooled prehospital (OR 0.015, 95% CI 0.0007–0.2886, $p = 0.006$) [55]. Most other evidence in the 2020 Douma review pertains to the cooling method rather than whether or not prehospital cooling is beneficial [54].

3.3.2.3 | Outcome 4: Length of Stay. For the important outcome of LoS, we identified no CT, three OSs (very low quality of evidence, downgraded for serious risk of bias, very serious indirectness, and imprecision), and no ES that address the PICO question [52, 53, 57]. The Vicario study, detailed above, found that mean LoS for patients who underwent rapid cooling was 8.3 days, while patients with delayed cooling had a mean hospital stay of 9.8 days ($p > 0.05$) [53]. Sloan et al. studied 32 patients who sustained heat stroke while participating in a marathon. Twenty-two received prehospital cooling, while 10 did not, being transported directly. Of the 22 who received prehospital cooling, 41% were admitted to the hospital, compared to 60% in the no prehospital cooling group ($p > 0.05$) [52]. Finally, the Mok study detailed above found that patients treated prehospital with 4°C IV fluids had shorter median LoS (2 days) compared to those receiving ambient temperature IV fluids (3 days; $p < 0.0001$) [57].

3.3.3 | Treatment Recommendations

We recommend moving dogs and cats showing signs of heat stroke to a cool environment as soon as possible (strong recommendation, expert opinion).

We recommend prehospital active cooling in dogs and cats showing signs of heat stroke (strong recommendation, very low quality of evidence).

We suggest actively cooling dogs and cats showing signs of heat stroke in the prehospital setting by applying cool running water to the animal's trunk with emphasis on the area with the thinnest haircoat, usually the ventral abdomen, soaking to the skin (weak recommendation, expert opinion).

We suggest actively cooling dogs and cats showing signs of heat stroke in the prehospital setting to a rectal temperature of 39.7°C–40°C (103.5°F–104.0°F), and then discontinuing active cooling measures (e.g., stop running water, dry the animal) (weak recommendation, expert opinion).

We suggest continuing active cooling in dogs and cats with stertor or stridor that are showing signs of heat stroke in the prehospital setting until clear improvement in panting, or until temperature reaches 38.6°C (101.5°F), whichever is sooner (weak recommendation, expert opinion).

We recommend against prehospital active cooling measures in dogs and cats showing signs of heat stroke if the risk to the rescuer is perceived to be high (strong recommendation, expert opinion).

We recommend that dogs and cats showing signs of heat stroke be transported to a veterinary facility immediately following prehospital active cooling (strong recommendation, expert opinion).

3.3.4 | Justification of Treatment Recommendations

This PICO question was designed to determine the impact of performing prehospital active cooling measures on various outcomes in dogs and cats with presumed heat stroke. Interestingly, there is very little evidence regarding whether active prehospital cooling is beneficial, most likely because the scant evidence available uniformly and strongly supports immediate, active cooling to avoid negative outcomes [53, 55]. Moreover, human first aid guidelines recommend removing heat stroke victims from the source (passive cooling) in addition to instituting immediate active cooling measures to remove heat from the body [2, 3] based on a recent, large meta-analysis [54]. To justify immediate, active cooling, this meta-analysis cited in its introduction only the same two small studies we found demonstrating the dangers of delayed active cooling [53, 55]. Zeller's discussion mentions the lack of "controlled trials demonstrating outcome advantage" of immediate cooling [55], but such studies are very unlikely to come, given the dangers of prolonged heat injury. Thus, in alignment with the recommendations for people, and supported by the data available from two pertinent studies in dogs [45, 56], the committee recommends moving dogs and cats with suspected heat stroke to a cool environment immediately and, if risk to the rescuer is perceived to be low, suggests active cooling in the prehospital setting.

The RECOVER FA Domain did not pose a question as to the best method for prehospital active cooling in dogs and cats; however, given our recommendation to pursue active cooling, the writing group chose to suggest how a caregiver in the prehospital setting may accomplish this in a dog or cat. While the literature available "for or against" prehospital cooling is sparse for the reasons mentioned above, there is far more evidence regarding first aid active cooling methods to achieve the fastest and most effective cooling in people, which we reviewed but did not evaluate using GRADE methods. Given the information comparing active cooling methods did not undergo GRADE evaluation, the writing group assigns it an additional level of indirectness for dogs and cats.

The literature comparing prehospital active cooling methods is largely observational and includes competitors in sporting events (e.g., marathons) or people working in physically demanding conditions (e.g., military training), or is experimental using healthy human volunteers performing exercise in controlled, hot conditions [54]. In people with exertional hyperthermia or heat stroke, cold (cool to icy) water immersion (CWI) from the neck down in water at 1°C–26°C (33.8°F–78.8°F) is the preferred cooling method because CWI has been most consistently shown to be effective at rapid cooling [2, 3]. While CWI in shallow rigid tubs is standard first aid for adult people, human beings bend at the waist and are often able to cooperate with basic commands during active cooling and thereby avoid full submersion, and this is not true for small animals. Thus, the RECOVER FA Domain writing group chose not to suggest tub or sink CWI in dogs and cats, considering the risk of unintentional pet drowning and the risk to the rescuer too high. In people, when CWI is not possible, any other active cooling technique is recommended [2, 3]. A cold shower (20.8°C [69.4°F]) is more effective than passive cooling in people, while water misting, fanning, and local ice pack application (e.g., axillae, groin) perform less well [54]. Additionally, active cooling of glabrous (hairless) anatomical regions in people provides more rapid cooling than active cooling applied to the groin, axillae, and neck [58], which are haired regions in people. Thus, the writing group chose to suggest running cool water over the animal, caudal to the neck (for the safety of the pet and rescuer), at an anatomic region with relatively less fur to help facilitate soaking to the level of the skin. Running water is considered superior to a single dousing because when water is stagnant, an insulative thermal plane may develop, which could diminish the cooling rate [54]. Cool running water harnesses conductive, convective, and evaporative heat loss mechanisms simultaneously. While CWI of only hands and/or feet performs better than passive cooling alone in people [54], the committee does not recommend active cooling of dogs and cats by active cooling of only the paws, due to paws' smaller relative surface area and different skin characteristics (i.e., thick paw pads) compared to human hands and feet.

The recent topical meta-analysis and human first aid guidelines do not report harm or hypothermia associated with CWI or other active cooling techniques [2, 3, 54]. Despite this, guidelines recommend discontinuing active cooling measures once rectal temperature reaches 1°C above the high end of the human reference interval (i.e., reaches 39°C). Using an analogous approach, active cooling of hyperthermic dogs and cats should be discontinued when the rectal temperature reaches approximately 40°C (104°F; high-end normal for dogs and cats being 39.1°C). This approach is reasonable for dogs and cats without airway obstruction (i.e., without stertor or stridor), even if the animal is still panting; however, if the animal has audible stertor or stridor, which would hinder its innate ability to dissipate heat, continuing to cool until the animal stops panting is reasonable, even if the rectal temperature is normal at that time. The committee does not recommend active cooling to a rectal temperature <38.6°C (<101.5°F). In people, when rectal temperature measurement is not possible, they recommend 15 min of active cooling prior to transport, and we suggest the same, assuming panting has improved in stertorous or stridorous animals.

3.3.5 | Knowledge Gaps

Although prehospital active cooling is recommended for dogs and cats with heat stroke, there are no studies directly evaluating prehospital cooling versus no prehospital cooling in dogs and cats. A large retrospective, multicenter study gathering data on outcomes with prehospital cooling versus no prehospital cooling in heat stroke would be a first step to more conclusively recommend this treatment. Also, the optimal method for cooling has not been studied in dogs and cats and is likely to differ from that in people, nor have methods to determine when to stop cooling. Best method(s) for prehospital cooling of dogs and cats with heat stroke is considered a critical knowledge gap.

3.4 | Thermal Burns (FA-05)

In cats and dogs in the prehospital setting with thermal injuries (P), does active cooling of burns (e.g., cold water, ice) (I), compared with no active cooling of burns (C), result in improved outcome (O)?

3.4.1 | Introduction

Current human first aid guidelines recommend the immediate active cooling of thermal burns using running water [3]; however, evidence-based guidelines for first aid in cats and dogs with burn wounds are lacking. For this PICO, we attempted to determine whether any form of active cooling (e.g., application of cool running water, ice water, burn spray or gel), compared to no cooling, would result in improved outcomes in dogs and cats with thermal burns.

3.4.2 | Consensus on Science

3.4.2.1 | Outcome 1: Functional Recovery. For the most critical outcome of functional recovery, no studies were found that addressed the PICO question.

3.4.2.2 | Outcome 2: Severity of Clinical Signs (Extent of Burn). For the critical outcome of severity of clinical signs, we identified five OSs (moderate quality of evidence, downgraded for serious indirectness and upgraded for large effect and dose–response effect) relevant to the PICO question [59–63]. Harish et al. performed a prospective OS in 4918 people with burns of <10% total body surface area [61]. Investigators found that adequate first aid, which they defined as application of cool running tap water to the burn for at least 20 min and within 3 h of injury, was associated with reduced burn depth (OR 1.39, 95% CI 1.24–1.55, $p < 0.001$). Additionally, in patients not requiring grafting, those who received adequate first aid healed on average 10% (hazard ratio 1.10; 95% CI 1.03–1.18, $p < 0.01$) or 1.9 days faster (95% CI −2.9 to −0.9, $p < 0.001$). Adequate first aid in patients requiring grafting was associated with a 15% increase in total body surface area not requiring graft (0.27; 95% CI 0.01–0.52, $p = 0.04$) [61]. In a prospective OS of 2495 pediatric burn patients, Griffin et al. found that adequate first aid, defined as cooling for at least 20 min with running water within 3 h of burn, was associated with decreased need for skin graft (OR 0.6, 95% CI 0.4–0.8, $p < 0.001$) and a decreased development of full-thickness burns (OR 0.4, 95% CI 0.2–0.6, $p < 0.001$) [59]. Wood et al. performed a retrospective cohort study of 2320 patients whose data had been collected prospectively [62]. This study found that any water therapy (vs. none) provided to burns was associated with reduced probability of graft surgery from 0.537 to 0.467 (a 13% reduction; $p = 0.014$) [62]. The remaining two OSs were smaller, with 695 and 390 patients, respectively, and findings were consistent with these larger studies: cooling with water was associated with mitigation of burn thickness, and one showed decreased OR of requiring skin graft [60, 63].

Eight relevant ESs in rodents (2) or swine (6) (low quality of evidence, downgraded for serious indirectness and imprecision, upgraded for large effect) were also identified in this literature search for severity of clinical signs [64–71]. While there is significant heterogeneity in both experimental methodology and outcomes assessed in these studies, all suggested a protective effect of early, active cooling of thermal burns. The studies among these that evaluated cooling compared to no cooling uniformly found that cool, running water application was beneficial. One study evaluated cool (17°C) versus warm water (37°C) applied by soaked gauze sponge, compared to no cooling, in rats and found that both cool and warm water slowed burn progression and that warm water reduced surface extension of necrosis more than cool water [69]. Three studies evaluated ice or ice water [65, 67, 70]: the two comparing ice to cool water found that cool water was superior to ice water for burn outcomes [65, 70], while the final study found, in a guinea pig burn model, that 0°C–3°C water led to mitigation of histological microvasculature damage compared to no cooling [67]. Regarding timing, the studies that evaluated duration of cool water application found that 20 min in cool running water was beneficial to mitigate burn severity and speed healing (though even shorter times were beneficial when compared to no cooling), and studies that evaluated delay in cooling found benefit even when cooling began up to 60 min following injury [64, 66–68, 70].

Finally, one relevant study was identified in the October 2025 bridge search, and it did not undergo a full, two-EE GRADE evaluation but is included here for completeness. Liu et al. reported data from 470 people who experienced burns between 2012 and 2017 [72]. Lack of cooling prior to hospital admission increased the risk of amputation ($p = 0.048$), and data in 117 patients with localized hand burns showed that lack of cooling prior to admission was associated with increased hospital stay (OR 3.481, 95% CI 1.25–9.698, $p = 0.017$).

Outcomes 3 and 4 are not included in this Consensus on Science because the committee found evidence from Outcome 2 to be adequately strong to create a treatment recommendation.

3.4.2.3 | Outcome 5: Harm to Rescuer. For the important outcome of harm to rescuer, no studies were found that addressed the PICO question.

3.4.3 | Treatment Recommendations

We recommend active cooling of thermal burns in cats and dogs by applying cool running tap water for at least 20 min, as soon as possible and within 3 h of injury (strong recommendation, moderate quality of evidence).

We suggest active cooling of thermal burns in cats and dogs by alternative techniques (e.g., cool, water-soaked towel; cold pack) for at least 20 min, as soon as possible and within 3 h of injury, if cool running water is unavailable, such as during transport to a veterinary facility (weak recommendation, moderate quality of evidence).

In cases where the risk to rescuer is believed to be high, we recommend against active cooling for burns in cats and dogs (strong recommendation, expert opinion).

3.4.4 | Justification of Treatment Recommendations

Moderate quality evidence based on investigations in over 10,000 people supports active cooling to mitigate tissue damage due to thermal burns. Additionally, cool running water ("tap water") applied for 20 min as soon as possible, within 3 h of burn injury, is the practice best supported by the clinical and experimental data currently available.

The committee believes that the risk-to-benefit assessment is strongly in favor of actively cooling burns if possible. In standing animals that are amenable, evidence suggests caregivers should perform the full 20 min of cool water application at the injury scene, if possible, to provide the earliest cooling possible. However, for animals that are not standing (i.e., could be unstable), those that may have smoke inhalation, or those for which cool water application would endanger the caregiver, the patient should be presented for veterinary care as soon as possible, and cool water should be applied in the veterinary clinic.

3.4.5 | Knowledge Gaps

We identified a number of studies in support of the treatment recommendation, involving various species, including human, mouse, rat, swine, and guinea pigs; however, studies in dogs and cats are lacking. Many of the ESs we reviewed attempted to create an evenly layered burn wound, which may differ from real-life scenarios in which more heterogeneous burn wounds may occur. Additionally, all ESs were conducted with subjects under general anesthesia, which may have had an effect on the reported outcomes. Finally, the optimal temperature of water (ice/icy, cool, warm) for cooling burns is uncertain.

3.5 | Chemical Burns (FA-08)

In cats and dogs in the prehospital setting exposed to a caustic substance on the skin (P), does irrigation with water (I), compared with no irrigation (C), result in improved outcome (O)?

3.5.1 | Introduction

Prompt prehospital first aid consisting of copious flushing with water is the current guideline for chemical exposure to the skin in people [3]. However, species differences such as hair density and length, as well as differences among best treatments for various chemicals, create uncertainty regarding ideal prehospital management of chemical exposure to the skin in dogs and cats. No guidelines currently exist regarding the prehospital management of chemical skin exposure in these species. Therefore, this PICO question was designed to determine whether water irrigation in the prehospital setting could improve outcomes in cats and dogs with caustic substance exposure to the skin.

3.5.2 | Consensus on Science

3.5.2.1 | Outcome 1: Survival to Discharge. For the most critical outcome of survival to discharge, we identified no CT, no OS, and three ESs in rodents (very low quality of evidence, downgraded for very serious indirectness and imprecision, upgraded for large effect) that addressed the PICO question [73–75]. All studies included rats or mice, and methods indicated that the fur was clipped prior to chemical exposure in two studies and fur presence/absence was not mentioned in the final study. Two studies investigated phosphorous burns, while the third evaluated NaOH and HCl burns. Most [74] or all [73] rodents exposed to phosphorous burns died without skin decontamination, while all survived in both studies if irrigated copiously with water. The final study evaluating NaOH and HCL burns found that the only rodents that died were in the untreated group, while none that received washing or irrigation died [75].

3.5.2.2 | Outcome 2: Severity of Clinical Signs. For the critical outcome of severity of clinical signs, no CT, one OS (very low quality of evidence, downgraded for very serious indirectness and imprecision, and upgraded for large effect), and seven ESs (low quality of evidence, downgraded for very serious indirectness and imprecision, and upgraded for large effect and dose–response) were identified that addressed the PICO question [74–81]. A retrospective study by Leonard et al. in 35 people experiencing chemical burns from 14 different agents found that patients receiving appropriate prehospital first aid (copious water irrigation within 10 min of exposure, for at least 15 min) experienced a lower incidence of full thickness burns (12%) than those in the group that did not undergo irrigation until hospital presentation (63%; $p < 0.01$) [76].

Four ESs in rodents showed a significant reduction in injury severity associated with chemical exposure to the skin with early and copious irrigation with water [74, 75, 80, 81]. These studies all included rodents with fur clipped from the sites prior to chemical application, and the chemicals varied, including hydrofluoric acid in two studies and NaOH, HCl, or phosphorus in two. One ES in people explored a related concept: a simulated contaminant was applied to multiple sites on the participants' skin, and it was found that water irrigation significantly reduced the presence of that contaminant when compared with control groups in whom no irrigation was performed ($p < 0.05$) [79]. Another related ES that evaluated the timing of water irrigation in rats exposed to HCl on an area with clipped fur found that irrigation beginning at 1 min after injury resulted in a significant difference in the pH of the skin ($p < 0.01$) and a tissue damage score of 1 (almost normal) as compared to control rats in which no irrigation was performed; a delay of irrigation of 10 min following exposure resulted in tissue damage scores similar to those of the control group [78]. Finally, one ES in swine with phenol-induced burns found that water irrigation alone did not reduce burn severity compared to controls, regardless of the duration of irrigation ($p = 0.91$). In that study, irrigation with isopropyl alcohol and polyethylene glycol with industrial mineral spirits was more effective than water at reducing tissue injury ($p < 0.05$) [77]. This study was the only study that did not find a meaningful improvement with water irrigation following topical exposure to a caustic substance.

In the bridge search performed for this question, one additional study was identified and is included here, though it did not undergo full GRADE evaluation. In a 2025 retrospective study of 1549 patients with chemical burns (2009–2020) by Chai et al., 656 of 1549 (40%) people underwent prehospital water irrigation for an unknown length of time; 444 of 1549 (28.7%) underwent water irrigation upon arrival at the burn center for a mean of 29 min (SD = 37.35). Patients who received prehospital or in-hospital irrigation had a decreased requirement for acute surgical intervention (prehospital OR 0.63, 95% CI 0.49–0.82, $p < 0.000$; in-hospital OR 0.69, 95% CI 0.53–0.89, $p = 0.005$) compared to those not receiving irrigation [82].

For the important outcome of LoS, we identified no CT, no ES, and one OS (very low quality of evidence, downgraded for serious indirectness and imprecision, and upgraded for large effect) that addressed the PICO question [76]. In this retrospective study of 35 people experiencing chemical burns from 14 different agents, a 15-min shower performed within 10 min of caustic substance exposure was associated with a mean LoS of 7.7 days compared to 20.5 days in those not receiving appropriate prehospital irrigation ($p < 0.01$) [76].

In the bridge search performed for this question, two additional studies were identified and are included here, though they did not undergo formal GRADE evaluation. In the 2025 retrospective study by Chai et al. of 1549 patients with chemical burns mentioned above, patients receiving in-hospital water irrigation were found to have a reduced LoS in multivariable analysis (coefficient −0.18, $p = 0.011$, 95% CI −0.32 to −0.04); multivariable analysis did not identify prehospital irrigation as an independent predictor of LoS in this study [82]. Additionally, a retrospective cohort study found a significantly shorter LoS in the 37 people who received immediate irrigation for chemical skin exposure (6.2 days) compared to the 46 people who received delayed irrigation (22.0 days; $p < 0.01$) [83].

3.5.2.3 | Outcome 4: Harm to Rescuer. For the important outcome of harm to the rescuer, no evidence was identified.

3.5.3 | Treatment Recommendations

We recommend performing immediate irrigation with running water in the prehospital setting for as long as possible (minimum 15 min) for cats and dogs with caustic substance exposure to the skin (strong recommendation, very low quality of evidence).

We recommend the rescuer wear personal protective equipment (gloves, long sleeves, face protection, eye protection) while performing water irrigation for caustic substance exposure in dogs and cats (strong recommendation, expert opinion).

We recommend against performing water irrigation for dogs and cats with caustic substance exposure if the risk to the rescuer is high (strong recommendation, expert opinion).

3.5.4 | Justification of Treatment Recommendations

Although no direct evidence was available regarding prehospital water irrigation for caustic substance skin exposure in dogs and cats, there is a highly consistent albeit modest body of evidence in people and rodents that immediate, copious water irrigation following exposure to many caustic substances improves survival, decreases clinical severity, and decreases LoS. The single study in which water was found ineffective involved skin exposure to a phenol, a water-insoluble chemical not expected to be rinsed effectively with water [77]. However, given the strongly positive outcomes associated with water irrigation in OSs in people with skin exposure to a wide variety of chemical substances [76, 82], the committee believes that the general recommendation for irrigation with water is appropriate in small animals as well. While the best evidence available was low in quality, these recommendations mirror those for first aid in people, based on the same basic body of evidence [3].

One important area of indirectness in the body of literature as pertains to dogs and cats is that all identified evidence, whether observational or experimental, involved chemical exposure to hairless or nearly hairless skin. Thus, while the evidence may inform more directly the care of paw pad exposure, how the presence of a dense haircoat on other body areas may affect a substance's ability to reach the skin, or possibly to trap or distribute the substance against the skin, is unknown. One study found in the literature search showed that water irrigation was effective to remove a chemical substance from locks of human hair [84]. Prolonged exposure (≥15 min) to running water over the contaminated area aims to irrigate the initially exposed area and also dilute and wash away any chemical that may run onto adjacent skin or fur. The benefit of clipping contaminated fur away from an affected area is unknown; however, the committee considered the possible benefit of clipping fur in the prehospital setting to be outweighed by exposure risks to the caregiver and delay in water irrigation and hospital transport.

One identified paper was a case series of two people working alongside one another who were involved in the same workplace accident in which ammonia liquid and vapors leaked from a hose they were working with. At the scene, one person showered immediately and changed his clothing, while the other worker did not. The person who showered at the scene arrived to the hospital 2 h after exposure, was admitted to the burn center, and was discharged after a 2-day uncomplicated hospital stay with acetaminophen for pain control. The patient who did not shower or change clothes at the scene presented to the hospital 90 min after the accident, having suffered 14% total body surface area burns and significant inhalation injury; he was managed with mechanical ventilation in the ICU for 6 days and underwent skin grafting during his 13-day hospital stay [85]. This small series was not included in the consensus on science or for generation of the treatment recommendations, though it appears in a recent systematic review on this topic and is cited in similar human guidelines [3, 86].

3.5.5 | Knowledge Gaps

No direct evidence regarding water irrigation for caustic substance exposure is available in dogs and cats. In addition, the caustic substances in these studies were largely representative of workplace exposure (e.g., hydrochloric acid, white phosphorus, anhydrous ammonia, phenol), which may be less likely to occur in companion animals. Given the available evidence, the recommendation for water irrigation in caustic substance exposure in people, and the relative rarity of caustic exposure in dogs and cats, CTs regarding first aid measures for caustic substance exposure in small animals would be impractical. Multicenter retrospective study data of caustic substance exposure and management in dogs and cats could be helpful to tailor and hone this first aid recommendation for small animals in the future. Also, ESs of mock "contaminant" exposure to densely haired areas on dogs and cats may inform on the utility of dry substance removal (e.g., wiping with a cloth prior to or instead of irrigation), clipping fur before water irrigation, and ideal duration of water irrigation in these species.

3.6 | Oxygen for Respiratory Distress or Hypoxemia (FA-03)

In cats and dogs in the prehospital setting with signs of shortness of breath, difficulty breathing, or hypoxemia (P), does administration of oxygen (I), compared with no administration of oxygen (C), result in improved outcome (O)?

3.6.1 | Introduction

The provision of oxygen to hospitalized dogs and cats with respiratory distress or hypoxemia is fundamental care, but the value of oxygen supplementation in the prehospital setting in such cases is unknown. Oxygen is commonly administered to people in the prehospital setting during medical transport [2, 3], but there are no evidence-based guidelines regarding oxygen therapy for dogs and cats with respiratory distress or hypoxemia during transport for definitive care. This PICO question was designed to help determine the usefulness of oxygen therapy in the prehospital setting for dogs and cats with respiratory distress or hypoxemia.

3.6.2 | Consensus on Science

3.6.2.1 | Outcome 1: Survival to Discharge. For the most critical outcome of survival to discharge, we identified one CT (moderate quality of evidence, downgraded for serious risk of bias and very serious indirectness, and upgraded for large effect and effect found despite confounder) and one OS (very low quality of evidence, downgraded for serious risk of bias, very serious indirectness, and imprecision) that addressed the PICO question [87, 88]. A randomized controlled trial by Austin et al. included 405 patients with a presumptive chronic obstructive pulmonary disease (COPD) exacerbation for whom oxygen was provided by first responders in the prehospital setting [87]. Patients in this study received either high-flow oxygen (considered standard care; 8–10 L/min) or nasal oxygen titrated to maintain pulse oximetry values (SpO_2) between 88% and 92% (intervention arm); both groups received bronchodilators. Use of titrated oxygen, compared to high-flow oxygen, markedly reduced the risk of mortality by 58% for all patients in the intention-to-treat analysis (relative risk 0.42, 95% CI 0.20–0.89, $p = 0.02$). Notably, this study was designed to assess for a difference in outcome between two strategies of oxygen provision, and as such, all patients received oxygen prehospital, so the effect of oxygen therapy versus no oxygen therapy cannot be ascertained from this study, but rather the benefit of oxygen therapy titrated to mitigate severe hypoxemia is highlighted in this population of patients with COPD [87]. A retrospective study by Igarashi et al. included 137 patients with advanced cancer and new onset hypoxemia ($SpO_2 < 90\%$) as determined during a home health visit [88]. In this study, oxygen was prescribed at the discretion of the attending clinician to 35 (25.5%) patients. On multivariate analysis, the adjusted hazard ratio of oxygen use was 0.35 (95% CI 0.13–0.89, $p = 0.027$) for death and 0.33 (95% CI 0.11–0.96, $p = 0.041$) for death at home in patients with dyspnea ($n = 44$). No difference in mortality was seen for patients without dyspnea [88].

An additional, large, prospective, observational, cohort, multicenter study relevant to this outcome was identified in the October 2025 bridge search and thus is included here, though the study did not undergo full GRADE evaluation [89]. Del Pozo Vegas et al. studied 7494 patients with unselected, acute disease who were transported to the ED by emergency medical services (EMS) in Spain [89]. The study divided patients into three cohorts: those who were treated/transported on room air (FiO_2 0.21; $n = 5267$, 70.3%), those transported with moderate oxygen therapy (FiO_2 0.22–0.49; $n = 1123$; 15%), and those transported with high oxygen supplementation ($FiO_2 \geq 0.50$; $n = 1104$; 14.7%). Two-day mortality was 0.4% for those transported on room air, 5.3% for those transported with moderate oxygen therapy, and 22.9% for those transported with $FiO_2 \geq 0.50$ ($p < 0.001$). Similarly, 365-day mortality was 9.9% for those transported on room air, 33.1% for those transported with moderate oxygen therapy, and 50.5% for those transported with $FiO_2 \geq 0.50$ ($p < 0.001$). While these results seem obvious—those with a need for more aggressive oxygen therapy are sicker and thus more likely to die (i.e., confounding of these findings by indication for treatment)—

the "moderate therapy" group that received FiO_2 0.22–0.49 was significantly older and had more chronic comorbidity than the group transported on higher FiO_2, which had the worst short- and long-term survival. While this study primarily demonstrates that the need for oxygen support is predictive of outcome, it is interesting to note that more aggressive oxygen supplementation was not clearly effective at preventing death when compared to more moderate support [89].

3.6.2.2 | Outcomes 2 and 3: Incidence of CPA and Length of Stay.

For the critical outcome of incidence of CPA and the important outcome of LoS, no studies were found that addressed the PICO question.

3.6.3 | Treatment Recommendations

We recommend administering oxygen to dogs and cats with signs of difficulty breathing or hypoxemia (i.e., cyanosis, low SpO_2) in the prehospital setting during transport to a veterinary facility (strong recommendation, expert opinion).

When such monitoring is available, we recommend titrating oxygen support to SpO_2 95%–97% in the prehospital setting to dogs and cats with signs of difficulty breathing or hypoxemia (i.e., cyanosis, low SpO_2) during transport to a veterinary facility (strong recommendation, moderate quality of evidence).

3.6.4 | Justification of Treatment Recommendations

Prehospital dyspnea and hypoxemia are reliably associated with prehospital [90] and in-hospital [91–93] mortality. Thus, oxygen supplementation during prehospital transport to the ED is standard care for people with dyspnea and hypoxemia. The only study we identified that compared oxygen supplementation to no oxygen supplementation was in end-stage cancer patients, in whom oxygen supplementation extended life for hypoxemic patients if they were experiencing dyspnea [88]. While evidence from this single, retrospective study in people is very low in quality due to its indirectness, small size, and risk of bias due to terminal diagnoses in all patients, it is very unlikely that higher quality evidence will emerge, since purposely withholding oxygen therapy from hypoxemic, dyspneic individuals in the prehospital setting is inhumane and unethical. Not only may oxygen supplementation relieve some feelings of breathlessness in dyspneic patients, but the provision of oxygen to patients with shortness of breath or suspected or confirmed hypoxemia improves arterial oxygenation and tissue oxygen delivery.

Two prospective studies of moderate oxygen supplementation, either titrated to moderate hypoxemia specifically in people with COPD [87] or restricted to FiO_2 <0.5 in a heterogeneous population of ambulance patients [89], suggest better outcomes for the degree of illness with a titrated approach rather than high-flow oxygen therapy. These improved outcomes associated with avoidance of hyperoxemia are consistent with literature suggesting harm associated with hyperoxemia, particularly in immediate post-ischemic/hypoxemic states and critical illness [94–96], likely due to generation of reactive oxygen species [97]. The committee therefore recommends normoxemia as the target for prehospital oxygen therapy in dogs and cats, rather than moderate hypoxemia as in Austin et al., since that study focused on people with COPD, a disease in which oxygen supplementation titrated to normoxemia or hyperoxemia has been associated with increased mortality compared to moderate hypoxemia [98].

Moreover, the potential benefit and perceived low risk of harm from oxygen administration favor such treatment in the prehospital setting for dyspneic or hypoxemic dogs and cats. In settings where titration to a specific SpO_2 is possible, for instance with animal ambulance services, oxygen therapy in dogs and cats in respiratory distress titrated to avoid hyperoxemia is supported by the available evidence [94–96].

3.6.5 | Knowledge Gaps

Evidence for this PICO was drawn exclusively from the human literature, as there are currently no clinical studies evaluating the prehospital use of oxygen for dogs and cats with respiratory difficulty or hypoxemia. Given that ethical considerations preclude a prospective study in which oxygen is intentionally withheld, a multicenter retrospective study comparing prehospital oxygen versus no prehospital oxygen administration may help to more conclusively inform on this recommendation. As there are several methods available for providing oxygen noninvasively, including flow-by from oxygen tubing, face mask, and nasal cannula, that vary in both the achievable FiO_2 and patient tolerance and compliance, future studies could investigate the optimal method of oxygen administration in this setting. Finally, as there is a growing body of literature suggesting that hyperoxemia can be harmful, studies comparing liberal oxygen therapy to oxygen titrated to maintain normoxemia and avoid hyperoxemia are warranted.

3.7 | Choking (FA-09)

In conscious cats and dogs suspected to be choking (P), does performing back blows or other interventions (I), compared to abdominal thrusts (C), result in improved outcome (O)?

3.7.1 | Introduction

Foreign body airway obstruction (FBAO) is an occasional problem in dogs and is uncommon in cats. First aid guidelines for people recommend that bystanders help the victim attempt to dislodge the obstructive foreign body (FB) when a victim is choking and unable to cough productively [2]. Many different methods of on-scene FB removal have been reported, including back blows, abdominal thrusts (the "Heimlich maneuver"), chest thrusts, chest compressions, finger sweep, suction, and forceps use by trained and equipped personnel [2, 99]. However, equipoise remains regarding the most effective, safest method(s) to resolve FBAO in the prehospital setting, and no evidence-based recommendations are available in small animals. Therefore, we developed this PICO question to determine whether performing back blows or other interventions, compared to abdominal thrusts, would result in improved outcomes in conscious cats and dogs suspected to be choking. While we did not include the term "prehospital" in the PICO question, which was done to find as many articles as possible, the goal of this question is to guide prehospital, first aid interventions.

3.7.2 | Consensus on Science

3.7.2.1 | Outcomes 1 and 2: Survival to Discharge and Incidence of CPA. Because the identified studies did not distinguish between survival to discharge and incidence of CPA as pertains to the method of FBAO resolution, these outcomes were combined.

For the most critical outcomes of survival to discharge and incidence of CPA, there were no CT, two OSs (very low quality of evidence, downgraded for very serious indirectness), and no ES that addressed the PICO question [100, 101]. Igarashi et al. found that of 155 people with FBAO, 19 were treated by bystanders and 22 were treated by emergency medical technicians or emergency physicians at the scene, while 114 patients were transferred to the hospital and first treated by emergency physicians [100]. FBs were removed successfully at the scene in 39 of 41 (95%) people by a variety of methods, sometimes in combination, including abdominal thrusts (10), Magill forceps (9), "tapping" (9), mechanical suction (5), intubation (4), finger sweep (2), and a home vacuum cleaner (2). Thirty-two of 155 (21%) survived with favorable outcomes, while 123 of 155 (79%) died or had unfavorable outcomes (severe disability, vegetative state, or death). Patients whose FBs were removed by a bystander at the scene were more likely to have a favorable outcome than those whose FBs were removed by emergency medical technicians or emergency physician at the scene (73.7% vs. 31.8%, $p < 0.0075$) or at the hospital after transfer (73.7% vs. 9.6%, $p < 0.0001$). This study did not evaluate the effectiveness of different techniques to dislodge FBs as pertains to outcome, but was considered relevant to the PICO because it shows improved survival with bystander assistance on scene for FBAO [100]. A retrospective study by Vilke et al. evaluated 182 children with FBAO found in a prehospital care database [101]. Of these, 107 cases resolved before paramedics arrived, some by the patient alone and some with assistance. Interventions used by assisting parents included bulb suction (3%), finger sweeps (6%), abdominal thrusts (3%), and back blows (12%). Paramedics used advanced life support (ALS) skills in only three cases. No deaths were reported, and the relative success of different dislodgement techniques was not reported; the study is included here because of the good survival associated with FBAO dislodgment on the scene [101].

In the bridge search, we identified three additional relevant studies that did not undergo GRADE evaluation. One prospective OS of 407 people (median age 82 years, IQR 15 years) presenting to the ED following FBAO evaluated the impact of bystander intervention and reported the various methods of bystander interventions [102]. In this study, survival was higher in patients who received bystander interventions ($p < 0.001$), and data showed that the biggest impact of bystander intervention was in preventing CPA [102]. The most common first on-scene interventions in this study were suction (101/407; 24.8%) and back blows (85/407; 20.9%), and the overall success of the first intervention attempted was 46.8% (173/370 - no removal attempt was made in 37 people) [102]. Additionally, a retrospective study of 709 FBAOs from the EMS medical records of Alberta, Canada, between 2018 and 2021 investigated the associations between FBAO relief and survival to discharge for the exposures of "BLS interventions" (which included abdominal thrusts, chest compressions or thrusts) versus back blows [103]. This study reported that 643 of 709 (90.7%) cases had a bystander-administered FBAO intervention on scene, which was successful in relieving the FBAO in 492 of 643 (76.5%) cases. People with FBAOs not relieved before emergency personnel arrival were more likely to die ($p < 0.001$). Chest compressions/thrusts were associated with decreased odds of survival to discharge compared to back blows (adjusted odds ratio [aOR] 0.04 [95% CI 0.01–0.32]) [103]. A study by Wolthers et al. investigated 321 cases of FBAO that resulted in out-of-hospital cardiopulmonary arrest (OHCA) in Denmark [104]. In this study, there was no association between survival and specific bystander interventions (e.g., abdominal thrusts, back blows, manual removal) or whether emergency medical personnel used Magill forceps to remove the FB (aOR 1.47 [95% CI 0.55–3.65] and aOR 0.88 [95% CI 0.34–1.12], respectively) [104].

3.7.2.2 | Outcome 3: Severity of Clinical Signs/Time to Resolution of Choking/Complications. For the critical outcome of severity of clinical signs (including time to resolution of choking), we identified no CT, one OS (very low quality of evidence, downgraded for very serious indirectness), and one ES (very low quality of evidence, downgraded for very serious indirectness and imprecision) that addressed the PICO question [105, 106]. Soroudi et al. describe 513 cases of adult FBAO in the prehospital setting, 496 (96.7%) of whom survived [105]. Two hundred twenty-three FBAOs resolved before paramedics arrived; a variety of techniques were used on scene, including abdominal thrusts in 84 cases (16.4%), use of Magill forceps in 17 (including four in whom abdominal thrusts had been unsuccessful; 3.3%), supine abdominal thrusts in 14 cases (2.7%), and suction in 12 cases (2.3%). Abdominal thrusts led to improved patient status in 86.5% of cases in which they were used; however, no patients were reported to have received back blows, and the paper does not compare the type of intervention with time to resolution of choking or outcome [105]. In the ES, Langhelle et al. used 12 unselected adult cadavers with a simulated complete airway obstruction in a randomized crossover design to evaluate airway pressures generated by abdominal thrusts versus chest compressions [106]. This study showed the mean peak airway pressure was lower with abdominal thrusts than with chest compressions, 26.4 ± 19.8 cm H_2O versus 40.8 ± 16.4 cm H_2O, respectively ($p = 0.005$, 95% CI for the mean difference 5.3–23.4 cm H_2O). Standard chest compressions, therefore, have the potential to be more effective than abdominal thrusts for the management of FBAO once a patient loses consciousness [106].

In the bridge search, we identified two additional relevant studies. The retrospective study mentioned above of 709 FBAOs from the EMS medical records of Alberta, Canada, in people of all ages found that abdominal thrusts and chest compressions/thrusts were associated with decreased odds of FBAO relief relative to back blows (aOR 0.53 [95% CI 0.29–0.98] and 0.14 [95% CI 0.07–0.28], respectively) [103]. In that study, abdominal thrusts, chest compressions/thrusts, and back blows were implicated in intervention-associated injuries in four, nine, and zero cases, respectively [103]. Finally, a retrospective study in the United States aimed to determine the effectiveness of abdominal thrusts in relieving FBAO [107]. Suga et al. identified 1947 cases in which abdominal thrusts were used for FBAO and found they were successful in 908 (46.6%) cases (first-time success 808/1870 cases [43.2%]) [107].

3.7.2.3 | Outcome 4: Need for Intervention by a Medical Professional. For the important outcome of need for intervention by a medical professional, there were no CT, one OS (very low quality of evidence, downgraded for very serious indirectness), and no ES that addressed the PICO question [101]. Vilke et al. used prehospital database information to report on treatments and outcomes in 182 children under 5 years of age with FBAO [101]. One hundred seven of 182 (59%) FBAOs were resolved before paramedic arrival. Interventions used by parents included bulb suction (3%), finger sweeps (6%), abdominal thrusts (3%), and back blows (12%). After paramedic evaluation, 5% of the patients were deemed not to require further evaluation by a physician and were medically cleared and released at the scene, while 48% were transported by ambulance to the ED. The parents of 47% of children with resolved FBAO refused transport to the ED against medical advice. Of those transported to the ED with disposition documented, 13 were admitted and 49 were discharged directly from the ED [101].

3.7.2.4 | Outcome 5: Harm to the Rescuer. For the important outcome of harm to the rescuer, no studies qualifying for GRADE evaluation were identified.

One case report was identified that described a rescuer having suffered a rotator cuff injury after performing abdominal thrusts [108].

3.7.3 | Treatment Recommendations

In conscious dogs and cats in the prehospital setting suspected to be choking, we recommend bystander intervention to help clear the airway if the risk to the rescuer is low (strong recommendation, very low quality of evidence).

In conscious dogs and cats in the prehospital setting suspected to be choking, we recommend first administering up to 5 back blows unilaterally or bilaterally over the caudodorsal thorax, lateral to the spine, to help clear the airway (strong recommendation, very low quality of evidence).

In conscious dogs and cats in the prehospital setting suspected to be choking, we recommend trying alternative techniques to help clear the airway if 5 back blows are not successful (strong recommendation, very low quality of evidence).

In conscious dogs and cats in the prehospital setting suspected to be choking, we recommend against bystander intervention if the risk to the rescuer is high (strong recommendation, expert opinion).

In unconscious dogs and cats in the prehospital setting suspected to have an FB airway obstruction, we recommend against blind finger sweeping to attempt to clear the airway (strong recommendation, expert opinion).

In unconscious dogs and cats in the prehospital setting suspected to have an FB airway obstruction, we recommend immediately starting chest compressions, following the RECOVER Out-of-Hospital CPR Algorithm (strong recommendation, very low quality of evidence).

We recommend that any animal having required bystander assistance (e.g., back blows, abdominal thrusts) to clear the airway be evaluated by a veterinarian immediately (strong recommendation, very low quality of evidence).

3.7.4 | Justification of Treatment Recommendations

This PICO question aimed to determine the effect of back blows or other interventions compared to abdominal thrusts with regard to critical and important outcomes in dogs and cats suspected to be choking in the prehospital setting. The most consistent general finding across the studies identified in the initial and the bridge search is that rapid bystander intervention to assist choking individuals is crucial to the outcome [100–103]. Only one study directly compared "BLS interventions," which included abdominal thrusts and chest compressions/chest thrusts with back blows, and this study of 709 FBAOs found that both abdominal thrusts and chest compressions/thrusts were less likely to relieve the obstruction than back blows in people (aOR 0.53 [95% CI 0.29–0.98] and 0.14 [95% CI 0.07–0.28], respectively) [103]. During the final completion stage of this domain paper, an additional study was identified that further supports the recommendation to perform chest compressions before airway evaluation in the unconscious choking victim [109]; Kinoshita et al. had been screened "in" for GRADE evaluation by two EEs, but the paper uploaded into the GRADE site was incorrect, and so the study was not GRADE-evaluated. Additionally, there are many complications of abdominal thrusts reported in the literature, some of which were fatal, including aortic thrombosis, aortic dissection and rupture, splenic rupture, gastric rupture, and tracheal tear [110–114].

The human first aid guidelines recommend an escalating approach for bystanders toward the choking victim, first encouraging the victim to cough and then, if coughing is not productive, moving first to as many as 5 consecutive back blows, followed by as many as five consecutive abdominal thrusts, and interchanging these two techniques until either the FBAO is relieved or the victim loses consciousness [2]. Once a victim loses consciousness, the bystander is instructed to institute basic life support (BLS) by moving immediately to chest compressions without blind sweeping the airway [2]. Blind sweeps can worsen an FBAO or fail to remove it (particularly if it is deeply located), and chest compressions/thrusts are sometimes able to dislodge an FBAO [102, 103, 106, 115]. Additionally, reaching into a dog or cat's mouth carries risk to the rescuer, even as an animal is losing consciousness and may be gasping. Initiating BLS and performing CPR in animals on scene with FBAO is probably worthwhile, as Wolthers found that patients in CPA due to FBAO had a greater chance of return of spontaneous circulation (ROSC) than patients with other causes of OHCA [104]. Additionally, there is evidence that an abdominal thrust may not effectively dislodge an FBAO during canine CPA and that chest compressions may be more effective in that instance [115]. In general, many studies found that if a first intervention did not succeed in removing the FBAO, a different intervention may still succeed [102, 103, 116]; thus, we also recommend an escalating approach, starting with back blows due to their greater potential for efficacy and lower risk.

While we found more reports of complications associated with abdominal thrusts in people than with other interventions, back blows theoretically have the potential to cause injury or to be unsuccessful [117]. If 5 consecutive back blows are unsuccessful at dislodging the FBAO in a dog or cat, it is vitally important that the rescuer continue to assist the animal to attempt to clear the airway as quickly as possible [100–103]. However, the committee considered abdominal thrusts to have even greater potential to injure dogs and cats than older children or adults because many dogs and cats are small, and there are many different chest and abdominal conformations to consider. Therefore, while up to 5 abdominal thrusts are recommended in human choking victims when 5 back blows are ineffective, the committee chose not to recommend abdominal thrusts as the universal second maneuver. There are many possible alternative maneuvers a bystander could attempt in such a scenario, including abdominal thrusts, chest compressions or chest thrusts, vertical body positioning, or external manual pressure to the pharynx, to name a few. Therefore, rather than recommending a single, specific alternative method if 5 back blows fail, we recommend that the rescuer continue trying different maneuvers that they deem may be safe and effective for that animal. In general, it is recommended that any animal that requires assistance to clear an FBAO be seen by a veterinarian, due to the risk for complications associated with choking and with any bystander intervention used to help clear the airway [2, 116].

In people, suction is playing a greater and greater role in the relief of FBAO, and commercially available devices have shown great promise in on-scene treatment of this life-threatening problem [100, 101, 118]. However, commercially available devices rely on a plastic face mask that fits flush to the human face with an airtight seal to allow for suction to be applied, and home vacuum cleaners rely on the patient to seal their lips around the nozzle to apply suction. Because of these anatomical and communication differences between people and small animals, suction cannot be recommended as a means for clearing FBAO in dogs and cats at this time.

3.7.5 | Knowledge Gaps

There are no studies comparing various methods to relieve FBAO in the prehospital setting in dogs and cats; considering compliance and conformational differences between people and small animals, it is likely that more species- and size-tailored recommendations would be appropriate, and even case reports and case series of effective methods for relieving FBAO prehospital would be helpful. Additionally, suction methods are becoming more commonplace to treat FBAO on scene in childcare environments and assisted living facilities, but the potential to adapt these devices for veterinary use is unknown. Such adapted suction devices or more reliable methods for relieving FBAO could be of great value for owners of animals with swallowing disorders, and research in this area would be helpful.

3.8 | Bystander CPR (FA-10)

In cats and dogs in the prehospital setting with suspected OHCA (P), does BLS performed by a bystander (e.g., the owner, a good Samaritan) (I), compared to no prehospital BLS (C), result in improved outcome (O)?

3.8.1 | Introduction

For over 25 years, human healthcare systems have emphasized the importance of the “chain of survival” to optimize outcomes in people with CPA; importantly, that chain often includes bystander laypeople for those suffering out-of-hospital cardiac/cardiopulmonary arrest [119, 120]. Reported incidence of OHCA among dogs and cats with CPA at a veterinary hospital is 8%–37% [121, 122], reportedly due to trauma, heart disease, or respiratory disease; some dogs with OHCA have been reported to survive to discharge [122–124]. Both cats and dogs can suffer from specific diseases (e.g., hypertrophic cardiomyopathy in cats, arrhythmogenic right ventricular cardiomyopathy in dogs) that predispose them to OHCA and death, and even previously healthy dogs and cats can experience OHCA in unexpected circumstances, such as FB upper airway obstruction or drowning. Theoretically, patients with OHCA due to either a shockable rhythm or a reversible cause may have better chances of a good outcome than, for instance, an elderly animal with multiple comorbidities that experiences OHCA due to end-stage disease. Considering the potential for better outcomes in certain dog and cat populations at higher risk of OHCA, bystander CPR has the potential to save lives. However, the impact of BLS performed by a bystander (e.g., the owner or a good Samaritan) on outcomes in dogs and cats with OHCA is unknown.

3.8.2 | Consensus on Science

3.8.2.1 | Outcome 1: Survival to Discharge. For the most critical outcome of survival to discharge, we identified 0 CTs, 23 OSs (moderate quality of evidence, downgraded for very serious indirectness and upgraded for very large effect and dose–response effect), and 0 ESs that addressed the PICO question [125–147]. Taken together, these 23 OSs include approximately 1 million people with OHCA, and all studies evaluated an outcome pertinent to survival, such as survival to discharge, survival at 30 days, or survival with a favorable neurological outcome. Many studies were registry-based, and they were from a variety of North American, European, Asian, and Australian regions. All studies included a “no bystander CPR” comparison group, and some also compared spontaneous/non-dispatcher-assisted bystander CPR to dispatcher-assisted or dispatcher-directed CPR. Most studies included cases attended by ambulance services, though some studies included people who were transported to the hospital by private vehicle or other means. Some studies included only medical causes of OHCA (i.e., excluded trauma), while others included all causes of OHCA. Of particular relevance to dogs and cats are the seven studies of the impact of bystander CPR in a total of > 20,000 people (many children) with asphyxial (noncardiac) cause of OHCA [125, 126, 129, 130, 135, 142, 146]. Every one of the 23 studies, whether it involved cardiac or noncardiac causes of OHCA, found that bystander CPR improved survival significantly, generally by approximately two to three times. One study involved 741 cases of OHCA in a rural region with very limited healthcare services and long EMS response times, and while the overall survival from OHCA was low in this study, bystander-performed CPR still improved survival (OR 2.79, 95% CI 1.28–6.05) compared to no bystander CPR being performed [134].

A bridge literature search performed in December 2025 identified many additional references published since the original 2020 literature search. Selected references are discussed here, though they did not undergo GRADE evaluation and thus are assigned an extra degree of indirectness. A 2023 meta-analysis by Hou et al. evaluated 38 studies comprising 233,376 people experiencing OHCA in China and, consistent with reports above, found that patients with OHCA receiving bystander CPR had better outcomes than those only receiving CPR once EMS arrived, despite comparable EMS response times between the groups [148]. The median rate of survival to discharge across populations receiving bystander CPR was 3.66% (3.06%–3.85%), higher than the 1.23% (0.57%–1.36%) rate seen in populations that did not receive CPR until EMS arrival ($p = 0.025$) [148]. An additional bridge search was performed to identify studies published more recently than Hou et al., and four additional relevant studies were identified [149–152]. Of these four, three were consistent in the finding that bystander CPR significantly improved survival, specifically with a good neurological outcome [149–151]. The final study by Strnad et al. included 381 people from Slovenia with OHCA, and this study did not find that bystander CPR was associated with survival on either univariate or multivariable analysis [152]. The study's authors state concern for the low frequency of bystander CPR in their region and concern that citizens are unaware of the appropriate techniques.

3.8.2.2 | Outcome 2: ROSC. For the critical outcome of ROSC, 0 CTs, 15 OSs, and 0 ESs were identified that addressed the PICO question [125, 128, 130, 134, 136–144, 146, 147]. All 15 of these OSs were used in the survival to discharge consensus on science, above. Given the strength of the information pertaining to the most critical outcome of survival to discharge, these studies were not fully evaluated for the outcome of ROSC because this lower priority outcome would not change the treatment recommendation. All individuals surviving to discharge by definition achieved ROSC, and achieving ROSC without the potential for survival to discharge is not a high-priority outcome on its own.

3.8.2.3 | Outcomes 3 and 4: Length of Stay and Harm to the Rescuer. For the important outcomes of LoS and harm to the rescuer, no literature was identified to address the PICO question.

3.8.3 | Treatment Recommendations

We recommend immediate bystander-performed BLS for OHCA in dogs and cats as long as the risk to the rescuer is low (strong recommendation, moderate quality of evidence).

We recommend transport to the nearest open veterinary clinic as soon as possible for dogs and cats experiencing OHCA (strong recommendation, moderate quality of evidence).

We recommend continuous BLS during transport to the nearest open veterinary clinic with a primary emphasis on rescuer safety and while following applicable vehicle passenger safety laws (strong recommendation, expert opinion).

3.8.4 | Justification of Treatment Recommendations

No studies were identified that specifically evaluated the impact of bystander CPR on survival from OHCA in dogs and cats. However, we know that dogs and cats experience CPA in the out-of-hospital environment [121, 122], and some of these events may be survivable with a good long-term outcome [122–124]. Additionally, there is at least one report of a dog that suffered respiratory arrest in the out-of-hospital setting that survived an approximately 45-min car ride to the nearest veterinarian while the owner performed mouth-to-nose ventilation [153]. It is likely that a strong "chain of survival" is as vital to the outcome for dogs and cats with reversible or treatable causes of CPA as it is in people [119, 120].

The evidence is convincing that BLS administered by laypeople improves critical survival outcomes in human OHCA [125–151]. For people, the evidence supporting bystander CPR is low to moderate in certainty, though most studies are from high-income/high-resource regions. Applicability of these findings to lower resource or rural areas, such as regions without ambulance service or with longer transport distances and thus times to advanced medical care, is uncertain; however, a single, fairly small rural study supported the usefulness of bystander CPR for OHCA even in these circumstances [134]. While the PICO does not ask about timing of BLS measures for dogs and cats with OHCA, both studies that evaluated the impact of the time interval between victim collapse and CPR onset found that shorter intervals between collapse and initiation of bystander CPR were associated with better outcomes [143, 151]. Interestingly, all identified studies that compared survival between spontaneous/non-dispatcher-assisted bystander CPR and dispatcher-assisted or dispatcher-directed CPR found that dispatcher assistance did not help (or had worse outcome) compared to spontaneous bystander CPR [137, 138, 140–143, 147]; it is unclear whether this lack of improvement with dispatcher assistance may actually reflect the impact of time delay in initiating on-scene CPR while the bystander makes the phone call and waits for instructions—evidence suggests this may be the case [143, 154]. Given the consistency of findings supporting bystander CPR for OHCA, the large treatment effect of performing BLS for OHCA of either cardiac or noncardiac medical cause, and the dose–response effect of earlier bystander CPR on survival, the committee makes a strong recommendation for bystander CPR for dogs and cats experiencing OHCA. As many studies did not include trauma victims, the usefulness of bystander CPR for OHCA associated with trauma specifically is less certain.

No studies were found regarding harm to rescuers performing BLS for OHCA, though recent human guidelines emphasize the rescuer's physical safety as a top priority and recognize the psychological injury that may result to rescuers following on-scene bystander CPR [155]. The committee recommends that rescuers for dogs and cats with OHCA prioritize their own safety (e.g., at the scene of an accident, while riding in a moving vehicle) before and during performance of BLS in small animals.

One area of meaningful equipoise in applying human study findings to dog and cat populations with OHCA is the difference in the options and timing for transportation to a veterinary hospital. All but one study included (sometimes exclusively) urban centers with robust ambulance and EMS teams available to transport OHCA victims to a hospital while continuing to perform lifesaving interventions. Identified studies found that longer delays between collapse and access to more advanced care (e.g., ambulance or hospital) were associated with poorer survival in people, which emphasizes the importance of prompt, advanced medical care on outcome in OHCA [134, 139]. Unless an ambulance option were available for dogs and cats, a rescuer would either need to achieve ROSC in the field prior to transport or, for most dogs, abandon CPR efforts while transporting the animal to the closest veterinary facility. Discontinuing BLS for transport would decrease the likelihood of a good outcome. For cats or small dogs, a seat-belted passenger may be able to continue BLS using a circumferential or one-handed chest compression technique and mouth-to-nose ventilation [7, 156] while another person drives to the closest veterinary facility; in this scenario, continued BLS cycles during transport may lead to better outcomes. Working dogs (canine officers) likely have additional transportation options, in which case BLS cycles should continue, if possible, during rapid transport to a veterinary hospital.

3.8.5 | Knowledge Gaps

While there is strong evidence to support bystander CPR for OHCA in people, studies on the impact of OHCA in veterinary medicine are absent. Companion animal species are most likely pediatric patients with OHCA (i.e., noncardiac cause of arrest) in a rural setting (i.e., resource-limited with no or very limited ambulance services and relatively long distances to hospitals), and no study was found in people that studied this specific scenario from which we could glean information. Differences in transportation options and causes of OHCA in small animals compared to people may be relevant to outcome, so case series and larger, registry-based OSs in small animals, including working canine officers versus pets transported by owners versus animal ambulance, are important.

3.9 | Naloxone for Suspected Opioid Exposure (FA-14)

In cats and dogs in the prehospital setting exposed to opioids (P), does administration of a reversal agent (I), compared to no reversal agent administration (C), result in improved outcome (O)?

3.9.1 | Introduction

Prescribed and illegal opioids are widely available and can cause adverse effects as serious as death in exposed dogs and cats. Pets may be accidentally exposed to opioids in the environment. Working dogs, particularly operational canines working in the military or law enforcement, are at risk for substantial opioid exposure in the field, whether they work in detection, patrol, search and rescue, tracking, or other specialty [157]. As stated by one prominent researcher on the topic, the use of prehospital naloxone to treat people with opioid intoxication and spontaneous circulation is "uncontroversial" [158]. However, evidence regarding the prehospital use of naloxone to treat accidentally exposed dogs and cats is sparse. This PICO was developed to determine the impact of prehospital naloxone on outcomes in dogs and cats with suspected opioid exposure.

3.9.2 | Consensus on Science

All 29 articles that were identified in this PICO's original 2020 literature search, designed and performed as described elsewhere [8], were excluded by the PICO's EEs, and, therefore, none of them underwent full GRADE evaluation by two independent EEs. Domain Chair and Co-Chair review of these articles deemed 19 of them potentially relevant to one or more outcomes assigned to this PICO, and information from the most useful of those 19 studies is included here. Additionally, a bridge literature search was performed in December 2025 to update the evidence prior to creating this document, and information from the most relevant, recent studies is also incorporated. Details about these references and the bridge search are available elsewhere[2]. Because none of the literature cited here underwent two-blinded-EE GRADE evaluation, all treatment recommendations were downgraded by one level of certainty.

3.9.2.1 | Outcome 1: Survival to Discharge. For the most critical outcome of survival to discharge, two CTs (low quality of evidence, downgraded for serious risk of bias and very serious indirectness, and upgraded for large effect), 10 OSs (low quality of evidence, downgraded for very serious indirectness and upgraded for very large effect), and 0 ESs were identified, between the original literature search and the bridge search, that inform the PICO question [159–170]. A "before-and-after" CT by Rando et al. compared opioid overdose deaths in Ohio between two periods of time [159]. Police were trained in October 2013 to administer naloxone to individuals suspected to be suffering from an opioid overdose. Following police training, the number of opioid overdose deaths decreased each quarter compared to the pretraining period ($p = 0.025$). Of the 67 people who received naloxone from police officers, 52 of 67 (77.6%) survived, and 8 of 67 (11.9%) were lost to follow-up [159]. A prospective, randomized, unblinded CT by Kerr et al. compared equal doses of prehospital IN or intramuscular (IM) naloxone administration in 172 patients with opioid overdose, and in this study, no deaths were reported [165].

Of the OSs that addressed the PICO question, some evaluated naloxone administration in the field by EMS, some by trained law enforcement officers, and some included laypeople and bystanders.

3.9.2.2 | EMS/Paramedics. In a prospective OS, Tylleskar et al. evaluated 2215 patients receiving naloxone for opioid overdose in the prehospital setting in Norway between 2014 and 2018, all of whom survived the immediate overdose crisis following naloxone administration. Of these 2215 patients, 10 (0.45%) died within 1 week of the date they received naloxone; six of these were subsequent unintentional heroin overdoses, and all occurred ≥1 day after receiving naloxone from EMS [160]. Two retrospective OSs included 1315 total patients treated by EMS with prehospital naloxone for suspected opioid intoxication on scene, all of whom refused transport to a hospital against medical advice; all 1315 cases survived after a positive response to naloxone (sometimes multiple doses) on scene [161, 162]. A study of 164 EMS-treated opioid overdose patients from one county in Washington State reported that a partial or full response to naloxone occurred in 119 of 164 (73%) patients; 36 of 164 (22%) died at the scene or during transport to the hospital [163]. Finally, a similar study of 145 patients treated on scene for opioid overdose by EMS in Finland found that all 145 survived, despite the fact that 134 (92%) were experiencing respiratory depression and/or a Glasgow Coma Scale score ≤8 [164].

3.9.2.3 | Trained Law Enforcement Officers. A retrospective OS by Mahonski et al. evaluated naloxone administration by law enforcement officers in the state of Maryland from January 1, 2015, to October 15, 2017; naloxone doses from prepacked kits were administered to 1139 cases during the study period, of which 1035 (91%) were administered by law enforcement [166]. Most doses were given IN (1051; 97.9%), and intoxication was successfully reversed on scene in 886 (79.2%) of overdose victims. Overall, 1092 of 1139 people (95.8%) survived, 28 (2.5%) died, and the outcome was unknown for 19 [166]. Pourtaher et al. retrospectively reviewed 9133 naloxone administration reports by 5835 unique law enforcement officers located in 60 counties in New York and found that overdose victims survived in 87.4% of cases [167]. Similarly, a retrospective OS by Gooley et al. reported 597 cases of law enforcement officer-administered IN naloxone in the case of general suspected "overdose" (not all opioids) and reported that IN naloxone was effective in 370 (62%) cases; only 29 of 597 (5%) died [168].

3.9.2.4 | Laypeople/Bystanders Included. Avetian et al. retrospectively reported on 261 opioid overdose cases treated with IN naloxone by laypeople in community organizations; outcome was known for 245 cases, 242 (98.8%) of whom survived [169]. Finally, a 2021 retrospective OS by Farkas et al. included 359 patients from Pittsburgh, Pennsylvania, from 2013 to 2016, who received naloxone in the prehospital setting from bystanders (15% cases), first responders (87%), and/or EMS (41%). In this study, while 193 of 359 (54%) had meaningfully abnormal mental status (Glasgow Coma Scale ≤12) upon paramedic arrival, 283 (79%) had achieved normal mentation prior to hospital arrival, and only 6 (2%) died [170].

3.9.2.5 | Outcomes 2 Through 5: Incidence of CPA, Severity of Clinical Signs (Time to Resolution of Signs), Length of Stay, and Need for Intervention From a Medical Professional. These outcomes were not fully evaluated because a treatment recommendation regarding whether to administer naloxone to dogs and cats with opioid exposure in the prehospital setting could be made based on the evidence gathered for the most critical outcome, survival to discharge. References for these outcomes were either aligned with the results of or the same references as those for survival.

3.9.3 | Treatment Recommendations

We recommend administration of naloxone by the IN or IM route in the prehospital setting to dogs and cats with altered mentation or a respiratory rate <10 breaths per minute if opioid exposure is suspected (strong recommendation, low quality of evidence).

In the prehospital setting, if a dog or cat is unresponsive and agonal, gasping, or apneic, and opioid exposure is suspected, we recommend initiating BLS per the RECOVER Out-of-Hospital CPR Algorithm and thereafter administering naloxone intranasally or intramuscularly as soon as possible (strong recommendation, very low quality of evidence).

We recommend against administration of naloxone to dogs and cats in the prehospital setting if the risk to the rescuer is high (strong recommendation, expert opinion).

We suggest giving naloxone by the IN or IM route to dogs and cats with suspected opioid overdose that do not have established vascular access (weak recommendation, low quality of evidence).

3.9.4 | Justification of Treatment Recommendations

While there were no clinical studies identified regarding the use of prehospital naloxone to treat clinical signs of opioid intoxication in dogs, and no evidence at all for this topic regarding cats, the available evidence in people is convincing that prehospital naloxone saves lives in the context of opioid overdose. Current first aid guidelines for people recommend bystander administration of naloxone for suspected opioid overdose, by the IN route if untrained and by the IM route if the rescuer is trained in such administration [2]. Additionally, the 2024 American Heart Association First Aid Guidelines recommend administration of naloxone to people with CPA as soon as BLS is established [3]. Indeed, there is a growing body of evidence suggesting that naloxone may be indicated as the first ALS intervention in human OHCA associated with opioid intoxication [171].

Although some species differences exist regarding sensitivity to the respiratory depressant effects of opioids, it is generally accepted that opioid overdose can be fatal in both dogs and cats due to respiratory depression and depressant effects on the neurologic and cardiovascular systems [172]. While all of the identified clinical studies were conducted in people, there is some experimental information about naloxone use in dogs. A study in six healthy, mixed-breed laboratory dogs found that naloxone was well absorbed following IN administration after a brief mean lag time of 2.3 ± 1.4 min [173]. While mean maximum plasma concentration of naloxone was lower with the IN versus the IV route (9.3 ± 2.5 ng/mL vs. 18.8 ± 3.9 ng/mL, respectively;

$p = 0.0005$), the plasma half-life was longer with the IN route [173]. Of note, despite dogs having received no narcotics prior, naloxone administration did not result in a change in behavior, heart rate, or respiratory rate when given by either route, which supports its safety in the field, even if opioid exposure is uncertain [173]. To investigate the clinical efficacy of the IN route in dogs, Barr et al. studied the effects of IN versus IM naloxone in working dogs administered a sedative dose of fentanyl (0.3 mg IV); they found that either IN or IM naloxone (4 mg) adequately reversed the sedative effects of fentanyl within 5 min; the dogs were not assessed for respiratory depression [174]. Additionally, it appears that IN administration of a commercially available naloxone nasal spray[4] following fentanyl sedation does not negatively impact a trained scent dog's ability to detect target odors for tested time points between 2 and 48 h following IN administration [175]. An ES in Beagle dogs showed that a novel microneedle array device applied to the clipped shoulder area can administer an effective dose of naloxone to dogs intradermally, which could be relevant to treat apneic dogs (in which IN naloxone administration may be less effective) if the IM route were undesirable [176]. No literature was found on cats.

As noted above, naloxone administered by the IN route takes longer to achieve plasma levels; thus, it may lead to a slower clinical reversal than IM naloxone [173]. However, Barton et al. found that IN naloxone and IV naloxone had the same time to clinical response in opioid overdose of 3 min in people [177]. In people, Avetian et al. evaluated clinical response time to prehospital naloxone given by the IN route and reported clinical response time of 1–3 min in 33.5%, 3–5 min in 27.1%, >5 min in 26.5%, and <1 min in 12.9% of patients [169]. These delays in onset of IN naloxone, in combination with the small nares size in cats and small dogs, may favor the use of IM naloxone in these species. Importantly, the opioid-exposed dog or cat may itself be a risk to the rescuer, particularly if the rescuer attempts administration of IN medication or rescue breathing [178]. Thus, while respiratory support could be lifesaving for an opioid-exposed, apneic or bradypneic dog or cat in the prehospital setting while waiting for naloxone to take effect, the rescuer should consider their own risk in such scenarios. In general, risk to the rescuer must be considered when treating dogs or cats with suspected opioid exposure. Most of this risk is probably from drug/toxin exposure rather than from bites or scratches; most people described in the studies of prehospital naloxone administration had severely decreased mentation along with respiratory depression, and it would be expected that dogs or cats requiring naloxone for opioid overdose would be similarly affected. Additionally, the studies that reported human patient behavior following naloxone administration reported occasional "irritability," but that aggressive behavior was rare [168, 179]. Training programs are needed for handlers of working dogs to help them recognize opioid overdose in these dogs and to ensure comfort and safety during naloxone administration [180].

Veterinary professionals may choose to administer naloxone IN or IM to dogs or cats with suspected opioid overdose that do not have an IV catheter in place in the clinic setting. Administration by these routes is particularly attractive if it would be quicker than establishing vascular access for IV naloxone administration; such rapid administration could avoid negative outcomes, including CPA. However, the suggestion to administer naloxone by the IN or IM route for suspected opioid overdose when IV access is not established presents the potential for deviation from the established CPR algorithm. At this time, the committee recommends maintaining the established order of ALS interventions for dogs and cats in CPA in which opioid overdose is not likely the cause of arrest (i.e., monitoring first, vascular access second, reversals third). We suggest that IN or IM naloxone be given for suspected opioid overdose if vascular access is not established, but veterinary teams would consider such administration during CPR scenarios only if it did not delay establishment of vascular access for other vital ALS interventions such as epinephrine administration.

Many of the opioids to which animals may be exposed could produce clinical effects that outlast the reversal dose of naloxone, and thus, rebound or recurrent narcosis can occur following naloxone administration. Barton and others found that 7 of 95 (16%) naloxone-treated patients required additional doses of naloxone due to recurrent signs of narcosis, while 36 (84%) did not [177]. A retrospective study of 145 patients by Boyd et al. evaluating recurrent opioid toxicity after prehospital care found that of 61 patients transported to the ED after naloxone administration, 12 received another dose of naloxone in the ED for respiratory depression. All had signs of heroin use-related adverse events within 1 h of prehospital naloxone [164]. Finally, naloxone has been associated with some adverse effects. For instance, Maloney et al. reported a positive correlation between the number of prehospital naloxone doses and adverse events in the hospital, though this association may reflect confounding by indication for naloxone [181]. Similarly, Du Pont et al. reported some adverse patient events following bystander naloxone administration, though such adverse events were rare [182]. Finally, a case series of 10 adults reported acute onset pulmonary edema after receiving naloxone for opioid overdose [183].

3.9.5 | Knowledge Gaps

There are no descriptive or analytical studies of field naloxone use in dogs or cats; the question is particularly pertinent to operational canines, and reports describing on-scene techniques and outcomes are needed at a minimum. Optimal field dose and administration route for dogs and cats with opioid exposure in the field are unknown, and this should be studied; whether a single "small dog" (e.g., Beagle) versus "large dog" (e.g., Malinois) dose was feasible for field convenience is important for simplifying rescuer procedures and allowing for issuance of standardized kits. Finally, training programs to optimize rescuer safety should be developed and assessed for effectiveness.

3.10 | Tourniquet for Severe External Limb Bleeding (FA-04)

In cats and dogs in the prehospital setting with external limb bleeding (P), does the application of a tourniquet (I), compared with not applying a tourniquet (C), result in improved outcome (O)?

3.10.1 | Introduction

Hemorrhagic shock is a leading cause of early death following trauma. Prehospital tourniquet placement may help control severe extremity bleeding; however, concern has been raised regarding the feasibility of tourniquet use by non-medically trained laypeople as well as the potential for tourniquet-associated complications including ischemia, nerve injury, compartment syndrome requiring fasciotomy, or delayed amputation (amputation performed day[s] after the initial injury, often due to infection or poor wound healing) [184, 185]. Data on tourniquet use in dogs and cats are lacking; thus, for this PICO, we attempted to determine whether application of a tourniquet in the prehospital setting, compared with no tourniquet application, would result in improved outcomes in dogs and cats suffering extremity hemorrhage.

3.10.2 | Consensus on Science

3.10.2.1 | Outcomes 1 and 2: Survival to Discharge and Incidence of CPA. Because none of the studies distinguished between survival to discharge and incidence of CPA, Outcomes 1 and 2 were combined.

For the most critical outcomes of survival to discharge and incidence of CPA, we identified no CT, five OSs (very low quality of evidence, downgraded for serious risk of bias, very serious indirectness, and inconsistency), and no ES that addressed the PICO question [186–190]. In a retrospective, multicenter study of 1026 patients with peripheral vascular injuries, Teixeira et al. found that use of a tourniquet in the prehospital setting ($n = 101$, 17.6%) was independently associated with survival with an adjusted OR of 5.86 (95% CI 1.41–24.47, $p = 0.015$) [187]. Similarly, a retrospective OS by Scerbo et al. of 306 patients with extremity injuries found that prehospital tourniquet application ($n = 252$ people) was associated with 4.5 times reduced odds of mortality from hemorrhagic shock (OR 4.5 for mortality without prehospital tourniquet, 95% CI 1.23–16.4, $p = 0.02$) compared to patients with delayed tourniquet application (i.e., after hospital arrival); however, this may have been confounded by injury severity as patients from the late tourniquet cohort had a higher injury severity score [190]. Passos et al. described 190 patients with extremity arterial injury, only eight of whom underwent tourniquet placement either in the prehospital setting or in the ED within 1 h of injury. In this study, there were six deaths, all from the "no tourniquet" cohort and all due to exsanguination [186]. Two smaller retrospective studies, one with 192 patients with extremity arterial injury and one with 204 patients with penetrating extremity trauma, found no difference in survival when comparing patients who had a tourniquet placed prehospital to those who did not, both matched for baseline characteristics, including injury severity [188, 189].

The bridge literature search in October 2025 identified multiple larger, some multicenter, OSs of tourniquet use in people; these studies did not undergo full GRADE evaluation and so are discussed separately from the studies mentioned above. Two papers relevant to this outcome were used in development of the treatment recommendation. Taghavi et al. conducted a prospective, multicenter OS of 2284 adults presenting with penetrating trauma at 25 urban centers in the United States [191]. This study included only patients with torso and proximal extremity penetrating injury, so tourniquet use was fairly uncommon given these inclusion criteria, with only 108 tourniquets placed. Many prehospital interventions in this study were associated with decreased survival in multivariate analysis, and each additional prehospital procedure worsened the chances of survival; the authors attributed these findings to delay in hospital arrival, particularly because the majority of interventions were performed on scene rather than during transport. However, in this study, tourniquet placement was not associated with survival outcome (i.e., was a prehospital procedure that did not negatively impact survival) [191]. Finally, Henry et al. performed a retrospective OS of 944 patients with extremity vascular injury from October 2015 to July 2019 in Los Angeles, 97 (10.3%) of whom were treated with a prehospital tourniquet [192]. In multivariable analysis, prehospital tourniquet use in this study was associated with decreased odds of mortality (aOR 0.32, 95% CI 0.16–0.85, $p = 0.032$) [192].

3.10.2.2 | Outcome 3: Functional Recovery, Including Complications Associated With Tourniquet Use. For the critical outcome of functional recovery, we identified no CT, 10 OSs (very low quality of evidence, downgraded for serious risk of bias and very serious indirectness), and one ES in swine (very low quality of evidence, downgraded for serious risk of bias, very serious indirectness, and imprecision) relevant to the PICO question [187–190, 193–199].

Most identified studies were neutral with respect to this outcome. In a multicenter retrospective study of 1026 patients with peripheral vascular injury, 181 of whom were managed with a tourniquet, tourniquet use was not associated with an increased risk of delayed amputation (1.1% vs. 1.1%, adjusted OR 1.82, 95% CI 0.36–9.99, $p = 0.473$) [187]. Smith et al. found that use of a tourniquet was not associated with development of nerve palsy or secondary infection, and there was a higher incidence of fasciotomy (31.4% vs. 12.6%; $p < 0.0001$) and delayed amputation (9.1% vs. 0.8%; $p = 0.005$) in the non-tourniquet group [189]. Tsur et al. found no difference in rates of amputation despite increased use of tourniquets over time, though few details are available in this study, and there was no control group that was not managed with a tourniquet [193]. In a retrospective study of 105 adults with a tourniquet applied for extremity hemorrhage, Scerbo et al. reported no amputations due to tourniquet placement but found that in the 94 patients in whom the tourniquet was justified, 3 (3.2%) developed acute kidney injury, 2 (2.1%) developed compartment syndrome, 5 (5.3%) had nerve palsies, and 8 (8.5%) had venous thromboembolisms [190]. In a study by Inaba et al., 14 of 87 patients with extremity trauma and tourniquet application required amputation, but most occurred at the scene or were directly attributed to the extent of tissue damage. In one patient, the tourniquet was thought to be lifesaving but likely contributed to limb loss; in this case, the tourniquet had been in place for approximately 8 h as the patient was transported [198]. Shlaifer et al. found that 11 of 79 (13.9%) trauma survivors managed with a tourniquet experienced complications believed to be related to its use, including five who required a fasciotomy and six who developed neurologic sequela [195]. Three more relatively small retrospective studies of 98, 70, and 56 patients found a low incidence of or no complications directly related to tourniquet application [194, 197, 199]. Complications thought to be associated with tourniquet application in these studies included one arterial tear, two cases of nerve palsy, and two cases of compartment syndrome, although details on long-term outcome are lacking. While a study by McNickle et al. found a higher incidence of early amputation (23% vs. 6%) in patients who had a prehospital tourniquet, this was likely confounded by injury severity, as patients managed with a tourniquet had a higher mangled extremity severity score [188]. Finally, in an experimental swine study by Khierabadi et al., use of a combat-ready clamp for 2 h following experimental partial transection of the femoral artery delayed recovery to full function of the hindlimbs in six pigs as compared to five controls treated instead with hemostatic gauze [196].

Four studies relevant to this outcome were identified in the bridge literature search in October 2025. In Henry et al.'s retrospective cohort study of 944 patients with extremity vascular injury, of whom 97 had prehospital tourniquet placement, there was no difference in delayed amputation between patients treated with versus without a tourniquet (adjusted OR 1.07, 95% CI 0.21–10.88, $p < 0.097$) [192]. A prospective OS of 1392 injured limbs with 1130 total tourniquets (962 prehospital) placed by Schroll et al. found a similar incidence of limb complications with tourniquet use as without ($p > 0.05$) [200]. Two of the studies specifically evaluated complications associated with prehospital tourniquets. Clasper et al. reviewed 65 instances of significant lower limb injury in military members and ultimately compared 22 limbs on which a prehospital tourniquet had been placed to 22 matched limbs with no prehospital tourniquet [184]. The total number of limbs with any complication, superficial wound infection, delayed amputation, and flap failure was similar between the two groups; however, the incidence of major complications ($p = 0.04$) and of deep infection specifically ($p < 0.05$) was more common in patients treated with a prehospital tourniquet [184]. Finally, Rittblat et al. studied 84 trauma casualties in Israel, all of whom had prehospital tourniquet placement, and evaluated variables related to complications [201]. This study found that 20 of 84 (23.81%) patients with prehospital tourniquet experienced a complication, including local infection, compartment syndrome, and thromboembolism. In logistic regression analysis, LoS and injuries from falls were the variables associated with development of complications. There was no group without tourniquet placement in the Rittblat study [201].

3.10.2.3 | Outcome 4: Severity of Clinical Signs/Bleeding. For the critical outcome of severity of clinical signs/bleeding, we identified no CT, eight OSs (very low quality of evidence, downgraded for serious risk of bias and very serious indirectness), and no ES that addressed the PICO question [187–190, 195, 200, 202, 203]. Five of these studies evaluated how many prehospital tourniquets successfully stopped hemorrhage, and four of them found that prehospital tourniquets arrested hemorrhage in ≥88% of cases [187, 200, 202, 203]. The final study including 90 people with point-of-injury tourniquet placement found that single tourniquet placement was successful at arresting hemorrhage in 70% of cases, and this was regardless of caregiver skill level ($p = 0.56$), tourniquet type ($p = 0.16$), or limb characteristics ($p = 0.48$); all but one remaining case experienced hemorrhage cessation with placement of a second tourniquet [195]. Two studies showed improved blood pressure in patients treated with a prehospital tourniquet compared to those without [189, 190]. The only inconsistency regarding mitigation of bleeding regarded transfusion requirement: while one study in 204 patients with penetrating extremity trauma found that prehospital tourniquet placement reduced transfusion requirement [189], another in 192 patients with extremity arterial injuries found higher transfusion requirements in patients treated with tourniquets prior to hospital presentation, despite similar illness severity [188].

The October 2025 bridge literature search identified two additional, larger studies relevant to the outcome of clinical signs/bleeding. In their retrospective cohort study of 944 patients with extremity vascular injury, Henry et al. found in multivariable analysis that patients treated with a prehospital tourniquet had lower transfusion requirements at 4 h (regression coefficient −547.76; 95% CI −762.73 to −283.49, $p < 0.001$) and at 24 h (regression coefficient −1389.82; 95% CI −1824.88 to −920.97, $p < 0.001$) [192]. Schroll's study including 1392 injured limbs found that despite higher limb injury severity, patients treated with a prehospital tourniquet were less likely to arrive in shock compared with the control group (13.0% vs. 17.4%, $p = 0.04$) [200].

3.10.3 | Treatment Recommendations

We suggest prehospital application of a tourniquet in conscious cats and dogs with severe extremity hemorrhage not responsive to application of direct pressure alone (weak recommendation, very low quality of evidence).

We recommend prehospital application of a tourniquet in unconscious cats and dogs with severe extremity hemorrhage not responsive to application of direct pressure alone (strong recommendation, very low quality of evidence).

In cases where the risk to the rescuer is believed to be high, we recommend against application of a tourniquet in cats and dogs (strong recommendation, expert opinion).

3.10.4 | Justification of Treatment Reacommendations

The human literature supports that tourniquets placed in the prehospital setting may reduce mortality [187, 190, 192], effectively arrest extremity hemorrhage and improve hemodynamic stability [187, 189, 190, 195, 200, 202–204], and likely reduce blood product requirement [189, 192].

The overall rate of complications directly attributable to use of a tourniquet appears to be low, and it is impossible to know whether patients who suffered tourniquet-associated complications would have survived without the prehospital tourniquet. Most common complications in people included compartment syndrome, nerve palsies, infection, and thromboembolic complications. There is strong evidence that in people, prolonged tourniquet times of >4 h are associated with worse functional outcome and increased mortality compared to shorter tourniquet times of <2 h [205]. However, one small study in Australia with longer transport and thus tourniquet times (median 124 min, interquartile range 47–243 min), which could mimic longer transport times for dogs and cats in working or rural scenarios, still found tourniquet-related complications in only 4 of 30 (13.3%) cases [206]. Finally, although prehospital tourniquets in the included studies were most commonly applied by emergency medical personnel, there is evidence to suggest that improvised tourniquets applied by bystanders using materials like belts and neckties may be of benefit [195]. A study by Scott et al. showed in 246 volunteer subjects that 198 of 246 (80.5%) of these untrained lay volunteers could completely stop simulated "bleeding" by application of a tourniquet following verbal guidance from a certified emergency medical dispatcher [207]. Additionally, 53 of 65 (82%) of the simulated patients with improvised (vs. commercial) tourniquets were "stabilized" with tourniquet application, suggesting that improvised tourniquets placed by laypeople receiving basic instructions can be lifesaving [207].

While current human guidelines recommend prehospital tourniquet application when manual pressure alone cannot arrest life-threatening extremity hemorrhage [208], translation of these guidelines directly to dogs and cats presents three distinct challenges. First, there is a meaningful bite risk to pet caregivers from conscious, painful animals in such scenarios, and human safety must be considered the highest priority. Second, it may be technically more challenging to apply a tourniquet, particularly to the proximal extremities (i.e., thigh and brachium) of dogs and cats due to their limbs' conical shapes compared to the more cylindrical shape of human limbs; while this difference may not pose a problem, lack of species-specific evidence leaves this issue in question. Finally, even in people in urban areas of the United States, it appears that taking the time to apply a tourniquet prior to transport may not provide a survival benefit [191], and it is unknown where the risk-to-benefit relationship will fall when comparing definitive treatment delay to earlier hemorrhage control in dogs and cats.

3.10.5 | Knowledge Gaps

No CTs or ESs were identified evaluating the use of tourniquets to arrest life-threatening extremity hemorrhage in dogs or cats. It is unclear whether the difference in extremity shape (tapered from proximal to distal, compared to more cylindrical in people) and vascularity may affect the efficacy of a tourniquet or the likelihood of a tourniquet to slip distally down the limb. Finally, most studies from the human literature reported on the use of commercially available tourniquets that are likely not applicable to small animal species due to the difference in limb size. Studies involving tourniquets fashioned from other materials, including cloth, Penrose drains or other rubber tubing, and inflated blood pressure cuffs, are warranted.

4 | Discussion

This paper describes the development of, evidence regarding, and rationale behind the first evidence- and consensus-based treatment recommendations for first aid provision in dogs and cats and complements the series of RECOVER consensus guidelines papers [6, 7, 12, 209, 210]. The series of RECOVER consensus guidelines papers is an important element in the pathway from scientific knowledge to clinical decision making, which begins with generating evidence from research, synthesizing that evidence to generate guidelines, and finally applying the guidelines in practice to inform clinical decisions.

In this process, we extracted a large amount of scientific information from primary, peer-reviewed literature to address high-priority clinical questions pertaining to prehospital treatment for specific conditions relevant to the chain of survival in dogs and cats. The resulting treatment recommendations can serve as a foundation for standardized educational programs for animal owners, handlers, and paraprofessionals to facilitate the provision of high-quality first aid to dogs and cats in the prehospital setting. Additionally, these treatment recommendations provide evidence- and consensus-based instructions that veterinary professionals can use to assist concerned laypeople during phone triage, which can improve outcomes. To increase accessibility of this information to veterinary professionals and laypeople, a concise summary of actionable information is important; such a clinical reference is available in a companion article, the 2026 RECOVER Guidelines: First Aid for Dogs and Cats. Clinical Guidelines [209].

We used methodology to develop the current treatment recommendations similar to what we used to generate the 2024 RECOVER CPR Guidelines for dogs and cats [8], with the exception of additional literature searches to bridge the time gap between the original 2020 searches and the time of Evidence Profile Worksheet writing in the second half of 2025. The GRADE method for guidelines generation in health care is a rigorous, comprehensive approach to ensure evidence is considered and applied in a systematic way to inform actionable treatment recommendations [9]. In developing the recommendations presented in this document, relevant peer-reviewed literature was reviewed and assessed for indirectness, imprecision, inconsistency, and risk of bias to assign a strength to the treatment recommendations. While we applied this GRADE approach to the 10 general first aid PICO questions addressed in this paper, 47% (n = 18) of the 38 recommendations were developed based on expert opinion and 39% (n = 15) were based on evidence of low or very low quality. Much of the evidence uncertainty was a consequence of the dearth of CTs in any species, including people [2, 3]. The existing large studies regarding first aid topics in people are mostly observational in nature, and the few available prospective controlled trials are very small or lower in quality due to disease process indirectness or risk of bias. Consequently, many of the recommendations herein were generated by expert opinion based on assessment of the available evidence and a careful risk–benefit analysis of the first aid interventions considered by the writing group. The recommendations presented here generally agree with previously published recommendations for the prehospital care of dogs and cats [4, 5], with an emphasis here on first aid interventions that can be performed by pet owners or bystanders with limited to no formal medical training.

Despite poor-quality evidence in some areas, we provide treatment recommendations because of the need for clear, consistent standards for first aid provision in dogs and cats. While treatment recommendations supported by low- or very-low-quality evidence or expert opinion would usually be accompanied by a "weak" or "conditional" suggestion for treatment, the writing group made many "strong" treatment recommendations, which were upheld through the consensus process. We provided reasoning for such deviations in the justification section of each PICO question. One example is the strong recommendation for active cooling of heat stroke victims before transport to a hospital despite scant evidentiary support [53, 55]. However, the evidence that is available is consistent, and lack of immediate cooling in heat stroke has dramatic, negative consequences [53, 55]. Interestingly, the human first aid guidelines for heat stroke cite the same scant evidence, and we arguably base our recommendations on more evidence because we include veterinary and experimental animal studies, which the human guidelines do not [2, 3].

If there existed concerns for undesirable effects of an intervention, we recommended or suggested against that intervention. Indeed, the FA Domain contains more negative treatment recommendations than other RECOVER topic domains presented to date. The writing group considers provider safety to be paramount, and it was heavily considered when developing the recommendations presented here. Uniformly, we recommend against the provision of first aid when risk to the provider is perceived to be high, and all of these negative treatment recommendations are strong recommendations based on expert opinion. In some cases, an undesirable effect is a neutral intervention that would delay transport for definitive care. For example, we recommend against routine prehospital emesis induction following toxin ingestion because there is no evidence of benefit across multiple large studies in people, and because inducing emesis at home delays presentation to a veterinary facility. Professional veterinary care provides the opportunity for more efficient and safer emesis induction, if warranted; administration of AC; administration of an antidote; or provision of supportive care. This recommendation should, however, not preclude providers from following veterinarian or poison control center advice for prehospital emesis, should veterinary care be unavailable; therefore, a conditional ("weak") positive recommendation was made to fit that scenario.

One of the treatment recommendations made based on the recent evidence review for this topic domain updates (changes) a prior RECOVER CPR treatment recommendation [103, 106, 109, 115]. Specifically, a treatment recommendation made on newer evidence regarding the most effective treatment for unconscious choking victims states: "In unconscious dogs and cats in the prehospital setting dogs and cats in the prehospital setting suspected to have an FB airway obstruction, we recommend immediately starting chest compressions, following the RECOVER Out-of-Hospital CPR Algorithm." This recommendation changes the single rescuer initial assessment algorithm to start CPR with chest compressions first (as is done in multiple rescuer CPR) rather than starting with an airway assessment; this recommendation matches recently updated guidelines for people, including children [2, 211, 212]. Further discussion of this update and new out-of-hospital CPR algorithms are available in the companion First Aid guidelines paper [209].

Another new treatment recommendation may alter the way clinicians approach the dog or cat that is unconscious and apneic with suspected opioid overdose: "We suggest giving naloxone by the IN or IM route to dogs and cats with suspected opioid overdose that do not have established vascular access." In dogs and cats in CPA with known or suspected opioid overdose, clinicians may choose to prioritize IM or IN naloxone once BLS is established, if the patient does not already have vascular access; this recommendation is a supplement to the current CPR algorithm for special cases.

We were unable to consider all first aid topics relevant to dogs and cats due to the limited resources available for the prolonged, complex evidence evaluation process. For example, evaluating the benefit of home bronchodilator administration to cats experiencing status asthmaticus or determining the ideal type, dose, and route of anticonvulsant to give during an active seizure could improve outcomes. Questions like these were not chosen because veterinary professionals have likely provided prescriptions and instructions to clients in relevant cases. Additionally, questions such as the impact of irrigation for an ocular irritant were considered less likely to affect the chain of survival and so were considered lower priority. As more direct veterinary evidence is published to address these and other questions, integrating such topics in future rounds of evidence evaluation is warranted.

We identified important knowledge gaps for the majority of PICO questions. It is our hope that the knowledge gaps that emerged in the process will serve as a basis for collaborative research initiatives to gather evidence regarding first aid in dogs and cats. It is expected that the RECOVER First Aid treatment recommendations will be updated as new information becomes available.

Author Contributions

Vincent J. Thawley: conceptualization, investigation, writing – original draft, writing – review and editing, formal analysis, supervision. **Deborah C. Mandell**: conceptualization, investigation, writing – original draft, writing – review and editing, formal analysis, supervision. **Jamie M. Burkitt-Creedon**: conceptualization, investigation, writing – original draft, methodology, writing – review and editing, formal analysis, project administration, supervision, visualization. **Daniel J. Fletcher**: conceptualization, investigation, funding acquisition, writing – original draft, methodology, visualization, writing – review and editing, formal analysis, project administration, supervision, software. **Manuel Boller**: conceptualization, funding acquisition, methodology, visualization, writing – review and editing. **Karen Anderson**: formal analysis, writing – review and editing. **Shannon Axiak Flammer**: writing – review and editing, formal analysis. **Fiona J. L. Brown**: writing – review and editing, resources. **Rebekah Donaldson**: writing – review and editing, formal analysis. **Liz Guieu**: writing – review and editing, formal analysis. **Sonya C. Hansen**: writing – review and editing, formal analysis. **Bradley A. Harris**: writing – review and editing, formal analysis. **Amber R. Hart**: writing – review and editing, formal analysis. **Christina A. Hewes**: writing – review and editing, formal analysis. **Jodie L. Hughes**: writing – review and editing, formal analysis. **Kevin S. Kirchofer**: writing – review and editing, formal analysis. **Matthew Kornya**: writing – review and editing, formal analysis. **Genevieve C. Luca**: writing – review and editing, formal analysis. **Christina Maglaras**: writing – review and editing, formal analysis. **Duana McBride**: writing – review and editing, formal analysis. **Victoria S. Miller**: writing – review and editing, formal analysis. **Heather K. Moberly**: writing – review and editing, resources. **Laura M. Rey**: writing – review and editing, resources. **Kathryn Rhue**: formal analysis, writing – review and editing. **Elke Rudloff**: writing – review and editing, formal analysis. **Stefania Scarabelli**: writing – review and editing, formal analysis. **Kristin M. Smith**: writing – review and editing, formal analysis. **Tamara M. Swor**: writing – review and editing, formal analysis.

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Conflicts of Interest

Drs. Boller, Burkitt-Creedon, and Fletcher are Executive Board members of The RECOVER Initiative, a not-for-profit organization. Dr. Burkitt-Creedon is the Chief Editor of the Journal but only participated in the peer review process as an author. The authors declare no other conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available in Open Science Framework at https://osf.io, reference number Project: RECOVER Worksheets and Search Strategies, 2019-Pres.

Endnotes

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[2] Open Science Framework. Project: RECOVER Worksheets and Search Strategies, 2019–Present. https://doi.org/10.17605/OSF.IO/DB2AM.

[3] Google docs, Google LLC, Mountain View, California, USA. Available at https://docs.google.com.

[4] 0.1 mL Narcan. Adapt Pharma Inc, Radnor, PA.

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