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UK Brachycephalic Working Group Consensus Statement on Preventing and Moderating Heat-related Illness in Dogs

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Prepared by: Dr Dan O'Neill, MVB BSc(hons) GPCert(SAP) GPCert(FelP) GPCert(Derm) GPCert(B&PS) PGCertVetEd FHEA MSc(VetEpi) PhD FRCVS, **Dr Emily Hall**, MA VetMB PGCAP MRSB MRCVS SFHEA, **Dr Anne Carter**, BSc (Hons) MSc PhD SFHEA MRSB, **Dr Lynda Rutherford** BVM&S MVetMed DipECVS MRCVS, **Dr Dominic Barfield** BSc BVSc MVetMed DACVECC DECVECC FHEA MRCVS, **Dr Jude Bradbury** BVSc CertAVP(SAM) FHEA MRCVS

This consensus statement has been prepared by an independent group of veterinary surgeons and scientists with extensive expertise in the research and management of heat-related illness in dogs. It is intended to help owners, breeders, veterinary professionals and charities/dog welfare organisations to appreciate the current understanding of why dogs develop heat-related illness and to make informed decisions on how to prevent and moderate this condition in brachycephalic (flat-faced) dogs.

While heat-related illness can affect all types of dogs, this consensus statement focusses primarily on brachycephalic dogs. The consensus provides a series of evidence-based statements that support recommendations by the Brachycephalic Working Group (BWG) to minimise the occurrence and severity of life-threatening heat-related illness in brachycephalic dogs. This consensus statement does not aim to cover veterinary clinical management of heat-related illness in dogs.

Heat-related illness is a potentially fatal disorder that affects dogs when their body temperature exceeds a critical temperature, triggering tissue and organ damage (1, 2). This occurs when their capacity to prevent their body temperature rising to unsafe levels is

UK Brachycephalic Working Group Consensus Statement: Heat-related illness in dogs

overwhelmed (1, 2). Heat-related illness is triggered by two main mechanisms that often interact, either exposure to a hot environment (external heat source) that overwhelms the dog's ability to maintain a safe body temperature, or following physical activity (internal heat generation) in any environment (1, 2). The extent of environmental temperature increase or level of exercise needed to trigger heat-related illness varies dramatically between dogs with differing physical conformations. Brachycephalic (flat-faced) dog breeds are at least twice as likely to suffer from heat-related illness compared with mesocephalic (medium skull shapes) breeds (3). Owners, breeders, veterinarians and other animal carers can control and reduce many of the factors leading to heat-related illness in dogs (4). New understanding of clinical grading has resulted in fresh opportunities for better awareness of the progressive nature of heat-related illness in dogs and therefore can now empower owners and veterinary professionals to prevent milder cases from progressing to more serious forms of the condition (5).

Current key understanding on heat-related illness in dogs

1. Heat-related illness is a priority health issue for dogs with brachycephaly in general in the UK.
 - Brachycephalic breeds overall are more than twice as likely to suffer heat-related illness compared with mesocephalic (medium skull shapes) breeds (3).
 - Over a third of owners of brachycephalic dogs have reported that heat regulation is a problem for their dog (6).
2. Certain brachycephalic breeds are at especially high risk of heat-related illness compared to Labrador Retrievers (3).
 - (English) Bulldog: **14 x** risk compared to Labrador Retrievers
 - French Bulldog: **6 x** risk compared to Labrador Retrievers
 - Dogue de Bordeaux: **5 x** risk compared to Labrador Retrievers
 - Cavalier King Charles Spaniel: **3 x** risk compared to Labrador Retrievers
 - Pug: **3 x** risk compared to Labrador Retrievers
3. Heat-related illness should be considered as an important disorder for any type of dog and can severely reduce the welfare of affected dogs (5).
 - Distress (60% of heat-related illness cases), pain and neurological dysfunction because elevated body temperature can cause damage to tissues and organs, leading to ulceration of the gastrointestinal tract, and damage to the central nervous system (10% of heat-related illness cases cases).

- Exacerbation of brachycephalic obstructive airway syndrome (BOAS) clinical signs due to increased respiratory effort (60% of heat-related illness cases) and due to vomiting (24% of heat-related illness cases).
 - The need for hospitalisation and separation from owner which happens in 50% of heat-related illness cases veterinary cases.
 - Death occurs in 11% of all heat-related illness cases veterinary cases and 57% of severe heat-related illness cases veterinary cases.
4. The most common triggers for heat-related illness in dogs in the UK are (4):
- a. Exercise (exertional): 74.2% of events
 - b. Environmental (hot weather): 12.9% of events
 - c. Vehicular confinement: 5.2% of events
5. Brachycephalic breeds are at increased risk of heat-related illness when exposed to common trigger situations (4).

Table 1. Brachycephalic risk of heat related illness for some key triggers

Trigger for heat-related illness	Overall brachycephalic risk compared to mesocephalic (medium length skull) dogs	English Bulldog risk compared to Labrador Retriever
Exercise (exertional)	1.3 x	3.7 x
Environmental (hot weather)	2.4 x	7.5 x
Vehicular confinement	3.1 x	16.6 x

6. Sudden heat wave events and unseasonably hot weather poses a particular threat because some brachycephalic breeds tend to overheat at relatively low ambient temperatures of 21°C (7).
7. Dogs that are presented earlier for veterinary care during overheating while still at mild-moderate stages of heat related illness are more likely to survive (5). Delayed presentation for veterinary care reduces survival (8).

8. Overweight / obese dogs are at higher risk of heat-related illness than dogs at a healthy-weight (3). Temperature regulation is impaired by obesity and obesity in brachycephalic dogs impairs the effectiveness of panting as a cooling mechanism (9).
9. The evidence-based VetCompass Clinical Grading Tool helps users to recognise and grade the severity of heat-related illness events. Early recognition and prompt effective treatment of this condition can help to prevent progression to more severe forms of heat-related illness, reduce fatalities and result in better patient outcomes (Hall et al., 2021).
10. Travelling in enclosed airspaces such as in cars and planes carries risks of heat-related illness for dogs (3, 10). These risks are substantially increased for brachycephalic breeds (4).

BWG recommendations to prevent or moderate heat-related illness in dogs

1. **Owners and carers** should be aware that exercise is by far the most common trigger for heat-related illness in dogs in the UK and should therefore be especially vigilant to reduce or prevent heat-related illness related to exercise. A long campaign using the 'Dogs die in hot cars' slogan has usefully raised awareness of the risks of heat-related illness from confinement in cars. It is now recommended that the annual heat-related illness campaign should reflect the current evidence and be updated to 'Dogs die in hot cars and on hot walks'.
2. **Owners and carers** should be aware that early care for any dog suspected of heat-related illness can help to prevent progression to more severe forms of heat-related illness and should include:
 - Remove the source of over-heating e.g. stop exercise, seek shade, ensure air movement, remove the dog from hot environments e.g. cars.
 - Seek veterinary advice.
 - Wetting, soaking or water spray with air movement, or immersion in tap water is most effective for rapid cooling (11-15). Ensure the dog does not inhale water during these procedures.
3. **Owners** should ensure dogs are appropriately prepared for interacting with other dogs and with wider society (including veterinary professionals) as part of their training, socialisation and behavioural development. Ensuring dogs are able to adapt to novel situations, and do not experience undue stress when exposed to other dogs and people, will reduce the likelihood of anxious behaviour that could trigger heat-related illness in unfamiliar situations (4, 16).
4. **Owners** of brachycephalic dogs should maintain lean bodyweights in their dogs (9).
5. **Veterinarians and animal carers** should be aware of the typical clinical signs of heat-related illness and should monitor carefully for these. Individual care plans should be designed based on dog's temperaments to reduce treatment in hot and humid

environments, to reduce stress (including both housing and handling), and minimise duration of stay where possible. This may include:

- Enhanced monitoring of dogs to ensure early clinical signs of hyperthermia are detected rapidly (altered respiration, lethargy).
- Consideration to how and where anxious dogs are housed to reduce restless behaviour (vocalising, pacing, resisting enclosure).
- Ensuring dogs can be effectively cooled in a timely manner if needed.
- Avoid housing or detaining dogs in direct sunlight, or in hot/humid conditions wherever possible. Ensure access to shaded areas.
- Ensure drinking water is freely available, as dehydration will impair effective temperature regulation.

6. **Veterinary professionals** should promote lean body condition in brachycephalic dogs.

7. **Veterinary professionals and owners** should use the VetCompass Clinical Grading Tool for Heat-related Illness in Dogs to support earlier and more accurate recognition of heat-related illness events and thus promote earlier interventions by owners and veterinary teams (5).

The VetCompass Clinical Grading Tool for Heat-Related Illness in Dogs			
Grade	Clinical Signs	Suggested Treatment	Previous Terminology Used for Presentation
Mild	Continuous panting or respiratory effort unresolved following cessation of exercise or removal from hot environment. Lethargy, stiffness or unwilling to move.	Active cooling if hyperthermia present. Rehydration (may be oral only). Supportive care for organ systems affected (e.g. oxygen for dyspnoea). May be able to manage on the scene. Monitor for progression of clinical signs.	Heat stress
Moderate	Progression of Stage 1 – no response to cooling and/or fluids. Hypersalivation, diarrhoea and/or vomiting (no blood present). A single seizure. Episodic collapse with spontaneous recovery (no impaired consciousness).	Active cooling if hyperthermia present. Rehydration – may require intravenous fluids. Supportive care for organ systems affected (e.g. gastrointestinal support). Consider hospitalisation to monitor progression of clinical signs.	Heat exhaustion
Severe	Progression of Stage 2. Any of: Central nervous system impairment (ataxia, two or more seizures, profound depression, unresponsive, coma). Liver or kidney dysfunction. Gastrointestinal haemorrhage. Petechiae/purpura.	Requires hospital care. Active cooling if hyperthermia present. Coagulation assessment required. Supportive care for organ systems affected: <ul style="list-style-type: none"> • Neurological support (e.g. osmotic agents, seizure management); • Intravenous fluid therapy, blood glucose and electrolyte management; • Respiratory support (e.g. oxygen, intubation); • Circulatory support (e.g. vasopressors); • Gastrointestinal support (e.g. antiemetics, GI protectants, antibiotics); • Transfusion products. 	Heat stroke

8. **Animal carers** (including veterinary staff, groomers, dog walkers and boarding kennels) should manage ambient conditions to reduce the risk of heat-related illness cases when working with brachycephalic dogs.
9. **Breeders** should give priority to breeding away from extremes of conformation that predispose to heat-related illness in brachycephalic dogs.
10. **Kennel Clubs and Breed Clubs** should review and modify Breed standards for brachycephalic breeds to promote conformations and features that protect against heat-related illness.

BWG Recommendations to reduce the risk and severity of heat-related illness from exercising

1. Avoid or reduce exercising of dogs during the hottest part of the day, during heat wave events and in direct sunlight or when it is warm and humid.
2. Ensure access to shade and fresh drinking water is always available during exercise in hot weather.
3. Consider attaching the lead to a walking harness rather than directly to the collar during exercise. Leads that pull on a collar can compress the airways and therefore exacerbate breathing difficulties in brachycephalic dogs as well as impairing the cooling effects from panting (17). Remember that it's a UK legal requirement for a dog to wear a collar showing their owner's name and address.
4. Dog walkers should remain vigilant for early signs of heat-related illness when exercising unfamiliar dogs (18).
5. Be cautious exercising dogs with fever, dehydration, heart failure or severe respiratory problems, and seek veterinary advice before exercising any dog that is unwell. Dehydration impairs cooling mechanisms (19, 20).
6. Be particularly cautious exercising unfit dogs in warm or humid weather because they do not cool as effectively (21-23).
7. Keep in mind regional weather variations in terms of temperature and humidity, and plan ahead for walks.

BWG Recommendations to reduce the risk and severity of heat-related illness from travelling by car

1. Never leave a dog unattended in a car or other vehicle, regardless for how short a time and regardless of having windows left open. Stationary vehicles can rise rapidly in internal temperature and lead to fatal heat-related illness.

2. Reduce travel time or avoid travel in the hottest times of the day. Peak internal car temperatures occur between 2pm and 5pm in the UK, with internal vehicle temperatures exceeding 35°C between April and September (24). Plan ahead for all journeys, taking into consideration regional variations in terms of temperature and humidity.
3. Maintain an effective and safe temperature-controlled environment e.g. air conditioning, improved air flow.
4. Avoid dogs being in direct sunlight during travel e.g. provide window shades.
5. Maintain vigilant observation for signs of heat-related illness.
6. Plan for possible delays by having access to water, shade, ventilation and enhanced air-flow (e.g. fans).
7. Stage/split the journey if necessary.

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