

New thinking on heat-related illness (heatstroke) in dogs

BY EMILY HALL, ANNE CARTER AND DAN O'NEILL

For years there have been warnings to not leave dogs in hot cars, but now it seems exercising in the wrong conditions can also make your dog very ill

After a long winter of lockdowns, social distancing and reduced opportunities to exercise our dogs, the return of summer weather brings hope for more time outdoors in the fresh air, soaking up sunshine. However, whether you're planning a staycation at home, a return to canine activities, or are just aiming to spend more time outdoors with your canine companion, it is worth also considering some of the potential negative impacts that high temperatures could have on your dog's health this summer.

Like people, dogs have an optimum body temperature for health (around 37-39°C for dogs) that is maintained

through a combination of heat production (e.g. from muscle activity and digesting food) and heat loss (e.g. from panting, lying on cold surfaces or in water). Exceeding this healthy temperature range, and especially when going above 41°C, can trigger heat-related illness, a progressive disorder that can be fatal if severe or left untreated. Heat-related illness describes a spectrum of heat-induced conditions that range from the mild form (traditionally called heat stress) that can respond to cooling and rehydrating, to the severe, life-threatening disorder (traditionally called heatstroke) characterised by brain damage and multiple-organ failure (Figure 1, opposite page). The hotter the dog becomes and the longer the dog's temperature remains elevated, the more damage is done. So the sooner a dog can be cooled down and treated by a veterinary surgeon, the more likely it is that their life can be saved. If left untreated or allowed to progress, dogs generally worsen progressively from the mild to moderate and finally to the severe grades of heat-related illness.

What types of dogs are at increased risk?

The general understanding of heat-related illness in dogs has progressed substantially over the past year. In this article, we would like to share some of this exciting new knowledge so that you can better protect your dogs. Last year, we published the largest study of heat-related illness in dogs to date. We

Below: A cool drink during a walk will be most welcome



Figure 1: Grades of progression for heat-related illness in dogs



identified nine breeds at excess risk of heat-related illness compared to the Labrador Retriever:

- Chow Chow (x17 risk)
- Bulldog (x14 risk)
- French Bulldog (x6 risk)
- Dogue de Bordeaux (x5 risk)
- Greyhound (x4 risk)
- Cavalier King Charles Spaniel (x3 risk)
- Pug (x3 risk)
- English Springer Spaniel (x3 risk)
- Golden Retriever (x3 risk)

We chose the Labrador as the comparator breed due to their popularity, and their consistent and non-extreme body conformation.

It is notable that many of these high-risk breeds are flat faced (brachycephalic). Indeed, heat-related illness was twice as likely in brachycephalic dogs as in dogs with a medium (mesocephalic) skull shape (e.g. Springer Spaniels and Labradors). Dogs rely on panting to cool down, so the narrowed airway and shorter muzzle of brachycephalic dogs enables less effective cooling, contributing to the increased risk in flat-faced breeds.

Overweight dogs and large-sized dogs (over 50 kg) also had greater risk. Previous research has shown that unfit dogs get hotter while exercising and are slower to cool compared to fit dogs. So, if your dog has gained a few pounds during lockdown and perhaps missed a few walks, they will be at higher risk of overheating. It is really important to consider carefully



Golden Retriever cooling off in a paddling pool
Photo: Michelle Collard©

“The hotter the dog becomes and the longer the dog’s temperature remains elevated, the more damage is done”

before exercising dogs in hot weather. This is even more important if they are a higher risk breed.

If you think your dog may be overheating, move them into the shade and cease any activity while encouraging them to rest. If you are concerned they are not cooling down or have severely overheated, then cool them down using water – tap water is fine and can either be used as a cool bath, or sprayed on to the dog depending on the resources available. If your dog has

lost consciousness or is gasping, make sure no water gets into their mouth to protect their airway. Covering them in wet towels just acts as an insulator so avoid this; air movement is critical for effective cooling.

We have some great advice on cooling your dog and keeping your dog cool on one of our blog posts (see bottom of last page).

What are the important triggers for heat-related illness in dogs?

There are several recorded triggers for overheating in dogs, including being trapped in a hot car or hot building, getting too hot during exercise, overheating in hot weather and being unable to effectively cool due to health reasons. Until recently, the relative contributions of these triggers to the overall count of dogs with heat-related illness was unknown but the media tended to focus on hot cars. However, another paper that we published last year from the VetCompass programme has revealed a very different story. We found 75 per cent of heat-related illness events presenting to UK vets are triggered by exercise (often in hot weather and in predisposed breeds). In contrast, only five per cent of cases were triggered by confinement in cars.

The good news here is that owners can prevent most of these heat-related illness events by making sensible decisions about when and how to exercise their dogs. Remember that walking on hot pavements can be painful for dogs and can burn their footpads. If your dog does need to travel across hot pavements, e.g. to reach somewhere to toilet, consider carrying smaller dogs, stick to shaded areas and try to go out before the pavement heats up. Where unavoidable, fabric paw boots offer a temporary option to protect your dog's feet across a hot surface but remove the boots as soon as possible because dogs sweat through their paws. And avoid forcing your dog to stand around on hot surfaces for any length of time; move on to a grassy/shaded area before you stop to chat with friends.

The UK has had a national campaign for many years called 'Dogs die in hot cars'. Based on our work that was supported by an award from Dogs Trust, we now propose that this campaign is relaunched as 'Dogs die in hot cars and on hot walks' to better tackle the full breadth of the triggers for heat-related illness in the UK.

July is typically the hottest month in the UK, and our results highlight that this is when the largest number of dogs present for heat-related illness. However, any sudden hot spell – the 'heat wave' of February 2019, for example – can trigger heat-related illness in dogs. Like

humans, dogs need to acclimatise to hot weather, so sudden warm spells in early spring and summer can prove particularly dangerous, especially for dogs already at greater risk of overheating.

What can I do to protect my dog from heat-related illness?

Exercise is the most common cause of heat-related illness in UK dogs. Dogs can overheat during exercise all year round, not just in the summer. During exercise, heat is generated by muscle activity, so the more strenuous and longer the exercise, the more heat is

“75 per cent of heat-related illness events presenting to UK vets are triggered by exercise”



Two hot dogs post-canicross, taken out at dawn to beat the heat. Photo: Anne Carter©

generated. Fit dogs ordinarily shed this excess heat through panting to maintain a safe exercising body temperature. However, as the ambient temperature and humidity rise and as the level of exercise rises, any dog can overheat.

Several factors can impair a dog's cooling ability. It is important to recognise and limit the impact of these when exercising your dog in warm or hot weather:

- Underlying heart or respiratory disease, including brachycephalic obstructive airway syndrome, and diseases that narrow the airway such as laryngeal paralysis
- Illnesses leading to dehydration such as vomiting or diarrhoea. Dehydrated dogs don't cool as effectively through panting, so consider cutting their walks shorter if they are unwell and always provide access to drinking water
- Being overweight or obese can impact a dog's ability to breathe and reduces heat loss
- Older dogs, like people, may have reduced cooling ability
- Unfit dogs cool less effectively than fit dogs
- There are also some breeds of dog that appear to be more prone to heat-related illness triggered by exercise: Chow Chow, Bulldog, French Bulldog, Dogue de Bordeaux, Greyhound, English Springer Spaniel, Cavalier King Charles Spaniel, Pug and Golden Retriever
- If your dog has had less exercise than usual during the winter lockdown, plan a more gradual increase in activity through spring to get them fit, back to a healthy bodyweight and ready for the summer

Even with windows left open, a static car can rapidly reach over 50°C in the UK summer sunshine and can exceed 40°C from April to September. There is no safe duration to leave a dog in a car; dogs trapped in a static car have no way of cooling down and no way to escape. Dogs travelling in cars with limited ventilation or no air conditioning can also be exposed to high temperatures during long journeys, particularly if the vehicle is in stationary traffic for prolonged periods. Before travelling, plan your journey carefully to ensure your dog has adequate shade, access to water and ventilation. If you do manage to head abroad this summer, bear in mind that you may be going from relatively cooler weather in the UK to hotter weather on the continent. Your dog will need time to acclimatise to sudden increases in temperature, and therefore will initially be more susceptible to heat-

related illness. If temperatures are going to be particularly high, consider travelling in the cooler periods of the day, and keep walks early and short.

The next steps of our work on heat-related illness

We are lucky to now understand more about canine and environmental factors that contribute to heat-related illness, but this is only part of the story. We also need to understand how best to clinically manage the condition in affected dogs. The research team behind these earlier papers are working hard to evaluate how these cases are treated at veterinary clinics and what factors help to explain why some dogs recover well while others do not. Hopefully by this time next year, we can share part two of this saga to complete your knowledge on heat-related illness. But in the meantime, please protect your dog from heat-related illness by avoiding exercise or walks in hot weather and never leaving them in a static car. Seek veterinary advice as soon as you notice any signs suggestive of heat-related illness.

“Owners can prevent most of these heat-related illnesses by making sensible decisions about exercise”



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THE FULL PAPERS ON HEAT-RELATED ILLNESS DESCRIBED IN THIS ARTICLE ARE FREELY AVAILABLE TO DOWNLOAD AND READ AT:

Hall EJ, Carter AJ, O'Neill DG. *Incidence and risk factors for heat-related illness (heatstroke) in UK dogs under primary veterinary care in 2016*. Scientific Reports. 2020;10(1):9128 [nature.com/articles/s41598-020-66015-8](https://www.nature.com/articles/s41598-020-66015-8)

Hall EJ, Carter AJ, O'Neill DG. *Dogs Don't Die Just in Hot Cars – Exertional Heat-Related Illness (Heatstroke) Is a Greater Threat to UK Dogs*. Animals. 2020;10(8):1324 [mdpi.com/2076-2615/10/8/1324](https://www.mdpi.com/2076-2615/10/8/1324)

For more information visit heatstroke.dog/2018/08/02/cold-as-ice-keeping-hot-dogs-cool/