

Incidence and risk factors for heat-related illness (heatstroke) in UK dogs under primary veterinary care in 2016.

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Supplementary Note 1: Breed types by skull shape.

Table 1. Breed types defined as brachycephalic skull shape.

Brachycephalic breed types		
	Cavalier King Charles	
Affenpinscher	Spaniel	Miniature Bulldog
Alapaha Blue Blood Bulldog	Chihuahua	Miniture Shih-Tzu
American Bandogge Mastiff	Dogue de Bordeaux	Neopolitan Mastiff
American Bulldog	Dorset Olde Tyme Bulldogge	Old English Mastiff
American Lo-Sze Pugg	English Mastiff	Olde Boston Bulldogge
American Pocket Bully	French Bulldog	Olde English Bulldogge
Australian Bulldog	German Boxer	Olde Victorian Bulldogge
Aylestone Bulldog	Griffon	Pekingese
Boston Terrier	Griffon Bruxellois	Pug
Boxer	Italian Mastiff	Shih-tzu
Bull Boxer	Japanese Chin	Spanish Bulldog
Bull Mastiff	King Charles Spaniel	Valley Bulldog
Bulldog	Lhasa Apso	Victorian Bulldog
Catahoula Bulldog	Mastiff	

Table 2. Breed types defined as brachycephalic designer-cross skull shape

Brachycephalic-cross breed types		
American Lamalese	Chiweenie	Pugaliar
Beaglier	Chug	Puganese
Boxador	Cockalier	Pugapoo
Boxoodle	Jackachi	Puggle
Bug	Jackashit	Pugland
Bullador	Jug	Pugpom
Cavachi	La-Chon	PugTzu
Cavachon	Lha-Cocker	Sharanian
Cavadoodle	Lhasalier	Sharpador
Cavador	Lhasapoo	ShiChi
Cavajack	Malshi	Shichon
Cavapom	Maltalier	Shih-Poo
Cavapoo	Pekepoo	Shiranian
Cavapoochon	Pomapug	Shorkie
Cavatzu	Pomchi	Shug
Chichon	Pooshit	
Chi-Poo	Pugador	

Table 3. Breed types defined as dolichocephalic skull shape.

Dolichocephalic breed types		
Afghan Hound	Dachsbracke	Miniature Pinscher
Airedale Terrier	Dachshund	Miniature Poodle
American Bull Terrier	Dashapoo	Peruvian Hairless
American White Shepherd Dog	Dutch Sheepdog	Petit Basset Griffon Vendeen
Andalusian Mouse-Hunting Dog	Dutch Shepherd Dog	Pharaoh Hound
Anglos-Francaises de Petite Venerie	English Bull Terrier	Pinscher
Ariege Pointer	English Greyhound	Podenco
Australian Kelpie	English Terrier	Podenco Canario
Azawakh Hound	Fox Terrier	Poodle
Basset Griffon Vendeen	French Basset	Portuguese Podengo
Basset Hound	German Guard Dog	Saarloos Wolfhound
Bavarian Mountain Hound	German Pinscher	Saluki
Beauce Shepherd Dog	German Shepherd Dog	Scottish Collie
Bedlington Terrier	German Shepherd Dog - White	Scottish Deerhound
Belgian Groenendael Shepherd Dog	Grand Basset Griffon Vendeen	Scottish Rough Collie
Belgian Laekenois Shepherd Dog	Grand Griffon Bleu de Gascogne	Scottish Smooth Collie
Belgian Malinois Shepherd Dog	Grand Griffon Vendeen	Scottish Terrier
Belgian Shepherd	Great Dane	Shetland Sheepdog
Belgian Short-Haired Pointer	Greyhound	Sloughi
Belgian Tervuren Shepherd Dog	Ibizan Hound	Smooth Fox Terrier
Black and Tan Coonhound	Irish Terrier	Spanish Greyhound
Bleu de Gascogne Basset	Irish Wolfhound	Spanish Hound
Bloodhound	Italian Greyhound	Spanish Podenco
Bluetick Coonhound	Italian Hound	Standard Doberman Pinscher
Borzoi	Italian Shepherd Dog	Standard Poodle
Bracco Italiano	Kerry Blue Terrier	Swiss White Shepherd Dog
Braque Francais	King Shepherd Dog	Teacup Poodle
British Wolfdog	Lakeland Terrier	Teckel Dachshund
Bruno Jura Hound	Lurcher	Toy Fox Terrier
Bull Terrier	Manchester Terrier	Toy Manchester Terrier
Carlin Pinscher	Mexican Hairless - Intermediate	Toy Poodle
Carpathian Sheepdog	Miniature Bull Terrier	Trail Hound
Chippiparai	Miniature Coloured Bull Terrier	Welsh Terrier
Cirneco Dell 'Etna	Miniature Dachshund	Whippet
Coonhound	Miniature Doberman Pinscher	Wire-Haired Fox Terrier
Croatian Sheepdog	Miniature English Bull Terrier	Wolfhound
Czesky Terrier	Miniature Fox Terrier	Yugoslavian Shepherd Dog

All other named breed-types were classified as mesocephalic.

All crossbred, designer crossbred or dogs with no listed breed were classified as *unknown* skull shape.

Supplementary note 2: Univariable and descriptive statistics for potential risk factors.

Table 4. Descriptive and univariable logistic regression results for breed type associated with heat related illness in dogs under primary veterinary care in the VetCompass™ Programme in the UK during 2016.

Independent variable	Case No. (%)	Non-case No. (%)	Odds ratio	95% CI	P-value
<i>Breed type</i>					<0.001
Labrador Retriever	20 (5.13)	59,943 (6.62)	Base		
Chow Chow	5 (1.28)	997 (0.11)	15.03	5.63-40.13	<0.001
Bulldog	35 (8.97)	8375 (0.93)	12.53	7.23-21.71	<0.001
French Bulldog	29 (7.44)	16,368 (1.81)	5.31	3.00-9.39	<0.001
Dogue de Bordeaux	5 (1.28)	3027 (0.33)	4.95	1.86-13.20	0.001
Greyhound	8 (2.05)	5448 (0.60)	4.40	1.94-10.00	<0.001
Cavalier King Charles Spaniel	20 (5.13)	17,237 (1.90)	3.48	1.87-6.47	<0.001
Pug	16 (4.10)	16,198 (1.79)	2.96	1.53-5.71	0.001
English Springer Spaniel	18 (4.62)	20,190 (2.23)	2.76	1.26-6.06	0.012
Golden Retriever	9 (2.31)	9784 (1.08)	2.67	1.41-5.05	0.002
Boxer	7 (1.79)	9435 (1.04)	2.22	0.94-5.26	0.069
Pomeranian	4 (1.03)	6217 (0.69)	1.93	0.66-5.64	0.231
Missing	2 (0.51)	4054 (0.45)	1.48	0.35-6.33	0.598
Staffordshire Bull Terrier	26 (6.67)	53,029 (5.86)	1.47	0.82-2.63	0.196
Other purebred	51 (13.08)	123,018 (13.59)	1.24	0.74-2.08	0.411
Siberian Husky	2 (0.51)	5239 (0.58)	1.14	0.27-4.90	0.856
Beagle	3 (0.77)	8067 (0.89)	1.12	0.33-3.75	0.861
Miniature Schnauzer	3 (0.77)	8393 (0.93)	1.07	0.32-3.61	0.911
Border Collie	8 (2.05)	22,396 (2.47)	1.07	0.47-2.43	0.870
Yorkshire Terrier	10 (2.56)	28,169 (3.11)	1.06	0.50-2.27	0.873
Lurcher	2 (0.51)	6020 (0.67)	1.00	0.23-4.26	0.995
German Shepherd Dog	6 (1.54)	21,334 (2.36)	0.84	0.34-2.10	0.714
Cocker Spaniel	9 (2.31)	32,136 (3.55)	0.84	0.38-1.84	0.663
Rottweiler	2 (0.51)	7283 (0.80)	0.82	0.19-3.52	0.793
Cockapoo	5 (1.28)	18,247 (2.02)	0.82	0.31-2.19	0.694
Non-designer Crossbred	52 (13.33)	193,878 (21.42)	0.80	0.48-1.35	0.407
West Highland White Terrier	5 (1.28)	18,873 (2.09)	0.79	0.30-2.12	0.645
Bichon Frise	3 (0.77)	13,265 (1.47)	0.68	0.20-2.28	0.530
Border Terrier	2 (0.51)	9649 (1.07)	0.62	0.15-2.66	0.521
Jack Russell Terrier	9 (2.31)	48,426 (5.35)	0.56	0.25-1.22	0.145
Shih-tzu	5 (1.28)	32,905 (3.64)	0.46	0.17-1.21	0.116
Chihuahua	5 (1.28)	37,253 (4.12)	0.40	0.15-1.07	0.069
Labradoodle	1 (0.26)	7484 (0.83)	0.40	0.05-2.98	0.372
Other designer crossbred	2 (0.51)	20,268 (2.24)	0.30	0.07-1.27	0.100
Lhasa Apso	1 (0.26)	12,548 (1.39)	0.24	0.03-1.78	0.162

Table 5. Descriptive and univariable logistic regression results for risk factors associated with heat related illness in dogs under primary veterinary care in the VetCompass™ Programme in the UK during 2016.

Independent Variable	Case No. (%)	Non-case No. (%)	Odds ratio	95% CI	P-value
<i>Purebred</i>					< 0.001
Non-designer Crossbred	52 (13.33)	193,878 (21.42)	Base		
Designer Crossbred	10 (2.56)	52,019 (5.75)	0.72	0.37-1.41	0.335
Purebred	326 (83.59)	655,202 (72.39)	1.86	1.38-2.49	<0.001
Unrecorded	2 (0.51)	4054 (0.45)	1.84	0.45-7.55	0.398
<i>Skull shape</i>					< 0.001
Mesocephalic	173 (44.36)	452,295 (49.97)	Base		
Dolicocephalic	31 (7.95)	75,817 (8.38)	1.07	0.73-1.57	0.732
Brachycephalic-cross	1 (0.26)	12,337 (1.36)	0.21	0.03-1.51	0.122
Brachycephalic	131 (33.59)	166,772 (18.42)	2.05	1.64-2.58	< 0.001
Unknown	54 (13.85)	197,932 (21.86)	0.71	0.53-0.97	0.03
<i>Adult bodyweight (kg)</i>					< 0.001
<10	61 (15.64)	213,291 (23.56)	Base		
10-<20	90 (23.08)	167,689 (18.53)	1.88	1.36-2.60	< 0.001
20-<30	76 (19.49)	117,605 (12.99)	2.26	1.61-3.17	< 0.001
30-<40	37 (9.49)	69,895 (7.72)	1.85	1.23-2.79	0.003
40-<50	11 (2.82)	19,848 (2.19)	1.94	1.02-3.68	0.043
≥50	7 (1.79)	6391 (0.71)	3.83	1.75-8.38	0.001
Unrecorded	108 (27.69)	310,434 (34.3)	1.22	0.89-1.67	0.221
<i>Bodyweight relative to breed/sex mean</i>					< 0.001
Lower	124 (31.79)	317,225 (35.05)	Base		
Equal/Higher	156 (40.00)	275,357 (30.42)	1.45	1.15-1.84	0.002
Unrecorded	110 (28.21)	312,571 (34.53)	0.90	0.70-1.16	0.423
<i>Sex/neuter</i>					0.459
Female-entire	93 (23.85)	233,734 (25.82)	Base		
Female-neutered	89 (22.82)	197,792 (21.85)	1.13	0.85-1.51	0.407
Male-entire	117 (30.00)	259,405 (28.66)	1.13	0.86-1.49	0.367
Male-neutered	91 (23.33)	209,993 (23.20)	1.09	0.82-1.45	0.563
Unrecorded	0 (0.00)	4227 (0.47)	~	~	~
<i>Age</i>					0.063
<2 years	78 (20.00)	234,364 (25.89)	Base		
2-<4 years	94 (24.10)	178,135 (19.68)	1.59	1.17-2.14	0.003
4-<6 years	65 (16.67)	139,916 (15.46)	1.40	1.00-1.94	0.047
6-<8 years	56 (14.36)	113,325 (12.52)	1.49	1.05-2.09	0.024
8-<10 years	36 (9.23)	90,982 (10.05)	1.19	0.80-1.77	0.391
10-<12 years	24 (6.15)	66,241 (7.32)	1.09	0.69-1.72	0.716
≥12 years	34 (8.72)	69,769 (7.71)	1.46	0.98-2.19	0.064
Unrecorded	3 (0.77)	12,421 (1.37)	0.73	0.23-2.30	0.586