A dog is for life, not just for hypos: Medical alert assistance dogs for young people

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Evidence suggests that medical alert assistance dogs can help to reduce hypoglycaemic events by alerting owners when their blood glucose levels drop. Medical Detection Dogs is a charity that trains dogs to recognise the scent of lowered glucose levels and teaches them how to alert their owners while they are still able to act to prevent a hypo- or hyperglycaemic episode. The charity matches people with a suitable detection dog and 12 of the 26 dogs trained for diabetes have been placed have been with young people with type 1 diabetes. The article includes a case report of a successful placement, which has resulted in a complete elimination of hypoglycaemic events for the dog's teenage owner. The authors recommend that healthcare professionals keep an open mind about medical detection dogs and remain aware of patients that might benefit from their services.

Evidence suggests that some domestic dogs are able to detect episodes of hypoglycaemia in their human owners (Lim et al, 1991; Chen et al, 2000). The fear of hypoglycaemia in children and young people with diabetes can be great (Haugstvedt et al, 2010) and a medical alert assistance dog for diabetes can be a useful adjunct to the usual treatment modalities. Animals, particularly dogs, are used frequently in today's healthcare setting, fulfilling many roles such as guide dogs, hearing dogs, seizure dogs and making therapeutic visits to hospitals, care homes and special schools. Research has shown that dogs may be able to prevent and facilitate recovery from illness and even detect ill health (Wells, 2007), as is the case with hypoglycaemia in people with type 1 diabetes.

A national charity set up in 2008, Medical Detection Dogs (www.medicaldetectiondogs.org.uk) is dedicated to the detection of human disease by canine olfaction – a dog's ability to smell disease. A human nose has about 5 million olfactory cells, whereas a dog's has over 200 million; this enhanced ability to detect scent compared with humans can open up a new world to the healthcare professional and people with diabetes. Dogs use smell as their primary sense with over 10% of their brain dedicated to olfaction – 40 times greater than a human – and their sense of smell is about 1000 times better than ours (Correa, 2011). Medical Detection Dogs is able to train dogs to detect an odour change that occurs as someone's blood glucose level drops or rises and then to make this known to the individual, often before they are aware themselves, allowing them to take the appropriate action to avoid emergency situations such as collapse.

Over the past five years, 26 dogs have qualified as medical alert assistance dogs for diabetes and a further nine are in advanced training. Of this number, 12 have been placed with children and young people with type 1 diabetes.

Article points

1. Dogs can be trained to recognise the scent of lowered glucose levels in their owners and alert them of an impending hypoglycaemic event.

2. The charity Medical Detection Dogs trains dogs to be partnered with people with type 1 diabetes in order to prevent unnecessary hypos.

3. Healthcare professionals should keep an open mind about medical detection dogs and look out for potential candidates for their services.

Key words

- Hypoglycaemia
- Medical detection dogs
- Olfactory detection
- Type 1 diabetes

Authors

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The evidence base

There is currently little research in this area, but there is plenty of anecdotal evidence and stories of pet dogs reacting to emergency situations and alerting their owners to an impending episode. As early as 1992, Lim et al (1991) indicated that up to one-third of dogs living with people with diabetes had reportedly shown a change in behaviour during their owner's hypoglycaemic episodes.

Chen et al (2000) describe three cases where pet dogs were able to detect episodes of hypoglycaemia before the owner was aware and, in some cases, they were even able to detect hypoglycaemia overnight and wake their owner so they could take corrective action. This was followed by a larger study (Wells et al, 2008) that also suggested dogs could detect hypoglycaemia often without visual cues, although the actual mechanism of detection needs further investigation.

Only one study (Ward et al, 2013) showed an inability to detect hypoglycaemia. This was, however, a small study, investigating whether dogs could detect hypoglycaemia scent on the skin from samples obtained from participants who were not known to the dogs. Ward et al (2013) suggested that further research was required, particularly using other scent samples and behavioural cues from the dog's usual owners before discounting a dog's ability to reliably detect hypoglycaemia.

Recent research by Rooney et al (2013) has shown that the presence of a trained detection dog improved glycaemic control, client independence and quality of life, confirming many of the findings from the anecdotal reports. Further studies are needed to identify the mechanism of blood glucose level detection and benefits to health, but this can only be done when more medical alert assistance dogs have been placed with people with diabetes.

From application to placement: How Medical Detection Dogs work

Following a successful application process to Medical Detection Dogs, each person with diabetes is partnered with an appropriate dog following an intensive assessment and trial. The dog's personality and character are matched to the requirements of their new owner so that the dog can adapt easily to their daily routine and needs. The dogs are with their partner at all times, day and night. For young people and adults this may mean the dog has to attend their place of work or study, and for children these dogs may be required during school hours or during the walk to and from school.

All dogs undergo intensive training in obedience and public access by a small group of devoted "socialisers" before undergoing intensive alert training while living with an instructor who trains the dog to detect and act upon the client's specific hypoglycaemic scent. This process from puppy to placement, can take up to 18 months and at no stage is the dog placed in kennels – it always lives with volunteers or staff at the charity. When ready, the dog is placed full-time with their new owner who is given intensive training in caring for a dog and the dog is trained to develop their hypoglycaemia alert skills for their new owner. For younger children, a "team leader" is nominated (usually a parent or guardian) and they must all attend the training, with the team leader having overall responsibility for the dog.

Each owner is required to maintain accurate records of blood glucose levels, hypoglycaemic episodes and dog behaviour to ensure that the dog is progressing and performing as expected, as well as highlighting any areas that may need further training. Once the dog has been placed, consistent and reliable hypoglycaemia detection can take up to a further 6 months to achieve. Regular visits and training from the charity's instructors continue for about 6–12 months until the dog is assessed and recognised officially as a fully fledged medical alert assistance dog, accredited in line with Assistance Dogs UK and Assistance Dogs Europe regulations and guidelines.

The dogs are trained to alert the owner when blood glucose levels drop below 4.5 mmol/L (although this level can be adjusted to suit the client's needs in particular circumstances), allowing time to measure the blood glucose level by the usual method and take the appropriate action to prevent a hypo. In some cases, dogs are now alerting their owners up to 30 minutes before their blood glucose level drops to below the desired range. Many dogs are now also providing alerts for high blood glucose levels, again allowing the owner to monitor their blood glucose level and take the appropriate action. Follow-up and support from Medical Detection

Box 1. Case report: Beth and Billy

"Since Billy's arrival, Beth has not collapsed from a hypoglycaemic episode, allowing her to lead a full and normal life."

One successful partnership is Beth and her medical alert assistance dog Billy. Beth was diagnosed with type 1 diabetes when she was 11 years old and soon got into the routine of regular injections and blood glucose monitoring resulting in good glycaemic control. However, after two years, Beth suddenly stopped recognising when her blood glucose levels were dropping, and she would often collapse or complain of numb legs that would prevent her from moving to get the appropriate treatment. She couldn't be left alone and relied on her parents, sister and friends to ensure that she was safe or to get help for her during these episodes.

Beth recounts that her mother first found out about Medical Detection Dogs when she saw them appear on the television programme *This Morning* and talked to her about it as soon as she got home from school. They filled in the application form straight away. At the age of 16, Beth and her family were accepted, and she met Billy in July to see if they would be an ideal match. Beth remembers that they "clicked instantly" and so his scent training began, ready for Beth to take Billy home with her in October.

By that Christmas, Billy was giving Beth alerts most days, letting her know when her blood glucose level was dropping, or was rising above 12.5 mmol/L. He can alert her when she is out shopping or in the bath and he has even pushed her hairdresser out of the way to alert her to a hypo. Since Billy's arrival, Beth has not collapsed from a hypoglycaemic episode, allowing her to lead a full and normal life while maintaining her HbA$_{1c}$ at about 56 mmol/mol (7.3%). Her confidence has grown and she has become an independent young woman studying animal care, with Billy being very popular among the other students.

Beth is now 19 years old and says that Billy is her best friend. She says: "Without Billy, my life would be very different".

Dogs continues throughout the partnership until the dog is retired, the timing of which varies depending upon the age and ability of the dog.

The role of the healthcare professional

Diabetes healthcare professionals can advocate for a medical alert assistance dog as a useful adjunct to existing therapy when conventional methods have failed to reduce the occurrence of hypoglycaemic episodes. The use of the dogs for the care of children and young people is still in its infancy. It is important to consider possible conventional methods to alleviate hypoglycaemia, such as extra education about hypoglycaemia awareness, carbohydrate counting, insulin dose adjustment and self-management skills, and even the use of continuous subcutaneous insulin infusion (insulin pump) therapy with or without continuous glucose sensor technology and psychological interventions.

Suitability

The charity can currently place only 12–16 dogs per year, as they are totally reliant on donations to fund the service. The careful selection of owners is, therefore, vital. Medical alert assistance dogs are not for everyone, but they are suitable for people who meet the selection criteria and have tried all conventional methods to reduce the incidence of hypoglycaemic events. An outline of a successful placement is provided in *Box 1*.

Children and young people over the age of 5 years who have had diabetes for more than 12 months should be considered eligible when diabetes has caused a significant impact upon daily life, such as hypoglycaemia causing frequent collapse requiring hospital admission or significant absence from school. The family must be able to care for the dog, undergo regular and intensive training and commit to undertaking a long-term placement. Experience with dogs is not essential as training and support are provided by the charity, but of paramount importance is the realisation that the dog is not just for "hypos", but requires a long-term commitment – a decision that should be discussed in depth by all the family. The waiting list to receive a medical alert assistance dog can be up to 4 years after a successful application. There are about 30

puppies in training, each costing about £12 000 to train and support throughout its working life.

Conclusion

The work of Medical Detection Dogs is in its infancy, but it is pioneering for many people with diabetes who have significant problems with hypoglycaemia awareness, which affects quality of life and functioning. The development of social media has exposed many new, novel and unconventional methods of diabetes management that can improve the lives of children with diabetes. It must be remembered that insulin pumps were viewed as a novel method of diabetes management 30 years ago. Diabetes healthcare professionals need to keep abreast of these newer and novel methods of diabetes management, to support their research and to signpost appropriate families who may benefit from such interventions. ■

Visit www.medicaldetectiondogs.org.uk for further information about the work of Medical Detection Dogs.

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