

Learning with Charlie: A robot buddy for children with diabetes

Olivier A. Blanson Henkemans,
Sylvia van der Pal
TNO Child Health
Schipholweg 77-89
2316 ZL Leiden, the Netherlands
+31888666186
Olivier.BlansonHenkemans@TNO.NL

Ilja Werner
Diabetes Association The
Netherlands (DVN)
Fokkerstraat 17, 3833 LD Leusden,
the Netherlands
+31(0)334630566
I.Werner@DVN.nl

Rosemarijn Looije, Mark A.
Neerincx
TNO Perceptual & Cognitive Systems
Kampweg 5, 3769 DE, Soesterberg,
The Netherlands
+31(0)888665924
Rosemarijn.Looije@TNO.nl

ABSTRACT

Children with type 1 diabetes mellitus (T1DM) have a need for social, cognitive and affective support for self-management. The PAL project develops a social robot and its avatar. The aim is to assist the child, health care professional and parents to jointly perform diabetes management. Diabetes camps are an important setting in which the PAL can support children with T1DM. The video 'Learning with Charlie' shows how different robot buddies and children interact in a camp setting and learn about T1DM through educative activities. Also, the robots offer socio-emotional support in a pleasurable and safe environment.

1. INTRODUCTION

T1DM is a chronic disease that sets high demands on self-management in childhood to prevent health problems in short-term (hypo or hyper) and in long-term (e.g., arteriosclerosis) [1]. Self-management requires motivation and perseverance. The PAL project develops a social robot (i.e., the NAO, a humanoid, embodied and interactive agent) and its avatar (in an app). Children can play educational activities, such as a diabetes quiz and Sort&Break game with the robot and avatar (Figure 1). Also, it develops an authoring tool for healthcare professionals and an information system for parents (www.pal4u.eu). PAL aims at assisting the child, health care professional and parent to jointly perform diabetes management, whereby the child learns to be more self-reliant before adolescence. The long-term benefits are prevention of glucose dysregulation, improvement of well-being and health and reducing the economic burden on the care system.

2. CHILDREN'S EXPERIENCE WITH PAL AT DIABETES CAMP

Attending camps helps children to learn about how to cope with their diabetes. They offer a traditional camping experience in a medically safe environment. They enable children with T1DM to meet and share their experiences with one another while they learn to be more responsible for their condition [2]. Patient organizations, in various countries organize these camps. In the Netherlands, the Diabetes Association Netherlands (DVN)

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the Owner/Author.

Copyright is held by the owner/author(s).

HRI '17 Companion, March 06-09, 2017, Vienna, Austria
ACM 978-1-4503-4885-0/17/03.

<http://dx.doi.org/10.1145/3029798.3036656>

organizes camps for different age groups, with different themes, but with common aims. Children with diabetes have a pleasurable experience and go home in good spirits, despite their illness. Children learn via educational activities and from peers. They learn "implicitly" through action instead of attending conventional class. Children are knowledgeable about their illness, but the task of managing their illness is challenging due to environmental factors (e.g., climate, exams). Through camp experiences, they learn better how to cope.



Figure 1. Educational activities with PAL robot and avatar.

PAL can eminently contribute to these aims. Therefore, camps are yearly organized in the Netherlands and Italy, in which the PAL system is applied and evaluated [3]. In the Netherlands, DVN hosts these special camps and in the autumn of 2016, twenty-one children (aged 8-11), joined a 5-day camp.

The video 'Learning with Charlie: A robot buddy for children with a diabetes' illustrates how multiple PAL robot buddies and the children interact in a camp setting and how they can learn together about T1DM, through educative activities. Charlie is the name given to one of the robots. Also, these robots offer socio-emotional support (e.g., praise, small-talk and storytelling), in a pleasurable and safe environment.

3. ACKNOWLEDGMENTS

PAL is funded by Horizon2020 grant nr. 643783-RIA.

4. REFERENCES

- [1] Scott, L. (2013). Developmental Mastery of Diabetes-Related Tasks in Children. *Nurs Clin Am*, 48, 329-342.
- [2] ADA (2012). Diabetes Management at Camps for Children With Diabetes. *Diabetes Care*, S72-S75.
- [3] Neerincx, A., Sacchitelli, F., Kaptein, R., van der Pal, S., Oleari, E., & Neerincx, M. A. (2016). Child's Culture-related Experiences with a Social Robot at Diabetes Camps. In *The 11th ACM/IEEE Int Conference on Human Robot Interaction* (pp. 485-486).