

How To Introduce A New Technology Into Existing Health Care Practices And Evaluate Its Potential: experiences from the New Pals project.

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Abstract Hospitalization is a stressful experience for children. In hospitals in the Netherlands child life specialists are appointed to support the wellbeing of these children by, amongst others, offering play and self-expression activities. In this paper, we report on a study, still in progress, to evaluate the potential of a new technology (pet robot PLEO) for supporting a child's wellbeing when offered as part of an existing health care practice. We pay attention to how we designed the study, which problems we did encounter so far and how we tried to overcome them. To conclude, we present some recommendations to conduct a study like this.

Keywords: Robotics, well-being, pediatrics, hospitals

INTRODUCTION

Hospitalization is a stressful experience for children. The children are ill, out of their familiar environment, away from their parents and family, and often subjected to medical procedures that may be unpleasant, painful and can raise fear. All of which may affect the children's well-being in a negative way [1]. Research has shown that if a child has to undergo a medical procedure, offering play material helps to distract and relax and in this way support their wellbeing. These positive outcomes have been observed for a great variety of play material, ranging from age-appropriate toys to video games [2].

Pet robots which are designed to interact with human beings might be a good device to provide distraction. PLEO is such a pet robot which has been deployed for several years in the children's hospital San Joan de Deú in Barcelona, Spain, to distract the children who are hospitalized. Reports on the experiences with the robot are very positive, yet anecdotal. This means that the potential of PLEO is promising, but needs factual underpinning.

The New Pals project is designed as a multiple case study [3] and has the objective to explore if and how pet robots could be used as a means to improve wellbeing of hospitalized children. The project is initiated and conducted in co creation with child life specialists (CLS) working in three hospitals in The Netherlands and one in Spain. A CLS is a pediatric professional who provides information as well as mental and practical support for the child and its family during hospitalization. S/he provides, inter alia, play and self-expression activities for the child [4] and is oriented towards the needs of the children and their family, practicing a client-centered approach.

This paper is about a study still in progress. We describe the project, the way in which we introduced the robot in the hospitals and evaluated its effects on a child's well-being and the problems we encountered.

DESIGNING THE STUDY

The study focuses on the CLSs and is conducted in two phases. In phase 1 the intention is on introducing the robot to the CLS and exploring the feasibility of the study. Phase 2 will be used to evaluate the robot's impact on the wellbeing of the children.

Phase 1: To familiarize with the new technology

The aims for CLSs in phase 1 are to meet with PLEO and get to know how it functions; how it can be offered to a child as part of their daily work, what kind of responses the children show. For the researchers the aims are to test if the data collection method works and how to find and select eligible children.

We, as the research team, designed the study protocol for field study 1 in the following manner:

- Consulted CLS teams in the hospitals on their views about possibilities to deploy PLEO in their work.
- Visited the hospitals to assess the context in which a CLS does her job. Helpful to make a list of possibilities and requirements to deploy PLEO in that setting.
- Based on the consultation with the CLS team and the hospital visit, a study protocol was drafted, taking ethical considerations into account.
- Because the children's needs and the client-centered approach of the CLS may vary from hospital to hospital, a separate protocol was drafted for each hospital.
- Research methods to register the interaction between robot and child were chosen on the basis of what was needed for answering the research questions and what was possible in the specific contexts.

- A number of key points were similar at every location to make sure that the results obtained would be comparable. In study 1 these key points included (1) age criteria: 4 to 10 years, (2) the instructions for offering PLEO to a child and (3) the observation form used by the CLS to record the child-robot interaction.

Problems encountered in field study 1:

- PLEO has relatively limited technical possibilities. Several children commented on its 'being too slow'.

- Only a limited number of children were available at the time of observation who met the inclusion criteria. Older and younger children were also included.

- A concluding meeting was organized to discuss the findings of study 1 with two of the CLS teams and to do a respondent validation. Combining the findings and the problems encountered the teams saw opportunities for deploying PLEO to support a child's wellbeing in a trajectory tailored to the child. Meaning that they would not use PLEO for each child, and that PLEO could be used at different moments/events for different wellbeing-related reasons. The reasons included: stress/anxiety reduction, distraction and relief of boredom. In the meeting a draft of study 2 was presented to take them along to the next phase.

Phase 2: To evaluate the effect of the new technology embedded in the work methods of the CLS.

Based on this meeting we defined three starting points for study 2:

- (1) The pet robot is offered to support a particular aspect of the wellbeing of the child.
- (2) The offer of PLEO is embedded within the work methods of the CLS.
- (3) The study protocol fits in hospital policies, f.i. hygiene rules.

- To meet points 1 and 2 the CLS is bound to set wellbeing-related goals for the deployment of PLEO for each child separately and to draw up a Plan of Action.
- The inclusion criterion for the lower age limit of being 4 years of age was changed into being able to reflect on one's own experiences with PLEO.

- The aims of phase 2 for CLSs is to select the children and to define the situations in which using PLEO can be helpful for a child's wellbeing. For the research team the aims are to collect information on observed and expected effects of PLEO on a child's wellbeing through different sources of information (triangulation) and the ruling out of a novelty effect.
- In study 2 the key points, similar at every location, include (1) individual goal setting and drawing up a Plan of Action for a child by the CLS, (2) for each child 3 to 5 observations with PLEO done by an independent observer, (3) use of semi-structured observation forms with a focus on wellbeing (e.g. stress reduction, distraction, relief of boredom) and (4) use of different sources of information on the child's experience with the robot (CLS, child, parents).

Problems encountered in field study 2:

- Children on chemotherapy have frequently changing treatment schedules, resulting in many deviations from the planned observations in the Plan of Action.
- So far (mid July 2016) field study 2 is almost completed in one hospital, whereas a start is prevented in another hospital due to the unpredictability of dura-

tion of stay and related observation possibilities, and the reduced opportunities for the use of independent observers. So, the key points of study 2 cannot be met at that location. In hospital 3 and 4 a start is foreseen.

DISCUSSION

The New Pals project is intended to generate a list of recommendations for the use of pet robot PLEO as part of existing health practices for the support of the wellbeing of hospitalized children. To this end, we follow a practice-based evidence approach: start from the practice and collect growing evidence on the effectiveness of the use of the new technology.

We designed a multi-site multiple case study and made certain methodological choices to be able to present trustworthy outcomes [5]. F.i. we gather data on the child's interaction with and experiences of the robot, using different methods and sources, and we use think aloud techniques to let the CLS set wellbeing-related goals for each child and reflect on them later, so that we have a framework for evaluating a child's wellbeing.

Our approach is in accordance with the conduct of practice research as laid down in a recent report of the Netherlands Organization for Health Research and Development (ZonMW) on the topic [6]. One of the recommendations is to split the research project in separate stages and make small, consecutive steps instead of a larger study project. In our project it turned out to be important to let the CLSs first get familiar with the robot so they could envision ways to deploy PLEO in their daily work.

Another recommendation is to keep the study protocol flexible in case the practical situation confronts the researcher with problems. In preparing the study protocol it turned out to be difficult in one hospital to find children for whom we could plan a series of 3 to 5 sessions with an independent observer. Recently we started a more intense consultation to work out a protocol that meets the possibilities of the practice and key points of the research team.

REFERENCES

1. Carnevale FA, Gaudreault F. The experience of critically ill children: a phenomenological study of discomfort and comfort. *Dynamics* 2013 Spring; 24(1):19-27
2. Chambers CT, Taddio A, Uman LS et al. Psychological Interventions for Reducing Pain and Distress During Routine Childhood Immunizations: A Systematic Review. *Clin Ther.* 2009;31 Suppl 2:S77-S103
3. Yin RK. *Case study research. Design and methods.* 5th edition. Sage publications Ltd, London UK 2014.
4. <http://www.childlife.org/files/Flyer-ChildLife2011.pdf>, from www.childlife.org, retrieved July 8th, 2016
5. Guba EG. Criteria for assessing the trustworthiness of naturalistic inquiries. *ETCJ* 1981:29:75-91
6. Praktijkgericht onderzoek. Een goed voorstel! [in Dutch] from www.zonmw.nl/nl/over-zonmw/praktijkgericht-onderzoek/, retrieved July 8th, 2016