
Opportunities to Support Parents in Managing Their Children's Health

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Abstract

Parents always desire to take good care of their children and manage their children's numerous responsibilities. One of the parents' main responsibilities is to manage their children's health. Through their actions of caring for their healthy children, parents want to know they're doing the best job to ensure their children's well being.

Unfortunately, much of the time this responsibility is a challenge—particularly for busy, dual-income parents—because it involves the collection, organization, retrieval, and transfer of information between many people in many different contexts. In our user research with dual-income parents, they shared their experiences of forgetting to give medication, and of both not having an easy way of recording information and not having the information they needed when communicating with childcare and healthcare providers.

Smart home technology appears to offer a promise to ease this situation for parents; however, the HCI community has only investigated healthcare in the home with a focus on the elderly. To better understand this, we conducted a user-centered design project that looks at the management of children's health by their parents.

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ACM Classification Keywords

H5.2. [User Interfaces]: User-centered design.

Introduction

Parents have numerous responsibilities with respect to their children, and one of their main responsibilities is to manage their children's healthcare. However, many parents end up feeling like bad parents as they repeatedly experience breakdowns when trying to record, retrieving, and transferring information related to their children's health in many different contexts.

Parents need to record health information at many different times and in different places, such as when they are at the doctor's office, when they give their children medication, when a child care provider shares information, etc. Currently, many parents record some of this information using various methods; however, when they need to retrieve this information, such as when taking a child to the doctor, they do not have easy access to information such as the last time they gave their child fever reducer because it might be recorded on a piece of paper next to the bottle of medicine. When parents give their children to child care providers, such as one parent leaving a child with another parent, a grandparent or a day care worker, the parent needs to remember and have access to information that the care provider will need in the near future.

These communication and information access breakdowns result in missed medication, over-dosing, and in less effective medical care because healthcare workers must operate with incomplete or sometimes incorrect information. This situation leaves parents feeling overwhelmed and feeling like bad parents. While the activities of caring for their healthy children take place in diverse locations, there is no appropriate tool for helping parents record, retrieve, and transfer the right information at the right time.

We see in this situation an opportunity for ubiquitous computing technology to support parents managing the information concerning their children's health. We have begun a user-centered design project to investigate the opportunities for technology to help parents better manage their children's health needs by focusing on the recording, retrieval, and transfer of information. This project is an example of "Designing for the self;" [7] a product design approach that focuses on the design of products that help people feel they are moving closer to their ideal vision of themselves in a role. In this specific case, our research focuses on the design of systems that help parents feel they are becoming the parents they desire to be through their interactions with a system. In this paper we detail our design process, our findings, and opportunities for ubicomp technology to improve the lives of parents.

Related works*Literature Review*

Our research focuses on dual-income families because previous work on smart homes shows that these parents are looking for technology to give them more control over their lives [1]. In addition, we expect dual-income parents to experience more problems than

other parents because their frequent transfer of childcare responsibilities from parent to childcare providers.

The large number of studies about healthcare systems in smart homes has produced significant contributions to the field. Studies have focused on homecare monitoring technologies, home telemedicine systems, an automated medication reminder and digital family portrait for patients and elders [8,6,4,5]. However, the majority has focused on care of elders in the home. Of particular relevance is the ubicomp article on automated monitoring of kids for early signs of Autism [3].

The research so far has ignored issues related to parent's management of healthcare information for their children. Our project addresses the importance of parents' general health recording needs for healthy families. It explores a new smart healthcare system opportunity by providing an easily retrievable and updatable healthcare system, and is used between parents and healthcare providers for their healthy children in the many contexts where it is needed.

Design Process

Our design method included:

- Contextual interviews with dual-income families in their homes.
- Cultural probes that observed the medical documentation status related to kids' healthcare at home
- Diagramming as a participatory design method for exploring medical information flow between parents and healthcare providers.

- Phone interviews with pediatricians as a primary means of learning how healthcare providers interact with parents
- Concept generation based on our collected ethnographic research data
- Needs validation session where families provided feedback on our concepts [2]

User Research

Contextual Interviews

We conducted contextual interviews and observed the medical documentation status of seven dual income parents at their homes in the United States. The interviews included directed storytelling, cultural probes, contextual questions, and participant observation. Our interview questions focused on their method for family healthcare management, medical documentation, and the use of artifacts for common and emergency situations.

Participatory Design

During the contextual interviews, we also asked parents to participate in a simple diagramming activity for understanding the medical information flow. They were asked to show the medical resources that they interact with and the relationship between them. Moms and Dads were asked separately to do this activity since we wanted to see different roles and perspectives.

After the interviews, maps (Figure 1,2) were made to show various relations, such as where parents keep medicine, medical tools, and documents, what kind of resources they interact with for medical issues, and how frequently they interact with those resources.

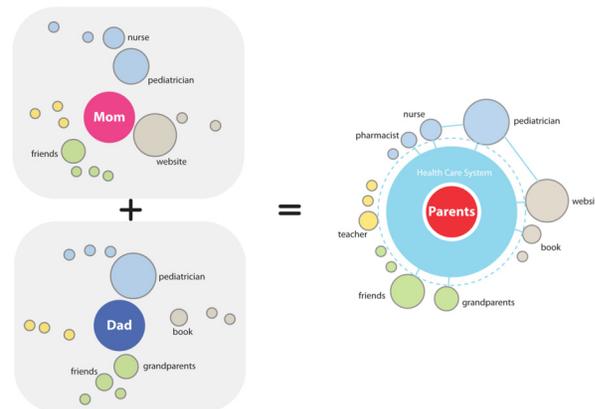


Figure 1: Maps indicate each resource (including human resource) that parents interact with for medical issues.

	Medical documents	Medical info book	Medical tools	Medicines	Others
Family 1					
Family 2					
Family 3					
Family 4					
Family 5					
Family 6					
Family 7					
Results:	spare room	various	bathroom + kids room	Kitchen + Bathroom	Areas for every family member

Figure 2: Map shows location of medicine, medical tools and document related to children’s healthcare placed in homes of interviewed families

Findings

We have five main/key/eminent findings:

(i) Parents want to take care of their children’s health and have many different strategies for managing the processes. For example, parents take notes in a food diary, headache diary and breastfeeding diary for recording their kids’ health information in detail. However, these are easy to forget and even lose, because they usually haven’t completed them and there are no good tools to help them do so.

(ii) There is a disconnect between information parents think they need to keep and information the doctors expect them to both keep and have available (Figure 3). When parents visit the doctor’s office for their kids, while parents naturally assume that their doctors are responsible for their kids’ medical information, the doctors think that parents keep and manage their kids’ medical history. Specifically, through phone interviews with two pediatricians, we noted that pediatricians expect that parents should know their children’s immunization records, but many parents do not recall and have not recorded them.

(iii) There are communication problems between parents and other caregivers. Parents have the need to pass information back and forth between each other as they trade roles caring for their children (Figure 3). Also, parents need an effective way to communicate with other caregivers, such as childcare workers and grandparents, when children are on the medication.

(iv) It is not easy to record kids’ medical information, such as temperature and medication, because the activities take place everywhere at home. For example, when a child is in the bath, parents can witness a rash but it is hard to record immediately. The map (Figure 2) is made to show that medical tools and documents

related to kids' healthcare are placed in multiple locations such as kid's rooms, parents' rooms, bathrooms, kitchens and hall closets. It means that a smart home healthcare should consist of a central healthcare system and ubiquitous devices to capture various healthcare actions.

(v) Parents have trouble retrieving information because it was either not recorded or because it is not available when it is needed. For example, although they got medical alert emails from daycare, they could not recall what the information said during a visit to the doctors' office. And also, particularly during an emergency situation such as a night call to nurse or at an emergency room, sometimes they were asked about their kids' recent diet, medication illnesses, and symptoms; however, they rarely have this information available if it is recorded at all.

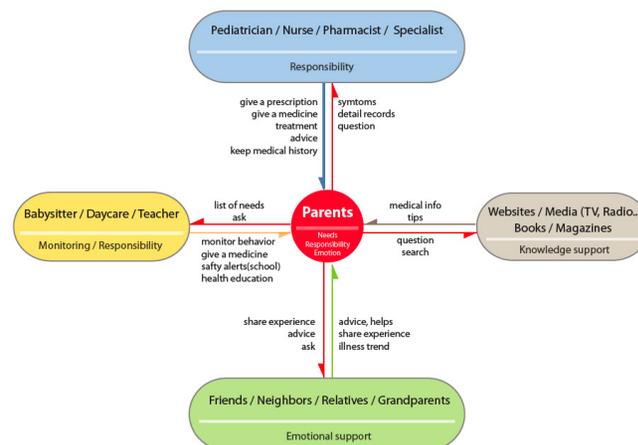


Figure 3: Diagram of medical information flow around parents who have young children

Concept Generation and Needs Validation

We generated forty concepts for a smart home healthcare system based on our user research findings. We abstracted these into five application areas (Figure 4): Automatic recording, Smart medical bottle, Information input and retrieval on the kitchen cabinet, Mobile phone as a medical information device, Ambient interactive display as a reminder.

- Automatic recording: By using a thermometer, scale or wall that is connected to the system, parents can record their children's medical details automatically.
- Smart medical bottle: The medical bottle with sensors reminds parents of medicine times for their children.
- Information input and retrieval on the kitchen cabinet: Through the display on the kitchen cabinet, parents and other care providers communicate and share the information at home.
- Ambient interactive display as a reminder: The ambient display reminds children to take their medicine.
- Mobile phone as a medical information device: a mobile phone can be a source of medical information storage that parents can access at any time.

We held a poster session for gaining further insight into the underlying needs, not for testing individual concepts. In order to validate individual concepts, additionally, we will utilize a speed dating [2] exercise as another needs validation method for rapidly exploring application design.

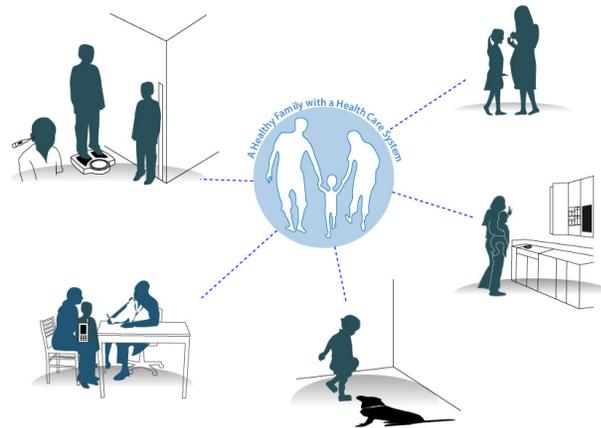


Figure 4: Five application areas related to a central healthcare system

Design Opportunities

Our research revealed three main design opportunities for a healthcare system in a Smart Home:

- (i) helping parents record and collect their children's health information easily.
- (ii) helping parents provide the children's medical information to their healthcare providers and interact with them effectively.
- (iii) using a cell phone as an accessible tool to connect to the central home healthcare system when a family is at another place such as a doctor's office, emergency room, daycare center, or grandparent's house.

Future Work

We are currently refining our healthcare system concepts and will soon begin concept/needs validation

with dual-income parents. From that, we will finalize the concepts and develop user scenarios. Based on user feedback and evaluation, we will develop a refined prototype before we complete the final system design.

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