Medisign for Toddlers
Sensory Product Experience in Hospital Care

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ABSTRACT

Diagnosing, treating and medicating small children, referred to as toddlers, can be challenging for a number of reasons. Medical devices for children have only recently received attention in the design literature, and pediatric devices are often just smaller versions of the adult’s device. Their abilities to process the information given to them, is very limited compared to an adult. It is difficult for a toddler to understand the reason for the treatment, and it can therefore often be experienced as forced. Toddlers experience the world with their senses and sensory product experiences are therefore discussed as relevant in the design of medical equipment for toddlers. Through literature on toddlers’ experiences, design for the senses, and the sensorial part of product experience, the article suggests some key aspects to consider when designing pediatric medical devices.

KEYWORDS: Medisign, design for toddlers, multi-sensory design, product experience

1. INTRODUCTION

When it comes to the design of children’s products, a number of aspects have to be taken into account. The child user has different needs, abilities, wishes and sensory experiences than an adult, and these should be considered in order to make the product fit. When designing for a sick child, even more aspects appear, because the use context and motivation for using products might be very different compared to more typical situations. Because of the child’s limited ability to process information, the emotional part of the experience becomes even more important to keep in mind. Where an adult understands the reason for the treatment and manages to see beyond the period of time in which a medical product might create some discomfort, a small child lacks this ability. The smallest children do not have a verbal language yet, and therefore the physical body language becomes extremely important in judging how the product and situation is experienced.

There are a lot of stakeholders that need to be kept in mind when designing a medical product. Nurses, doctors, the child, parents, siblings, manufacturers and salesmen are all involved at some point in the lifecycle of the product. In practice, designing for toddlers means designing for the parents as well and even more so in the case of medical products as they will always be used together with adults. In medical treatment of children, parents are usually present to help calm the child and help create a safe environment. In this paper, I want to explore to how enhanced focus on the areas of product experience, medisign and multi-sensory design may create a larger solution space for the challenge of medical treatment of toddlers.
Receiving medical attention in a hospital setting can evoke all sorts of emotions. The most important focus of treatment is always getting the medical attention you need. As technological innovations have settled in healthcare, the patient experience of these products has received increasingly more attention. In 2005, Philips launched Ambient Experience, creating an environment of positive distractions helping the patient get the attention away from the procedure.

The increasing focus on patient experience especially for children is also due to the challenging ethical aspects of forced treatment. Designing the medical product in such a way that it improves the child’s willingness to accept treatment, will most likely reduce the need for coercion, and may on this aspect, be a more ethical solution. Improving the child’s experience will make it better for the parents and nurses as well, as their roles in the treatment is highly dependent on how the child patient experiences the situation.

1.1 Research methodology

In order to approach the subject of multi-sensory medical product experience design for toddlers, it is necessary to go into depth in the areas of design for medical experiences, design for toddlers, and design for the senses. Where these fields overlap, there are new challenges that design may contribute to solve. These fields are multi-sensory design for toddlers, medical experience design for toddlers and medical experience design for all senses. The article is a review of literature found on these subjects.

1.2 Structure of the article

The article is divided into four parts. Firstly I will discuss experience design for toddlers. Secondly, I will go into the field of sensory design, and explain why this is relevant when designing for toddlers. Thirdly, I will discuss the subject of medical product experience for toddlers. Then I will go into how insights from these fields in total have the potential to help the designer in the process of improving the user experience of hospital treatment.

2. EXPERIENCE DESIGN FOR TODDLERS

“To understand experience, we need to go beyond shape and form, even beyond simple ergonomics. We need to understand how psychology, the social sciences, communication, and business shape a person’s experience” [1].

Designing for a specific user experience is becoming increasingly popular among designers. On-going and previous research on the subject is providing designers with more knowledge on how to influence a specific experience. The experience of a product is highly subjective, but there are some general clues as to how to enable a specific user experience. In order to do this, the need and importance of extended user insights are evident. Toddlers may not speak for themselves when research is done, as they have not yet developed a verbal language to such a degree that they can express their opinions verbally. Therefore, it is important to look into other forms of user involvement when dealing with toddler users. Observational studies are often used combined with eye tracking and focus measuring. Parents or other caregivers are often good interpreters of the toddlers’ needs and wishes. User testing with toddlers also evokes different sorts of challenges than testing with adults. Toddlers can often be sceptical towards strangers, so the presence of parents or other caregivers can be beneficial [2].

Young children’s experience of a product is more an overall impression, as they lack the mental images of concepts such as shape, colour and tactility [3]. Gibson among others claims that children up till four years of age have an integrated sensory organ. This implies that they do not have the ability to distinguish specific sensory experiences. It is not until further in their cognitive development that they develop the ability to interpret the world to such an extent.
that they can distinguish the different sensory modalities [3].

2.1 The Toddler

![Figure 1: A toddler exploring the world.](image)

“Children learn through their senses. They want to see, touch, taste, experience and experiment. The world seems exciting, interesting, and worth exploring” [4].

A toddler is the common term for a small child between 1-3 years old, with reference to the way small children “toddle” when they walk. Toddlerhood is a stage of important and extreme development from being an infant to becoming a child with opinions of their own, great motoric skills and becoming part of the social environment. The stage between zero and two years is referred to as the sensimotor stage by Piaget [3], a term that refers to the bodily dominance in small children. They experience the world with their whole body including all the senses. The sensory experience of their surroundings is more apparent, as their cognitive experience of the world is less developed than in adults.

The most obvious characteristic of a toddler is the size. Toddlers experience the world from a different height and most of the products they surround themselves with are huge and seen from below. In order to experience this world, toddlers learn to reach for things above, stand on their toes and climb.

During toddlerhood, the child increasingly explores the world on its own, while the safe and protective sphere of intimate relationships are also extremely important. These human impulses are present throughout the lifetime, but are maybe even more apparent in toddlerhood [5].

2.2 Toddlers learn through play

“Children who play over and over again with the same object, such as repeatedly pretending to drink from an empty cup, actually are practicing eye-hand coordination and developing sensory-motor skills” [6].

Play allows children to practice, elaborate on and perfect skills before they become necessary in adulthood. In the first year of life, children use their sensory and motor skills to explore their own bodies. During the second year, they start to manipulate objects in their environment. Through play activities like this the child develops self-esteem and a sense of accomplishment when he learns to manipulate his surroundings [6].

For toddlers, play is serious. They play because this is a natural way in which they can explore the world and learn to master it, and as human beings, we seek fun activities. Through play, the toddler learns to control his body, and gradually learns how to fit in the social culture. Play is self-motivating, which means that there is usually no need for any outer motivation to make a child play [7].

The different kinds of play require different amounts of cognitive development, and are therefore found at different stages in toddlerhood [6]. Through the first year, the child’s play develops from being practice play through construction play and to pretend play and role-play. In practice play, the goal is not the practical consequences of the play, but solely the pleasure of mastery. In play, the execution is a goal in itself. Research concludes that different kinds of play material have different impact on the child’s development. Convergent play
materials, which only have one way of use, like puzzles, may encourage children to seek only one solution to a problem, while divergent play materials, such as building blocks may help the child develop an understanding of the concept of multiple solutions [6]. Since toddlers and play are so closely interlinked, it is important to understand toddlers’ need for play, and the fact that this can be used therapeutically in hospital care.

2.3 Toddlers learn through the senses

Perception means to experience through the senses. There are two main directions within intermodal perception. According to Gibson (1979), the senses are an integrated whole at birth and then gradually become separate. Piaget (1936) on the other hand, represents a theory where the senses are separate and then gradually become integrated. Gottlieb, Wahlsten and Leckliter (1998) state that the two main directions are too simple and do not take developmental aspects of sensing into account. An example is the fact that both directions imply that the senses are equal at all stages of development, which is not likely the case. Hearing is developed and utilized by the child before birth, whereas vision is only functionally in use after the child is born. Therefore, it is likely that the sensory development will not be the same for all senses [7].

Toddlers’ sensory preferences are different to those of an adult in a number of aspects. Their cultural learning process has not gotten as far as influencing what is perceived as appealing. Therefore, a toddler’s preference of sensory experiences is mainly connected to biological preferences. Studies on environmental aesthetics have shown that toddlers have a preference for bright colors, smooth forms, glitter, patterns, rhythm and massivity (Cold, B. et al. (1998) as cited in [3]), even though it is not stated whether it is biological, cultural or emotional aspects that influence these preferences [3].

Toddlers quickly learn to recognize toys through their product characteristics like being colorful and having clear shapes. They know by experience that toys are fun to play with, and will therefore easier approach products with these characteristics [3].

Smell and taste of children’s products is even more important than in products for adults, as toddlers tend to taste and bite to experience a product. Taste will therefore be important even in products that are not originally designed to be tasted. Toddlers are learning new tastes and some are genuinely skeptical to new food, tastes and smells. Some medical products are made to be in contact with the child’s face, like i.e. facemasks for narcosis or treatment of respiratory diseases. In these cases, the smell and taste of the product should be carefully designed to limit rejection by the child.

2.4 Toddlers prefer clear affordance

“...the term affordance refers to the perceived and actual properties of the thing, primarily those fundamental properties that determines just how the thing could possibly be used” [8].

There is more than one definition of the term affordance. Donald Norman’s definition is the one that is most commonly used in design literature, as it refers to the action possibilities of an object, perceived by the user. James Gibson originally introduced the term in his ecological theory, but then defined it as all action possibilities, not depending on the user perceiving them or not [7]. In design, it is most relevant to talk about perceived action possibilities, as non-interpretable affordances are useless in the process of making a product understandable. Yet, as the definition of affordance refers to cultural aspects and previous experiences, it is necessary to add that affordance for a toddler is dependent on the toddler’s culture and experiences. According to Normans’ definition, a ball affords throwing or rolling, whereas a toddler may just as well perceive it as “sit-able”. Norman later revised
the term and changed his definition to regard “perceived affordance”.

Affordance in this version is a very important aspect of a children’s product. It is proven that toddlers prefer products with clear affordances, and that this aspect makes the product more approachable for the child. Kyttä (2003) states that if a product lacks a clear affordance, it might not be approached at all by the child [9]. It is therefore of great importance to keep this in mind when designing a product that needs to be used.

3. DESIGN FOR THE SENSORY COMPONENT OF PRODUCT EXPERIENCES

“When visual, tactual, auditory and olfactory aspects all contribute to the experience, together they create a rich form for user-product interaction” [10].

Sensory experiences come together under the term aesthetics, meaning “knowledge that comes through the senses”. There are multiple ways in which the term aesthetics is understood, and the subject will therefore be further discussed under the term “sensory experiences”.

Designing for sensory experiences is becoming increasingly popular, as we gain insights in to how different sensory stimuli are perceived and how it affects us. More and more research deals with how the different sensory modalities are used during the lifetime of a product, and from this, we can gain knowledge as to how to design for an intended experience [11]. A lot of products have what can be denoted an unintentional stimuli, like shoes with strange smells, uncomfortable tactile elements and the loud sounds of a coffee grinder. These sensory experiences may be unpleasant and may not have been intended by the designers. As adults, we learn to live with some of these unpleasant experiences because we have an interest in the end result of the product, while small children may lack this patience. Therefore, it is of even greater importance to be aware of all the sensory stimuli a product dispatches when designing for toddlers.

Small children experience the world through all the senses simultaneously if possible. They hear a sound, turn around to see what made the sound, then reach for the object, pick it up, turn it around in their hands to find out what it is and then, they might bring it up to their mouth and taste it before they throw it to find out about the physical aspects. Designing for toddlers is therefore closely linked with designing for multi-sensory experiences.

3.1 What is product experience?

According to Hekkert, there are three levels of product experience: Aesthetic experience, experience of meaning and emotional experience. The product experience is “the entire set of affects that is elicited by the interaction between a user and a product, including the degree to which all our senses are gratified (aesthetic experience), the meanings we attach to the product (experience of meaning) and the feelings and emotions that are elicited (emotional experience).” (Hekkert, P as cited in [12]) As mentioned, aesthetics can be defined as sensory experiences. The three levels of product experience is then sensory experience, experience of meaning and emotional experience.

![Figure 2: Framework of product experience, adopted from Hekkert 2006 in [11].](Image)

ISO 9241-210 defines user experience as "a person's perceptions and responses that result from the use or anticipated use of a product,
system or service". According to the ISO definition user experience includes all the users' emotions, beliefs, preferences, perceptions, physical and psychological responses, behaviours and accomplishments that occur before, during and after use. Experience is shaped by the user and the product and is always influenced by the context. Therefore, a positive product experience in one context might not be positive in another. Hence, the intended experience must be tailored to the actual context [13].

Already in 2003, Suri in IDEO wrote an article on what she denotes the “experience evolution” in design practice [14]: “The market is filled with products of high quality and similar prices, and the business needs to develop new product advantages. The role of designers then becomes more than shaping the object itself; it should include the whole experience- people’s goals, aspirations, rituals and values, personal, social and ecological contexts” [14]. The design process is becoming increasingly more complex because of this, and the focus on experience creates new challenges for prototyping and communication.

Toddlers actively use their senses when experiencing the world and I have therefore chosen to focus on the sensory (aesthetic) level of product experience. However, in real life, it may be difficult or even impossible to distinguish emotions from sensory experiences.

3.2 The senses

The senses can be divided in to two categories, distance senses and proximity senses. The distance senses consist of audition, vision and olfaction. The proximity senses are taste and touch. You can see, smell and hear something before you are able to feel or taste it. Therefore the distance senses are the ones that are usually triggered first in an encounter with a product [15].

What is considered sensory pleasing is related to biology, emotions and culture. The older we get, the more our culture influences the experience of a product, and therefore, the biological and emotional aspects of what is considered aesthetically pleasing might be overlooked.

Vision is the most valued sense in the Western culture, resulting in the other senses receiving less attention. For toddlers, vision is important in their understanding of the world, but as they have not yet been influenced by the cultural sensory values to the same extent as adults, initially the other senses are equally important. However, the cultural value of vision is also apparent in children’s products and the increasing trend of screen based play and learning. At this point in time, these kinds of interactions mainly appeal to vision and audio, but according to Schifferstein and Desmet (2008), multi-sensory gadgets are likely to supplement the current options in the future. They also state that in some cases, visual feedback may be used to create an illusion of haptic feedback in a product [16]. This is a positive trend for sensory design. As for toddlers, they need to gain firsthand experience to create knowledge and develop cognitive skills in abstract thinking so that they can generalize the knowledge to new situations [6]. Only then will the illusions of haptic feedback be useful for a toddler.

People’s perception of the attributes of a product in a given sensory modality is frequently affected by the sensations that are simultaneously being perceived by another modality. You could for example create the impression that a fabric is softer than it actually is by adding a scent of lavender [17]. The people participating in the study were unaware of the occurrence of these cross-modal effects. The cognitive associations evoked by sensing something may generate expectations that affect the succeeding sensory perception.

In order to use this in the design for toddlers, one has to investigate what kind of positive sensory experiences a toddler has, and then use this knowledge to make the experience of the situation more like those previous positive experiences.
3.3 Surprising the senses

“Provided that sensory incongruity is applied appropriately, evoking surprise in this way may be a means to create more pleasurable product experiences” [15].

 peek-a-boo is a popular game among toddlers. The surprise element when they see the face is still there usually creates laughter and is perceived as fun. In other areas, surprise may also be linked with positive experiences. Sensory incongruities can be fun to explore and thereby adds to the play value of the product. When talking about sensory experiences for toddlers, sensory surprises are therefore worth exploring.

When it comes to sensory experiences, it can be argued that multi-sensory design aim at “materializing ideas to products that optimally communicate these ideas through all the senses” [16]. It is important that the product emits a coherent message, but too much coherence might become boring after a period of use, so some sensory inconsistency might add to the positive experience of a product. Sensory surprises may create interest for a product and allow for a new experience [16].

The study carried out by Schifferstein and Desmet (2008) also showed that the participants had mainly positive experiences with sensory surprises, and that they were most welcome in public areas and situations like waiting. The authors distinguish between two types of surprising products, “Visible Novelty” (VN) and “Hidden Novelty” (HN). Visible novelty is when some of the product aspects are new to the perceiver, and he therefore has to assume certain product characteristics. When the product characteristics are different from what was anticipated, surprise occurs. In HN, a product looks familiar and the user links it to previous experiences with similar products. The surprise element is here when the user realizes that the product characteristics are not as expected by the first sensory input. The users tended to explore the VN products more than the HN, which might result from the fact that the VN appears to be an unfamiliar product in the first place. Nevertheless, people tended to be more surprised by the HN products, as the product characteristics did not fit with their expectations.

As mentioned in 3.2, the distance senses, with vision as the most evident, are the ones that are first triggered in an encounter with a product. Therefore, when designing for inconsistency with the different senses, creating an inconsistency with the visual product characteristics is most relevant for designers. The study by Ludden et al (2006) showed that people are more surprised by visual-tactual incongruities. The testparticipants did not recognize visual-audition and visual-olfactory product incongruity to the same extent. This does, however, not necessarily imply that creating incongruities with these sensory characteristics does not influence the evaluation of a product [18]. It only implies that people are not necessarily aware of the effect of these incongruities. This needs to be further researched.

In many cases incongruence might also be the result of unintentional stimuli. Even though some incongruence may improve the excitement of a product, creating inconsistency in the sensory dispatch of a product may also reduce the possibility of pattern- making, and thereby create confusion. The product may be perceived as chaotic [13].

3.4 Surprising toddlers’ senses

Toddlers and children were barely mentioned in the research on sensory design reviewed for this paper. When applying these results to toddlers’ products, it is therefore important to look at the reasons behind the surprise. What are the first perceptions and anticipation based on? If they were based on previous experiences and cultural norms, it would be likely that a toddler would not experience the same amount of surprise, as he has not yet developed this knowledge of the world. When designing for toddlers, the play value of the object is important, and sensory
inconsistencies can be fun to play with. They encourage exploration, which again is the fundament of learning. Surprising the senses would therefore be relevant in the design of toddlers’ medical products as well; but the field of children’s perception of sensory qualities needs to be further researched in order to do so.

4. SENSORY MEDICAL PRODUCT EXPERIENCE FOR TODDLERS

“Experience and interaction are fully intertwined and in order to explore people’s experiences of products, we need to thoroughly understand the constituents or building blocks of human-product interaction” [19].

For a toddler, someone else are responsible for most product encounters, so the first encounter with a product is typically in the use phase. Product experiences regarding shelf life and purchasing behaviour are therefore not relevant to the toddler user. Most of the products a toddler encounters in a hospital are unfamiliar. While a toddler can usually choose whether or not he wants to play with an object, hospital care does not necessarily have the same flexibility. Some products are necessary for the treatment to be successful, and therefore, there are some key elements that may enhance the toddler’s acceptance and cooperation.

4.1 Sensory Medical Product Experience in general

As mentioned in the introduction, the area of sensory medical product experiences is receiving increasingly more attention. The Ambient Experience is an example worth mentioning. The Ambient Experience lets the patient decide on a theme that will be projected in the room of the procedure. All unnecessary technical equipment and connections are hidden for the patient, making the room less foreign. The fact that the patient receives some control of the situation might be a reason to why the product has become a success. When the procedure room is filled with colored light and projected images, it also communicates to the patient that the procedure is not supposed to be scary.

![Figure 3: Philips’ Ambient Experience.](image)

In CAT-scans, the product has led to 16% reduction in the rate of sedation for children under the age of 18 months and 28% for children under the age of 4 [20]. The Ambient Experience suite is not, however, designed solely for children patients, and the same study also show that the product generates positive experiences in adult patients as well.

4.2 Play

Toddlers do not see the need to distinguish play from non-play, and might even reject actions that are not associated with play [3]. Play is therefore an important and effective means to get the toddler-patient to accept treatment. There is done a lot of research on the importance of play in hospital treatment of children, especially on the effect of hospital clowns. It has been shown that having hospital clowns present during for example smaller, slightly painful procedures greatly decreases the levels of distress and negative emotions in the child-patient.

Play as an important aspect of hospital stay is also closely related to the effect of distraction. Being hospitalized is not, per se, a positive experience, because the reason for being there is almost exclusively negative. Focusing on positive sensory experiences in the present may therefore be a means to reduce anxiety and stress in all patients [21].
Play is a quality rather than a certain category of activities. There are usually no outer goals in play, and playing is by its nature motivating. This as opposed to medical care, where the treatment is a means to reach a goal. This fact therefore contributes to the distinction of play from medical care. If the treatment was transformed somehow into a goal in itself, it may be easier for the child to associate it with play and therefore positive experiences. In order to include play in medical care, the aim therefore has to be that the treatment in itself is experienced as meaningful to the toddler.

4.3 Design for cooperation

“Whilst aerosol scientists predominantly focus on technical or anatomical aspects it is, as in all age groups, patient behaviour that is the dominant factor” [22].

A French designer named Thomas Panzolato was recently awarded the “Label Observateur du design 13”, the French version of Red Dot Award, for his work with the challenge of medicating children in hospitals. He designed a set of hollow chocolate figures, where the nurse could inject medicine for the treatment of children. The chocolates are meant for children 3-15 years old. The product has become a success because the chocolate motivates the child to take the medication and thereby encourages them to cooperate with the medical personnel.

![Figure 4: Médibons, chocolates to ease medication of children (Thomas Panzolato, 2012).](image)

Adherence describes the extent to which the patient correctly follows medical advice. In this setting, adherence means to what extent the child accepts and cooperates with the hospital staff in treatment of a disease. The importance of adherence is clearly stated in the medical literature reviewed for this article, i.e. [20], [23]. In inhalation therapy, the effect of the medication is drastically reduced if the child is resistant to follow through with the entire treatment [24]. There are different challenges with adherence regarding different kinds of treatments. A CAT-scanner has different requirements for the patient than an inhaler, but there are also some similarities. In most kinds of medical treatment, the child’s cooperation is crucial for the success. Studies on pediatric patients undergoing narcosis have shown that well-informed patients are more willing to cooperate than uninformed patients. One of the studies concludes that: “The use of professional clowns in hospital treatment has been shown to have great benefits, making mask induction fun and easy rather than frightening and suffocating.” [25]. In CAT and MRI procedures, the session will be less traumatizing for the child, but also for the medical staff and parents if the child is able to cooperate. Cooperation like this also leads to less sedation of children undergoing diagnostic testing, reducing the time spent by the nurses before and after the procedure [20].

It must however be mentioned that cooperation in medical care of toddlers does not necessarily imply providing them with all the information. If you somehow trick the child into accepting treatment, this may also lead to cooperation or at least lack of aversion from the child. In this setting, the term cooperation needs to be understood in this slightly broader sense. The Médibons can also be seen as tricking the child into taking medication, but they lead to cooperation from the child.

4.4 Design for distraction

In a study conducted by Kettwich et al. (2006), a 29% reduction in pediatric stress levels connected to syringes was shown when the equipment had been modified with stickers of
butterflies, musical notes, smiley faces and flowers [23] (see figure 5). This may show that implementing aspects that distract the patient decreases the level of stress and discomfort related to the treatment with a device. The effect might also relate to the device’s change from being a strictly medical device to being something in the world of the patients, something they could relate to.

**Figure 5: Stress-reducing syringes as decorated in the study by Kettwich et al. (2006).**

These results also show that only with small interventions and modifications of existing devices, positive response may occur. The Philips’ Ambient Experience represent a much more invasive design, transforming the whole context of the procedure. The effect from applying stickers on syringes can show that there are positive effects to gain from even the smallest effort of taking the patient experience into account. Mason (1999) states that: “A simple intervention that occupies both parent and child in an activity, but requires no training of staff, parents or children, is able to reduce substantially the distress of young children during aversive medical procedures“ [21].

In pediatric medicine, the issue of distraction is a popular field of research. The objectives are often to measure the effect of certain distractors, like cartoons, books, storytelling and companion animals, and then compare them. The design qualities of the distractors have, however, received little attention. An interesting topic to study further may therefore be what kind of benefits that can be gained from involving the design discipline in the field of distraction.

### 4.5 Design for communication

Communication is a crucial aspect of medical experiences at all ages. Understanding what is happening and preparing for a procedure can enhance the feeling of control. Communicating with toddlers can be challenging, as they are in the beginning of developing language skills and often skeptical towards strangers. Because of this, the bodily language of the nurse is important to communicate safety, playfulness and calmness. Communication in medical treatment of children usually involves a different message than communication with adults. In design for communication, hospital clowns can be of great help to create a positive atmosphere. Clowns’ playful and bodily presence has been shown to better prepare children for procedures by making it part of play [25].

In research on the subject of patient communication and children, the parents are usually referred to as the patient [26]. For designers, the child is the main user of the product, and will therefore receive special attention when research is done. This can be associated with the difference between parents as consumers and their children as users of children’s products. For a designer, the user is always the main point of interest, but the consumers have to be considered as well, as they are the ones bringing the product to the user.

The Philips solution not only provides a sensory experience during a procedure, they also developed a playful miniature version of the CAT-scanner called the Kitten Scanner. The children can play with the Kitten scanner, putting toy patients into the machine to see what is wrong with them. This way, the child patient gets to explore what the scan is doing and gradually becomes more familiar with the medical procedure.
A Patient Centered Communication (PCC) approach within healthcare is defined as “the array of communicative behaviors that can enhance the quality of the relationship between the health care provider and the patient or the patient’s family” [27]. According to this approach, a number of aspects can be assessed in order to improve the relationship between the patient and the health care provider. Clarity, empathy, immediacy, listening and humor are key aspects. In research on this particular field, most of the communication is between parents and medical staff. The view of the parent as the patient and thereby the disregard of the child was established already in the 1980’s [26]. Children patients and the communication with staff have therefore received very little attention in the research. Tates & Meeuwesen (2001) does however state that including the child as a participant in the communication is important and will have clear benefits [26].

In designing for communication, the product’s communicative abilities are worth mentioning. As previously stated, the affordance of a product is of great importance when designing for toddlers. This is a way in which the product itself can communicate its use without having to go through the verbal language. This is beneficial in all products, and especially products that will be used by children who are still developing their verbal understanding and language.

5. DESIGNING SENSORY MEDICAL PRODUCT EXPERIENCES FOR TODDLERS

When it comes to the design process of designing products for toddlers, there are some challenges that have to be overcome. In research on designing for children, the methodology presented is meant to be used on children 3 years and up. As the user group of toddlers is children 1-3 years old, it may seem that there are very few participatory design methods applicable [2]. Observational studies are applicable for all age groups, and some methods used in psychological research may be used, like focus measuring and measuring what the child is most attracted to. Observation of the interaction between patient, parents, nurse and medical device can be very useful in uncovering problem areas and possibilities for improvement. Even though the toddler cannot be part of traditional co-designing sessions, focusing on toddlers’ experience means taking the toddler user seriously.

Figure 7 is a summary of the research studied for this review article and shows an overview of the most important aspects to consider when designing sensory medical product experiences for toddlers, according to this research. The figure may work as an inspiration for designers when designing positive sensory experiences in a hospital setting. Keeping the context in mind while designing for cooperation, positive distractions, play qualities, sensory qualities and surprise elements may contribute to enable a better product experience. The figure also comes with some suggestions as to how these fields can be combined in order to create a positive sensory medical product experience for toddlers. However, the figure does not display all possibilities within the field and further research is necessary in order to validate the applicability of this figure.
6. DISCUSSION

It can be argued that implementing products and methods that keep the patients experience in mind will improve the ethical aspects of hospital care. On the other hand, the medical aspects are most important in health care, and designing for patient experience may clash with the mantra of efficiency and economical cut downs in short term perspectives. The “experience evolution” came as a result of the need for market benefits and much of the research on this area is done within the field of marketing and consumer behavior. Suri states that: “Especially in designing the kinds of products which people have a choice of whether to buy and/or use and how to interact with them, we need to consider emotional issues of appeal, fun, aesthetics, taste, ritual, image, lifestyle – the entire range of personal, social and cultural fit” [28](Accentuated by the author). It should, however be argued that we as designers have a responsibility and the possibility to also design the necessary products that will be used by people with no choice, taking all these aspects into account. The economical benefits are not as directly obvious as in a consumer product, but a good product experience can, as earlier mentioned, reduce time of use and improve efficiency in medical wards. This reduces costs in a long-term perspective, not to mention improve the ethical aspects of forced treatment. As is the case with many other fields design operates in, the economical benefits of putting effort into the design of a product or service, may not be obvious for all parties. There is a need for further research on how cost benefits for society can be more visible.

Toddlers and children are barely mentioned in the literature on product experience reviewed for this article. Despite of that, it is most likely that many of the principles are applicable for
The design qualities of distractors in health care have received little attention in medical research. It can be argued that involving designers in the process may help improve the design and thereby also the distracting qualities. Based on the research studied for this article, figure 7 propose some suggestions for improved product qualities of distractors.

In the field of sensory product experiences, there is little, or no research on toddlers’ sensory experiences. In order for the design to evoke positive experiences, it is necessary to study what sensory experiences are positive for toddlers. Because of the referral to previous experiences and cultural norms, designing sensory incongruities for toddlers can be challenging. It would be interesting to study what kind of product characteristics a toddler would expect from certain sensory inputs in order to create surprise.

In research on pediatric medical communication, the parent is referred to as the patient. This may result in the child patient and the importance of communication in medical product experiences being neglected. The research on this field is therefore less valuable for designers, as the designer always has the main user, the actual patient, in mind when designing medical product experiences. The focus of this article has been on the experience of the toddler patient. The experience of other stakeholders is also relevant for the designer, but considering the lack of literature on toddler patients, their experience may easily be overlooked. It is important that the child’s perspective receives more attention in further research. It is also evident that the experience of hospital staff and other caregivers will be improved with cooperating children.

No product exists in vacuum, and the context is also highly relevant in medical product design. How a product is introduced may be very important for the experience. As mentioned in 4.3, designing for cooperation does not necessarily mean to provide the child with all the information. In some cases, it can even be argued that it would be more successful to trick the child into taking medication.

All experiences are sensory experiences, as we use our sensory system to perceive the world around us. Designing for sensory experiences can therefore be argued to be a pleonasm. Nevertheless, the field is expanding and designing sensory product experiences is becoming increasingly popular. In the field of design, designing with a deliberate focus on the sensory qualities of a product is relatively new. The shift is then from unintended evoking product experiences to deliberately designing to facilitate specific experiences. This shift creates new challenges in the field of design methods and prototyping. Tools facilitating multi-sensory product design exist, but could have had a bigger role in the design business. Within sensory design, it is important to have a physical presence of materials, not only using visual and auditory tools, but also communicating and exploring samples of all sorts of sensory stimuli. Tools developed and used in the food industry may be of great help in predicting olfactory qualities of a product [16]. Prototyping medical products also evoke new challenges when it comes to hygiene, materials, safety and ethics. Testing products on sick children in actual hospital treatment raises multiple ethical issues.
This is important, but has not been the focus of this research.

7. CONCLUSIONS

The most important part of medical design is of course the medical treatment, and ensuring that the patient gets well. Studies have, however, shown that including the patient experience in the design will improve adherence and make the patient more willing to cooperate. Willing patients have been shown to be economically beneficial as well as time saving in hospital care.

Designing for toddlers means designing for a sensory experience. Being at the hospital is by all means a sensory experience, with smells, sounds, and physical environment often differing from what the patient is used to. This may in many cases cause a big amount of stress on the patient as well as for the relatives. This often evokes many negative emotions even before the treatment has started, so keeping the patient’s sensory experiences in mind is of great importance when designing a medical product. Improved understanding of the patient’s needs and emotions are crucial for a design to be successful. It has been showed that enabling participation and control for the patients improves both the experience and the success of treatment. In order to let children participate in the treatment, the medical objects have to be designed in such a way that they enable this to happen within the limits of the medical care. Play, cooperation, communication and distraction are key elements.

There are many important aspects to consider when designing a product for a toddler, and even more aspects when designing a medical product for a sick toddler. Through the literature studied for this article, some experiential qualities have been explored that may improve a toddler’s willingness to accept medical products and thereby hopefully also treatment. There are however, some gaps in the research on the field of sensory experience for toddlers:

- Design of distractors
- Children’s perception of sensory qualities
- The effect of sensory incongruity on toddlers
- The reasons for the lack of use of existing products that aim at enhancing the experience in hospital care
- Communication with toddlers in hospital care
- Participatory design with toddlers

My hope is therefore to inspire designers to continue working for improved product experience for toddlers in hospital care.
REFERENCES


FIGURES

Figure 1: http://barefootinsuburbia.wordpress.com

Figure 2: Pieter Desmet and Paul Hekkert

Figure 3, 6: Philips Ambient Experience

Figure 4: Médibons, Thomas Panzolato:

Figure 5: http://jpo.sagepub.com/content/24/1/20

Figure 7: Tori Klakegg Mæhlum, 2012