Designing for people in crisis

Service design for an emergency room

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ABSTRACT

Feeling stress, frustration, being tired and in pain creates intense emotions and could mean that the person is in psychological crisis. The person might regress to a lower functioning level and both the regression and the factors affects human behavior. There may be a reduction in the ability to receive and perceive information and the memory might be impaired.

This article investigates what affects people in a state of crisis and how these factors affect behavior. This is important for designers because if we better understand the factors of why people behave like they do in a state of crisis; we can better design a service for them. The analysis is conducted through a literature review, two expert interviews and empiric research from a service design project at an Emergency room (ER) at a Norwegian hospital. The result is presented in design guidelines that points out what designers should keep in mind when designing for people in crisis at an ER. The guidelines focus on what information to give and how, expectation management, less resources for memory, redesign of the physical room and personal communication.

Keywords: Crisis, behavior, service design, ER

1. INTRODUCTION

Human behavior is affected by a person's psychological state. Being in pain, tired and stressed can affect humans' abilities and behavior. These factors are closely linked to negative feelings like anxiety and frustration, which could both be the reason for, or a result of, these factors.

In this article the word crisis is used to describe a person´s emotional state [3]. Caplan described the crisis state as following "People are in a state of crisis when they face an obstacle to important life goals - an obstacle that is, for a time, insurmountable by the use of customary methods of problem-solving" [4]. A person in a state of crisis will to a higher degree than normal be affected by external interventions [3]. How much an individual go into a state of crisis depends on the person and the situation [5] and as people are different, people can be in a varying level of crisis. This article looks at the term crisis in a broad view, by including people with a broad range of crisis states.

The goal of this article is to provide suggestions for what designers should keep in mind when designing an Emergency Room (ER) service. Through examining the different factors of the state of crisis and how they may affect behavior, the article creates a theoretical foundation for designing for people in temporary crisis. The main research question that will be answered throughout this article is: How can we design a

service for people in a temporary emotional crisis? Other questions that will be discussed are: What kind of psychological factors may be present when a person is experiencing an ER and how do these factors affect behavior? Can designers reduce the factors that contribute to the state of crisis? Can designers improve the experience for patients in crisis at the ER?

The research for this article is based upon a literature review, two expert interviews and empirical research from a service design project. Research from articles and books about psychology, health and design were included. The goal for the interviews was to supplement the knowledge found in the literature. I planned and carried out the expert interviews in November 2016. The first interview was with a psychiatrist and was carried out as a semi structured in-depth interview at a mental health hospital in Norway. The concept of being in crisis was discussed as well as how different factors could affect the human behavior. The second semi-structured interview was with a design professor at the Norwegian University of Science and Technology. The interview focused on how to design for the selected target group. The article looks at the state of crisis in the context of an ER at a hospital, and a fellow student and I carried out a project at an ER using service design methods. For the project, the primary research was conducted through semi-structured interviews (nine patients and seven employees) and observation at the ER (in total 20 hours). Because of limited space, this article will not include theory or discussion about methods for design research and ethics towards patients.

The most important goal for patients at the ER is to get the correct medical help and to become healthy, but the patients are affected by the total experience for body and mind. This study does not look at how the state of crisis is related to the physical illness or injury, but to the patient´s psychological experience. Boudreaux et al. states that "Satisfied patients may be more compliant with their medical regimens, suggesting that satisfaction may be an important

component in promoting health and well-being" [6, p. 13] This article and the project was carried out to explore the opportunity of improving the patient experience at the ER through design methods.

In the next section the article will focus on what factors are seen in people in crisis and how these factors affect behavior. Part 3 will present the ER as an example of a relevant context for people in crisis. In part 4 some design guidelines will be provided for the ER setting that have the potential of increasing the patient satisfaction. In the last section, the given research questions will be considered and discussed in relation to the findings in this article.

2. THEORY

For a person experiencing an event that feels impossible to cope with, this person could go into a state of crisis [4]. The feeling of not coping could result in the person becoming more stressed and the uncertainty increases which is related to a feeling of anxiety [7]. From a study conducted on cancer patients, the typical reaction of an emotional crisis was feelings of anxiety, grief, depression and anger [8].

The feelings and factors related to the state of crisis are varying. They might both be included in the cause of the crisis, and be a result of the crisis [5]. This article has chosen the following factors to look into as it can be argued that they are relevant to the ER patients: negative feelings, tiredness, stress and being in pain. It is challenging to study the factors individually because they are closely related to each other. Even though many of these factors affect people similarly, for this article the factors are divided and researched separately to better structure the findings of what causes what behavior. In the following sections I will present the term regression and look at how the different factors affect behavior.

2.1 How regression and negative feelings could affect behavior

When a person is in crisis, the person might revert to an earlier stage of development. This is called regression [1][9]. This could occur when a person experiences an intense emotional situation, is put in an unknown situation or as part of an illness [9][10]. The person will act on a more primitive level than normal, for example complain more and be more demanding, like if the person was a child [9]. When a person regresses, the ability to be empathic could decrease, the person could be more likely to be acting out, more self-centered and might become more aggressive [1]. When in a crisis situation, the feelings that occur might be panic, anxiety, grief, restlessness and frustration, and all these factors could reduce the ability to receive and perceive information [1]. The more we regress, the more we will function on a primitive level and therefore the higher impairment of memory [1]. This is also discussed in the book Engineering psychology and human performance where it is stated that the feeling of anxiety could impair the working memory [11].

The level of regression varies from person to person, event to event. It is important to point out that the change in abilities will be compared to the person´s normal state. If the person is normally very empathic, this ability will not disappear but decrease [1].

2.2 What is tiredness and how does it affect behavior?

Mental exertion can lead to a tiredness and fatigue. Fatigue can be described as a result of an extreme use of energy, as a result of for example an infection or other physiological alteration or from sleep deprivation. Looking at fatigue from a psychological point of view, it is related to weariness and tiredness where the person has been bored or mentally active for an extended period of time. [12]

Studies have shown that sleep deprivation causes change in human behavior and it is plausible to think that these results will also be relevant for people that experience tiredness. The ability to stay focused is affected as well as the ability to communicate and process information. Disorientation with regards to physical surroundings is more likely when a person is tired. It has also been shown that memory is affected, particularly the short-term memory. Sleep deprivation might also result in irritability and anxiety, that might lead to indifference and loss of empathy towards others [13].

2.3 What is stress and how does it affect behavior?

Stress has been described differently by different researchers throughout time, and a final definition has not been set [14]. Stress is the body's way of responding to a threatening event by going into a mobilization state, where stress hormones is released into the body and it goes from one level of arousal to a higher level of arousal, making the body ready for an emergency [7]. The stimuli causing stress are often referred to as stressors. Even though they are closely linked, it is common to separate them into internal and external stressors. The external stressors are related to the physical environment, like temperature, sound and time pressure, and the internal stressors are the psychological factors, like anxiety and other feelings [14].

Since the body is put in emergency mode, stress can be seen as a positive thing, because the human might be more ready for action through an increase in arousal [7]. Stress can also be negative for a person when the stress is so high it goes towards being destructive for the brain, making it more confused and a feeling of helplessness occurs [7]. H. Ursin et al. point out that making a person think he can cope is an opportunity for handling the stressful situation. It can be argued that during an ER visit, the

feeling of coping and control is low because the patient will be dependent on others to get healthy, which could cause increase in stress. It is plausible to think that when the difficulty of a situation surpasses the person's abilities, the person's level of crisis state could rise.

Stress affects the person's behavior with an increase in selectivity and tunneling the attention on a few main tasks [11]. What appears to be the main task would be what the person think is the most important at that time, and if something is a secondary task, this would be filtered out. Studies show that stress make the person´s working memory weaker. Some conclude that this may come from that stress affect the overall brain capacity. It is also interesting to see that people under stress are less likely to help others because the social behavior is impaired. Another possible change of behavior is the ability to perceive time and space. [14]

2.4 What is pain and how does it affect behavior?

The sensory system in our body identifies changes in our body and tells the brain about them [15]. If the changes are different enough to be dangerous, we will become conscious about them and feel where the difference is and how dangerous it is. The pain is registered and we are warned that something needs to be done to steer away from the dangerous situation. Pain is therefore a very important part of human survival [16]. When in pain, our attention is easily interrupted by changes in the sensory system, which makes us less focused on other senses [17]. It is plausible to suggest that it could become more difficult to have a conversation, because our ability to listen and understand the information would decline and the focus on the conversation could easily be interrupted.

The psychiatrist I consulted, pointed out that it is not mainly the pain itself that affects the human behavior, but more importantly the feelings that the pain generates. Pain is therefore especially closely linked with feelings and how feelings could affect behavior. He also said that it is important to take into account that the different drugs the patient could be on may also affect the person's actions, attention span and ability to remember [1].

	Regression and negative feelings	Tiredness	Stress	In pain
Attention	• Reduction of the ability to receive and perceive information [1]	• Difficult to stay focused • Disorientation • Impaired communication • Slowed information processing [13]	• Attention tunneling • Misjudgment of time and space [14]	• Interrupts attention [17]
Memory	• Impairment of working memory [1][11]	• Impairment of short-term memory [13]	• Impairment of working memory [14][18]	
Behavior in general	• Demanding [1][9] • Self-centered [1]	• Irritability • Anxiety • Indifference • Loss of empathy [13]	• less likely to help others [14]	• Increase in negative feelings [1]

Table 1: An overview of which factors causes what behavior change

3. PROJECT: EMERGENCY ROOM AT HOSPITAL

One example of where it is important to better understand human behavior related to a person in crisis, is at the ER at a hospital. The people here experience an unexpected event trough an illness or injury, and it is plausible to suggest that patients will be in a varying degree of a crisis state and therefore they may, in a varying degree, also regress. I carried out a service design project at an ER at a public hospital in Norway with a fellow industrial design student. The intention of bringing the project into this article is to present a context for the reviewed theory and research, and to provide empiric research that can complement the findings from the literature review and expert interview, as well as to create a better foundation for the following design guidelines in part 4.

The project´s goal was to reduce the perceived waiting time in the ER for patients. The project chose to focus on the people that have lower priority because these users will have the longest wait time. This group is expected to be the least satisfied group. Waiting might result in an increase in anxiety and stress [19]. The perceived waiting time of a patient can potentially make a difference to the patient´s experience, as shown by Thompson et al. "Patient satisfaction is more strongly affected by perceived waiting time than by actual waiting time" [20, p. 662].

Through the research we saw that patients took a holistic view of their personal experience at the ER. Patients pointed out how anxiety, frustration about not knowing much and stress influenced their total experience. The expectations of how long time the waiting at the ER would take varied a lot from one person to another. Initial research was summed up into three main findings: 1. Patients have a lack of understanding of the internal processes happening at the ER. 2. Patients experience that they are given insufficient information. 3. Waiting time causes frustration for patients with lower prioritizing. One important potential we found was to provide more information about the experience. This is coherent with the findings in the article by Thompson et al. "Patients who perceived that they received the most information at arrival were the most satisfied with their ER visit" [20 p. 663] and with what the psychiatrist explained [1]. Giving information is not only positive because it decreases the experienced uncertainty, but also for the activity of receiving information. It is shown that people would rather do something than to be idle, as long as it is seen as worthwhile [21].

4. DESIGN GUIDELINES

In this section some design guidelines written by me are presented. They may give inspiration and direction for designers of what to think about when designing a service for an ER. The guidelines may also give inspiration of how to design in general for people in crisis. In psychology there exist theories for how to intervene when people are in crisis [3][22][23] and in the area of human-centered design there exist guidelines of how to design for people in stressful situations [18][24][25]. These guidelines come as a result of the gained knowledge from the theory in part 2 and from the related service design project described in part 3 and has inspiration from psychology and design theory.

4.1 Information

Information can improve the patient´s experience, this we have seen through the ER project, the literature review and the expert interview [1][20]. It is plausible to suggest that it may help the user to be more prepared for the experience, reduce the uncertainty and increase the feeling of coping.

Situational awareness (SA) has traditionally been studied for operational situations and interfaces where users need to be aware of the situation to perform on a high level [24]. However, the situational awareness theories could also be relevant for service design and patient experience because it explains in an interesting way the three levels of understanding information (see figure 1). At Level 1 the user perceives information through visual, auditory, tactile, taste or olfactory, and this might become difficult because of internal and external stressors or ambiguity in the design. In an ER context, the first level is relevant for checking that the information is designed in a way that it is easily processed by the user [24].
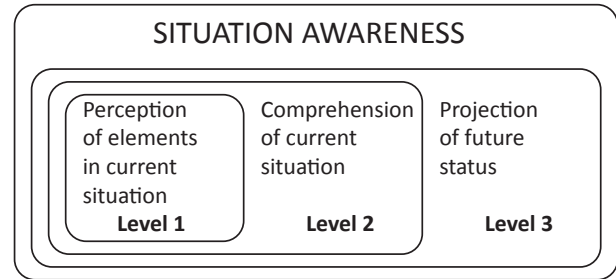

Figure 1. Model of the three levels in the situational awareness theory [24].

4.1.1 Information: simple and easy

At SA level 2 the comprehension of the present situation is the main focus, so that the user can understand what the information means. The data perceived at level 1 is analyzed, combined and prioritized to create valuable meaning for the user [24]. For a patient in the ER there is a possibility that he never gets to this level because of insufficient mental resources, for example if the internal stressors of negative feelings are too high. The designer should reduce the amount of information and prioritize the important information so that the user does not need to carry out this cognitive challenging task [11].

Because of regression for people in a state of crisis, the information should be designed in a simple and straightforward way and be easily understandable [1]. The patient´s attention span might be impaired, affecting how the user is capable of receiving information. It is shown in the study by Houts et al. that information flyers with graphical information, compared to those with just text, were significantly more likely to be remembered and understood [26]. Providing information in a graphical way could make it easier to understand, and decrease the users need to maintain and process the information in working memory [11]. One suggestion on how to make information more graphical is by creating a story board. When we regress we function on a more primitive level, and this story telling could be related to how we perceive information when we are children.

4.1.2 Information: Expectation management

At the third level of SA the user predicts what the perceived information will mean to the user in the future. From the SA design principles, it is recommended to create a high level overview of the situation and present possible future events. It is stated that this is particularly relevant for less experienced operators [24], which we can transmit to the novice ER patients. When we come upon a novel situation, we need a deeper understanding; a good mental model [25]. The mental model the patient already inhabits could have been created by assumptions that comes from similar experienced services which may make an incorrect mental model [18]. Designers can help the patient to create a more correct mental model by managing the patient´s expectations. This could for example be done through giving information about the different steps of an ER experience so that the patient is prepared and more aware through the experience. When managing a user's expectations, the service is more likely to have a higher level of satisfaction because the user will compare the actual experience with the expectations [20].

Another way to help to manage the expectations is to give indicators of how long something will take [18]. Giving real time information would be one way to influence the user´s expectations about time and have a possibility to increase the total service satisfaction [19]. This could for example be information of how many patients there are in the ER or an estimate of the perceived waiting time. In an ER context every day is unpredictable and the information provided would be likely to change, but even though it would be difficult to give for example the exact waiting time, it is important to give some kind of indicator of the approximate waiting time because the uncertainty and unpredictability increase the frustration and anxiety [1]. This is coherent with what we found through the patient interviews in the project research. Since the ER is unpredictable the time indicator may change a lot, and it would

therefore be especially important to explain why the time has changed.

4.1.3 Information: Different formats

The design professor points out there is a wide variety between how people prefer information to be presented, and this will also be the case in an acute situation [2]. By presenting the information for different modalities [2], the designer could take advantage of the human's capabilities of parallel processing. By designing for different senses the user can process information simultaneously because they use different cognitive resources [24]. For example, it is plausible that an information screen with both auditory and visual information has a higher potential of making the user go through all the SA levels and understanding the information and how it is related to the user.

It is also important to present the information in several ways and several areas to increase the possibility of users noticing it. Also, it is generally accepted that by repeating information, the more likely someone is to remember and understand it. This would be especially important in the context of the ER when a person is in crisis and the attention and memory could be impaired.

4.2 Less resources for memory

For a person in crisis the factors of stress, tiredness and being in pain could impair the memory. Patients at the ER are talking to different people receiving a lot of information that is relevant both for the present and the future.

One of the interviewed patients for the project, talked about receiving a lot of information from the doctor, but because his attention span was impaired he thought about other things while listening, and later on he could only remember parts of the information. As stated in the classical design book written by Don Norman [25] we

should design so that the least possible should need to stay in the short term memory. The capacity of the short term memory was studied by G. Miller in 1956 and he suggested that subjects can remember approximately 7 items +/- 2 [27], but Norman points out that designers should think about the capacity range as 3-5 items because it is so easy to be distracted. If this is the case when we are in the best version of ourselves, it is plausible to think that it would be best to design so that the user does not need to remember any important information. This need could be met by encouraging patients to write down information, or a summary of their experience could be given out afterwards.

4.3 Atmosphere and physical room

It is pointed out that people in crisis could be more affected by external interventions than normally [1][3]. The ER can have a hectic and messy atmosphere because of the action that happens every day, and it is plausible to think that the waiting area and the treatment room should be designed in a way so that the visual and auditory stimuli are decreased. The psychiatrist points out that it can be argued that to see and hear other people that are in crisis makes matters worse for a person in crisis [1]. These external stressors should be removed if possible, and as a result the patient´s stress level could decrease [11].

Both being tired and stressed decreases the ability to be oriented in the physical room and designers have an opportunity to create an experience that makes it easier to orient in the room. This could for example be done by providing a map showing the ER area or through extensive, good signage to show where the ER is and where relevant facilities like toilets are.

4.4 Personal communication and comfort

There is a design possibility in designing for the extreme user so that service improvements for this target group, also benefit other users. One extreme target group in the case of the ER, would be older people that have a potential of developing delirium through their stay at the ER. Delirium is a temporary state of mental confusion which leads to hallucination, memory impairment [28], disorientation and feelings of fear, panic and apprehension [29]. Delirium is associated with increased mortality, worse physical state, increased length of hospital stays and greater hospital and nursing home costs [30]. For patients with delirium, we can see that the effects can be similar to the effects we have investigated for other users. We can assume that the actions that should be carried out towards delirium patients, could also help create safety and reduce the negative feelings of any patient. Actions that can help to reduce the possibility of developing delirium and improving the situation for people with delirium are; being present for the patient and communicating with them [28] and helping the patient becoming aware of time and space [29].

4.1 Information
4.1.1 Simple and easy
4.1.2 Expectation management
4.1.3 Different formats
4.2 Less resources for memory
4.3 Atmosphere and physical room
4.4 Personal communication and comfort

Table 2: Summary of suggested guidelines

5. DISCUSSION

The design guidelines provided in this article try to give a suggestion of how to design for the holistic patient experience. This article has presented possible ways to redesign the ER service so that the patient experience is improved. The most important findings are that designers have the possibility to both design a service to improve the patient satisfaction for a person in crisis and also to design a service to decrease the factors that create undesirable change in behavior.

Through the guidelines we see a possibility of designing a service to reduce the discussed factors. By giving an indicator of how much time the patient could expect to wait, we could manage to reduce the frustration and therefore the negative feelings. When patients feel more informed the feeling of coping could increase which could reduce the stress level. Another way to reduce stress level is to reduce external stressors.

Some design guidelines take a slightly different approach by accepting the presence of the crisis, and designing to improve the total experience. An example on this is the design guideline about giving comfort and personal communication to the patient. Through literature review, the interview with the psychiatrist and the empirical data from the ER project we have seen that information can be comforting for patients. The guidelines of 4.1.1 Simple and easy and 4.1.3 Different formats, focus on how we may provide information so that even the patients that have regressed to a lower functioning level can go through level 1 of the situational awareness theory and help the user to get to the level of understanding.

For the context of the unpredictable ER, there lays a possibility to increase patient satisfaction in designing a service which builds upon a good foundation of empathy. I see benefits for all stakeholders if everyone understands what is happening. This is a challenging possibility because we have seen that regression can make people more self-centered and that stress leads to tunneling, which make people less likely to help others. The possibility is in giving more information and creating a foundation of understanding towards the whole ER service. If there is an indicator showing the expected waiting time, the importance is in showing why the change has happened. For example, if the expected time suddenly doubled, the reason of why it changed should be given (for instance that there has been a severe traffic accident). By giving the patient more information, the patient gets an opportunity to understand the situation

better and this could make the service more empathic.

It can be discussed if the situation awareness theory is relevant for patients at the ER. Should a patient be more aware in their experience? Can we expect this from a patient that is injured or ill? The patient's personality and abilities and the level of seriousness of the injury/illness are within such a wide range at the ER that we can say that it will be relevant for some, but not for all. Some patients might be in such a big emotional crisis that the provided guidelines might not give any increase in patient satisfaction. In this article we have included an example of an extreme user; patients with delirium. They might be so severely affected by the experience that not many of the provided guidelines would be relevant. For example, giving information might still be important, but the designer would have to think differently in how information could be given to this group. When setting a target group this wide for a design project the users are so different that the chances are high that the service will not benefit everyone. Maybe not all patients need to be more aware in the ER experience, but the possibility of improving the total service experience is still there. For further studies it might be a possibility to divide the user group into several segments, so that it would be possible to go into greater detail of how to better design for different patients.

In the ER project the focus was on patients that were lowered prioritized and often with less serious illnesses or injuries. It could be discussed how much this group is affected by the event on a psychological level and how much they go through a regression. Through the initial research, we saw that feelings of great anxiety actually did arise even for patients with less serious illnesses or injuries. It is important to point out the differences between people and how they react to an event. I would conclude that all patients are affected in some level by some or all of the factors; negative feelings,

tiredness, stress, and being in pain, which do affect their human behavior in a varying degree.

The guidelines might also be relevant for other similar services where the users are in a state of crisis. I would like to point out that being conscious about the possibility of regression creates a better foundation for understanding the user in its context and therefore creates an opportunity to design a better service for people in crisis.

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