MASTER THESIS

IMPROVING SELF-TRIAGE ON OUT-OF-HOURS PRIMARY CARE CLINIC WEBSITES

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SUMMARY

Background: Currently, Dutch out-of-hours (OOH) primary care clinics are experiencing increasing work pressure. The increasing work pressure is because two third of the nonurgent patient contacts are unnecessary. To take some pressure of the OOH primary care clinic, Moet ik naar de dokter? (MINDD), invented a self-triage widget. With the self-triage widget, the patient can assess whether and when it is necessary to contact the general practitioner (GP) or OOH primary care clinics. The self-triage instrument consists of general questions and questions about the health problem of the user. After completing the self-triage, the patient gets a contact advice. This tells the patient whether it is necessary to contact the doctor and when they should do it. The purpose of this research is to investigate why users are non-adherent to the MINDD self-triage widget and what should be changed in order to increase the user-adherence. Website visitors who do not start the self-triage and users who stop the self-triage or do not follow the advice are considered non-adherent.

Method: Multiple designs were used in this research. Three surveys were conducted, log data was analysed, experts' opinion was obtained, and A/B tests were performed. The surveys gained information about the users' intention to follow the self-triage advice, reasons for not completing the self-triage and preferred designs for the self-triage. The brainstorming session with UX design experts focussed on how more people will start the self-triage, more users complete the self-triage, and more users follow the advice. A/B testing was used to see which colour attracts the most people to start the self-triage. Log data was collected to see where users stopped the self-triages. All data was collected from three different Dutch OOH primary care clinic websites and one survey was also distributed among the researcher's own network.

Results: 84% of the respondents had the intention to follow the advice. The top three reasons to stop the self-triage were; 29% the questions do not fit my health problem, 21% I can not clarify my health problem, and 19% I think my health problem is too urgent. 35% of the self-triages were not completed. 74% of the not completed self-triages were stopped during the general questions and clarifying the health problem. 26% stopped elsewhere in the triage flow. The most last seen question in the triage flow was a pain scale question. According to the UX design experts, a calming colour and more empathic text should be used. Besides, the safety of the widget should be mentioned, action buttons should be added, and questions need to be asked more clearly. A different calming colour as the background did not result in a significant difference. Reasons for choosing the preferred design were mostly, ease to use, clarity, personalized content, safety, authority and trust.

Conclusion: The purpose of this research was to investigate what should be changed to the MINDD self-triage widget, in order to increase the user-adherence. This research shows that only 22% of the OOH primary care clinic website visitors are adherent to the MINDD self-triage widget. Possible factors influencing the user-adherence are ease to use, clarity, personalized content, safety, authority and trust. To improve the MINDD self-triage widget the recommended changes should be made to the start of the self-triage, the self-triage flow and the self-triage advice, so the user-adherence will increase.

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1. INTRODUCTION

Out-of-hours (OOH) primary care clinics are experiencing increasing work pressure [1–6]. The OOH primary care clinic is implemented for urgent health problems if the general practitioner (GP) is not available. International studies show that at least 50% of the calls to the OOH primary care clinics are unnecessary and can wait until the next day [2,4–6]. A study conducted in the Netherlands shows that almost two third of the nonurgent patient contacts with the OOH primary care clinic were unnecessary, while the majority of these patients considered their health problem as urgent [5]. The high number of unnecessary calls is not the only reason the workload is high. OOH primary care clinics are also having difficulties filling vacancies for nurses which results in more work for the current nurses.

To take some pressure from the OOH primary care clinics and to help the patient to find the right care in the right place, a self-triage widget called "Moet ik naar de dokter?" (MINDD) is introduced in Dutch healthcare. Usually, when a patient contacts the OOH primary care clinic, a triage nurse determines the urgency of the health problem [7]. This is called triage. Self-triage is when the patient performs the triage on his own to determine the urgency of their health problem. MINDD is a tool patients can use to perform self-triage. With the MINDD self-triage tool, the patient can assess whether and when it is necessary to contact the GP or OOH primary care clinics [8–10]. MINDD aims to encourage self-care and reduce unnecessary healthcare consumption and is available on 75% of all Dutch OOH primary care clinic websites. The self-triage tool consists of general questions, such as age and gender, and questions about the health problem of the user. After the self-triage has been completed, a contact advice is given. This tells the patient whether it is necessary to contact the doctor and when they should do it. The self-triage is for patients of all ages and is mostly for use outside the GP's office hours. It helps people to take responsibility for their own health. This is necessary because two third of the patient contacts with the OOH primary care clinic are unnecessary [5]. MINDD is available in an application and a widget. The application can be downloaded by anyone, and the widget is only available on the OOH primary care clinic websites. Both consist of the same questions. The focus of this research only lies on the widget on OOH primary care clinic websites.

An earlier conducted study about the effectiveness of the self-triage widget shows that the MINDD widget can reduce the workload at the OOH primary care clinics [11]. It showed that offering MINDD on the OOH primary care clinic websites results in an average of 3,0% fewer contacts with the OOH primary care clinic. Moreover, the telephone triage time was half a minute shorter when the patient did the self-triage first. These effects and therefore the workload for triage nurses at OOH primary care clinics can be reduced even further when the use of MINDD will increase. Besides, if there is less contact with the OOH primary care clinic and the telephone time is shorter, not only the workload will be reduced, but the healthcare costs can also decrease [12].

On most OOH primary care clinic websites, approximately 25% of website visitors start the digital self-triage [13]. Of the people who start the self-triage, about 65% complete the triage and get a contact advice. Not every user follows this advice. About 25% of the users do not intend to follow the triage advice [11]. Although MINDD may have a positive influence now, this impact can be enhanced even more if more people start the self-triage, more users complete the self-triage and more users follow the advice.

When studying whether people use digital tools such as MINDD fully, the term adherence is often used. Adherence is mostly focused on measuring usage behaviour [14]. In this research adherence is defined as the extent to which

the user uses the technology as intended and if the behaviour of an individual corresponds to the agreed recommendations of the technology. Looking at the MINDD widget, website visitors who do not start the self-triage and users who stop the self-triage or do not follow the advice can be considered as non-adherent. The purpose of this research is to investigate why users are non-adherent to the MINDD self-triage widget and what should be changed in order to increase the user-adherence. To investigate this research purpose the following sub-questions (SQs) have been formulated:

1) *Do users intend to follow the self-triage advice?*
2) *What are the reasons users do or do not want to follow the self-triage advice?*
3) *Where in the triage flow do users stop the self-triage?*
4) *What are the reasons users stop the self-triage?*
5) *What is the preferred design for the begin screen of the self-triage widget?*
6) *What is the preferred design for the self-triage flow?*
7) *What is the preferred design for the self-triage advice?*

2. THEORETICAL FRAMEWORK

In this chapter OOH primary care clinics in the Netherlands and the MINDD self-triage widget are discussed. Besides, the Centre for eHealth Research roadmap is explained, which is used as a guideline for new technologies and improvement of existing technologies. In addition, the term adherence will be explained and operationalized, to make clear what adherence in this study means. Lastly, the importance of design in eHealth technologies will be explained and the willingness to follow a self-triage advice and other self-triage tool are discussed.

2.1 OUT-OF-HOURS PRIMARY CARE CLINICS IN THE NETHERLANDS

In the Netherlands, OOH primary care clinics are available outside working hours of the GP [7]. In 2021, the total cost of this type of care was €395 million, which was 0,3% of total healthcare costs. 107 OOH primary care clinics were operational in the Netherlands in that year. The number of unique patients averaged 17% of the population in the service area of the OOH primary care clinics. When a patient contacts the OOH primary care clinic, a triage nurse determines the urgency of the health problem. The triage nurse uses the Nederlandse Triage Standaard (NTS) as a guideline. The urgency categorisation consists of six categories:

- U0: Failure of vital functions. Resuscitation is needed.
- U1: Immediate life danger. The patient should be seen immediately.
- U2: Threat to vital functions or organ damage. The patient should be seen as soon as possible.
- U3: Real chance of harm. The patient should be seen within a few hours.
- U4: Negligible chance of harm. The patient should be seen within 24 hours.
- U5: No chance of harm. The patient should be seen the next business day or can apply self-care.

Figure 1 shows the distribution of triage consults, consults and visits divided by the urgency categories.
Triage consults are telephone consults performed by triage nurses. Consults are consults performed by doctors at the OOH primary care clinics. Visits are consults at the patient's house or where the patient is located.

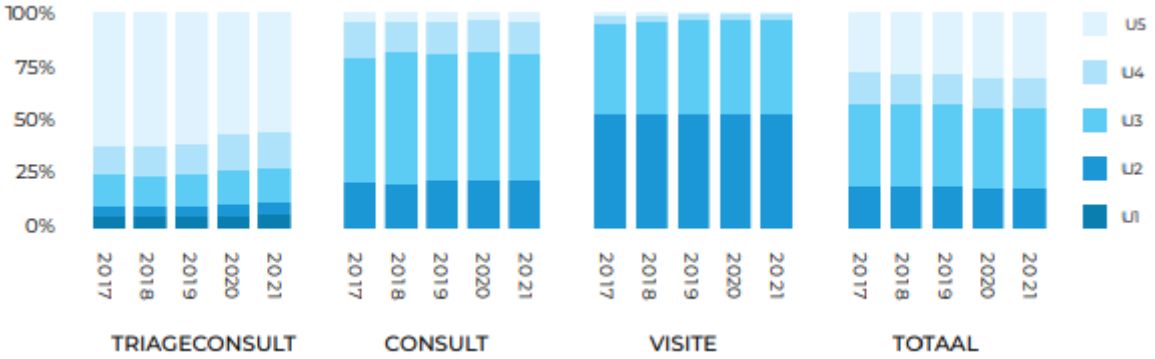

Figure 1: Urgency per action from 2017 to 2021 [7].

Figure 1 shows an increase in the percentage of high (U1 and U2) and medium (U3) urgent care in triage consults. At the same time, over 70% of the contacts with the triage nurse are low urgent questions (U4 and U5) [7]. In other words, triage nurses are mostly helping people with health problems that can wait until the next day. People mostly call the OOH primary care clinic because they are worried, but most people do not need a consult. The self-care advice that they receive from the triage nurse can also be given via digital resources such as MINDD.

Since 2021, OOH primary care clinics had difficulties with filling triage nurse vacancies [7]. Besides, in 2021 the average number of triage nurses decreased by 5% and of all the triage nurses 3% worked less than in 2020. Therefore, in 2021 was a higher outflow than inflow of triage nurses. The reason for this higher outflow can be the increased workload for triage nurses. The night shifts are hard, and the job tasks are not evenly divided since the triage nurses are mainly needed for telephone consults. Due to the outflow, OOH primary care clinics reported daily difficulty in providing enough staff compared to the demand for care. With the introduction of MINDD, the number of low urgent questions can be reduced, which will lower the workload of the triage nurses.

2.2 WHAT IS "MOET IK NAAR DE DOKTER"?

Normally, the triage nurse performs the triage via telephone or in real life, but the MINDD widget is used so patients can do the triage on their own. Figure 2 shows the start of the widget on an OOH primary care clinic website.

The widget can be found on the front page of the OOH primary care clinic websites, so patients see the widget directly when opening the OOH primary care clinic website. The MINDD widget is a self-triage device, which gives the patient a contact advice [8–10,15]. In appendix 1 an example of self-triage flow can be found. The self-triage starts with questions about the patient's gender and age. After these general questions, the patient needs to select the body area where the health problem is located and choose the main health problem. Then yes/no questions about the health problem will follow. In some cases, a pain scale is used. After the self-triage has been completed, a contact advice will be given. There are 7 types of advices:

1. Call 112 or your GP or OOH primary care clinic immediately
2. Call your GP or OOH primary care clinic immediately
3. Call your GP or OOH primary care clinic
4. Call the (on duty) dentist
5. Call the (on duty) obstetrician
6. Make an appointment with your GP
7. You do not need to see a doctor

Since the patient uses the MINDD widget to get an advice about their health problem, this advice must be safe and reliable. Therefore, the questions and advices of the self-triage widget are based on the NTS and made by a team of triage specialists [15]. In addition, MINDD has a CE-mark. This indicates that the widget is in line with European (safety) regulations and that the conformity and compliance procedures have been completed.

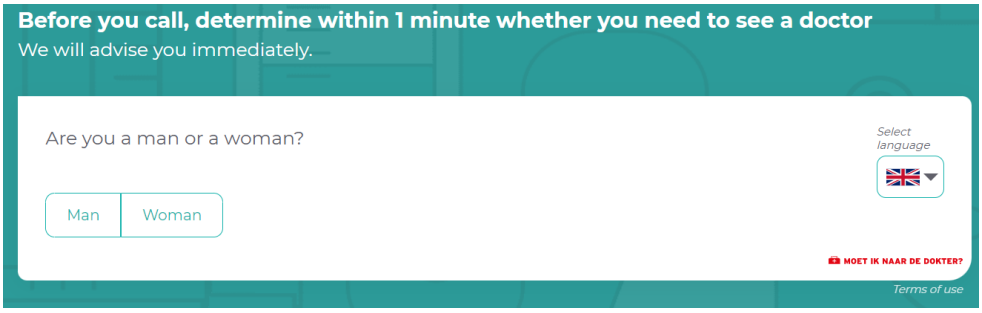

Figure 2: Start widget on OOH primary care clinic website[16].

A collaboration between the Scientific Centre for Quality of Healthcare (IQ healthcare) and Radboud UMC Nijmegen conducted three studies about the effect of the MINDD widget on OOH primary care clinic websites [10–12].

The first study aimed to get insight into the use and effect of the MINDD widget on OOH primary care clinic websites. The widget was alternately available every other week on the websites [10]. 79% of the users got the advice to call the emergency number or the OOH primary care clinic. 19% of the patients did call the OOH primary care clinic. According to the researchers, this difference could possibly be due to; patients contacting their own GP or the emergency number (this was not recorded in the study), patients performing multiple self-triages in a short period of time, patients being more confident in their own judgement, and/or the self-triage could not be linked to a contact because the self-triage health problem differed from the health problem in telephone triage. 92% of the patients did follow the advice to not call the OOH primary care clinic. However, this study did not show a difference in the number of telephone and physical contacts with the OOH primary care clinic, looking at all collaborating OOH primary care clinics. Although, a reduction in telephone contacts was seen at the OOH primary care clinic where the MINDD widget was used the most. According to the researchers, an explanation for this may be that the MINDD widget was not used enough on all collaborating OOH primary care clinic website, to see an effect in the number of contacts. Nevertheless, this study shows that the MINDD widget may reduce telephone contacts at the OOH primary care clinic if the MINDD widget is frequently used.

The second study was a second measurement, but with the same aim as the first study and a similar research design. 86% of the users got the advice to call the emergency number or the OOH primary care clinic. 34% of the patients did call the OOH primary care clinic. According to the researchers, this difference could possibly be due to the patient contacting their own GP or the emergency number or the patient did not see the need to contact the OOH primary care clinic. 83% of the patients did follow the advice to not call the OOH primary care clinic. The total number of contacts at the OOH primary care clinics was reduced by 3,0%. Besides, in 13 days a cost reduction of an average of 6 thousand euros per OOH primary care clinic was measured. The reduction in contacts was mainly seen in U4 and U5 advices, but also in U1 advices. This may be because in case of a U1 urgency, MINDD advices to call the emergency number or the OOH primary care clinic. So, maybe more users called the emergency number instead of the OOH primary care clinic. Besides the reduction in contacts, the duration of telephone triage decreased by 30 seconds. This may be due to those patients who can clarify their health problem after the self-triage, which allows the triage nurse to ask the right questions right away.

The third study was performed to gain more insight into the accuracy of the given advice of the MINDD widget, which shows that the sensitivity is high, which means that MINDD is safe to use [12]. However, the specificity is low, which means that MINDD can be more efficient. Besides, this study also looked at the intention to follow the self-triage advice. The intention was asked right after the advice was given, and all sorts of advices were taken into account. 76% of the users had the intention to follow the given advice, 8% did not have the intention and 16% did not know if they would follow the advice. The intention to follow the advice was higher when the advice was to contact the GP, OOH primary care clinic or ED (high/middle urgency). 51% of the users who did not have the intention to follow the advice thought the advice was not suitable for their health problem. Other reasons for not following the advice were mostly incompleteness or inappropriateness of the questions in the widget.

Besides these earlier conducted studies, MINDD allows their users to give feedback about the widget. This information gives insight is how users experience MINDD and possible improvements. In appendix 2 this feedback can be found. Mostly, people give feedback because they cannot clarify their health problem, the questions do not fit their health problem, the questions are not clear/specific, they cannot read the questions, or the widget does not work.

2.3 CEHRES ROADMAP

The Centre for eHealth Research roadmap (CeHRes Roadmap) is used as a guideline for a holistic development approach for eHealth [17]. CeHRes Roadmap can be used for new technologies, but also for the improvement of existing technologies, such as the MINDD widget[17]. The holistic development approach in eHealth sees technology, people and context as a whole. They are all interconnected and interdependent. This approach can help to achieve the goals of the eHealth technology and for successful adoption in healthcare. The CeHRes Roadmap combines multiple approaches so the eHealth technology can support the human needs and the intended context of the technology. As seen in figure 3 the CeHRes Roadmap has 5 stages: contextual inquiry, value specification, design, operationalization and summative evaluation. The stages can overlap and do not have to be completed to start the next stage. Therefore, this approach is more flexible than other approaches in the development of eHealth. Besides, each stage has a formative evaluation, which means that each stage is related to the stakeholder perspective, the context and the outcomes of previous stages.

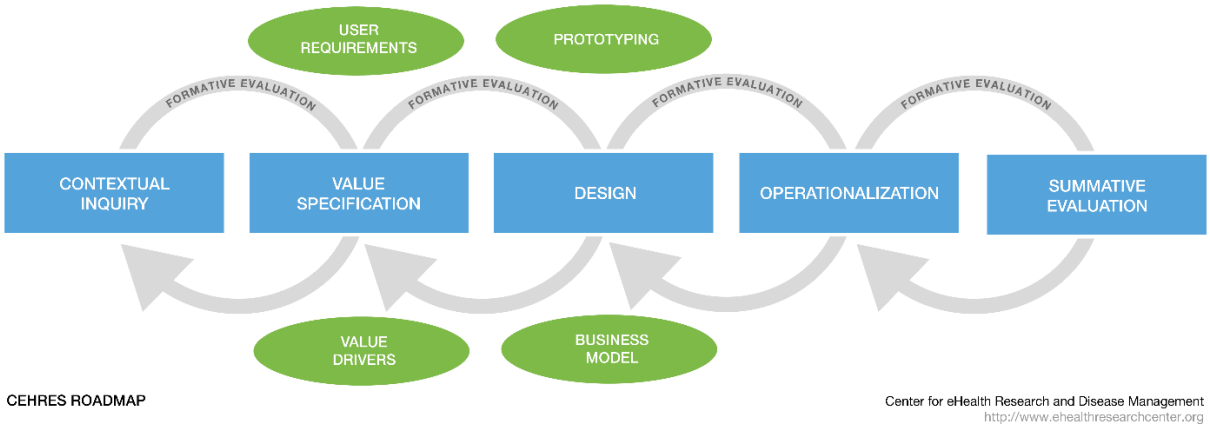

Figure 3: CeHRes Roadmap[17].

Each stage has a different purpose. The purpose of the contextual inquiry stage is to get more insight into the prospective users, relevant stakeholders and their environment [17]. Stakeholders should be included at all stages of eHealth development. Therefore, one of the first tasks is stakeholder identification. Of all the stakeholders, the relevant stakeholders are chosen. For example, the most relevant stakeholders of the MINDD widget are; visitors of the OOH primary care websites, triage nurses, GPs subsidy providers and MINDD itself. After the stakeholder identification, the current situation, including its weak and strong aspects, must be explained. This is done to gain more insight into whether and how the eHealth technology can contribute to the current situation.

The results of the contextual inquiry stage are used in the value specification stage [17]. In this stage, the focus lies on the added value of the eHealth technology, the requirements of the context and determining the essential design

points. At the end of this stage, the requirements for the eHealth technology are made. Requirements are the points the technology should have to actually have added value.

The results of the contextual inquiry stage and the value specification stage are the base of the eHealth technology [17]. The design stage is the start of the development and during this stage, multiple prototypes are made. After the design stage, the first version of the technology is ready.

The first version of the eHealth technology is used in the operationalization stage [17]. In this stage, a plan is made to implement the technology into the context of the contextual inquiry stage. The plan consists of how to finance the implementation, all the resources that are needed for the implementation and all the activities that need to be performed for the implementation.

The last stage is the summative evaluation [17]. The evaluation focuses on how the eHealth technology influences the current situation described in the contextual inquiry stage, the use of the technology, what the stakeholders think about the technology and if the added value is achieved. Multiple methods are needed to get the best overview of how the technology is used and how it influences healthcare. Which methods are used, depends on the goal of the evaluation. The goal depends on the technology, context, stakeholders and added value. The summative evaluation focuses on the impact and the uptake of the technology. The impact of the technology stands for the added value. The uptake of the technology stands for how the stakeholders use the technology. For the evaluation, different research questions are made for both the impact and uptake. The result of the summative evaluation depends on the goal of the evaluation and the research questions. The results can be used to change the technology, to make it a better fit for the users.

As mentioned before, each stage has a formative evaluation [17]. During the formative evaluation, information is gained on how the process can be improved. This information ensures the focus on the context and stakeholders and is performed at the end of each stage and during each development stage. Evaluation at the end of the stage ensures that outcomes of previous stages are not forgotten and evaluation during the stage ensures a fit between the development stages, context and stakeholders.

In this study, the summative evaluation stage is used. The seven SQs are based on this stage and focussed on the uptake of the technology. Besides, the SQs are focused on improving the MINDD widget's design according to the visitors of the OOH primary care websites.

2.4 ADHERENCE

Adherence in eHealth is mostly focused on measuring usage behaviour [14]. In literature, the definition of adherence is not the same. According to the World Health Organization (WHO), adherence means "the extent to which a person's behaviour - taking medication, following a diet, and/or executing lifestyle changes, corresponds with agreed recommendations from a health care provider" [18]. This definition is not easily adaptable for web interventions offered through free access sites or self-help interventions, such as the MINDD self-triage. Therefore, Donkin et al defines adherence as "the degree to which the user followed the program as it was designed" [19]. In this research a combination of these definitions is used to define adherence: the extent to which; the user uses the technology as intended and the behaviour of an individual corresponds to the agreed recommendations of the

technology. Looking at the MINDD widget, website visitors who do not start the self-triage and users who stop the self-triage or do not follow the advice are therefore non-adherent. So, if more website visitors start the self-triage, fewer users stop the self-triage and more users follow the advice the adherence to the MINDD widget will increase. In eHealth, adherence is important for a good adoption of the technology [14]. In eHealth evaluations, the results are often not as good as expected [14,20–24]. The results are often less positive than expected and the eHealth technologies have therefore less impact. Frequently, this is because users do not use the eHealth technology as intended [14]. Not all users use a technology exactly like it is supposed to and some users do not use the technology at all. Those users are therefore non-adherent to the technology. Therefore, changing factors that influence adherence can help the technology to have more positive effects [25]. In a systematic review conducted to investigate which characteristics are linked to better adherence shows that the frequency of interaction and intended usage, the ability to give feedback and proper communication between the technology and the user result in a better adherence. Besides, the design of the technology can influence adherence and reminders can positively influence adherence [26]. Moreover, gender, treatment expectancy, personalised content and guidance influence adherence [27,28]. Hence, it is important when (re)designing eHealth technologies to keep the factors influencing adherence in mind.

2.5 DESIGN EHEALTH TECHNOLOGIES

Design is very important for eHealth technologies and the adherence, such as the MINDD widget [29,30]. The first impression is important for the usage of the eHealth technology [29]. A first impression is made very quickly, multiple studies show that the first 50 milliseconds are crucial [31]. In those 50 milliseconds, the user gets a positive or negative idea about the technology, which will be held consistently over time.

Besides the first impression, one of the most important things about design is the use of colour [32,33]. Especially in marketing, colour psychology is used. Knowledge about colour can help developers to increase the adherence to the technology and therefore the effectiveness. Colours evoke moods and emotions, which influence the perception and behaviour of people. Bright colours are frequently used to attract people, however, they should not be overused since they may confuse or annoy the user. Besides, to get someone's attention on a website the colours should have contrast. If something needs to stand out from everything else a bright colour with contrast to the background and the rest of the website should be used.

Besides colour, images are also very important [29]. Images attract attention and activate the brain. Especially, images of faces, humans and human bodies. The use of image and text convey information better than text alone. A good combination of images and text can increase the ease of use and should be used in eHealth technologies. A study among people in generation Y (born in 1980-1990) shows that a large main picture, search feature, images of celebrities, and little text are visually appealing for this generation [34].

The Persuasive System Design (PSD) model can help developers with the design and functions of eHealth technologies [35]. This model defines persuasive functions for eHealth technologies. Persuasive functions are functions designed to change attitudes or behaviour. The model consists of the following categories: primary task, dialogue, credibility and social support. Primary task support helps the user in performing the primary task of the

eHealth technology. Dialogue support helps the user achieve their goal by providing feedback and improving communication between the technology and the user. System credibility support helps to design a system that is more credible and thus persuasive. Social support motivates the users by using social influence. Each category consists of multiple principles for the design and functions of eHealth technology. For primary task support, the design principles are reduction, tunnelling, tailoring, personalisation, self-monitoring, simulation and repetition. For dialogue support, the principles are praise, rewards, reminders, suggestion, likeness, liking and social role. For credibility support, the principles are reliability, expertise, superficial credibility, sense of reality, authority, third-party affirmation and verifiability. For social support, the principles are social facilitation, social comparison, normative influence, social learning, cooperation, competition and recognition. Using the PSD model during the development of improvement of eHealth technologies can increase the adherence and effectiveness.

2.6 FOLLOW EHEALTH ADVICE

There is minimal research available on the compliance of patients in digital triage [36]. However, in the found studies, 57–67,5% of the patients seemed to have the intention to follow the advice. Interestingly, patients were more motivated to seek primary care or self-management instructions after being advised to contact the emergency number or visit the ED mostly, because the patient found the advice inappropriate and unnecessary.

In a study about the MINDD widget patients were more willing to follow the advice when they needed to contact their GP during office hours (75%), got a self-care advice (67%), contact the OOH primary care clinic (61%) and wait-and-see instructions (56%) [9]. Parents with younger children, males and user satisfaction were patient characteristics which were related to the intention to follow the advice. Reasons to not follow the advice were; the patient could not clarify their health problem, had contact with a doctor before doing the self-triage and prefer their own judgement.

In eHealth in general therapeutic alliance is one of the predictors of adherence to the technology [37]. Therapeutic alliance in this context means the patient's agreement with the technology tasks and goals. Moreover, low health literacy has a negative impact on the efficacy and success of the technology.

2.7 SELF-TRIAGE TOOLS IN HEALTHCARE

MINDD is not the only self-triage tool used in healthcare. The first self-triage tool was introduced in 2009 [38]. This tool, named Strategy for Off-Site Rapid Triage (SORT), was designed for the H1N1 influenza pandemic. SORT consisted of static algorithms for clinicians and telephone call centres and two interactive websites for patients to self-assess their condition and need for treatment. However, the effect of SORT was not measured, because the tool did not save any data. A later conducted study did evaluate SORT for kids, which is SORT specified for children [39]. The parents/caregivers answered questions about their sick child. This evaluation concluded that SORT for kids results in over-triage of mildly and moderately ill children. Over-triage is overestimating the urgency of the health problem and therefore, more children went to the ED than necessary. The over-triage probably occurred more than expected because safety was the highest concern of the developers. The algorithm needed to avoid misclassifying high-risk cases, so they set sensitivity above specificity. This is a common issue in self-triage since

safety is important, but this may come at the expense of reducing the workload. However, SORT for kids works slightly differently from the MINDD widget. The MINDD widget advises to call the OOH primary care clinic or the emergency number and SORT for kids advises to go to the emergency room right away. So, when using the MINDD widget a triage nurse always performs a triage and the patient will not visit the OOH primary care clinic unnecessarily.

In 2019, a new pandemic occurred, the Covid-19 pandemic. During this pandemic, many self-triage tools were used to predict if someone had Covid-19 [40–45]. These self-triages were available as a web application or embedded in an already existing application. Some were also linked to the medical record, which gave the possibility to book appointments with their GP right away. All had the goal to reduce the workload in the hospitals, give reliable advice while keeping social distance and patients did not visit the hospital unnecessarily. Not all studies evaluated the effect of their self-triage tool or could give a reliable conclusion, but a symptom checker with self-triage and self-scheduling led to more efficiency and cost savings [46]. Online self-triage combined with self-scheduling helps patients to be fast and efficiently assigned to the right level of care, without the use of triage nurses. If the patients' answers to the self-triage questions can be integrated into the medical record, the self-triage combined with self-scheduling can be even more effective.

Also, MINDD made a self-triage tool only for Covid-19 next to the original self-triage widget. This Covid-19 version of MINDD was based on the MINDD widget. In a study among 11 Covid-19 self-triage tools used in the Netherlands, the MINDD app was best rated, together with two other applications [6]. MINDD scored the highest score possible on 'healthy & safe', 'secure data' and 'robust build'. Only on the point 'easy to use' were improvements needed. Easy to use was measured by the accessibility and usability of the app. Mostly the usability could be improved. The tool scored less well on the following points: "Is the health app design based on an explicit understanding of users, tasks and environment?", "Are intended users involved throughout design and development of the health app?", "Is the design of the health app driven and refined by user-centred evaluation?" and "Are measures in place to avoid user error and reasonably foreseeable misuse of the health app?". Therefore, improvements may be necessary for the usability of the MINDD widget and especially in user-centred design and development.

Self-triage is also used at the ED. Since the ED is often very crowded, self-triage is used to improve the triage at the ED [47]. In the ED of the Rotterdam Eye Hospital, a self-triage tool named ISET was developed to lower the workload and give patients an urgency level quickly. First, the ISET was on pen-and-paper, but later a computer-assisted ISET (ca-ISET) was developed [48]. This is a touch operated software application, which gives a patient an urgency level based on a maximum of 24 questions. The triage is performed at the ED.

In Belgium, a similar application to MINDD was developed. It is a French-language mobile app called ODISSEE (Outil Décisionnel et Informatif des Structures de Soins Efficientes Existantes) which is based on triage protocols for OOH primary care clinics [49]. The application is not yet implemented and is still a prototype. The application has 18 images that correspond to the most frequent conditions in unscheduled care settings. Figure 4 shows some of these images. The patients choose which image correspondents most with their health problem to start the self-triage. Depending on which image the patient chooses, they are directed to an algorithmic flowchart. When completing the self-triage, the patient will receive an advice of referral. The advice has two levels of care: (1)

"Emergency Departments" and (2) "Primary Care Services". In those two levels, four different urgency levels are given; (1)" Emergency Medical Services", (2) "Emergency Department Referred Consultation", (3) "Primary Care Physician Immediate Visit", and (4) "Primary Care Physician Delayed Visit". An early conducted study compared MINDD to ODISSEE, which concluded a lower sensitivity but slightly higher performant specificity for MINDD [49]. However, the data of MINDD is based on real-life data and ODISSEE's data on simulated clinical case scenarios. Further research about ODISSEE is currently not performed.

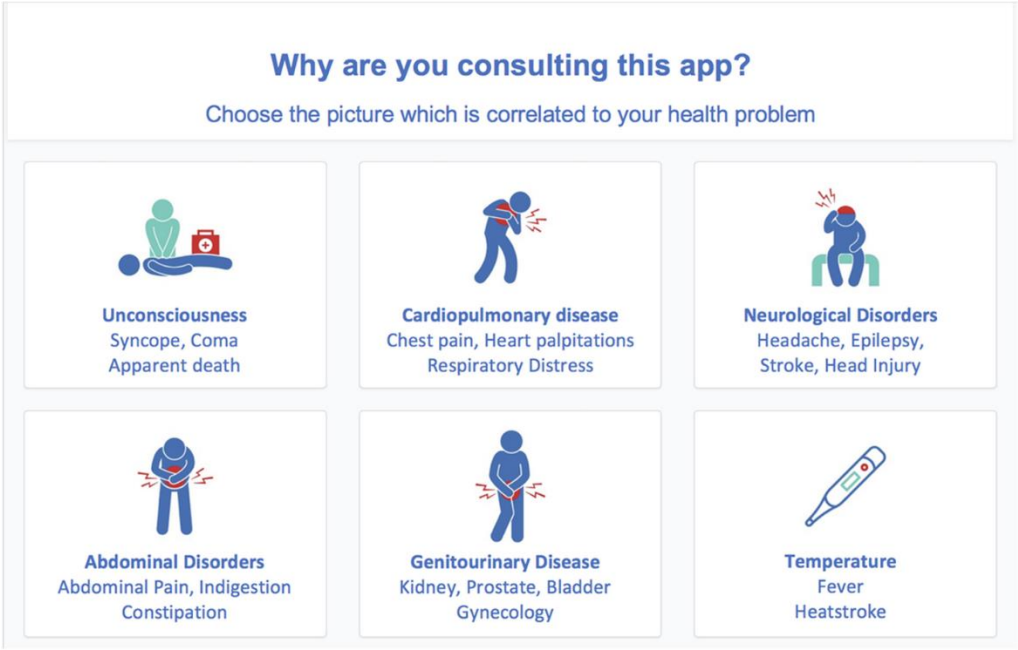

Figure 4: Presentation of the different pictures of the ODISSEE platform related to the most frequent pathologies encountered in unscheduled care settings [49]

3. METHOD

3.1 RESEARCH DESIGN

This study aims to get insight into how the MINDD widget can be improved to increase the user-adherence. For this research, a mixed method was used. The SQs in this research are:

1) *Do users intend to follow the self-triage advice?*
2) *What are the reasons users do or do not want to follow the self-triage advice?*
3) *Where in the triage flow do users stop the self-triage?*
4) *What are the reasons users stop the self-triage?*
5) *What is the preferred design for the begin screen of the self-triage widget?*
6) *What is the preferred design for the self-triage flow?*
7) *What is the preferred design for the self-triage advice?*

For the SQs data from three different surveys was used. Besides for SQ3 log data was used and for SQ5 A/B tests were performed. All data was collected from three different OOH primary care clinic websites: 'Huisartsenposten Amsterdam', 'Spoedzorg Huisartsen Twente' and 'Huisartsenpost Westland'. The survey of SQ5, SQ6 and SQ7 was also distributed among the researcher's own network.

3.2 RESEARCH POPULATION

The SQs were divided into three research populations. SQ1 and SQ2 are focused on the intention to follow the advice and the reasons to follow or not follow the advice. Therefore, the research population for SQ1 and SQ2 were the users of the MINDD widget on the three different OOH primary care clinic websites who finished the self-triage. SQ3 and SQ4 are focused on where in the self-triage flow users stop the self-triage and why they do not finish the self-triage. Therefore, the research population for SQ3 and SQ4 were the users of the MINDD widget on the three different OOH primary care clinic websites who did not finish the self-triage.

SQ5, SQ6 and SQ7 are focused on how the design can be improved. Therefore, the research population for SQ5, SQ6 and SQ7 were the visitors of the three different OOH primary care clinic websites and the network of the researcher, which is the general population.

3.3 MATERIALS

3.3.1 Surveys

For SQ1 and SQ2 a survey was conducted. At the end of the self-triage, after the advice, a survey was added. The survey consisted of three questions. In figure 5 the survey flow is displayed, with the questions and the answer options. The answer options were based on an earlier conducted study about the effect of MINDD [11]. The data was collected from 10 to 23 November. In addition to the answers to the questions, demographic data was collected. The demographic data consisted of; gender, age, health problem, urgency level and which OOH primary care clinic website was used. Respondents who did not complete the survey were excluded because these respondents did not answer any questions or did not fill in the other reason.

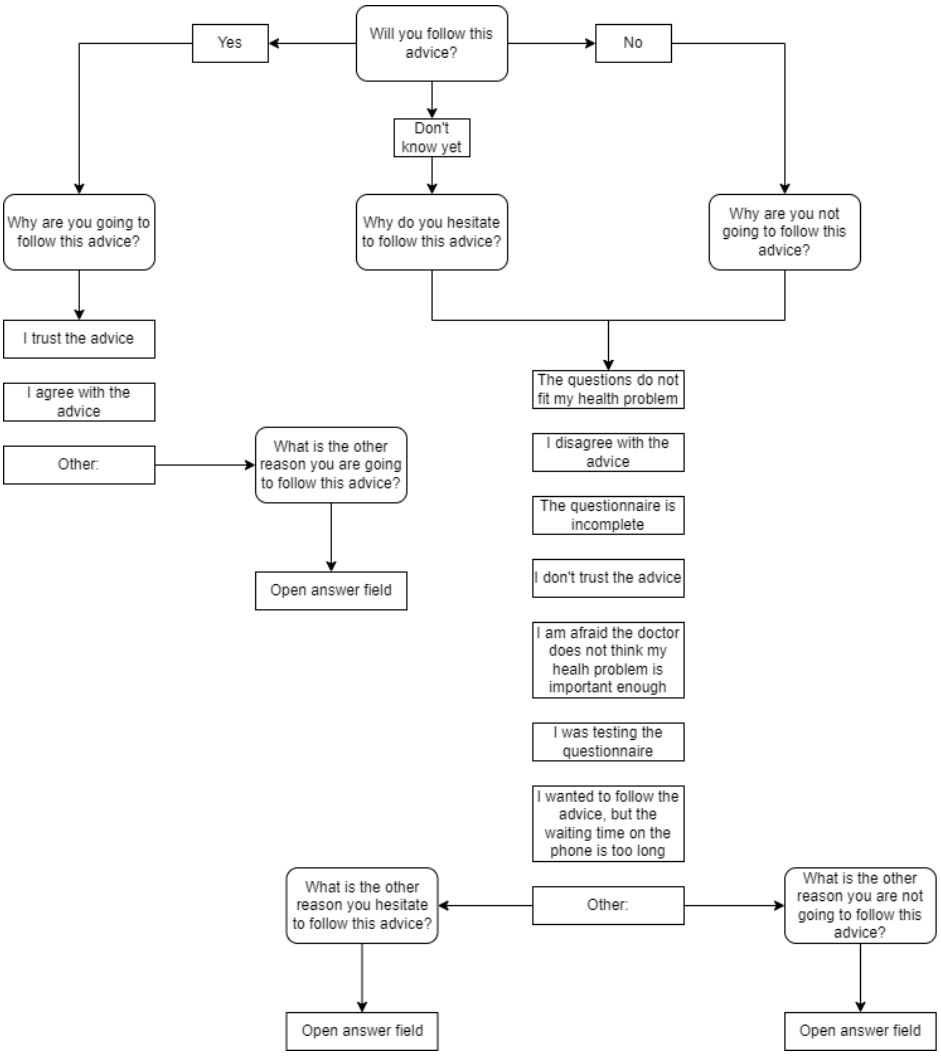

Figure 5: Survey flow SQ1

A survey was also conducted for SQ2. This survey gives insight into why users stop the self-triage. When the user closed the self-triage, a pop-up appeared on the user's screen. The pop-up was the survey and consisted of two questions. In figure 6 the survey flow is displayed, with the questions and the answer options. The answer options were based on feedback which was already given. All users of MINDD can give feedback about the self-triage and the questions. So, the answer possibilities were based on already existing data. The feedback data can be found in Appendix 2. The data was collected from 24 November to 19 December. In addition to the answers to the questions, demographic data was collected. The demographic data only consisted of which OOH primary care website was used. Respondents who did not complete the survey were excluded because these respondents did not answer any question or did not fill in the other reason.

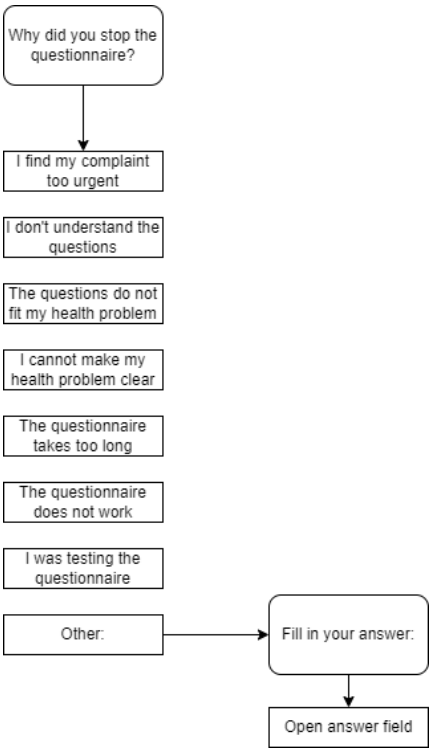

Figure 6: Survey flow SQ2

For SQ5, SQ6 and SQ7 a survey was used. The survey consisted of designs of multiple ways on how the self-triage can be improved. Literature, other self-triage tools and symptom checkers (see Appendix 3), the opinion of UX design experts (see chapter results) and the results of SQ1, SQ2, SQ3 and SQ4 were used to make the designs. The survey consisted of possible ways to visualize the widget. The original visualization was also shown. This was done to compare the results with the original visualization. The survey had 7 questions with for every question the possibility to explain the answer. The first question displayed the start question of the self-triages, with five answer possibilities; (1) original gender question, (2) start button, (3) search bar, (4) body area and (5) birthdate. The second question displayed possible ways to ask for the user's age, with four answer possibilities: (1) the original birthdate, (2) age category, (3) age in numbers and (4) birth year. The third question displayed the order of the questions, with four answer possibilities; (1) the original: gender, birthdate, body area, health problem, (2) gender, body area, health problem, birthdate, (3) body area, health problem, gender, birthdate and (4) body area, health problem, birthdate, gender. The fourth question displayed possible ways to ask the health problem, with three answer possibilities; (1) the original health problem list, (2) the health problem list with an extra button if the health problem is not stated in the list and (3) a search bar. The fifth question displayed multiple photos above the advice, with three answer possibilities: (1) the original bell, (2) a photo of a doctor and (3) the logo of the OOH primary care clinic. The sixth question displayed possible ways of the advice text, with three answer possibilities; (1) the original text, (2) the original text with extra mentioning that the advice is based on medical guidelines and (3) the original text with extra mentioning that the advice is made together with GP's and triage nurses. The seventh question displayed possible ways of the advice, with two answer possibilities: (1) the original advice and (2) the original advice with a call button. In Appendix 4, the different designs are displayed. The respondents were asked to fill in which picture attracted them the most. The data was collected from 20 January to 7 February via the OOH primary

clinic websites and the researcher's network. The researcher's network was approached via social media. There were no exclusion criteria.

3.3.2 Log data

Besides the surveys, log data was used to answer SQ3. The log data showed where users stop the self-triage. This log data gives more insight into whether some questions have more dropouts than others and if there is a pattern visible. The data was collected from 24 November till 19 December.

3.3.3 Open brainstorm session UX experts

Together with three UX designers an open brainstorming session was held on 23 December 2022. In this brainstorming, session the UX designers were free to give their opinion. There were three main topics during the session; how more people will start the self-triage, more users complete the self-triage, and more users follow the advice. The UX experts were contacted via the researcher's network. They all had different working experiences in UX design and were all working in different work fields. Their current positions were designer & UX/full stack developer at a software development consultancy bureau, creative director at a communication bureau, and experience lead at an advisory bureau focused on customer insights and experiences. They were selected to get a broad perspective on UX design in different work fields, as MINDD targets everyone with a health problem. Before the brainstorming session, the experts received information about the widget and what it currently looks like. During the session, the purpose, target group and origin of the widget were explained further. Furthermore, the purpose of the brainstorming session was discussed. The aim was to identify what should be changed to the widget so more people start the self-triage, complete the self-triage and follow the advice. For this, the experts and the researcher conducted a customer analysis, to get the customer problems clear. Then there was an open brainstorming session based on the goal and customer problems. Finally, the ideas were clustered and prioritised, from which improvement recommendations followed.

3.3.4 A/B test

Besides the surveys and the log data, A/B tests were performed to answer SQ5. A/B testing is used to see which colour attracts the most people to start the self-triage. The current background colour for the widget is green. The colours being tested were; light blue, dark blue and grey since these are calming colours. On the website of 'Huisartsenposten Amsterdam', grey (HEX: 696969) is tested, on 'Spoedzorg Huisartsen Twente' dark blue (HEX: 00008B) and on 'Huisartsenpost Westland' light blue (HEX: 89CFF0). The data was collected from 23 January to February.

3.4 DATA ANALYSES

3.4.1 Surveys

For the surveys of SQ1, SQ2 and SQ4 descriptive statistics were used. To see if there is an association between the intention to follow the advice and gender, age category and urgency level a Chi-Square test was performed with an alpha of 0,05 and a Cremer's V. The Chi-Square test calculates if the difference between the expected

count and the actual count is significant. Cramer's V indicates how strongly the variables are associated. For the survey of SQ5, SQ6 and SQ7 descriptive statistics are used.

3.4.2 Log data

For the log data, visualizations were made and descriptive statistics were used. To see if there was an association between not completed self-triages and the age category a Chi-Square test was performed with an alpha of 0,05 and a Cremer's V.

3.4.3 Open brainstorm session UX experts

A summary of the session was made.

3.4.4 A/B test

For each test, the conversion rate per day was calculated and a trendline was made. The conversion rate is the percentage of website visitors who start the self-triage. In addition, the average conversion rate was given. To see if the differences between the original colour and the test colour were significant a Wilcoxon Signed-Rank Test was performed with an alpha of 0,05.

4. RESULTS

4.1 SURVEY SQ1 AND SQ2

In total 1126 users started the survey at the end of the self-triage. 222 users were excluded because they did not complete the survey. In total 904 users were included in this research.

In table 1 the data of the respondents are represented. The demographic data: gender, age and OOH primary care clinic are displayed. Besides, the urgency and the answer to the first question “Will you follow this advice?” is shown. From now on called “intention to follow” Of the 904 respondents 530 (58,6%) did the self-triage for a female. 17,5% of the respondents did the self-triage for someone who is 0-5 years old, 11,0% for someone who is 6-17 years old, 62,8% for someone who is 18-64 years old and 8,7% for someone who is 65+.

In the period 10 to 23 November, Huisartsenposten Amsterdam had 9.307 website visitors of which 2.295 (24,7%) completed the self-triage. Of those 2.295 visitors, 725 (31,6%) completed the survey. Spoedzorg Huisartsen Twente had 3.362 website visitors of which 557 (16,6%) completed the self-triage. Of those 557 visitors, 90 (16,2%) completed the survey. Huisartsenpost Westland had 1.084 website visitors of which 223 (20,6%) completed the self-triage. Of those 223 visitors, 89 (39,9%) completed the survey.

Many respondents got a high or middle urgency advice. 142 (15,7%) got U1 advice, 336 (37,2%) an U2 and 315 (34,8%) an U3. Fewer respondents got a low urgency advice. 65 (7,2%) got an U4 advice and 37 (4,1%) an U5. For 9 (1,0%) respondents the data was missing. In total 793 (87,7%) respondents got a high or middle urgency advice (U1, U2 & U3) and 102 (11,3%) had a low urgency (U4 & U5). Yearly, approximately 20% is low urgent. So, the results of this survey have less low urgency advice than normal.

The intention to follow is shown at the end of table 1. 761 (84,2%) respondents intended to follow the given self-triage advice. 61 respondents (6,7%) did not have the intention to follow the advice and 82 (9,1%) were unsure if they are going to follow the advice.

Table 1: Respondents' data

		N	%
Gender	Female	530	58,6%
	Male	374	41,4%
Age	0-5	158	17,5%
	6-17	99	11,0%
	18-64	568	62,8%
	65+	79	8,7%
OOH primary care clinic	Amsterdam	725	80,2%
	Twente	90	10,0%
	Westland	89	9,8%
Urgency	Urgency level 1	142	15,7%
	Urgency level 2	336	37,2%
	Urgency level 3	315	34,8%
	Urgency level 4	65	7,2%
	Urgency level 5	37	4,1%
	Missing	9	1,0%
Intention to follow	Yes	761	84,2%
	No	61	6,7%
	Doubt	82	9,1%

Table 2 shows the distribution of the urgency level and the intention to follow the advice. Respondents who are going to follow the advice got mostly an U2 (34,0%) or an U3 (36,7) advice. 16% got an U1 advice, 6,3% U4 and 0,5% U5. Besides, 1,7% of the urgency levels were missing. Respondents who are not going to follow the advice got mostly an U2 (19,7%), an U3 (21,3%) or an U4 (18,0%) advice. 9,8% got an U1 advice and 3,3% U5. Besides, 27,9% of the urgency levels were missing. Respondents who are doubting to follow the advice got mostly an U2 (35,4%) or an U3 (28,0%) advice. 17,1% got an U1 advice, 7,3% U4 and 3,7% U5. Besides, 8,5% of the urgency levels were missing. As shown in the table, users with a higher urgency level were more likely to fill in the survey.

Table 2: Intention to follow versus urgency

Urgency		U1	U2	U3	U4	U5	Missing	Total
Intention to follow	Yes	122 (16,0%)	295 (34,0%)	279 (36,7%)	48 (6,3%)	4 (0,5%)	13 (1,7%)	761 (100%)
	No	6 (9,8%)	12 (19,7%)	13 (21,3%)	11 (18,0%)	2 (3,3%)	17 (27,9%)	61 (100%)
	Doubt	14 (17,1%)	29 (35,4%)	23 (28,0%)	6 (7,3%)	3 (3,7%)	7 (8,5%)	82 (100%)
Total		142	336	315	65	9	37	

Table 3 also shows the distribution of the urgency level and the intention to follow the advice. In U1 85,9% had the intention to follow the advice, 4,2% did not have the intention and 9,9% were unsure. In U2 87,8% had the intention to follow the advice, 3,6% did not have the intention and 8,6% were unsure. In U3 88,6% had the intention to follow the advice, 4,1% did not have the intention and 7,3% were unsure. In U4 73,8% had the intention to follow the advice, 16,9% did not have the intention and 9,2% were unsure. In U5 44,4% had the intention to follow the advice, 22,2% did not have the intention and 33,3% were unsure.

Table 3: Intention to follow versus urgency

Urgency		U1	U2	U3	U4	U5	Missing	Total
Intention to follow	Yes	122 (85,9%)	295 (87,8%)	279 (88,6%)	48 (73,8%)	4 (44,4%)	13 (35,1%)	761
	No	6 (4,2%)	12 (3,6%)	13 (4,1%)	11 (16,9%)	2 (22,2%)	17 (45,9%)	61
	Doubt	14 (9,9%)	29 (8,6%)	23 (7,3%)	6 (9,2%)	3 (33,3%)	7 (18,9%)	82
Total		142 (100%)	336 (100%)	315 (100%)	65 (100%)	9 (100%)	37 (100%)	

In table 4 the answers of the reasons to follow or not follow, are shown versus the intention to follow. Only one answer was allowed. 567 (74,5%) of the respondents who are going to follow the advice, do this because they trust the advice. 16 (26,2%) of the respondents who are not going to follow the advice, do this because the questions did not fit their health problem, 11 (18,0%) because they are scared their health problem is not urgent enough and 10 (16,4%) because they did not agree with the advice. 40 (48,8%) of the respondents who are doubting to follow the advice, do this because they are scared their health problem is not urgent enough, 17 (20,7%) because they found the self-triage incomplete and 11 (13,4%) because the questions did not fit their health problem. In total there were 22 other reasons, 10 (1,3%) respondents who are going to follow the advice, 7 (11,5%) respondents who are not going to follow the advice and 5 (6,1%) respondents who are doubting to follow the advice. The most given other reason for respondents who are going to follow the advice was an explanation of their health problem (5 (50,0%)). The most given other reason for respondents who are not going to follow the advice was because the GP was not available (5 (71,4%)). The most given other reason for respondents who are doubting to follow the advice was also because the GP was not available (2 (40,0%)). Most respondents who are scared their health problem is not urgent enough got a high or middle urgency advice. For all other answer options, the urgency level is rather evenly distributed.

Table 4: Reasons to follow or not follow versus intention to follow

Intention to follow		Yes	No	Doubt	Total
Reason to follow or not follow	I trust the advice	567 (74,5%)	0	0	567 (62,7%)
	I agree with the advice	184 (24,2%)	0	0	184 (20,4%)
	I am afraid the doctor does not think my health problem is important enough	0	11 (18,0%)	40 (48,8%)	51 (5,6%)
	The questions do not fit my health problem	0	16 (26,2%)	11 (13,4%)	27 (3,0%)
	The questionnaire is incomplete	0	7 (11,5%)	17 (20,7%)	24 (2,7%)
	I disagree with the advice	0	10 (16,4%)	2 (2,4%)	12 (1,3%)
	I wanted to follow the advice, but the waiting time on the phone is too long	0	4 (6,6%)	4 (4,9%)	8 (0,9%)
	I do not trust the advice	0	5 (8,2%)	0	5 (0,6%)
	I was testing the questionnaire	0	1 (1,6%)	3 (3,7%)	4 (0,4%)
	Other:	10 (1,3%)	7 (11,5%)	5 (6,1%)	22 (2,4%)
Total		761 (100%)	61 (100%)	82 (100%)	904 (100%)

In table 5, the urgency levels per most given reasons are displayed. As seen in table 5, trust is in every urgency level the reason to follow the advice. The reason for not following the advice at high urgency levels is that users are scared their health problem is not urgent enough. However, for low urgency levels, the reason is that the questions do not fit the health problem. The urgency levels for disagreeing with the advice are almost evenly divided.

Table 5: Urgency level versus reason to follow or not follow

	U1	U2	U3	U4	U5	Missing
Trust the advice	97 (68,3%)	227 (67,6%)	195 (61,9%)	34 (52,3%)	11 (29,7%)	3 (33,3%)
Scared their health problem is not urgent enough	12 (8,5%)	17 (5,1%)	15 (4,8%)	6 (9,2%)	1 (2,7%)	0
The questions do not fit the health problem	0	6 (1,8%)	5 (1,6%)	3 (4,6%)	12 (32,4%)	1 (11,1%)
Disagree with the advice	2 (1,4%)	2 (0,6%)	3 (1,0%)	1 (1,5%)	4 (10.8%)	0
Total of all answers	142	336	315	65	37	9

To see if there is an association between the intention of respondents to follow/not follow/doubting to follow the advice and gender, a Chi-Square test is performed with a Cramer's V. In table 6 the gender versus the intention of the respondents is shown. Besides, the expected count is shown. The expected count is what is expected to see if the variables are totally independent of each other. There is a weak relationship if Cramer's V is less than 0.10, a moderate relationship between 0.10 and 0.25 and a strong relationship greater than 0.25. As seen in table 6 if respondents are going/not going/doubting to follow the advice and gender are moderately associated. So, females are more likely to follow the advice.

Table 6: Count and expected count gender versus intention to follow

Intention to follow			Yes	No	Doubt	Total	P-value	Cramer's V
Gender	Male	Count	331 (43,5%)	17 (27,9%)	26 (31,7%)	374	0,010	0,101
		Expected count	314,8 (41,4%)	25,2 (41,3%)	33,9 (41,3%)	374,0		
	Female	Count	430 (56,5%)	44 (72,1%)	56 (68,3%)	530		
		Expected count	446,2 (58,6%)	35,8 (58,7%)	33,9 (41,3%)	530,0		
Total		Count	761	61	82	904		

In table 7 the age category versus the intention of the respondents is shown. As seen in table 7 if respondents are going/not going/doubting to follow the advice and age categories are not associated.

Table 7: Count and expected count age versus intention to follow

Intention to follow			Yes	No	Doubt	Total	P-value	Cramer's V
Age	0-5	Count	141 (18,5%)	8 (13,1%)	9 (11,0%)	158	0,230	0,067
		Expected count	133,0 (17,5%)	10,7 (17,5%)	14,3 (17,4%)	158,0		
	6-17	Count	82 (10,8%)	7 (11,5%)	10 (12,2%)	99		
		Expected count	83,3 (10,9%)	6,7 (10,9%)	9,0 (11,0%)	99,0		
	18-64	Count	466 (61,2%)	43 (70,5%)	59 (72,0%)	568		
		Expected count	478,2 (62,8%)	38,3 (62,8%)	51,5 (62,8%)	568,0		
	65+	Count	72 (9,5%)	3 (4,9%)	4 (4,9%)	79		
		Expected count	66,5 (8,7%)	5,3 (8,7%)	7,2 (8,8%)	79,0		
Total		Count	761	61	82	904		

In table 8 the urgency level versus the intention of the respondents is shown. As seen in table 8 if respondents are going/not going/doubting to follow the advice and the urgency level are strongly associated. Users with a high urgency level are more likely to follow the advice.

Table 8: Count and expected count urgency versus intention to follow

Intention to follow			Yes	No	Doubt	Total	P-value	Cramer's V
Urgency	U5	Count	13 (1,7%)	17 (27,9%)	7 (8,5%)	37	<0,001	0,271
		Expected count	31,1 (4,1%)	2,5 (4,1%)	3,4 (4,1%)	37,0		
	U4	Count	48 (6,3%)	11 (18,0%)	6 (7,3%)	65		
		Expected count	54,7 (7,2%)	4,4 (7,2%)	5,9 (7,2%)	65,0		
	U3	Count	279 (36,7%)	13 (21,3%)	23 (280%)	315		
		Expected count	265,2 (34,8%)	21,3 (34,9%)	28,6 (34,9%)	315,0		
	U2	Count	295 (38,8%)	12 (18,7%)	29 (35,4%)	336		
		Expected count	282,8 (37,2%)	22,7 (37,2%)	30,5 (37,2%)	336,0		
	U1	Count	122 (16,0%)	6 (9,8%)	14 (17,1%)	142		
		Expected count	119,5 (15,7%)	9,6 (15,7%)	12,9 (15,7%)	142,0		
	Missing	Count	4 (0,5%)	2 (3,3%)	3 (3,7%)	9		
		Expected count	7,6 (1,0%)	0,6 (1,0%)	0,8 (1,0%)	9,0		
Total		Count	761	61	82	904		

4.2 LOG DATA SQ3

In the period 24 November till 19 December, on the websites of 'Huisartsenposten Amsterdam', 'Spoedzorg Huisartsen Twente' and 'Huisartsenpost Westland' had 27.877 website visitors of which 11.345 (40,7%) triages were performed. 4.015 (35,4%) of the 11.345 triages were not completed. 2.959 (73,7%) of the 4.015 triages were stopped during the general questions and clarifying the health problem. Figure 7 shows how many users stopped without filling in their gender, their birthdate, the body area of their health problem and their health problem. These are the first four questions of the self-triage.

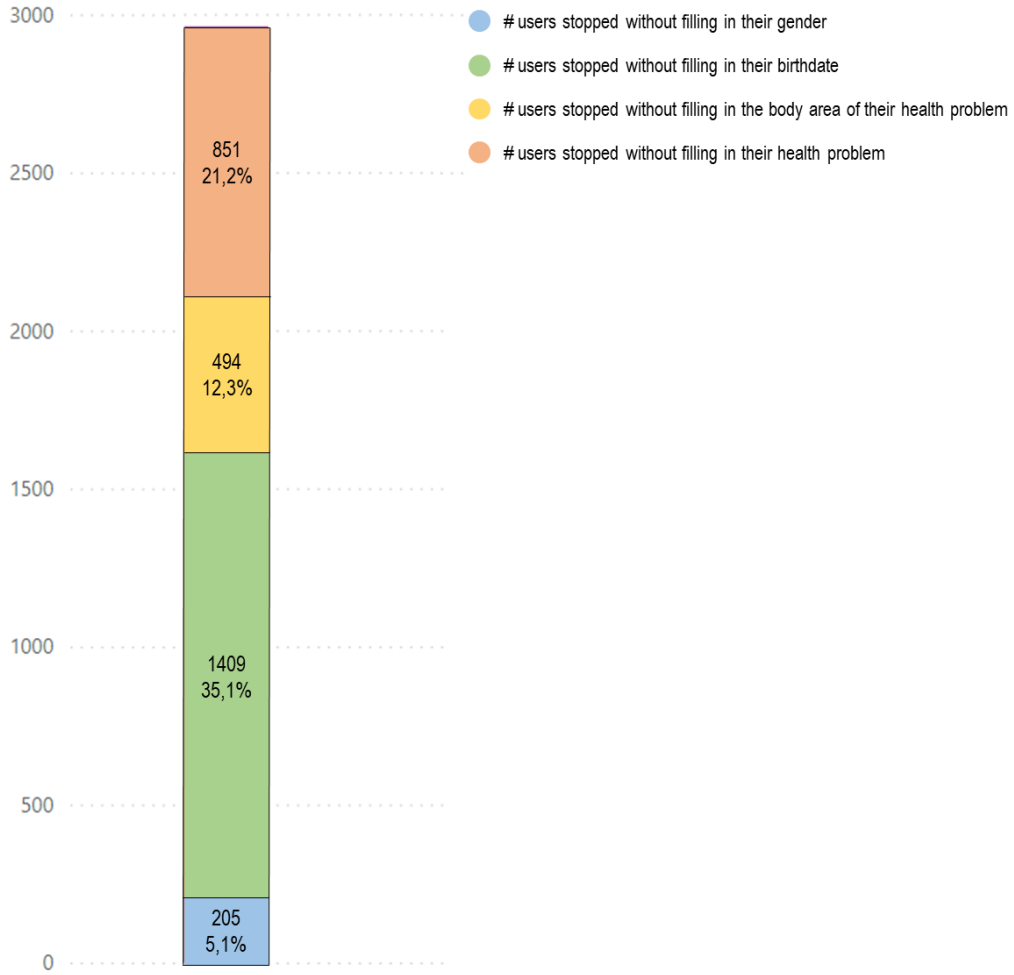

Figure 7: Number of users stopped during the general questions and clarifying the health problem

1.056 (26,3%) of the 4.015 not completed triages stopped during the questions about the health problem. Of those 1.056 triages, 524 (49,7%) triages stopped before answering the first triage question about the health problem. 532 (50,4%) triages stopped in the triage flow. The top last seen questions can be found in Appendix 5. All the top last seen questions are pain scale questions, such as how bad is the pain? 0 is no pain and 10 is the worst pain imaginable?.

Figure 8 shows the number of not completed triages per age category and gender. As seen in figure 8, in the age categories 0-5 and 6-17 the not completed triage are evenly divided among men and women (approximately 50%). In the age category 18-64 and 65+ more women (60,0% and 62,1%) not completed the self-triage. Furthermore, in

the no age category more women (48,2%) not completed the self-triage. Furthermore, in the age category 0-5, 1.588 triages were performed. 329 (20,7%) of those triages were not completed. In the age category 6-17, 879 triages were performed. 200 (22,8%) of those triages were not completed. In the age category 18-64, 6.493 triages were performed. 1.627 (25,1%) of those triages were not completed. In the age category 65+, 769 triages were performed. 243 (31,6%) of those triages were not completed. 1.616 not completed triages did not have an age category specification. As seen in table 9 not completed self-triages and the age category are weakly associated.

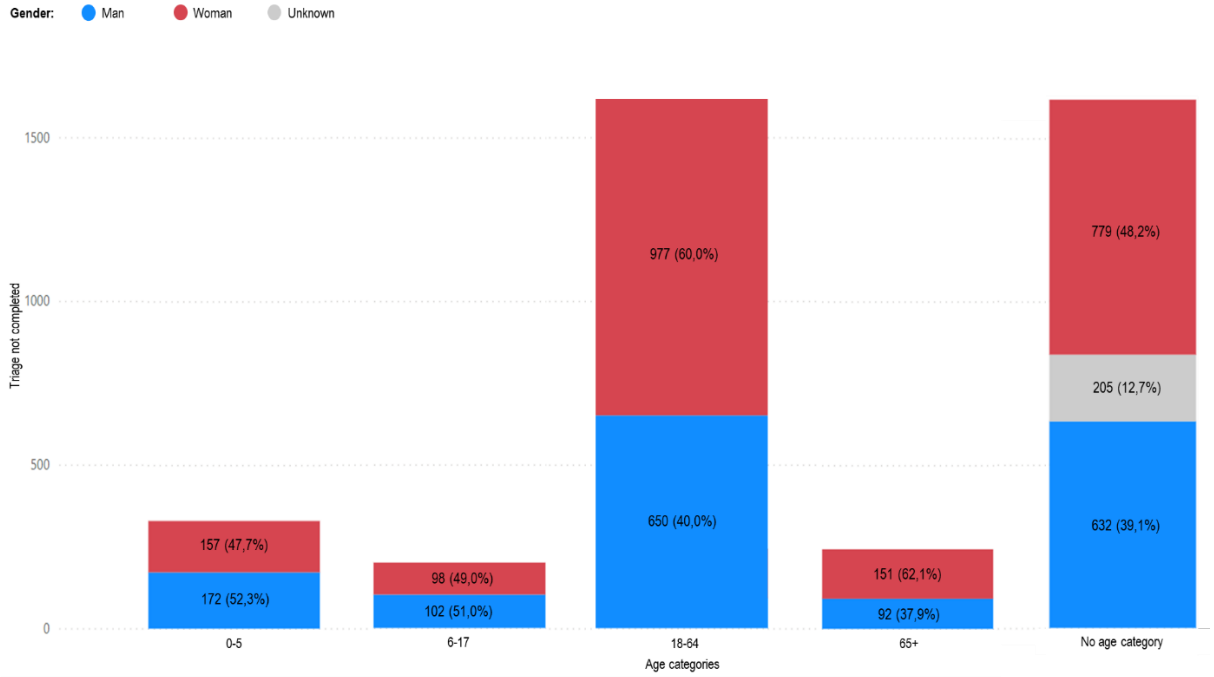

Figure 8: Number of not completed triages per age category and gender

Table 9: Count and expected count age versus completed self-triage

Completed self-triage			Yes	No	Total	P-value	Cramer's V
Age	0-5	Count	1259 (17,2 %)	329 (13,7%)	1588	< 0,001	< 0,001
		Expected count	1196,4 (16,3%)	391,6 (16,3%)	1588,0		
	6-17	Count	679 (9,3%)	200 (8,3%)	879		
		Expected count	662,3 (9,0%)	216,7 (9,0%)	879,0		
	18-64	Count	4866 (66,4%)	1627 (67,8%)	6493		
		Expected count	4891,9 (66,7%)	1601,1 (66,7%)	6493,0		
	65+	Count	526 (7,2%)	243 (10,1%)	769		
		Expected count	579,4 (7,9%)	189,6 (7,9%)	769,0		
Total		Count	7330	2399	9729		

4.3 SURVEY SQ4

The survey was conducted to answer SQ4: What are the reasons users stop the self-triage? Out of the 4.015 stopped self-triages a total of 198 users started the survey when they stopped the self-triage. 25 users were excluded, because they did not complete the survey. In total 173 users were included in this research, 115 of 'Huisartsenposten Amsterdam', 36 of 'Spoedzorg Huisartsen Twente' and 22 of 'Huisartsenpost Westland'. The respondents could select more than one answer option. So, the total given answers do not correspond with the number of respondents. In table 10 the results are shown. In total 181 answers were given. The top three most given answers were; 50 (28,9%) the questions do not fit my health problem, 36 (20,8%) I can not clarify my health problem, 32 (18,5%) I think my health problem is too urgent. 20 (11,6%) respondents answered other. The most given other reasons were; 10 (50,0%) the triage is for someone else, 5 (25,0%) the respondent wanted to make an appointment right away and 4 (20,0%) gave an explanation about their health problem.

Table 10: Answers why users stopped the self-triage

Why did you stop the questionnaire?	Frequency	Percentage
The questions do not fit my health problem	50	28,9%
I cannot make my health problem clear	36	20,8%
I find my complaint too urgent	32	18,5%
The questionnaire does not work	14	8,1%
I was testing the questionnaire	12	6,9%
The questionnaire takes too long	10	5,8%
I do not understand the questions	7	4,0%
Anders	20	11,6%
Total	181	100,0%

4.4 BRAINSTORM SESSION UX EXPERTS SQ5, SQ6 AND SQ7

A meeting with three UX experts was held on 23 December 2022. In this meeting, the experts gave their opinions on what should be changed about the MINDD widget. This mainly involved their opinions on how to better entice OOH primary care website visitors to start the self-triage, complete the self-triage and follow the triage advice.

Looking at enticing to start the self-triage, the experts thought that a calming colour should be used as background, such as green or blue. Besides, more empathic texts should be added to the starting text and the safety of the widget should be mentioned. This will make website visitors feel more secure and at ease with the widget, making them more likely to start the self-triage. They also gave multiple examples of how to improve the start question. Now, the start question is not inviting, nor does it give the user the feeling that he can quickly clarify his health problem. Therefore, the experts thought there should either be a start button or the option to fill in the health problem right away.

Looking at completing the self-triage, the experts thought the date of birth should be asked differently, as it is now too specific. For example, the age category can be asked instead. Besides, since the starting question should be different, they thought the whole question order should be different to improve the ease of use. Furthermore, they

considered it difficult to make a health problem clear. So, they preferred to see a search bar or something similar to make difficult/not specific complaints clear.

Looking at following the triage advice, the experts thought a picture of a GP/doctor could give the user a safer feeling. Besides, the advice should mention that the advice is based on medical guidelines and made together with GPs and triage nurses. Lastly, to encourage users to call their GP, the OOH primary care clinic or 112, there should be call buttons or other action buttons below the advice.

4.5 RESULTS A/B TEST SQ5

Figure 9 shows the conversion rate per day for the original green colour and the test colour grey with HEX code 696969. As seen in the figure there is no enormous difference, however, on most days the grey colour had a slightly higher conversion rate. Therefore, the average conversion rate is higher with the grey colour namely 35,46% versus 34,19% with the original green colour. However, this difference is not significant (p-value 0,234).

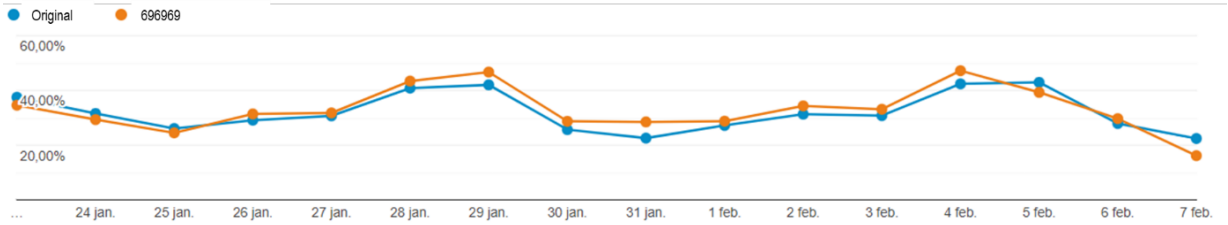

Figure 9: Conversion rate per day 'Huisartsenposten Amsterdam'

Figure 10 shows the conversion rate per day for the original green colour and the test colour dark blue with HEX code 00008B. As seen in the figure, the dark blue colour had a higher conversion rate on eight days, but the original colour had a better rate on six days. However, the differences are mostly bigger when the dark blue colour has a higher conversion rate. Therefore, the average conversion rate is higher with the dark blue colour namely 21,92% versus 21,40% with the original green colour. However, this difference is not significant (p-value 0,532).

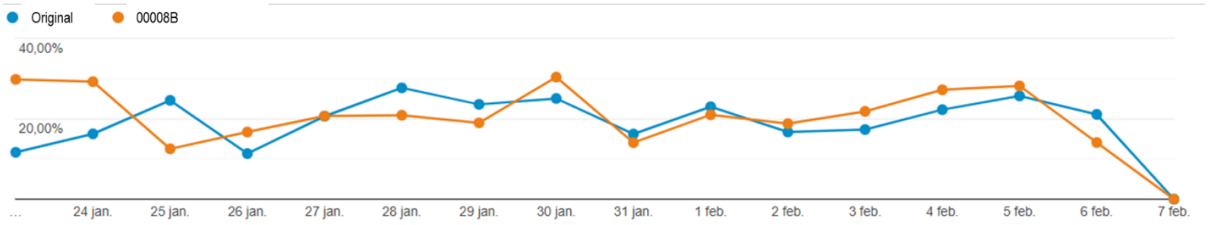

Figure 10: Conversion rate per day 'Spoedzorg Huisartsen Twente'

Figure 11 shows the conversion rate per day for the original green colour and the test colour light blue with HEX code 89CFF0. As seen in the figure, the light blue colour had a higher conversion rate on eight days, but the original colour had a better rate on six days. However, the differences are mostly bigger when the light blue colour has a higher conversion rate. Therefore, the average conversion rate is higher with the light blue colour namely 33,26% versus 31,88% with the original green colour. However, this difference is not significant (p-value 0,211).

Figure 11: Conversion rate per day 'Huisartsenpost Westland'

4.6 SURVEY SQ5, SQ6 AND SQ7

In total 235 people started the survey focused on the design of the MINDD widget. 62 respondents were excluded because they did not answer any question. In total 173 respondents were included in this research. Not every respondent answered all the questions. Therefore, there is some missing data. Of the 173 respondents, 162 (93,6%) were approached by the researcher, 5 (2,9%) via the website of 'Huisartsenposten Amsterdam', 4 (2,3%) via the website of 'Spoedzorg Huisartsen Twente' and 2 (1,2%) via the website of 'Huisartsenpost Westland'. Of the 173 respondents, 84 (48,6%) was woman, 58 (33,5) was man, 2 (1,2%) rather not say their gender and 29 (16,8%) did not fill in their gender. Of the 173 respondents, 86 (49,7%) had a bachelor's diploma or higher, 12 (6,9%) did higher education but did not have a diploma yet, 17 (9,8%) had vocational education, 21 (12,1%) had middle education, 4 (2,3%) had basic education, 4 (2,3%) rather not say their education level and 29 (16,8%) did not fill in their highest education level.

The survey consisted of 7 questions with designs. In this section, every question will be discussed, for each question the respondents had the option to clarify their answer. These clarifications are also discussed in this section. All the answer options can be found in Appendix 4. Table 11 shows the answers to question 1. The original question: gender was chosen 41 (23,7%) times, the start button 49 (28,3%) times and the search bar 45 (26,0%) times. According to the respondents, the gender question was chosen because, it is a low-key question, and the self-triage will start right away. The start button is chosen because, it is clear a questionnaire will be started, no personal data is asked as a start question, and it is more inviting to start the self-triage. The search bar is chosen because it is the fastest way to make the health problem clear and no personal data is asked as a start question.

Table 11: Answers question 1

1. Which questionnaire will you start first?	Frequency	Percentage
Answer option 1 (original: gender)	41	23,7%
Answer option 2 (start button)	49	28,3%
Answer option 3 (search bar)	45	26,0%
Answer option 4 (body area)	26	15,0%
Answer option 5 (birthdate)	12	6,9%
Total	173	100,0

Table 12 shows the answers to question 2. The original answer option: the birthdate was chosen 37 (21,4%) times. The most chosen answer was only giving up their age in numbers, namely 60 (34,7%). According to the respondents, only giving up their age was chosen because, it is easy, simple, fast and not too specific but with all information needed.

Table 12: Answers question 2

2. Which way of asking your age do you prefer?	Frequency	Percentage
Answer option 1 (original: birthdate)	37	21,4%
Answer option 2 (age category)	47	27,2%
Answer option 3 (age)	60	34,7%
Answer option 4 (birth year)	20	11,6%
Missing	9	5,2%
Total	173	100%

Table 13 shows the answers to question 3. The original order: gender, birthdate, body area and health problem was chosen mostly, namely 76 (43,9%) times. According to the respondents, this order was the most logical, and they liked that the questions were ordered from less specific to more specific.

Table 13: Answers question 3

3. Which order of questions do you prefer?	Frequency	Percentage
Answer option 1 (original: gender, birthdate, body area, health problem)	76	43,9%
Answer option 2 (gender, body area, health problem, birthdate)	12	6,9%
Answer option 3 (body area, health problem, gender, birthdate)	33	19,1%
Answer option 4 (body area, health problem, birthdate, gender)	26	15,0%
Missing	26	15,0%
Total	173	100,0%

Table 14 shows the answers to question 4. The original answer: the health problem list was chosen 13 (7,5%) times. The search bar was chosen mostly, namely 90 (52,0%) times. According to the respondents, the search bar was chosen because it is easy, the answer can be specific, and it is clearer than the other options.

Table 14: Answers question 4

4. Suppose you have pain in your calf, how would you best express this health problem?	Frequency	Percentage
Answer option 1 (original: health problem list)	13	7,5%
Answer option 2 (health problem list + button health problem is not listed)	53	30,6%
Answer option 3 (search bar)	90	52,0%
Missing	17	9,8%
Total	173	100,0%

Table 15 shows the answers to question 5. The original answer option with a bell was chosen 25 (14,5%) times. The answer option with a photo of a doctor was chosen 84 (48,6%) times. According to the respondents, the photo of the doctor was chosen because it gives more trust to the advice, and it is more personal.

Table 15: Answers question 5

5. Which advice would you follow up on first?	Frequency	Percentage
Answer option 1 (original: bell)	25	14,5%
Answer option 2 (photo doctor)	84	48,6%
Answer option 3 (photo logo OOH primary care clinic.)	45	26,0%
Missing	19	11,0%
Total	173	100,0%

Table 16 shows the answers to question 6. The original advice was chosen 52 (30,1%) times. According to the respondents, this advice was chosen because, it contains the least amount of text. The advice mentioning collaboration with GP and nurses was chosen by 65 (37,6%). According to the respondents, this advice was chosen because, it is more serious, gives more trust and is more personal.

Table 16: Answers question 6

6. Which advice would you follow up on first?	Frequency	Percentage
Answer option 1 (original)	52	30,1%
Answer option 2 (original + medical guidelines)	34	19,7%
Answer option 3 (original + together with GP & nurses)	65	37,6%
Missing	22	12,7%
Total	173	100,0%

Table 17 shows the answers to question 7. The original answer option was chosen 21 (12,1%) times and the answer option with the call button was chosen 129 (74,6%). According to the respondents, the advice with the call button was chosen because, it draws attention, is easy to use and it is clearer what the user should do.

Table 17: Answers question 7

7. Which advice would you follow up on first?	Frequency	Percentage
Answer option 1 (original)	21	12,1%
Answer option 2 (original + call button)	129	74,6%
Missing	23	13,3%
Total	173	100,0%

5. DISCUSSION

5.1 ANSWERS SUB-QUESTIONS

In this chapter, the SQs will be answered and important factors for adherence in self-triage tools are discussed. The purpose of this research was to investigate what should be changed to the MINDD self-triage widget, in order to increase the user-adherence. To investigate this research purpose the following SQs were formulated:

1) *Do users intend to follow the self-triage advice?*
2) *What are the reasons users do or do not want to follow the self-triage advice?*
3) *Where in the triage flow do users stop the self-triage?*
4) *What are the reasons users stop the self-triage?*
5) *What is the preferred design for the begin screen of the self-triage widget?*
6) *What is the preferred design for the self-triage flow?*
7) *What is the preferred design for the self-triage advice?*

In this section, the questions will be answered. To answer the SQ1; almost 85% respondents intended to follow the given self-triage advice. Compared with a previously conducted study about the effect of MINDD, the percentage of respondents who has the intention to follow the advice is in this study higher, namely almost 85% against 75% [11]. Interestingly, users with a higher urgency level were more willing to follow the advice. More than 85% of the users with a high urgency advice had the intention to follow the advice and almost 60% of the users with a low urgency advice had the intention to follow the advice. 40% of the users with a low urgency advice did not have the intention to follow the self-triage advice. Therefore, there are still a lot of unnecessary telephone consults at the OOH primary care clinic and the MINDD widget can increase in effectiveness.

To answer SQ2; trust was the most common reason to follow the advice at every urgency level. The reason to not follow the advice at high urgency levels is because users are scared their health problem is not urgent enough. In low urgency levels the reason to not follow the advice is because the questions do not fit to the health problem.

To answer SQ3; 35% self-triages were not completed. This corresponds with the yearly not completed self-triages, which is also 35% [13]. Of the not completed self-triages, almost 75% were stopped during the general questions and clarifying the health problem. Most users (35% of the 75%) stopped without filling in their birthdate. This could be because users do not want to share personal data online. Since the willingness to share personal identifiers in an online environment is approximately 40% lower than in a telephone environment [50].

The top last seen questions in the triage flow, were all pain scale questions, such as how bad is the pain? 0 is no pain and 10 is the worst pain imaginable?. The reason many people stop when seeing this kind of question may be because pain is difficult to indicate in numbers. Internal research of MINDD also shows that the pain scale question has the most issues [12,51]. Users are having trouble grading their pain online since pain is very complex and is related to personality and earlier pain experiences [12,51,52]. In addition, in pain assessment in telephone triage or real life, the triage nurse can interpret the patient's answers. Mostly, the patient grades their pain higher on the pain scale than the triage nurse. Using the pain scale online can therefore result in over-triage.

To answer SQ4, the most common reasons to stop the self-triage are; the questions do not fit to the health problem, the health problem can not be clarified, and the health problem is too urgent. This correspondent with earlier

conducted studies about the MINDD widget where users thought the questions were inappropriate to their health problem, they could not clarify their health problem or they preferred their own judgement [9,12].

To answer SQ5, according to the UX experts, a calming colour should be used for the background, empathic texts should be added to the start screen, the safety of the widget should be mentioned, and the start question needs to be changed. The UX experts thought this should attract more website visitors to start the self-triage because the self-triage will be more comforting and gives a safer feeling. Changing the background from the original green colour to blue or grey did not have any effect. This may be because green is a calming colour, just like blue and grey [53]. Therefore, green may not give a more comforting and safer feeling than blue or grey.

Looking at the start question, in the survey about the preferred designs, the original gender question, the start button and the search bar were chosen mostly. The reasons for the gender question were; it is a low-key question and the self-triage will start right away. The reasons for the start button were; clear a questionnaire will be started, no personal data as the start question, and more inviting. Reasons for the search bar were; fast, and no personal data as start question. The UX experts also did not recommend starting with a personal question.

To answer SQ6, according to the UX experts, the date of birth question should be changed, the question order should be changed and to specify the health problem a search bar should be added. Besides, the UX experts thought it was best to start with the health problem question since users get the feeling they are more heard. Looking at the birthdate question, most respondents preferred to only give up their age in numbers, because it is easy, simple, fast and not to specific but with all information needed. For the questions' order, most respondents preferred the original order; gender, birthdate, body area and health problem because it is the most logical, and the questions are ordered from less specific to more specific. To specify the health problem, most respondents preferred the search bar without a health problem list because, it is easy, specific, and clearer than the other options. However, the search bar was not tested in real life. The respondents preferred the design of the search bar, but it can be hard to explain the health problem in medical terms. Using medical terms can be difficult, especially if the user has limited health literacy [54]. Therefore, it is important that the search bar is easy to use and users with low health literacy should be able to make their health problem clear. The search bar needs to consist of a lot of synonyms for all kinds of health problems. Besides, the search bar should be tested in real life multiple times, to improve the possible search terms.

To answer SQ7, according to the UX experts, the bell needed to be changed to a photo of a doctor, and the advice should mention that it is based on medical guidelines and made together with GPs and triage nurses. Both can give users a saver and more trustworthy feeling about the advice. Besides, to trigger actions by the users call/action buttons should be added under the advice. Most respondents preferred an advice with a photo of a doctor above it because, it gives more trust to the advice, and it is more personal. These reasons can also be seen in the preferred advice text. The advice mentioning it is made together with GPs and triage nurses was preferred most because, it is more serious, gives more trust and is more personal. However, the original advice was also chosen frequently, because it contains the least amount of text. This correspondent with the literature, since multiple eHealth studies and interface design books recommended less text [55–60]. Lastly, the advice with a call button was chosen mostly because, it draws attention, is easy to use and it is clear what the user should do.

5.2 MAIN FINDINGS

The results show that one of the reasons people are non-adherent to the self-triage is because the self-triage questions do not fit to the health problem of the user. This may be because the user cannot or did not clarify their health problem good enough. Therefore, it is important that the user can clarify their health problem at the beginning of the self-triage and that the questions are specific to the health problem. Besides, questions should be clear and easy to answer. Ease to use and clarity were common reasons users chose certain designs in the design survey. Clarity and ease to use are important in not only eHealth but in all forms of interface and interaction design [59,60]. A usability study of symptom checkers shows that symptom checkers that are easy to use are preferred by users [61]. Users preferred the symptom checker with the ability to select the symptoms and further clarify the symptoms with follow-up questions. The users felt that the symptom checker without the follow-up questions did not fully evaluate their health problem. Besides, this symptom checker used a body area and health problem list similar to MINDD, which was, according to the users, not easy to use. Furthermore, this study shows that users preferred not to use medical terminology since these terms were not always clear for the user. The MINDD self-triage questions are based on the NTS guidelines, which is a medical guideline with mostly broader questions. In telephone triage, the triage nurse can interpret the answers of the patient and can ask follow-up questions if something is not clear. In addition, the patient can say they do not understand certain terms and the triage nurse can explain them further. Possibly, the NTS triage questions are hard to translate to questions for patients. Most questions have medical terminology and room for interpretation for the triage nurse. If these questions are translated to questions for patients, it can be that the questions are less clear. Furthermore, if patients do not understand the question fully, they can get the feeling they are not heard or that the self-triage is not specific enough to get a reliable advice. Personalized content can give the users the feeling they are heard and has a greater capability for persuasion [35]. The self-triage widget must have persuasive features since the widget is designed to influence the behaviour of the users to not contact the OOH primary care clinic when it is not necessary. The results also show that personal content is a common reason to choose a preferred design for the self-triage widget. Personalized content and design testing are important to increase adherence to eHealth technologies [62–64]. Personalized content can be focussed on gender, needs, characteristics, and interests but also a more personal interface and texts.

In addition, safety and authority are important for user-adherence. The PSD model states that a technology incorporating expertise will have increased persuasion, third-party endorsements boost perceptions of system credibility and a technology that leverages roles of authority will have enhanced powers of persuasion [35]. If the user feels safe using the self-triage, they are probably more likely to share personal data. This is important since people are less willing to give up personal identifiers online [50]. Furthermore, the results of this study show that users prefer questions with minimal personal data.

Lastly, the results show that trust is an important factor for user-adherence. For both the reason to follow the advice and the reasons for the preferred designs, users mentioned trust multiple times. That trust is important for following the advice correspondents with the literature. A meta-analytic review shows the most common reasons people do not comply with telephone triage advice [65]. These reasons were; recall problems, symptom change, trust, and accessibility to healthcare services. This study was conducted for telephone triage and not for self-triage, but it

shows that either way, trustworthy advice is important for users to follow the advice. The PSD model also states that a trustworthy technology will increase persuasion [35]. Features that improve trust in the technology are important, as social cues are minimal, which makes trust more difficult to establish [66]. In addition, eHealth creates more complex medical information that may raise privacy and security concerns. If patients do not trust the eHealth technology they may withhold information or avoid using the technology fully [67]. Multiple studies show a relationship between trust and acceptance of the technology and the willingness to share information with the technology [68–72]. Factors influencing trust are source credibility, personal content, predictability, reliable and accurate information, visual appeal, language style, interaction, honesty, qualifications, and good communication between patient and technology [68–71].

5.3 RECOMMENDATIONS FOR MINDD

To visualise how many OOH primary care website visitors actually follow the advice of the MINDD widget, figure 12 was made. The figure shows, according to the data of this research, that 221 of the 1000 website visitors will start the self-triage, complete the self-triage, and follow the self-triage advice. So, 22% of the OOH primary care website visitors are adherent to the MINDD widget. This means that almost 80% of the website visitors are non-adherent to the MINDD widget and improvements should be made to increase adherence.

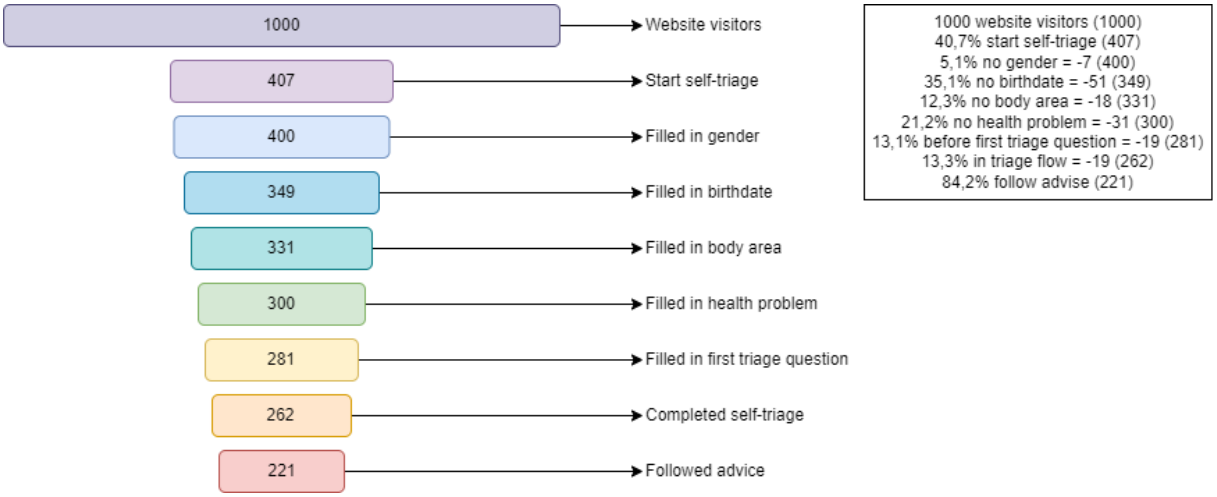

Figure 12: Website visitors adherent to the MINDD widget

To increase the user-adherence of the MINDD self-triage widget, the researcher recommends the following changes based on this study. First, to entice more OOH primary care clinic website visitors the start text should be more empathic, and the safety of the widget should be clear. Since this research did not investigate which empathic text is best and how safety should be mentioned, the researcher recommends testing different versions of empathic texts and compare the conversion rates of the websites to determine which text should be added. For the safety of the widget, the researcher recommends adding a 'disclaimer' under the widget, with the text; "Gebaseerd op de geldende medische standaarden en protocollen en gemaakt in samenwerking met huisartsen en verpleegkundigen.". For the start question, the researcher recommends using a start button, since no personal data

will be asked right away, and it is more inviting to start the self-triage. Here it is recommended to test the start button compared to the original start question, since the original question is also a good option, according to this research. Secondly, to have a higher number of users completing the self-triage the birthdate question should be changed to only giving up the age in numbers. MINDD will receive almost the same data, but the users are giving fewer personal data. Furthermore, the pain scale question is the most last seen question and should be simplified. This can be done by using examples of what people cannot do when they have severe pain. For example: "Do you have as much pain that you can only lie still?". According to an early conducted study about the MINDD widget, this can help users clarify their pain better [12,51]. Besides, the most chosen reasons to stop the self-triage is because users find the questions not fitting to their health problem and they can not make their health problem clear. Therefore, it is recommended to change the health problem question to a search bar. With a search bar users can be more specific about their health problem, which may also result in the right triage questions for their health problem. However, the use of the search bar should be tested, since, for example, low-literate people can have more issues with the use of a search bar instead of the now used health problem list.

Thirdly, to have a higher number of users who will follow the advice, the bell above the advice needs to be changed to a photo of a doctor. The advice will be more trustworthy and personal. Besides, under the advice action buttons should be added. The action button will draw attention, make the ease of use better and gives a clear overview of what the user should do. Lastly, it is recommended to give advice with as little text as possible, since a lot of users found the least amount of text important.

Besides the changes, the researcher recommends keeping the following points the same. First, the background of the widget does not need to be changed. The original green colour is already a calming colour and there were no differences seen with a blue or grey background. Besides, the order of the questions can stay the same. However, as mentioned above a start button as the start of the self-triage is recommended. Furthermore, the advice text can stay the same because it has the least amount of text. However, as mentioned above in the start screen of the self-triage should be mentioned that the self-triage is made together with GPs and triage nurses.

5.4 FURTHER RESEARCH

This research shows possible factors influencing the user-adherence to self-triage tools. These factors are ease to use, clarity, personalized content, safety, authority and trust. Since this study did not test whether these factors actually influence adherence to self-triage tools but are based on users' preferences and behaviour, it is recommended to further study these factors and their effect on adherence to self-triage tools. Especially, because self-triage tools are a relatively new kind of eHealth technology and not broadly evaluated. In addition, it is interesting to study whether other factors influencing adherence is eHealth technology, such as reminders, gender treatment expectancy, guidance, therapeutic alliance, frequency of interaction, the ability to give feedback and proper communication between the technology and user [26–28,37].

After the recommended changes are made, an effect measurement should be conducted to see if the recommended changes actual work, whether the adherence increases and why effects occurred or not. Besides the effect measurement, research focussed on the characteristics of the OOH primary care clinic websites visitor

who do not/do start the self-triage, the reasons for not starting the self-triage, attracting the website visitors to the self-triage and the actual behaviour of the users after the advice can be interesting. This gives more information about the website visitors and users, their behaviour and the reasons behind this behaviour, so MINDD can better personalize the widget for their target group.

In addition, it is interesting to keep comparing MINDD to other self-triage tools, such as the Belgium ODISSEE, to see if good working features in other self-triage tools can be used to improve the MINDD widget. Since there is limited literature available about self-triage tools even self-triages in the early stages of implementation can be used for possible improvements.

5.5 LIMITATIONS

Firstly, not all OOH primary care clinics that are working together with MINDD are considered in this research. However, the three chosen OOH primary care clinics in this research represent various parts of the Netherlands, have a different amount of website visitors, and have a different number of citizens in their working area.

Secondly, users with a higher urgency level were more likely to fill in the survey about the intention to follow the advice. The percentage of respondents with a low urgency level (11%) was lower than the yearly low urgency level (20%) of the users of MINDD. This difference in low urgency users can be explained due to the place the survey was displayed. When users get an low urgency advice, mostly a self-care advice is also given. The survey could be found after the advice and self-care advice. As a result, users had to scroll down first to see the survey. In high and middle urgency advice this was not the case because these advices usually do not have a self-care advice. So, users with high and middle urgency advice saw the survey right away. That is most likely why more users with a high or middle urgency advice filled in the survey. This probably influences the results of the survey.

Thirdly, the survey that was conducted to investigate which designs OOH primary care clinic website visitors preferred did have only a few respondents who visited the OOH primary care clinic website. Almost 94% of the respondents were approached by the researcher. This may influence the results. However, since everyone can access the OOH primary care clinic website and everyone with a health problem is the target group of MINDD, the results of the survey are still important. Besides, almost 50% of the respondents were women and almost 50% had a bachelor's diploma or higher. This correspondence with the normal users of MINDD, since most self-triage users are women and have a higher education [13].

5.6 CONCLUSION

The purpose of this research was to investigate what should be changed to the MINDD self-triage widget, in order to increase the user-adherence. This research shows that only 22% of the OOH primary care clinic website visitors are adherent to the MINDD self-triage widget. Possible factors influencing the users adherence are ease to use, clarity, personalized content, safety, authority and trust. To improve the MINDD self-triage widget the recommended changes should be made to the start of the self-triage, the self-triage flow and the self-triage advice, so the user-adherence will increase.

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7. APPENDIX

7.1 SELF-TRIAGE EXAMPLE

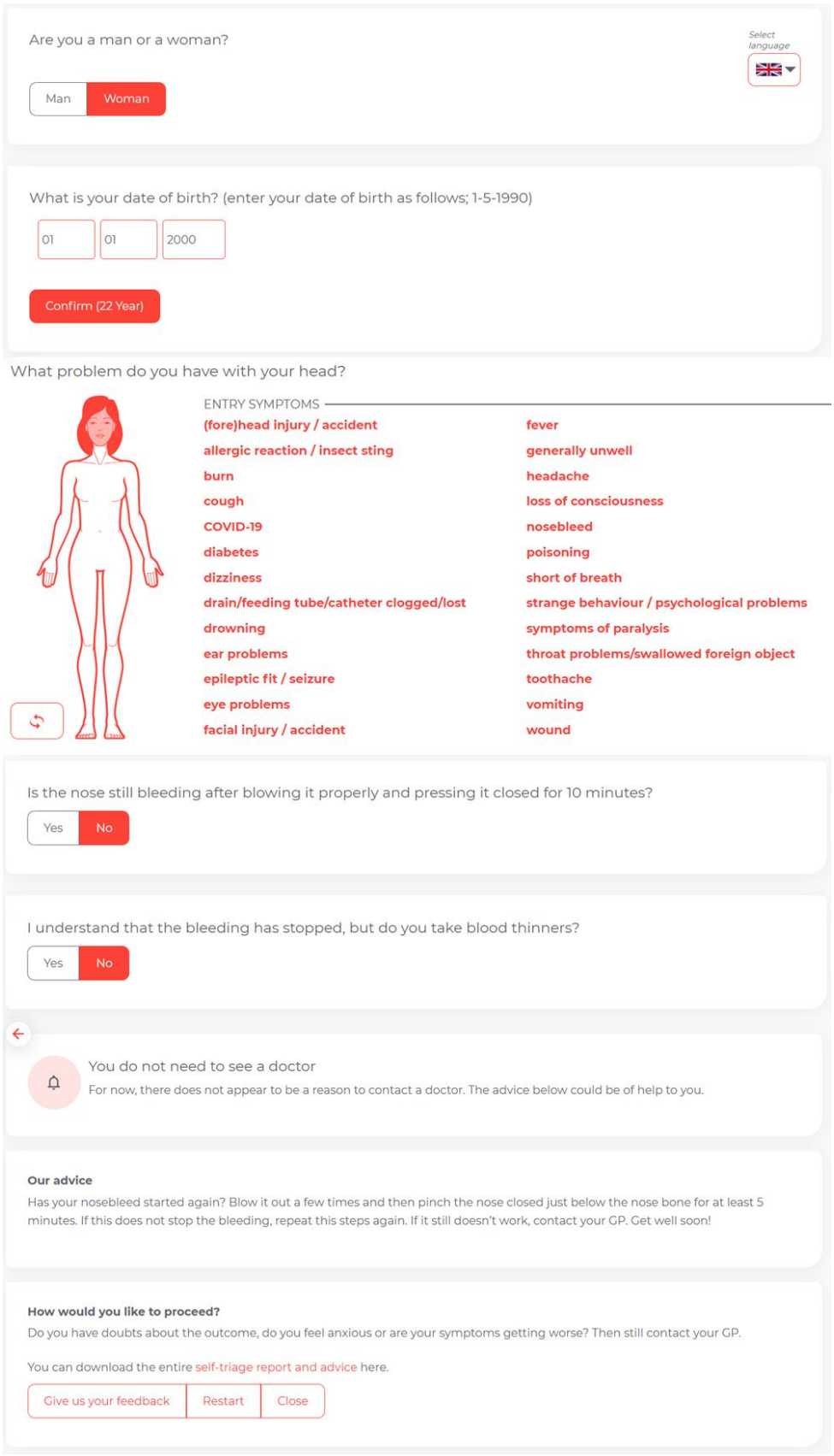

Figure 13: Example of the widget[16].

7.2 FEEDBACK MINDD USERS

The feedback is already filtered and the period 01-09-2022 to 26-10-2022 is used.

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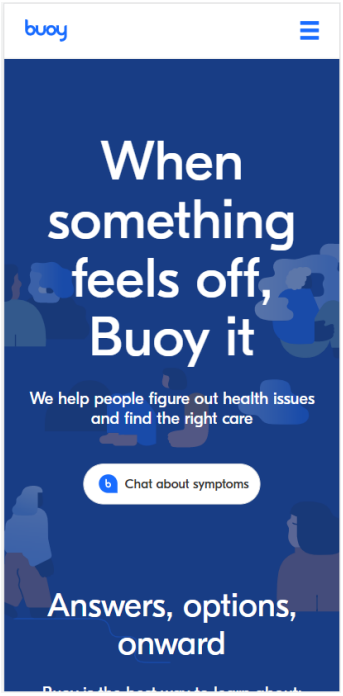
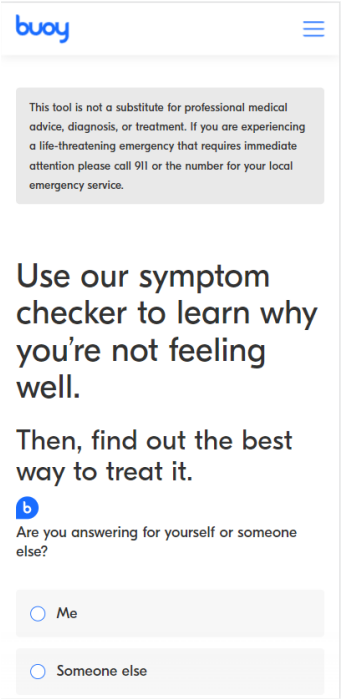
7.3 SELF-TRIAGE TOOLS & SYMPTOM CHECKERS

Spreekuur is a symptom checker on the website https://www.spreekuur.nl/. On the homepage the button “Start direct” is visible. The button is turquoise. If the user clicks on the button the self-triage starts. Above the button is explained how Spreekuur works. Above the explanation, the text “Veilig online advies van jouw huisarts” is stated. Below the button is the button “Bekijk de video” visible. This video explains how/why to use spreekuur. The background is white.

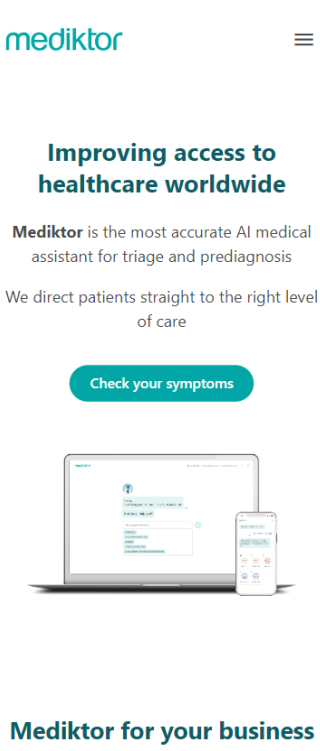
The self-triage starts with the question “Goedemiddag, wie heeft de klacht?”. The user has two options “Ik”, with the subtitel “16 jaar en ouder” or “Mijn kind”, with the subtitle “Tot 16 jaar”. Below the options the text “Je kan Spreekuur.nl als ouder gebruiken voor kinderen tot 16 jaar. Is jouw kind 16 jaar of ouder? Laar je kind dan zelf Spreekuur.nl invullen.”



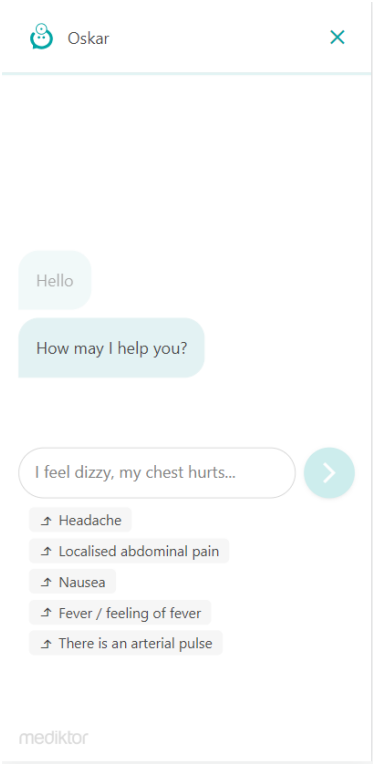
Buoy health is a symptom checker on the website https://www.buoyhealth.com/. On the homepage the button “chat about symptoms” is visible. The button is white. If the user clicks on the button the self-triage starts. Above the button the text “When something feels off, buoy it” with the subtitle “We help people figure out health issues and find the right care” is stated. Below the button is explained what buoy does (not visible in the screenshot). They help the user to find out what is going on, how to fix it and if the user is financially covered for the care. The background is plain blue, with abstract images of people.



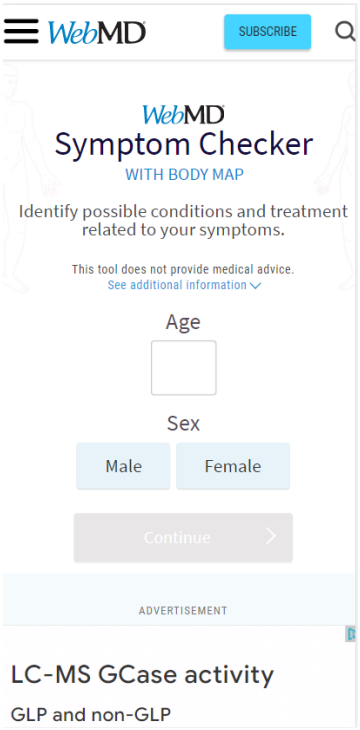
The start question of the self-triage is “Are you answering for yourself or someone else?”. Besides, a disclaimer is stated on top of the page “This tool is not a substitute for professional medical advice, diagnosis, or treatment. If you are experiencing a life-threatening emergency that requires immediate attention, please call 911 or the number for your local emergency service.”. Above the question and below the disclaimer, the text “Use our symptom checker to learn why you’re not feeling well.”, with the subtitle “Then, find out the best way to treat it.” Is stated.



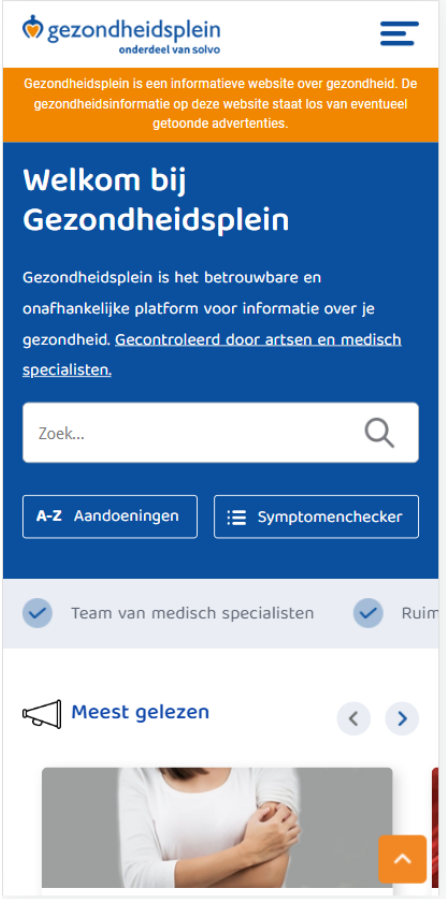
Mediktor is a symptom checker on the website https://www.mediktor.com/en. On the homepage the button “Check your symptoms” is visible. The button is turquoise. If the user clicks on the button the self-triage starts. Above the button, the text “Improving access to healthcare worldwide”, with the subtitle “**Mediktor** is the most accurate AI medical assistant for triage and prediagnosis. We direct patients straight to the right level of care” is stated. Below the button, a picture of Mediktor on a laptop and phone is displayed. The background is white.



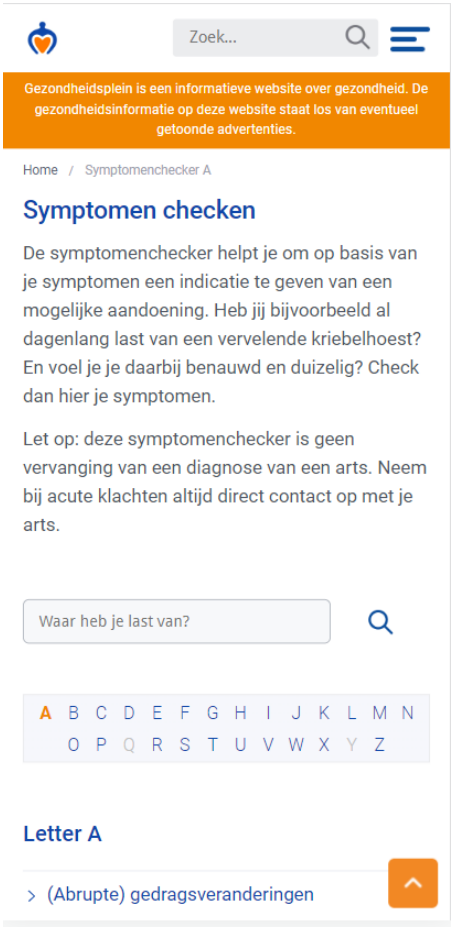
The start question of the self-triage is “How may I help you?”. The user can type their health problem, where the program gives multiple options based on the user’s text. The user can choose between the given options and a follow-up question will follow.



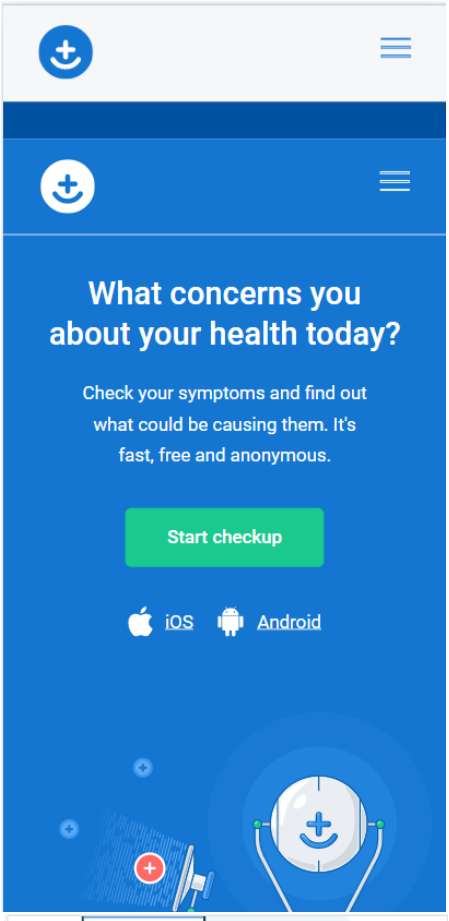
Webmd is a symptom checker on the website https://symptoms.webmd.com/. On the homepage, the symptom checker is already displayed. The title of the page is “WebMD Symptom Checker WITH BODY MAP”, with subtitles “Identify possible conditions and treatment related to your symptoms.” and “This tool does not provide medical advice. See additional information” is stated. Users can click on “See additional information” and more text will be visible. Below the text, the user can fill in their age and sex, to which the user can continue the self-triage if they click on the button continue below. The background is white and on the left, an outline of a male body is visible and, on the right, a female body.



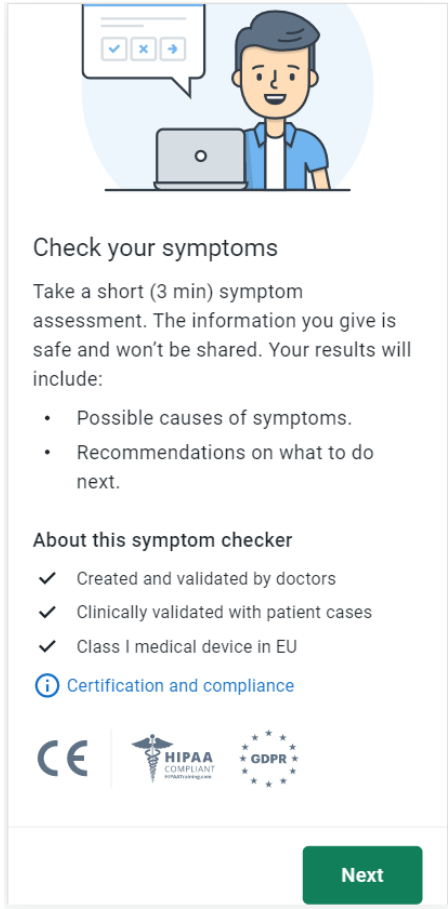
The Dutch website https://www.gezondheidsplein.nl/ mainly consists of info about diseases, but it also has a symptom checker. On the homepage, you can find a button for the symptom checker and for the list of diseases. The button has the same colour as the background (blue) and is surrounded by a white line. Above the buttons, the user can search for their health problem. Above the search bar the text "Welkom bij Gezondheidsplein", with the subtitle "Gezondheidsplein is het betrouwbare en onafhankelijke platform voor informatie over je gezondheid. Gecontroleerd door artsen en medisch specialisten." is stated.



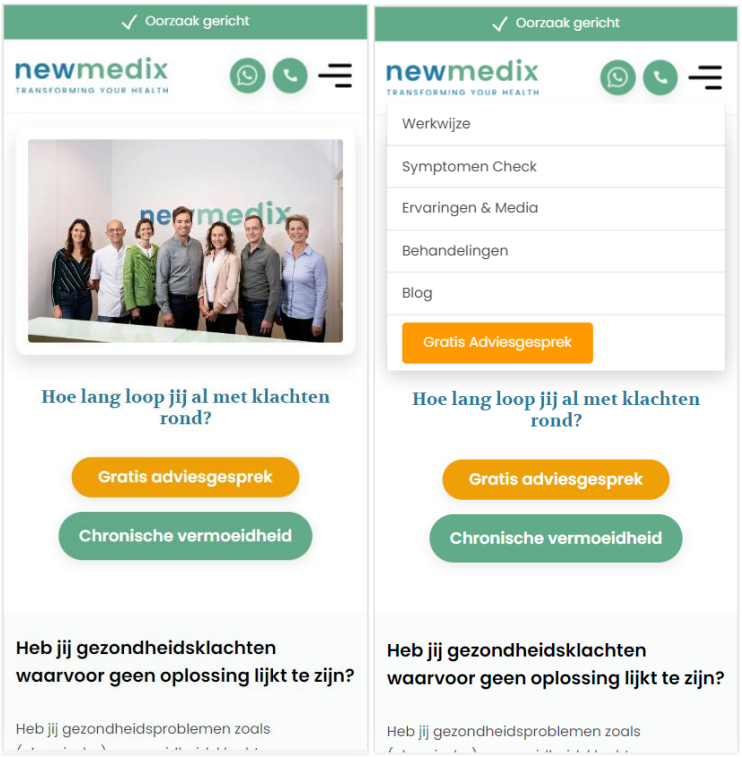
The first question of the self-triage is “Waar heb je last van?”. Above the question is stated how/why to use the symptom checker and a disclaimer: the symptom checker is not a replacement for a doctor. Below the first question, the list of health problems is stated.



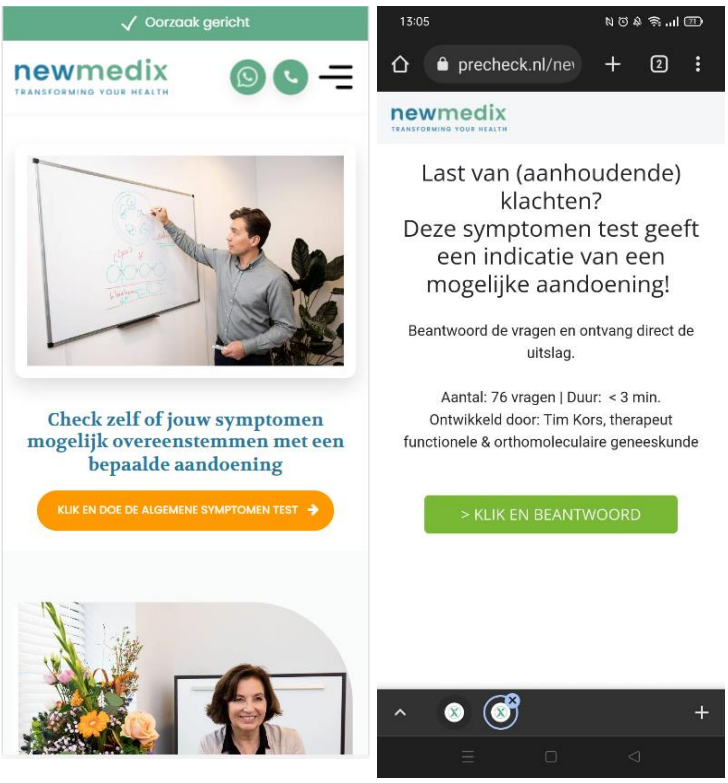
Symptomate is a symptom checker on the website https://symptomate.com/. On the homepage the button “Start checkup” is visible. The button is green. If the user clicks on the button the self-triage starts. Above the button, the text “What concerns you about your health today?”, with the subtext “Check your symptoms and find out what could be causing them. It is fast, free and anonymous.” is stated. The background is blue, and a cartoon of a kaleidoscope is displayed.



The self-triage starts with an introduction with information about the symptom checker and how it works. In the bottom right corner, the user can start the triage by clicking on the button “Next”.

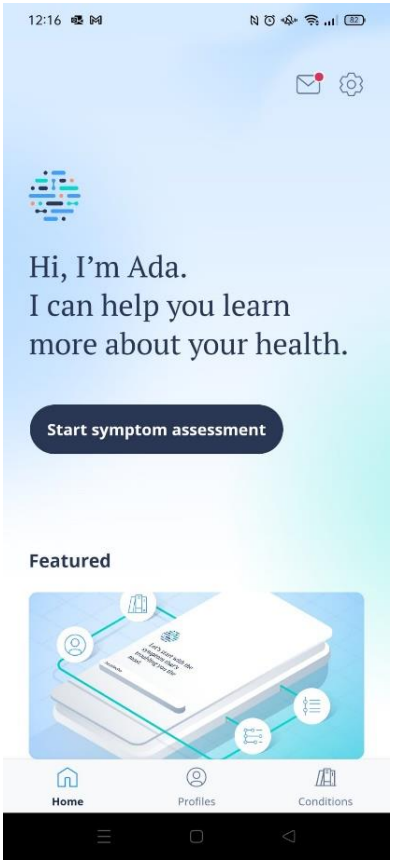


The Dutch website https://newmedix.nl/ has a symptom checker. At the top of the homepage are menu tab is visible. If a user clicks on the menu tab the second one is for the symptom checker and is called “Symptomen Check”. If the user clicks on this tab, they will be redirected to the page where the user can start the symptom checker.

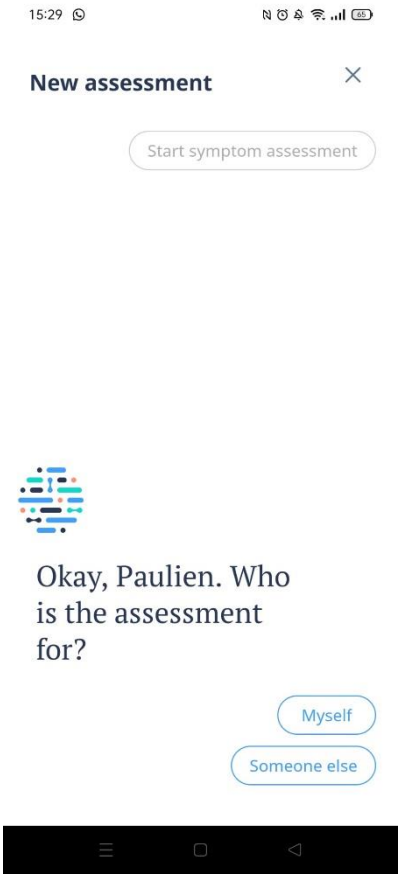


On this page the button “Klik en doe de algemene symptomen test ->” is visible. The button is orange. If the user clicks on the button the self-triage starts. Above the button the text “Check zelf of jouw symptomen mogelijk overeenstemmen met een bepaalde aandoening” is stated. Above the text, a picture of a man drawing a human cell is displayed.

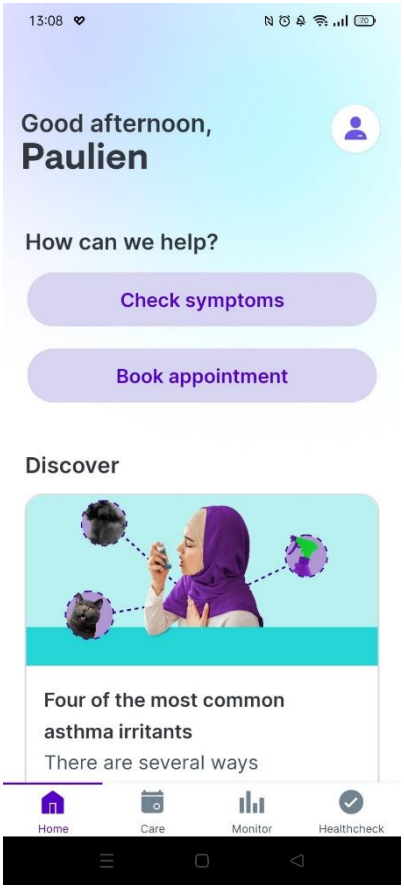
The self-triage starts with information about the symptom checker, why to use it, how it works, the number of questions, duration, and developers. At the bottom, a green button with the text “> Klik en Beantwoord” is stated. If a user clicks on this button the first question will be displayed.



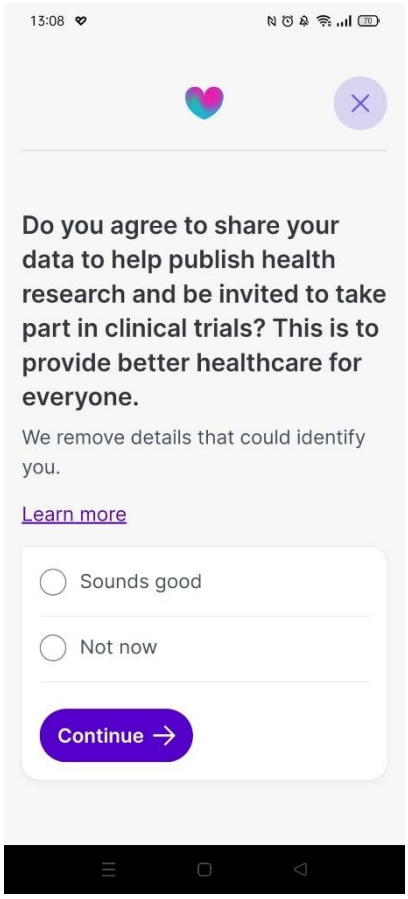
Ada is an application with a symptom checker. After downloading the app, the user needs to make an account. After that the user goes to the homepage. On the homepage, the button “Start symptom assessment” is stated. This button is dark blue. If the user clicks on this button the self-triage starts. Above the button the text “Hi, I’m Ada. I can help you learn more about your health.” is stated. Below the button, a clickable picture is displayed with the text “How Ada can help”.



The start question of the self-triage is “Who is the assessment for?”. The user can click on two buttons with “Myself” or ”Someone else”.



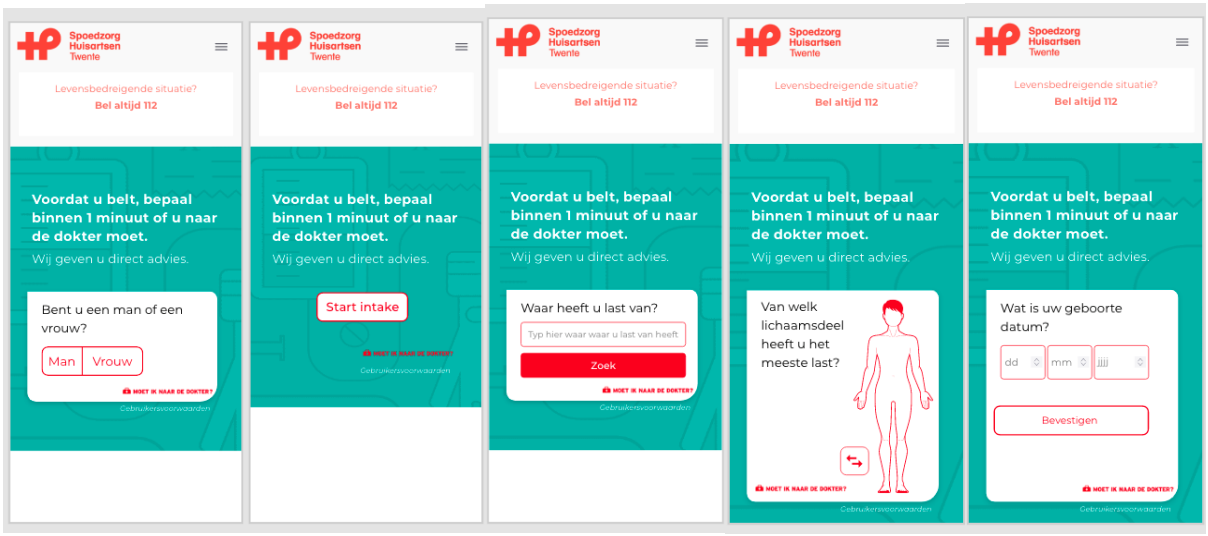
Babylon is an application with a symptom checker. After downloading the app, the user needs to make an account. After that, the user goes to the homepage. On the homepage, two buttons “Check symptoms” and “Book appointment” are stated. These buttons are purple with purple text. If the user clicks on this button “Check symptoms” the self-triage starts. Above the button the text “Good afternoon Paulien” and “How can we help?” is stated. Below the button, clickable pictures are displayed with information items.



The start question of the self-triage is “Do you agree to share your data to help publish health research and be invited to take part in clinical trails? This is to provide better healthcare for everyone.”, with the subtitle “We remove details that could identify you.”. The user has two options “Sounds good” and “Not now”. After answering the question, the user can click on the continue button to continue.

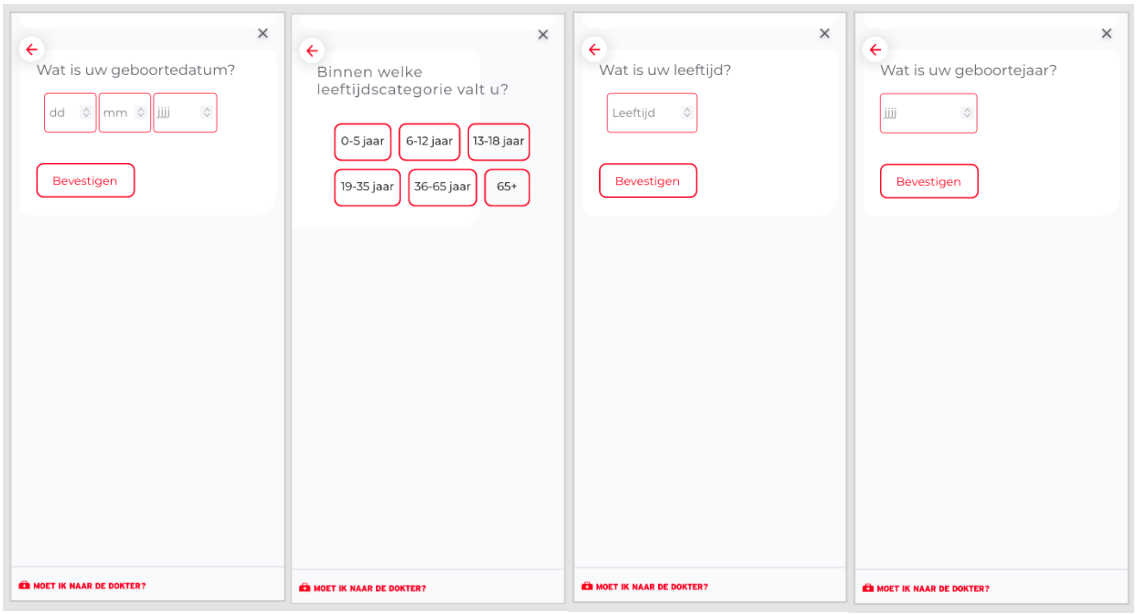
7.4 DESIGNS SURVEY SQ5, SQ6 & SQ7

Question 1:



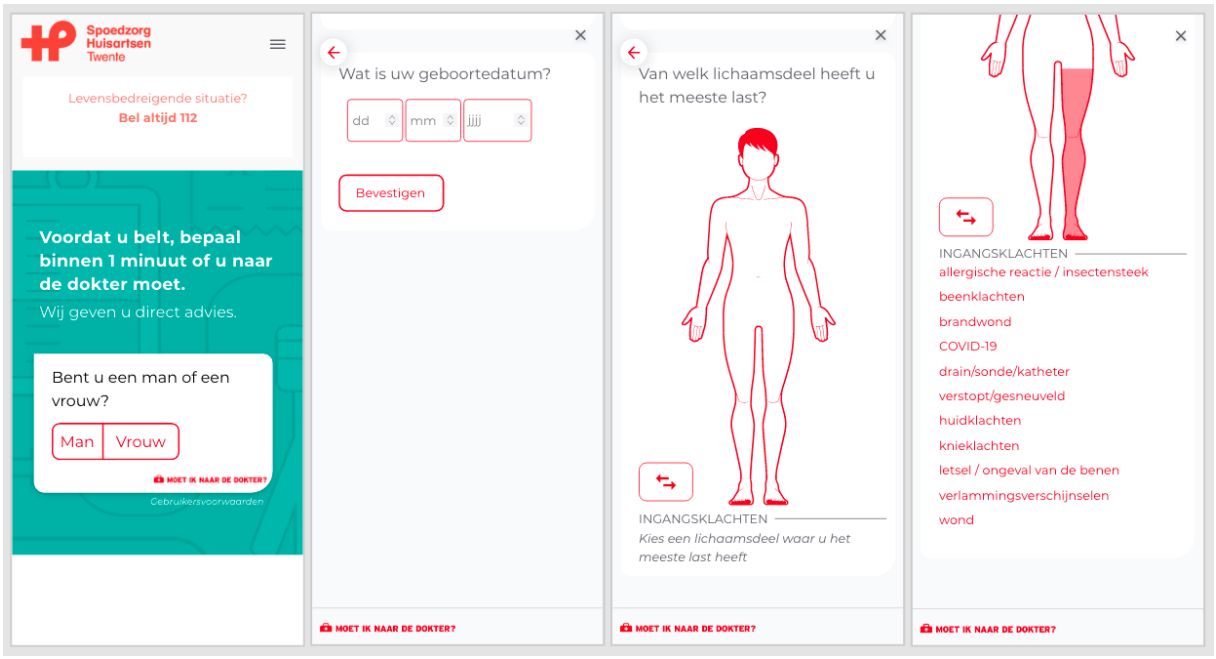
Answer 1 Answer 2 Answer 3 Answer 4 Answer 5

Question 2:

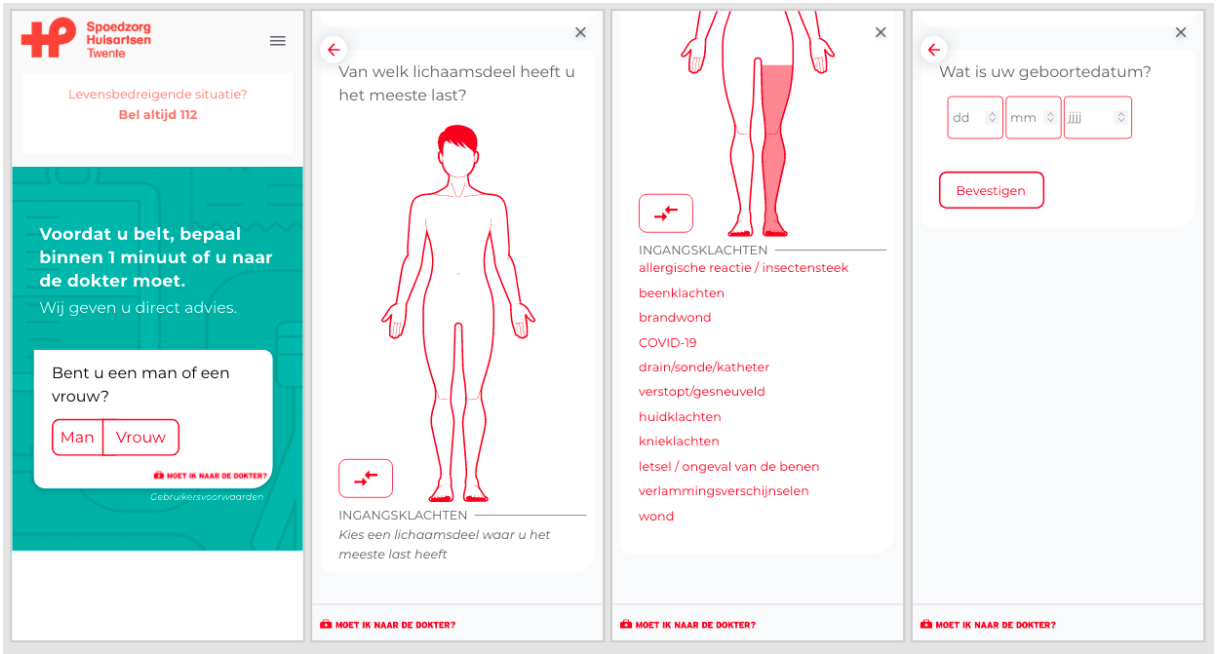


Answer 1 Answer 2 Answer 3 Answer 4

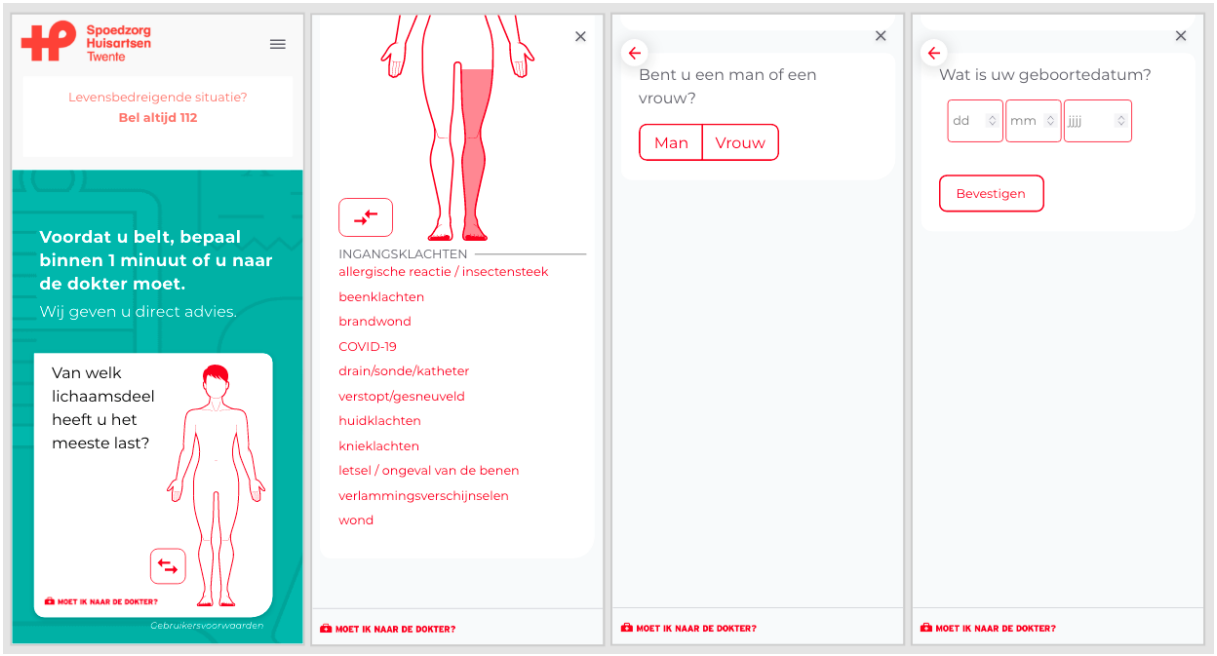
Question 3:



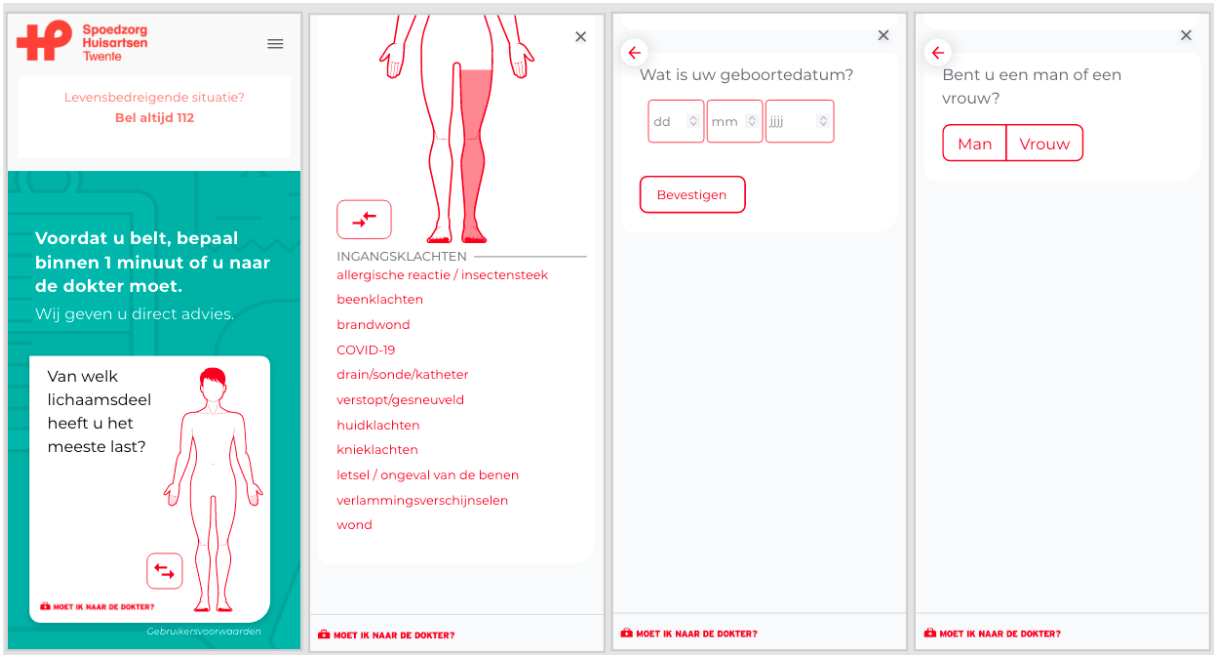
Answer 1



Answer 2

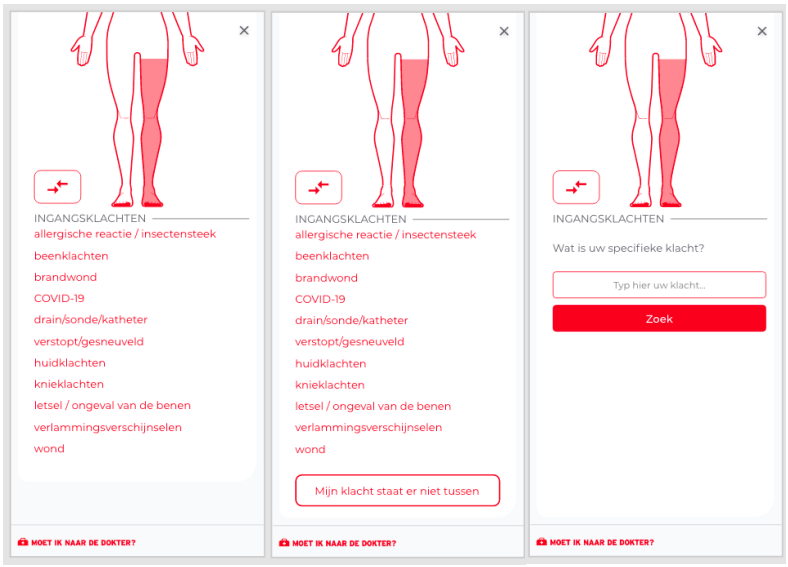


Answer 3



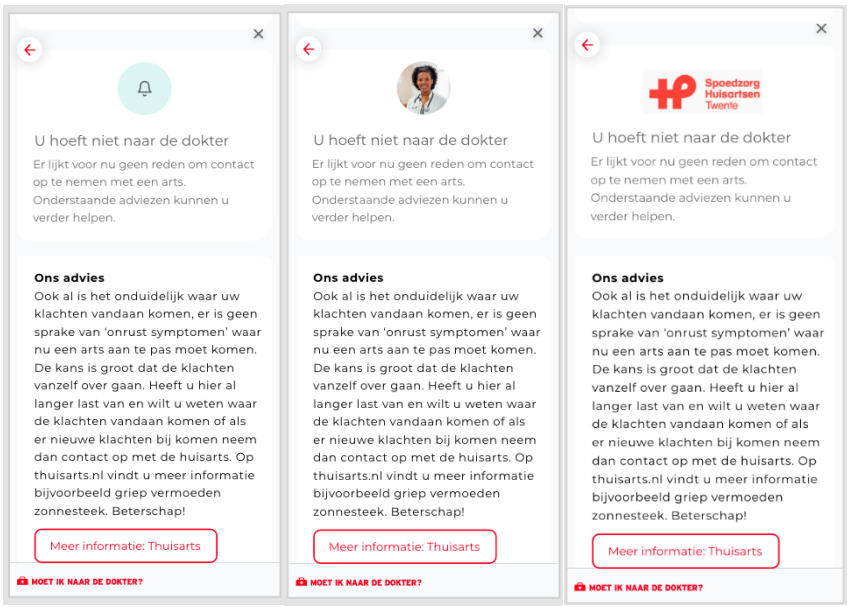
Answer 4

Question 4:



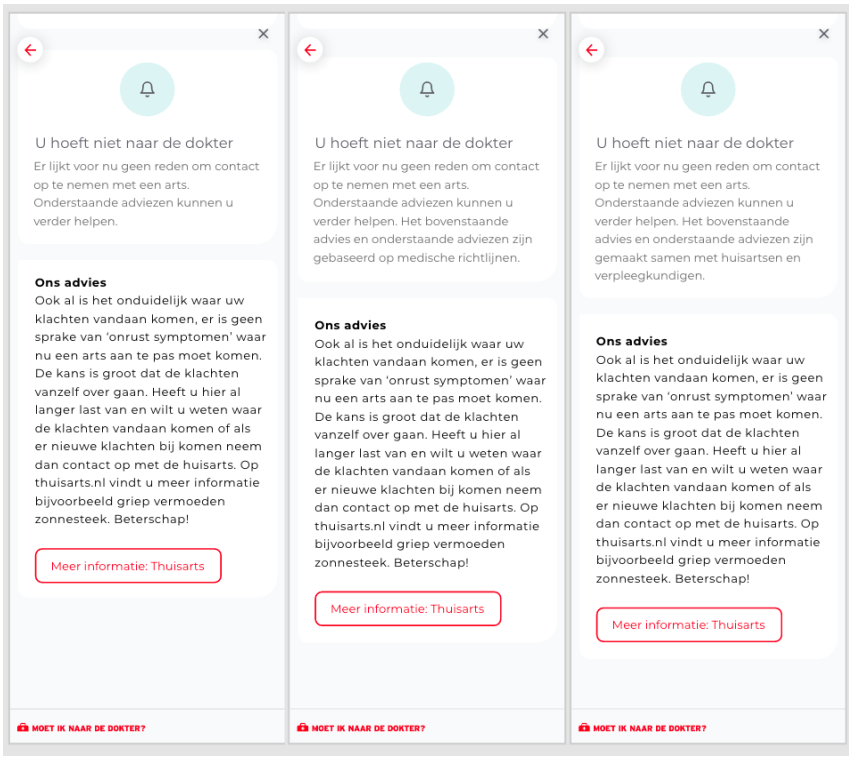
Answer 1 Answer 2 Answer 3

Question 5:



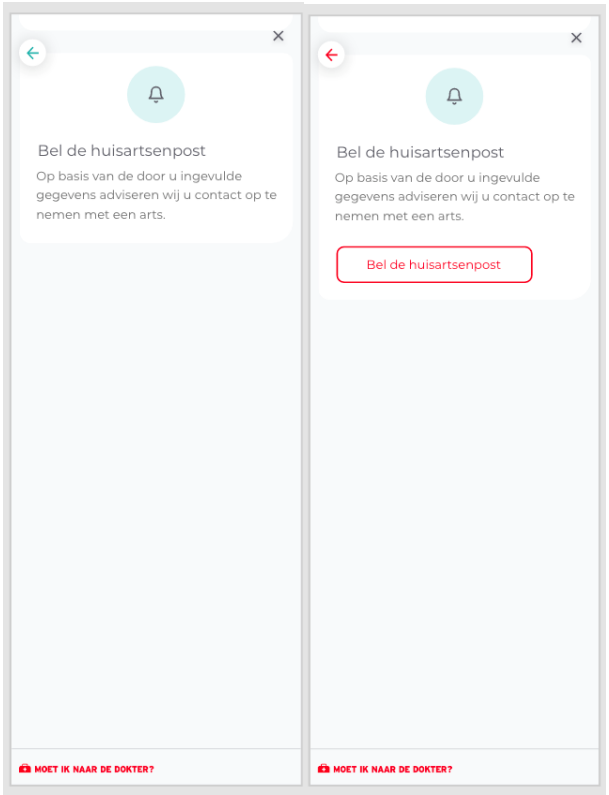
Answer 1 Answer 2 Answer 3

Question 6:



Answer 1 Answer 2 Answer 3

Question 7:



Answer 1 Answer 2

7.5 TOP LAST SEEN QUESTIONS

For ‘Huisartsenposten Amsterdam’ the top three last seen questions are; “hoe erg is de pijn? 0 is geen pijn en 10 is de ergst denkbare pijn?” (22 triages), “hoe erg is de pijn of druk? 0 is geen last en 10 is de ergst denkbare pijn of druk. Bij een 8 of 9 wordt u duidelijk belemmerd in uw dagelijkse activiteiten.” (15 triages) and “Hoe erg is de buikpijn? 1 is nauwelijks pijn en 10 is de ergst denkbare pijn. Bij een 8 of 9 wordt u duidelijk belemmert in uw dagelijkse activiteiten.” (11 triages). For ‘Spoedzorg Huisartsen Twente’ the top two last seen question are; “hoe erg is de pijn? 0 is geen pijn en 10 is de ergst denkbare pijn?” (5 triages) and “Hoe erg is de buikpijn? 1 is nauwelijks pijn en 10 is de ergst denkbare pijn. Bij een 8 of 9 wordt u duidelijk belemmert in uw dagelijkse activiteiten.” (4 triages). A top three is not possible since multiple questions had the same amount of stopped triages. For ‘Huisartsenpost Westland’ the most last seen question is; “Hoe erg is de pijn? 0 is geen pijn en 10 is de ergst denkbare pijn. Bij een 8 of 9 wordt u duidelijk belemmerd in uw dagelijkse activiteiten.” (3 triages). A top three is also not possible here.

7.6 SPSS SYNTAX

7.6.1 Survey SQ1 & SQ2

```
FREQUENCIES VARIABLES=Gender Urgency Age HAP AnswerFirstQuestion AnswerSecondQuestion
    AnswerThirdQuestion
  /ORDER=ANALYSIS.

OUTPUT MODIFY
  /SELECT TABLES
  /IF COMMANDS=["Frequencies(LAST)"] SUBTYPES="Frequencies"
  /TABLECELLS SELECT=[VALIDPERCENT CUMULATIVEPERCENT] APPLYTO=COLUMN
HIDE=YES
  /TABLECELLS SELECT=[TOTAL] SELECTCONDITION=PARENT(VALID MISSING) APPLYTO=ROW
HIDE=YES
  /TABLECELLS SELECT=[VALID] APPLYTO=ROWHEADER UNGROUP=YES
  /TABLECELLS SELECT=[PERCENT] SELECTDIMENSION=COLUMNS FORMAT="PCT"
APPLYTO=COLUMN
  /TABLECELLS SELECT=[COUNT] APPLYTO=COLUMNHEADER REPLACE="N"
  /TABLECELLS SELECT=[PERCENT] APPLYTO=COLUMNHEADER REPLACE="%".
CROSSTABS
  /TABLES=AnswerSecondQuestion BY AnswerFirstQuestion
  /FORMAT=DVALUE TABLES
  /CELLS=COUNT
  /COUNT ROUND CELL.

CROSSTABS
  /TABLES=AnswerThirdQuestion BY AnswerFirstQuestion
  /FORMAT=DVALUE TABLES
  /CELLS=COUNT
  /COUNT ROUND CELL.

CROSSTABS
  /TABLES=Age Urgency Gender BY AnswerFirstQuestion
  /FORMAT=DVALUE TABLES
  /CELLS=COUNT
  /COUNT ROUND CELL.

GET DATA
  /TYPE=XLSX
  /FILE='C:\Users\pauli\OneDrive\Moetiknaardedokter\Thesis\Data enquete 1\R data alle haps.xlsx'
  /SHEET=name 'Blad1'
  /CELLRANGE=FULL
  /READNAMES=ON.
EXECUTE.
DATASET NAME DataSet1 WINDOW=FRONT.

CROSSTABS
  /TABLES=Gender BY AnswerFirstQuestion
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
```

```
  /CELLS=COUNT
  /COUNT ROUND CELL.

CROSSTABS
  /TABLES=Age Urgency BY AnswerFirstQuestion
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ
  /CELLS=COUNT
  /COUNT ROUND CELL.
```

7.6.2 Log data SQ3

```
DATASET NAME DataSet15 WINDOW=FRONT.
CROSSTABS
  /TABLES=Leeftijd BY Afgerond
  /FORMAT=AVALUE TABLES
  /STATISTICS=CHISQ PHI
  /CELLS=COUNT EXPECTED
  /COUNT ROUND CELL.
```

7.6.3 Survey SQ4

```
FREQUENCIES VARIABLES=Ik_vind_mijn_klacht_te_dringend Ik_snap_de_vragen_niet
    De_vragen_passen_niet_bij_mijn_klacht Ik_kan_mijn_klacht_niet_goed_duidelijk_maken
    De_vragenlijst_duurt_te_lang De_vragenlijst_werkt_niet Ik_was_de_vragenlijst_aan_het_testen
Anders Vul_uw_antwoord_in
  /ORDER=ANALYSIS.
```

7.6.4 A/B test SQ5

```
NPAR TESTS
  /WILCOXON=O_A WITH H_A (PAIRED)
  /STATISTICS DESCRIPTIVES QUARTILES
  /MISSING ANALYSIS.

NPAR TESTS
  /WILCOXON=O_S WITH H_S (PAIRED)
  /STATISTICS DESCRIPTIVES QUARTILES
  /MISSING ANALYSIS.

NPAR TESTS
  /WILCOXON=O_W WITH H_W (PAIRED)
  /STATISTICS DESCRIPTIVES QUARTILES
  /MISSING ANALYSIS.
```