Nurses' experiences of using AsthmaTuner – an eHealth self-management system for healthcare of patients with asthma

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Abstract

Objective: This study describes nurses' experiences of using eHealth for assessment in the healthcare of patients with asthma.

Methods: Five nurses with experience of using AsthmaTuner in the healthcare of patients with asthma participated in the study. Individual semi-structured interviews were conducted with the nurses to understand their experiences of using the eHealth system. The transcribed interviews were analyzed using qualitative content analysis.

Results: The results show that nurses as well as patients find the tool useful and easy-to-handle. AsthmaTuner gives the nurses access to more and better information about the patients, which facilitates assessments and makes their work more efficient. The patients become more involved in their care, gain increased control and take more responsibility for their illness and treatment.

Conclusions: The nurses appreciate eHealth in asthma care. Using AsthmaTuner makes the nurses' work more efficient and the patients become more involved in their care.

Keywords

Asthma, digital health, eHealth, nursing, self-efficacy, smartphone

Submission date: 30 September 2021; Acceptance date: 21 March 2022

Introduction

Health services that can be used to support patients' self-management are rapidly increasing. Self-management is defined as an individual living with a chronic condition to manage the symptoms, treatment, physical and psychosocial consequences and life changes by themselves, on an interactive and daily basis.[1,2] However, self-management can be considered to be a person's capability to monitor their asthma and affect the cognitive, behavioural and emotional reactions needed to preserve an adequate quality of life.[3] Self-management systems are used for management of asthma, among other chronic illnesses.[4] Asthma self-management consists of monitoring the symptoms, measuring peak expiratory flow (PEF) and adhering to asthma treatment, among other things.[5] eHealth is a concept that includes the use of digital tools and digital exchange of information to achieve and maintain health.[6] eHealth tools could be useful for strengthening people through self-management[7] and can contribute to equal, efficient,[8] accessible and safe care.[9,10] eHealth can also increase welfare, good and equal health and strengthen the independence of individuals.[11] Furthermore, eHealth can form a basis for decision-making among healthcare professionals and provide patients with direct feedback.[10,12] However, it is important that information and support of

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digital healthcare are tailored to the patients using it.[13] One review study[14] reported the mHealth app provides opportunities for improvements, such as enabling data measurement.

Using eHealth in healthcare can be effective, but there is a lack of sufficient knowledge regarding the clinical outcome. According to Cochrane reviews,[15] performed in 2016, there was no differences between remote examination and face-to-face concerning quality of life, exacerbation and asthma control. However, nurses have reported a lack of formal education and training in eHealth systems in general, and poor clinician workflow integration.[16] Lack of time and competence hampers increased digitalization in healthcare. At the same time, eHealth systems provide opportunities for nurses to regularly update their knowledge.[17] Bonini and Usmani[18] concluded that eHealth is useful for optimal and personalized asthma management. It has also been shown that using telemedicine to measure lung function can reduce the number of emergency visits.[19]

Asthma is a global health problem, and a lifelong, heterogeneous disease that usually includes chronic airway inflammation and may require long-term treatment. The diagnosis of asthma is based on respiratory symptoms and spirometry/ PEF with reversibility test. Patients with asthma need regular check-ups of lung function, asthma control, treatment, inhalation technique and adherence to medication.[5] In Sweden, the prevalence of asthma in adults is less than 10%. Asthma prevalence among children is estimated at 4.9%.[20] According to GINA,[5] it is difficult to estimate morbidity and mortality due to different views of asthma. Patients with asthma are mainly cared for in primary healthcare. Patients with more severe illness are treated in specialized care.[21] One digital PEF, Smart Peak Flow (SPF), has been tested in a minor study and the result seems to be promising. However, it needs to be tested in larger studies to be able to draw any conclusions from the benefits of SPF.[22] The AsthmaTuner self-management system is an eHealth system developed in Sweden for people with asthma. AsthmaTuner measures lung function and asthma symptoms using a digital spirometer, and consists of a patient app, a cloud-based data storage and a healthcare interface. AsthmaTuner was developed to reduce the perceived gap between clinic practices and guidelines and treatment recommendations. The goal was to facilitate the distribution of treatment plans and improve patients' self-management and education. Patients who use AsthmaTuner report significantly better asthma control compared to patients with conventional case management.[23] Approximately 100 clinicians in Sweden have tested AsthmaTuner and about 3500 patients with asthma have used the self-management system during a test period.[24] Another smartphone-based telemedicine program was developed in an intervention study for people with uncontrolled asthma. After the intervention of asthma control, quality of life and lung function were improved.[25]

Some mobile applications for spirometry are validated.[23,26] However, there are several mobile applications that are not validated in clinics, which needs to be noticed for health care staff.[27] Talboom-Kamp et al.[28] claim that more studies are needed to gain more insight into the integration of self-management in healthcare work and to assess the implications for healthcare professionals at care centres.

Digitalization can be considered to increase the effectiveness and accessibility of healthcare and improve communication with patients in a way that improves the quality of healthcare.[17] However, existing apps need several improvements, according to McKay et al.[29] There is fear that digitalization may threaten the relationship between patients and nurses, thus affecting the holistic care.[17] There is a lack of research about nurses' experiences of using eHealth in the healthcare of patients with asthma, and tested and reliable eHealth application will be helpful for the healthcare centers.[30] Therefore, it is important to fill this knowledge gap. Examining nurses' experiences with the use of AsthmaTuner may be a part of this increase of knowledge that this paper can contribute to.

The aim of this paper was to describe nurses' experiences of using eHealth for assessment in the healthcare of patients with asthma.

Method

Study design

Qualitative methods were used in this study.[31] The current study is part of 'VITAL – for the good health', a larger project that focuses on testing digital technology in healthcare contacts between patients and the primary healthcare centre.

Participants

The participants in the study were nurses with experience of using eHealth in the healthcare of patients with asthma. Information about the study and an invitation to participate was published on social media. Inquiries about participants were also sent by e-mail to ten nurses in primary healthcare and hospital care. Since AsthmaTuner was not yet used to a wide extent in the business, it was difficult to recruit respondents. For this reason, a research nurse was asked for contact information to nurses who use AsthmaTuner. Contact information to ten nurses was available. Of these, four said yes. One respondent was obtained from social media. Five nurses, one man and four women, accepted the invitation to take part in the study. All participants were using AsthmaTuner. The nurses work in the south, west and east regions of Sweden. Both primary healthcare and hospital care are represented in the study. The

number of patients using AsthmaTuner varies between 3 and 23 patients per nurse, total 100 patients. The range of experience of using AsthmaTuner ranged from 4 months to 4 years, among the nurses.

Data collection

Individual semi-structured interviews[31] were conducted between April and June 2020. An interview guide with ten thematic questions about experiences of using AsthmaTuner was constructed. The thematic questions covered perceived competence and user security as well as experience of assessment, communication, patient safety, ethics, person-centred care and accessibility. The participants could speak freely about the themes. Appropriate follow-up questions were asked during the interviews[31] to confirm and gain a deeper understanding of the participants' experiences. The interviews lasted between 13 and 30 min. Four interviews were conducted by telephone and one interview was conducted via video call. All interviews were digitally recorded and transcribed verbatim.

Analysis

Qualitative content analysis as described by Graneheim and Lundman[32] was used to analyze the transcribed interviews. The analysis focused on manifest content and the degree of interpretation varied in depth and abstraction. The analysis was conducted in several steps. The interview data were first read several times in order to gain a deeper understanding of the whole text. Meaning units that correspond to the aim of the study were then identified. The meaning units were condensed and each meaning unit was labelled with a code. Finally, similarities and differences among codes were compared and codes were sorted into categories. Two of the authors (KS and ME) had a dialogue during the analysis until an agreement of the analysis was reached. The categories were then discussed with the third author (AS).

Ethical

The study was approved by the Swedish Ethics Review Authority, ref. no. 2020-00099. All procedures in this research adhere to the standards of the Helsinki Declaration.[33] Written informed consent was obtained from the participants.

Result

Two main themes and six categories representing the nurses' experiences of using AsthmaTuner in asthma care emerged. The first theme 'Improving the nurses' work with eHealth' includes four categories: 'Feeling confident with eHealth', 'Digitally changed working methods', 'eHealth makes work more efficient' and 'Facilitates assessment'. The second theme 'Helpful for the patient' includes two categories: 'An aid for the patient' and 'Promotes self-care ability'.

Improving the nurses' work with eHealth

Feeling confident with eHealth. There is a positive attitude towards eHealth systems among the participants. The nurses perceived their experience of using AsthmaTuner as short. Despite relatively little experience, the participants emphasized that they have a good knowledge of how to use AsthmaTuner, but do not see themselves as experts. None of the nurses have received any formal training. Instead, they have received oral information and guidance from a contact person and in this way gradually learned how to use the eHealth system. One nurse described it as 'learning by doing'. AsthmaTuner was described as a user-friendly digital tool that is easy to handle for both nurses and patients. The participants feel confident with the eHealth system technically, and consider it patient safe.

> Learn the most by using it with patients. (informant 2)

Digitally changed working methods. All participants reported that AsthmaTuner has changed the way they work. With AsthmaTuner, the diagnostic is digital and remote. During the diagnostic of asthma, the patients test their lung function with a digital spirometer for a given period. The measurement values are transferred to a computer program that the nurses can access. In this way, the nurses can follow the diagnostic remotely. Previously, patients used an analogous method, in which lung function was tested with a PEF meter at home and documented by the patient on paper. Several nurses have used AsthmaTuner to a greater extent during the COVID-19 pandemic. The nurses emphasized that even though it is possible to carry out large parts of the work remotely, they also need a personal meeting with the patient at the health centre. eHealth systems only provide measured values and self-reported symptoms and was described as a complement to physical healthcare. A described weakness of AsthmaTuner is that only few people at the health centre have access to the computer program with the patients' data. If they are absent from work, there is a risk that no one assesses the received data. An expressed positive aspect is that the geographical distance between the patient and the health centre plays less of a role in remote care.

> …I can follow up with video calls. They do not have to come in [to the health center] because I see how they blow in any case. (informant 2)

eHealth makes work more efficient. Using the eHealth system was perceived as positive with an improved quality of measurement values. The nurses also described that care was perceived as more efficient. In some cases, patient visits became shorter, especially in combination with video-based meetings. Patient preparation before the video-based meeting, such as filling out forms and spirometry, was considered to reduce the meeting time considerably. AsthmaTuner does not offer a chat function, which is something that several nurses lack. A nurse who used the health centre's own chat function described it as an easy and effective way of establishing patient contact. Although starting a chat could result in more frequent contact, the chats were perceived to focus on the subject, compared to physical visits or phone calls. In the long run, chatting was considered time-saving.

> …it [AsthmaTuner] has been a complement, a less workload. (informant 1)

Facilitates assessment. The eHealth solution is described as helpful for the assessment. With regular use, the nurses receive and take notes of a lot of data. Participants expressed that the large amount of objective data generated via the eHealth system facilitates assessment. The nurses also expressed that measurement values are considered reliable and more accurate with digital tools compared to when PEF is used. The received data help the nurses prioritize among patients and perform assessments. Although measurement values provide a good basis for assessment, it is pointed out that conversations with the patients are also important for obtaining an overall assessment. In case of deviating values that indicate that the patient does not feel well, the nurse could initiate contact with the patient. The frequency of assessing received measurement values in the care portal varied among the nurses. Some reviewed the data before a follow-up visit and others reviewed the data on a regular basis, for example once a week or almost daily. One nurse who had only worked with asthma patients for a short time expressed that AsthmaTuner contributed to strengthening the nursing role by providing more comprehensive anamnesis values.

> … we see it in black and white, there you will deteriorate, both in how you felt and in terms of parameters. I think it's easier to assess patients with AsthmaTuner. (informant 4)

Helpful for the patient

An aid for the patient. The participants emphasized that the eHealth system is above all an aid for the patient. At the same time, they considered it not suitable for all patients. Newly diagnosed patients or patients with asthma problems are considered to gain from AsthmaTuner. The nurses

assess the usefulness of the digital tool for the patients. When deciding whom to offer AsthmaTuner to, it is important to consider the patient's general technical skills, interest in using eHealth systems, and judged ability to correctly handle the tool. Only one nurse discussed gender and ethnicity and believed that it is unimportant in the selection of patients. However, there was uncertainty about language requirements in the digital tool. The digital tool was described as not suitable for elderly people who cannot handle smartphones. Children who use AsthmaTuner are required to have a guardian who can support the child with the digital tool. Not only the patients' personal characteristics are considered, several participants also talked about economy. AsthmaTuner involves a cost for the caregiver. Although the cost is considered small, it can cause some caution when offering it to patients, since the effect must correspond to the cost. None of the nurses had ended up in a situation where they had to deny a patient AsthmaTuner. It was discussed that such conflicts could arise.

> This [AsthmaTuner] is really a tool for the patient to get to know their asthma. (informant 4)

Promotes self-care ability

The advantages of AsthmaTuner are that the patients become more involved, gain increased control and take more responsibility for their illness and treatment. A positive aspect described is that the patients can gain increased insight into the disease by linking symptoms to triggers. This makes it possible for patients to notice indications of impaired asthma before clear symptoms occur. In this way, medications can be adjusted and further impairments can be prevented. The nurses mean that it leads to improved asthma control for the patients. However, the tool is not always used as much as the nurses wish. The nurses report that patients forget about it or lose interest in regular use. It is difficult for the patients to get a daily routine, according to the nurses. For those who use the tool regularly, it strengthens self-care ability.

> It [AsthmaTuner] creates a good, what shall I say, an equal link between caregiver and patient. Because the patient is more active and has some control himself. (informant 3)

Discussion

This study focuses on nurses' experiences of using an eHealth system in asthma care. The main result of this study is that nurses appreciate eHealth in asthma care. With eHealth, some work is done remotely. A large number of measured values facilitate the assessment of asthma diagnosis as well as asthma control.

The self-management system AsthmaTuner is perceived as an aid for the patients, in the sense that it makes the patients more involved in the care and strengthen their self-care ability. Monitoring their own health data, the nurses perceived gave patients a greater self-awareness of their condition and higher motivation to engage in lifestyle behaviours. The study also showed that the use of the self-management eHealth system made the nurses work more efficient. This result was not in accordance with Morton et al.[34] study, where some concerns about the burden were raised of the healthcare professionals monitoring patient data.

The attitude towards AsthmaTuner among the nurses is exclusively positive in this study. This may be one reason why they do not experience stress and reduced job satisfaction, as described in the Öberg et al.[17] study. The results show that oral information and 'learning by doing' were sufficient for using the self-management system AsthmaTuner. This may be because the AsthmaTuner is considered an easy-to-handle and user-friendly eHealth system. Including the nurses' views when developing eHealth systems can reinforce knowledge and increase their confidence in using eHealth systems. Stevenson and colleagues[35] draw similar conclusions. The findings of our study are in line with van den Wijnaart et al.,[36] who demonstrated that web-based monitoring cannot replace face-to-face contacts. Based on our findings, AsthmaTuner was used to collect measured values and self-reported symptoms. AsthmaTuner was seen as a complement to face-to-face meetings in follow-ups, for example when inhalation technique needed to be examined.

Overall, using AsthmaTuner was considered patient safe in this study. One risk that emerged is that the patient's measurement values are not assessed since only few people at the healthcare centre have access to the eHealth system. The Patient Safety Act includes requirements for maintaining a high level of patient safety.[37] Who should have access to patient records is also an ethical issue.[38] One important question is patient safety regarding privacy policy. Laws provide a high level of security for patient data.[39] AsthmaTuner uses a cloud-based solution to store patient data.[23] This can lead to concerns regarding privacy policy.[40] To protect patient privacy, an e-service card is required for accessing the data.[24] During the COVID-19 pandemic, there was a rapid development in eHealth to be able to maintain provision of primary care,[41] and this study was conducted right at the beginning of the pandemic when eHealth for asthma patients were not yet widely used. However, according to Bitar and Alismail,[42] more evidence is needed on the effectiveness of eHealth during the COVID-19 pandemic, and this study provides such evidence.

The nurses in this study described that measurements were more accurate with eHealth systems such as AsthmaTuner. The received measured values also facilitated their assessment. Similar findings can be found in the Skär and Söderberg[38] discussion paper, which points out that accessible patient information facilitates decision-making for healthcare professionals.

The respondents expressed that the geographical distance between patients and healthcare centres is now less important thanks to eHealth. This finding is in line with United Nation's ambition to use technology to achieve global goals. Thus, the opportunities for healthcare to reach patients increase with eHealth.[43]

The self-management system AsthmaTuner was considered by the nurses in this study as a complement to physical healthcare. This is in line with the conclusion in Tran et al.[44] regarding eHealth interventions on smoking cessation. The results imply that the nurses experienced that digital tools make the work more efficient. According to another Swedish study,[17] eHealth can increase the effectiveness of primary healthcare. This conclusion may, however, depend on which eHealth system is used and for what disease, and the perceived usefulness of the system. All eHealth systems may not suit all patients, and nurses should be aware of this. Some people may lack knowledge of digital technology and have difficulty managing it. On the other hand, digital care services can be perceived as a positive complement to physical visits.[13] To include people who have difficulties using digital tools and help them manage their own self-care at a distance from the healthcare centre, they should be offered additional information and support. Nymberg et al.[13] found that especially older people wish to be informed about eHealth, and receive support regarding how to use it.

The nurses experienced that the patients become more involved, gain increased control and take more responsibility for their illness and treatment when using AsthmaTuner. This results in improved asthma control for the patients and supports self-care ability.[23] When the patients have better access to healthcare and information, and more knowledge of health or telehealth, healthier lives and more commitment to self-care follows.[43]

Strengths and limitations

The strength of this study is the rich variation of answers to the research question, thanks to the wide geographical distribution, different genders and experiences of the participants.[32] However, it was difficult to recruit informants. This may be because AsthmaTuner is not so widely used, as broad implementation in clinical practice has not been accomplished so far.[45] The small group of informants in this study may impact the transferability. However, a detailed description of the research enables other researchers to evaluate the transferability.[32,46] Anyhow, an increased number of interviews does not guarantee richer data.[47]

Two authors conducted the analysis until a consensus emerged and the third author checked the analysis in order to increase trustworthiness. Further research on nurses' perspectives and patient experiences is needed to get a wider view of experiences of using digital tools in asthma care.

Two of the researchers (KS, ME) are well experienced in the care of people with asthma and are also teaching and supervising students in asthma care. The third researcher (AS) is an informatics researcher with no knowledge of the care of asthma patients. That two of the researchers are familiar with the research area increases the credibility of the study. Additionally, to assure the credibility of the study, only respondents with knowledge and experience of asthma care and of using the AsthmaTuner system were included in the study.[46]

To fully achieve dependability can be difficult as the nurses have gained more experience in their work with AsthmaTuner. However, findings could probably be repeated if a follow-up study would be conducted when the nurses have more experiences of AsthmaTuner.[47]

Conclusion

This study describes nurses' experiences of using eHealth in the healthcare of patients with asthma. The results indicate that nurses appreciate eHealth in asthma care. eHealth makes the nurses' work more efficient. Nurses get access to more information about the patients and the patients become more involved in their care. As the implementation of self-management systems is broadening, it would be able to draw more trustworthy to draw more trustworthy conclusions in studies with more participants. AsthmaTuner could also be used internationally given the availability of smartphones, which could enable studies with international comparisons.

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