

Barriers and Facilitators for Automated Home Medication Dispensers in Home Care (BAFDIS) A Qualitative Study

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English abstract

Background: Home care demand increases due to the ageing population. Efficient home care is essential to remain able to provide the needed care. With properly implemented use of automated home medication dispensers (AHMD), the number of visits needed to support elderly with their medication decreases.

Aim: This study aimed to explore barriers and facilitators for implementing AHMD in home care, from home care professionals' perspective.

Methods: Using a descriptive qualitative design, semi-structured interviews were conducted with home care professionals from a home care organisation in the Netherlands. Content analysis was performed alongside the Tailored Implementation for Chronic Diseases (TICD) Checklist, which contains seven domains: (1) innovation factors, (2) individual health professional factors, (3) patient factors, (4) professional interactions, (5) incentives and resources, (6) capacity for organisational change and (7) social, political and legal factors. Each determinant was labelled as a barrier, facilitator or both.

Results: Fifteen home care professionals were interviewed. Seventy-eight determinants were identified. The most frequently mentioned facilitators were selection and motivation of patients, providing them with proper instructions and guidance, and home care professionals having sufficient knowledge and confidence. The required unplanned visits when patients do not withdraw their medication is the most frequently mentioned barrier.

Conclusion: An overview of the 78 determinants alongside the domains of the TICD Checklist was developed. Sixty-four determinants (82%) fell within the domains innovation factors (16), individual health professional factors (20) and patient factors (28). Therefore, these domains were the most relevant.

Recommendations (implications of key findings): The determinants should be considered when developing tailored implementation strategies for implementing AHMD. Further research is recommended to determine the perceived importance of the determinants to rigorously prioritise them. Moreover, the perspectives of patients, relatives and informal caregivers should be further investigated.

Keywords (MeSH-terms): Telemedicine, Home Care Services, Implementation Science, Qualitative Research

Nederlandse samenvatting

Achtergrond: De vraag naar wijkverpleging stijgt door vergrijzing. Efficiënte wijkverpleging is essentieel om de benodigde zorg te kunnen blijven bieden. Met zorgvuldig geïmplementeerd gebruik van automatische medicatiedispensers (AHMD) neemt het aantal benodigde zorgmomenten om medicatie aan te reiken aan ouderen af.

Doel: Deze studie beoogde de bevorderende en belemmerende factoren voor het implementeren van AHMD in de wijkverpleging te onderzoeken, vanuit het perspectief van thuiszorgprofessionals.

Methode: Aan de hand van een beschrijvend kwalitatief onderzoeksontwerp zijn semigestructureerde interviews uitgevoerd met thuiszorgprofessionals van een thuiszorgorganisatie in Nederland. Content analyse werd toegepast met behulp van de Tailored Implementation for Chronic Diseases (TICD) Checklist, welke zeven domeinen bevat: (1) innovatiefactoren, (2) individuele zorgprofessionalactoren, (3) patiëntfactoren, (4) professionele interacties, (5) prikkels en middelen, (6) capaciteit voor organisatieverandering en (7) sociale, politieke en juridische factoren. Elke determinant werd gelabeld als belemmerende factor, bevorderende factor of beide.

Resultaten: Vijftien thuiszorgprofessionals zijn geïnterviewd. Er zijn 78 determinanten gevonden. De meest genoemde bevorderende factoren omvatten selectie en motivatie van patiënten, adequate instructies en begeleiding geven, en voldoende kennis en zelfvertrouwen bij thuiszorgprofessionals. De benodigde onplanbare zorgmomenten wanneer patiënten hun medicatie niet uitnemen is de meest genoemde belemmerende factor.

Conclusie: Een overzicht van de 78 determinanten is ontwikkeld, ingedeeld volgens de domeinen van de TICD Checklist. Vierenzestig determinanten (82%) vielen onder de domeinen innovatiefactoren (16), individuele zorgprofessionalactoren (20) en patiëntfactoren (28). Daarom waren deze domeinen het meest relevant.

Aanbevelingen: Bij het implementeren van AHMD moet rekening gehouden worden met de determinanten om passende implementatiestrategieën te kiezen. Verder onderzoek is aanbevolen om de ervaren belangrijkheid van de determinanten te bepalen en prioriteit hierin aan te brengen. Daarnaast moeten de perspectieven van patiënten, familie en mantelzorgers verder worden onderzocht.

Trefwoorden (MeSH-termen vertaald): Telegeneeskunde, Wijkverpleging, Implementatiewetenschap, Kwalitatief Onderzoek

Introduction

The worldwide population is ageing¹⁻⁴, causing increased grey pressure, defined as the ratio between retired population (65 years and older) and potential working population (20-65 years old)⁵. The proportion of people having one or more chronic diseases increases with age⁶. Thus, the higher proportion of elderly causes an increased need for healthcare, with an expected increase of 4% per year⁶. Since elderly live independently in their own homes longer⁷, the need for home care also increases⁸. Efficiency in home care is essential to provide the needed care.

Elderly with chronic diseases require drug therapy to reduce symptoms, but being adherent is essential for the therapy to succeed⁹⁻¹². Elderly's adherence depends on interactions of medical, personal and economic factors, the relationship with the physician, and cognitive status^{13,14}. Home care professionals support patients in being adherent and preventing medication errors¹⁵ by providing reminders or handing them their medication, e.g. because they forget their medication or cannot open the sachets¹⁵. These patients are visited multiple times a day¹⁶.

Automated home medication dispensers (AHMD), e.g. Medido, are e-health devices that support patients who are unintentionally nonadherent to drug therapy^{17,18}. AHMD aim to improve adherence and independence to reduce healthcare demand¹⁹. The patient is reminded by the AHMD to take their medication and is provided with a pre-opened sachet containing the prescribed medication for that specific time. When a patient does not withdraw their medication, their home care organisation is notified.

Previous studies found evidence that using AHMD increases adherence. A 6-month cohort study found that the mean adherence significantly increased from 49% at study enrolment to 97% ($p < 0.001$) after six months of using AHMD¹⁷. Reeder et al.²⁰ investigated patients' satisfaction with AHMD and found that patients accepted the dispenser as reliable, easy to use and helpful in coordinating personal medication management. Furthermore, Nakrem et al.¹⁹ found that healthcare professionals think that AHMD might help solve efficiency challenges. Moreover, short visits for medication assistance are expensive since travel time is the same regardless of the visit's purpose¹⁹. With AHMD, healthcare professionals have more time to provide care to patients with greater needs¹⁹. Thus, with properly implemented use of AHMD, the number of needed home care visits decreases without losing quality of the support in medication adherence¹⁹.

To properly implement an e-health innovation, barriers and facilitators of the innovation in the intended setting must be considered to tailor the implementation strategy to that particular context^{19,21,22}. The most frequently mentioned barriers for implementing e-health are limited exposure/knowledge of e-health, lack of necessary devices and problems with financing²³. The most frequently mentioned facilitators are ease of use, improvement of communication and

motivation²³. However, these determinants apply to the implementation of e-health in general and might not be specifically suitable for implementing AHMD in home care.

Therefore, this study aims to explore the barriers and facilitators for implementing AHMD in home care. Home care organisations can use the results to develop tailored implementation strategies for implementing AHMD in their organisation.

Aim

This study aims to explore the barriers and facilitators for implementing automated home medication dispensers (AHMD) in home care, from Dutch home care professionals' perspective.

Method

Design

A descriptive qualitative study was conducted to obtain minimally transformed answers²⁴. Using a qualitative design provided room for the respondents to share their experiences and beliefs²⁵⁻²⁷. For transparent reporting, COREQ was used as a guideline (Supplementary Table 1).

Population & domain

Spread over the Netherlands, 3,070 home care organisations with various numbers of patients and employees existed in 2018²⁸. To obtain rich data, home care professionals involved in the coordination (district nurses (EQF-5/6)) and provision of AHMD care (nurses (EQF-4) and nurse assistants (EQF-2/3)) were sampled purposively from one home care organisation in the South-West of the Netherlands. This organisation employs approximately 800 home care professionals and uses the Medido AHMD, which is one of the three AHMDs currently available on the Dutch Market²⁹.

Using maximum variation sampling, a range of perspectives from different home care professionals in various home care teams were accessed^{24,27}. Since educational level, age, and gender influence the engagement in e-health³⁰, the researcher strived for variation in geographic areas of operation (to include teams with various work cultures and processes), educational level (European Qualifications Framework (EQF)³¹), age and gender. To bridge any gap of knowledge, variation was also strived for in level of experience with AHMD (number of their patients that (have) use(d) AHMD), and years of work experience.

For inclusion, home care professionals had to work in a team that provides regular (non-specialised) home care. Seconded employees and professionals with insufficient mastery of the Dutch or English language were excluded.

Procedures

To recruit respondents, the researcher provided study information during a management team meeting and by email. The managers were requested to provide names and contact information of eligible home care professionals within one week. On the fourth day, a reminder was sent.

A selection was made based on the maximum variation criteria. These potential respondents were contacted by email, containing written study information and an informed consent form. They were given one week to respond whether they wanted to participate. If no response had been received, a reminder was sent.

When the intention to participate was confirmed and written informed consent was received by email, a digital interview was scheduled.

It was estimated that a sample size of minimal twelve respondents was needed to reach maximum variation. Sampling continued until no new patterns and themes emerged in the data (thematic data saturation)³². When this occurred, two more interviews were conducted to ensure data saturation was reached.

Data collection

Semi-structured individual interviews were conducted. The Tailored Implementation for Chronic Diseases (TICD) Checklist³³ was used to develop the initial topic list. The TICD Checklist contains seven domains: (1) guideline factors, (2) individual health professional factors, (3) patient factors, (4) professional interactions, (5) incentives and resources, (6) capacity for organisational change and (7) social, political and legal factors³³. Because AHMD are an innovation rather than a guideline, the first domain was supplemented with the innovation factors of Grol and Wensing³⁴: advantages in practice, feasibility, credibility, accessibility and attractiveness.

The topic list was subsequently translated into an interview guide that fits daily practice (Additional File 1). The main items were: demographic data (maximum variation factors), experiences with AHMD, past implementation of AHMD, needs of home care professionals, their teams, and patients and their relatives or informal caregivers, and requirements from the home care organisation. To refine the interview guide, it was piloted with one respondent³⁵. No further changes deemed necessary, and the interview was included in the main analysis.

Due to COVID-19 restrictions, interviews were conducted using online videoconferencing software (Microsoft Teams). The interviews were audio and video recorded, transcribed verbatim and pseudonymised.

Data analysis

Following the spiral of analysis²⁵, data analysis started after conducting the first interview. New insights gained from the analysis were included in the successive interviews, and constant comparison was applied until data saturation was reached^{25–27,32}.

Four transcripts were initially open coded (inductively) to ensure important themes were not lost through deductive data analysis³⁶. After that, a code tree was developed for coding deductively, using the TICD Checklist and the inductive codes as a basis (Supplementary Table 2). When data were relevant to multiple codes, they were included in both. The code tree was constantly adapted when needed. Each interview resulted in a conceptual interview scheme³⁷ with the mentioned codes/determinants labelled as barrier, facilitator, or both. Finally, all determinants were combined into a comprehensive overview of barriers and facilitators.

Data were managed and analysed in NVivo 12.

Study rigour

Multiple strategies were used to strengthen the study's trustworthiness. Member checking was performed during the interviews (by deliberately probing to ensure that the respondents' meanings were understood) and after analysis (by requesting written feedback on the conceptual interview schemes³⁵) to verify whether the information was correctly interpreted and the respondents' reality is presented²⁷.

Through peer reviewing, coding decisions, interpretations and assumptions of the researcher were challenged, and main ideas were confirmed, ensuring the reliability of the coding²⁷. Two independent researchers coded two randomly selected interviews, and discrepancies were discussed until consensus was reached.

During data collection and analysis, memos about context, observations, and methodological choices were written after each interview, recording an audit trail that can be used to judge the validity of this study²⁷ (Supplementary Table 4).

Ethical issues

This study is conducted according to the principles of the Declaration of Helsinki (October 2013) and in accordance with the Medical Research Involving Human Subjects Act (WMO). A non-WMO statement is acquired from the Medical Ethics Research Committee of the Erasmus Medical Centre Rotterdam. The principles of the General Data Protection Regulation are taken into account throughout the performance of the study.

Interviews were scheduled after receiving written informed consent by email.

Results

Respondents

Eighteen home care professionals were invited. Two declined participation due to holiday or personal reasons. One did not respond. Table 1 presents the characteristics of the fifteen participating respondents. Educational levels varied (EQF-2 to EQF-6). The mean age was 38.7 (SD 13.3) years. The majority (80%) was female. Work experience varied between 2 to 46 years. All respondents experienced at least one patient with AHMD. One respondent had seen more than ten patients.

<Table 1>

Overview

The mean duration of the interviews was 50.4 minutes (range 39–72). Reaching thematic data saturation was ensured after fifteen interviews. Thirteen respondents provided member checks. Four of them gave additional information, which was included in the analysis. During peer reviews, there were no major discrepancies, and no new determinants arose.

In total, 78 determinants (barrier, facilitator or both) were identified (Table 2). Sixty-four of them (82%) fell within three TICD domains: innovation factors (16), individual health professional factors (20) and patient factors (28). No determinants were identified within social, political and legal factors. Therefore, this domain will not be further reported. A comprehensive overview of the barriers and facilitators is presented in Table 3.

<Table 2>

Innovation factors

The following advantages of AHMD were mentioned as facilitators: increased self-sustainability, thereby efficiency in home care, ease of use, increased quality of life (not having to wait for home care) and increased treatment quality (taking medication at the exact prescribed times). Because of these advantages, respondents believe in the concept of AHMD, making credibility another facilitator.

Disadvantages of AHMD were identified as barriers, like patients having less social contact and professionals having less control. For example: when patients do not withdraw their medication (unanswered alarm) or in case of malfunctioning, home care is notified ('alarmed') to visit the patient and fix the problem. This is a facilitator for patients since it is a safety net. However, it is a barrier for home care professionals, who suddenly have to visit an extra patient in the middle of their scheduled work. All respondents stated this is the biggest barrier in using AHMD: the more it happens, the bigger the barrier.

'Alarms take time and it frustrates me! I get the call and have to cycle all the way back to that patient, but I can't leave because I'm busy with another patient.' (R11, EQF-2)

'If I hadn't experienced those alarms, I wouldn't know any disadvantages. It would be perfect! (...) Occasional alarms, no problem. But this many?! Nooo, big drawback!' (R3, EQF-5/6)

Individual health professional factors

Lack of knowledge, awareness and confidence are barriers. Respondents stated that not all colleagues are familiar with AHMD, and awareness decreases when AHMD are not used regularly. In addition, AHMD might come across as too technical and complex, inflaming a fear of dehumanising care and being substituted by technology.

'This is a cultural change which not everyone has joined yet. Because we love to take care of patients. When the patients become more and more independent, what will happen to my job? Is there still work for me?' (R8, EQF-5/6)

Facilitators to increase knowledge are using simplified instructions, group training, dummy devices for practice and e-learning. Opinions vary on whether e-learning should be mandatory. Additionally, using tools like YouTube videos and pocket cards with step-by-step instructions was suggested.

The past experiences of home care professionals can be both facilitators or barriers, depending on whether the experiences were positive or negative. Respondents stated that sharing positive experiences is a facilitator.

'I don't use AHMD because I've had bad experiences. (...) But in another team, my colleagues have excellent experiences. So I should get back at it! (...) It helps if we hear more positive experiences.' (R3, EQF-5/6)

Patient factors

Determining whether an AHMD is suitable for a patient should be tailored and in consultation with the patient and their relatives or informal caregiver(s). Respondents also mentioned that thorough assessment of patients' eligibility might prevent unanswered alarms and decrease the need for unplanned visits. Learnability (being able to learn how to use the device) is an essential facilitating criterium for eligibility. In contrast, a patient having insufficient learnability is an overriding barrier.

'There are patients with dementia – well, let's say forgetful people – who can't learn new things well. This would be a new thing like that.' (R10, EQF-4)

A facilitator to help assess suitability is using an existing selection tool with criteria like learnability and eligibility. However, most respondents are unfamiliar with this tool, which is a barrier.

Respondents identified two groups of patients: (1) who want to be independent and appreciate the regained freedom and (2) who deeply value the social contact with home care professionals and resist being visited less frequently. Whereas the first group will be happy to start using AHMD, the second group will need more effort to be motivated.

Several facilitating techniques were suggested to motivate patients, like emphasising the advantages and the possibility of trying it without obligations.

'We explain they don't have to wait [for us] to take their medication. (...) I also tell them that we don't drop you suddenly and don't look after you anymore. (...) And the fact that: "If you don't like it, we can just return it".'
(R1, EQF-5/6)

After agreeing to use an AHMD, it is a facilitator when patients are provided with simplified instructions, step-by-step, about how the device works.

'When the device beeps, it's time for your medication. If it beeps louder, it means you didn't hear it the first time. Really a very concise description: when the device does this, you should do that.' (R15, EQF-5/6)

Next to instruction, providing the patient with guidance during the initial period of use is a facilitator. Over time, the patient will need less guidance, and it can be phased out.

'We don't throw them into the deep, like: "OK, here's the device, good luck!" No. They must be guided during the first few weeks.' (R6, EQF-4)

Professional interactions

Collaboration within the teams (internal collaboration) is a facilitator. Colleagues support each other, e.g. dividing unplannable visits in the event of unanswered alarms or coaching on the job. Also, assessing patients' suitability should be a collaborative process involving all colleagues rather than just the district nurse.

'You shouldn't do it alone. We work with first contact persons. They visit the patient every week. They should certainly play a role! They are my eyes and ears and know the patient the best.' (R15, EQF-5/6)

Collaboration with other healthcare organisations (external collaboration), e.g. general practitioners (GPs) and pharmacies, was mentioned as a facilitator to raise broad awareness and pro-activeness to use AHMD.

'We often get requests from GPs to hand out medication multiple times a day. (...) But AHMD would be very good there. (...) GPs are quick in saying "Oh, home care will do that". They should be made aware too.' (R3, EQF-5/6)

Incentives and resources

It is a facilitator that AHMD are free of costs for patients. Health insurance companies fully refund the device. Furthermore, fewer home care visits are needed when the AHMD is successful, reducing home care costs. However, in the case of many required unplannable visits due to unanswered alarms, the respondents sometimes experience a decrease in efficiency. Nonetheless, the objective number of unplannable visits might still outweigh the number of visits needed without AHMD.

'For example, a Parkinson's patient who needs medication six times a day. If we have to go there, that is six times, seven days a week. Then, yes, it weighs up to introduce an AHMD; it of course reduces the costs a lot.' (R9, EQF-4)

Related to quality and safety, both barriers and facilitators were identified. AHMD increase safety, especially since home care is alarmed when patients do not withdraw their medication. However, the respondents experience having less control.

'If you only visit once a week and the patients do it themselves the rest of the time, you have no further notice whether they are really taking the medication... Then of course errors could still occur.' (R5, EQF-5/6)

Patients pulling their medication out before the device cuts the sachets is a safety barrier that causes malfunctions and medication errors. Instead, patients should be specifically instructed to wait for the device to cut the sachet.

'When the patient pulls, another sachet [for later moment] might get pulled out too. Pulling also causes faults in the cutting of sachets. Loose tablets may fall on the floor; medication may get lost and not taken.' (R7, EQF-3)

Capacity for organisational change

The home care organisation should pay repeated attention to AHMD, e.g. reminders or training repetitions, facilitating the raise and sustainment of awareness.

'After a while, it [attention] becomes less and less, so that, yeah, you kind of forget it again. So perhaps they should pay attention to it more often. (...) For example, once per year some kind of reminder of its use. And that it exists at all, of course.' (R5, EQF-5/6)

A simple and well organised administrative process of requesting (starting) and cancelling (stopping) an AHMD is a facilitator. However, it becomes a barrier in the event of miscommunication with the supplier and delays in delivery.

'We constantly had to call them, and it took three months to deliver the device. (...) They said they were busy and then that the communication had gone wrong. They kept giving different explanations. We almost felt like "whatever, we'll just keep visiting the patient".' (R15, EQF-5/6)

<Table 3>

Discussion

Main findings

A comprehensive overview of 78 determinants (barriers, facilitators or both) to use AHMD, alongside the domains of the TICD Checklist, was developed. Sixty-four determinants (82%) fell within three domains: (1) innovation factors (16 determinants, e.g. the (dis)advantages of using AHMD), (2) individual health professional factors (20 determinants, e.g. knowledge and skills, feeling confident and motivated, and the impact of past experiences) and (3) patient factors (28 determinants, e.g. selecting patients, motivating them and providing instructions and guidance). These domains were identified as highly relevant.

Comparison with literature

Our respondents believe in the concept of AHMD because of advantages like increased self-sustainability and efficiency. Kleiven et al.³⁸ support the finding that patients become less dependent on and less vulnerable to delays in home care. However, our respondents perceive unplanned visits in the event of unanswered alarms as the biggest barrier. This contributes to the claim of Ross et al.³⁹ that e-health systems can disrupt workflows. Our respondents stated that thoroughly assessing patients' eligibility is essential to decrease the need for unplanned visits, with learnability being the key criterion for eligibility.

Guisse et al.⁴⁰ reported that elderly have difficulties coping with technology due to insufficient learnability. The only way they can cope is if the technology is straightforward and familiar^{23,39,40}, but even then, it might not always succeed⁴⁰. The current study found that AHMD are user-friendly, but this does not guarantee success. Thoroughly assessing patients' eligibility remains essential.

We identified lack of knowledge and confidence as barriers, which is supported by prior research^{19,23,38}. According to Nakrem et al.¹⁹, healthcare professionals' insecurity with new technology also negatively affects relationships with patients, who would develop the same sort of insecurity. We support other studies' findings that training³⁹, written instructions⁴¹, hands-on practice with a dummy device⁴⁰ and (phased out) guidance for patients³⁸ are facilitators to gain knowledge and confidence.

We identified two groups of patients. Patients wanting to be independent and appreciating fewer home care visits were also described in other studies^{19,38}. However, patients who resist using AHMD because they deeply value social contact with home care professionals are not reported in prior research. Resistance is attributed to other factors that we also found, like age⁴¹, living conditions⁴¹, health problems⁴¹ or e-health being too complex⁴⁰. A possible explanation is that home care is a structural part of the patients' daily life relatively longer than in other healthcare settings, and patients might experience a stronger social bond with home care professionals.

Strengths and limitations

In qualitative research, a large sample is not necessary. It is essential to have various respondents that represent different perceptions on the use of AHMD. Therefore, a strength of this study is the maximum variation sample.

Member checks and peer reviews were performed to strengthen the trustworthiness of the study. Only four of the thirteen member checks provided additional information, which was included in the analysis. During peer reviews, there were no major discrepancies, and no new determinants arose. Thus, the code tree deemed comprehensive and complete.

Some limitations should be considered. First, respondents were sampled from a single organisation in the South-West of the Netherlands. Sampling respondents from multiple organisations spread over the country would have increased the transferability of the study. Second, few male respondents and no respondents without AHMD experience participated. However, this is expected to be representative of this home care organisation. Third, the perspectives of patients, relatives and informal caregivers are essential, but they were not interviewed. Thus, the findings are limited to the home care providers' perspective of patients, relatives and informal caregivers rather than their own perspectives. Finally, we can not exclude that the fact that the researcher is an employee of the home care organisation influenced the results. However, the researcher was continuously aware of her role by putting her knowledge aside and entering each interview with an open mind (bracketing) and reflecting on her role constantly (reflexivity).

Implications for clinical practice and future research

The determinants (barriers, facilitators or both) found in the current study should be considered when developing tailored implementation strategies for implementing AHMD in home care. To do so, prioritisation of the determinants is essential. Based on how often determinants are coded, we could have roughly estimated which determinants are the most important. However, since it would not be trustworthy, we did not. Further research is recommended to determine the perceived importance of the determinants rigorously and apply a trustworthy prioritisation to the determinants. Moreover, the perspectives of patients, relatives and informal caregivers remain unclear but are crucial when implementing AHMD and should therefore be further investigated.

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Tables

Table 1 Characteristics of the sample population.

Characteristic	Interview participants (N=15)
Gender (female), n	12
Age (yrs), mean (SD)	38.73 (13.26)
Educational level (EQF), n	
EQF-2	2
EQF-3	1
EQF-4	7
EQF-5/6 (district nurse)	5
Years of work experience^a, n	
0-9 years	6
10-29 years	6
30-49 years	3
Number of patients with AHMD, n	
0 patients	0
1-5 patients	10
6-10 patients	4
>10 patients	1

^a Years of work experience was measured as a continuous variable, and then classified into a categorical variable to ensure the anonymity of the respondents.

Table 2 Domains of the TICD Checklist and the numbers of barriers, facilitators and both that were coded within the domain.

TICD Domain	Barriers (n)	Facilitators (n)	Both (n)	Total (n)
Innovation factors	3	6	7	16
Individual health professional factors	3	6	11	20
Patient factors	4	12	12	28
Professional interactions	1	-	5	6
Incentives and resources	-	-	2	2
Capacity for organisational change	1	4	1	6
Social, political and legal factors	-	-	-	-
Total (n)	13	28	37	78

Table 3 Comprehensive overview of the perceived barriers and facilitators, developed by combining all conceptual interview schemes after member check.

TICD domains	Subdomains	Perceived barriers	Perceived facilitators
Innovation factors	(Dis)advantages in practice	<p>Disadvantages:</p> <ul style="list-style-type: none"> • Alarms and required unplanned home care visits <ul style="list-style-type: none"> ○ Frustration (both patient and home care professional), especially when it happens frequently ○ Cause of alarm not always clear before visit ○ Not always a home care professional available for unplanned visits ○ Patients leaving the house without withdrawing medication in advance causes alarms ○ The more patients using AHMD, the more alarms (and unplanned visits) will occur ○ Family picking patients up spontaneously without alerting the home care organisation causes alarms • Having less control <ul style="list-style-type: none"> ○ No guarantee that the patient takes their medication, only that they withdraw them from the device ○ Medication will not be extra checked before intake ○ The device can not be fixated in one place • Patients having less social contact due to fewer home care visits 	<p>Advantages:</p> <ul style="list-style-type: none"> • Some technical issues can be prevented with creative solutions: <ul style="list-style-type: none"> ○ Moving the pills to one side to prevent errors caused by the sensor ○ Adjusting settings (length of sachets) to prevent wrong cuts and pills falling on the floor • Increased quality of life: not having to wait for home care • Increased quality of treatment: taking medication at exact time of prescription • The device pre-opens the sachets (suitable for patients who cannot open packages) • Increased self-sustainability • Home care organisation is alerted when medication is not being withdrawn: safety net for patients • The ability to adjust distribution times to adjust to the daily life of the patient

TICD domains	Subdomains	Perceived barriers	Perceived facilitators
		<ul style="list-style-type: none"> • Maximum of six withdrawals per day 	
	Accessibility	<ul style="list-style-type: none"> • Involvement of home care is required but not always desired • Display not readable for all patients, sound not hearable for all patients, no light signals available in current AHMD model 	<ul style="list-style-type: none"> • Stable internet connection through SIM-card • New AHMD model combines sound and light signals
	Attractiveness	<ul style="list-style-type: none"> • Look of the device is technical (a square device with multiple buttons) 	<ul style="list-style-type: none"> • Look of new model device is improves: less technical looking (an analog clock with only one large button on top)
	Preconditions	<ul style="list-style-type: none"> • Some preconditions are beyond the influence of home care professionals, e.g. housing, server connections and supplying processes 	<ul style="list-style-type: none"> • The device will be a success if all preconditions are met, e.g. suitability of the patient, simple manual included, external factors like housing and server connections. 'It is a great system when it is successful' • Home care professionals need to be able to trust that the device works properly
	Credibility		<ul style="list-style-type: none"> • All respondents believe in the concept of AHMD: 'it is a great invention'
	Efficiency in home care	<ul style="list-style-type: none"> • Efficiency will not be reached if extra visits remain needed, e.g. when a patient situation has changed since the start of AHMD use, and suitability has not been re-assessed • In the case of many required unplanned visits due to alarms, home care professionals experience less efficiency in home care 	<ul style="list-style-type: none"> • Increased efficiency in home care because fewer home care visits are needed • In the case of required unplanned visits due to alarms: the absolute number of home care visits still weighs out the number of visits that would be needed without the AHMD
	Feasibility	<ul style="list-style-type: none"> • Digitalisation is perceived as too complex for patients 	<ul style="list-style-type: none"> • The device is simple and easy to use

TICD domains	Subdomains	Perceived barriers	Perceived facilitators
	Not portable	<ul style="list-style-type: none"> Patients leaving the house without withdrawing medication in advance causes alarms 	<ul style="list-style-type: none"> The ability to withdraw medication in advance to take with them when patients leave the house
Individual health professional factors	Cognitions (including attitudes)	<p>Visions on e-health</p> <ul style="list-style-type: none"> Fear of e-health taking over their job Risk of coming across as complex and technical <p>Feeling competent and confident</p> <ul style="list-style-type: none"> Not feeling confident might cause panic, which demotivates patients and home care professionals to use AHMD <p>Feeling frustrated</p> <ul style="list-style-type: none"> Having an insufficient level of patience: wanting to see results immediately after the start of AHMD Alarms cause frustration in both patient and home care professional, especially when it happens frequently 	<p>Visions on e-health</p> <p>Intention and motivation</p> <ul style="list-style-type: none"> Home care professionals should feel the urgency to use AHMD YouTube videos of home care patients using AHMD stimulate motivation to use AHMD Feeling competent and confident stimulates the motivation to use AHMD
	Knowledge and skills	<p>Awareness and familiarity</p> <ul style="list-style-type: none"> Not all colleagues know about AHMD When AHMD are not used regularly, awareness decreases Knowledge of seconded employees is insufficient <p>Training</p> <ul style="list-style-type: none"> Mandatory e-learning is already being used often, which causes resistance 	<p>Awareness and familiarity</p> <ul style="list-style-type: none"> Promoting the awareness and use of AHMD with internal publicity, discussing them, making home care professionals curious about them <p>Training</p> <ul style="list-style-type: none"> Group meetings, teams mixed Using a dummy device to practice with Coaching each other on the job YouTube videos E-learning <ul style="list-style-type: none"> Mandatory to ensure participation Not mandatory, but as a reference when needed/desired

TICD domains	Subdomains	Perceived barriers	Perceived facilitators
			<ul style="list-style-type: none"> • Using tools: step-by-step instruction cards, detailed protocol • Current administrative processes are clearly structured • Making information available for seconded employees by instructions on paper or through a link in the digital care plan • Having a point of contact for asking questions
	Professional behaviour	<ul style="list-style-type: none"> • Making a number of team members responsible for the use of AHMD, but not involving all team members in the process <p>Impact of past experiences</p> <ul style="list-style-type: none"> • Negative experiences demotivate home care professionals to use AHMD 	<ul style="list-style-type: none"> • Respecting the elderly while discussing AHMD with them <p>Impact of past experiences:</p> <ul style="list-style-type: none"> • Positive experiences motivate home care professionals to use AHMD • Sharing positive experiences with other home care professionals • Starting off with a maximum chance of positive experience: selecting an obviously suitable patient, e.g. a patient with high levels of learnability and motivation
Patient factors	Anxiety or panic	<ul style="list-style-type: none"> • Alarms and unplanned visits by home care can cause distress in the patient • When alarms happen often, the patient will lose confidence and not want AHMD anymore • Patients will feel panic if home care professionals are not confident 	
	Concerns	<ul style="list-style-type: none"> • Patients can be too fixated on the beeping device and withdrawing their medication as quickly as possible, which increases the risk of falling 	<ul style="list-style-type: none"> • Home care professionals can help patients with their concerns by having a decent conversation about them and giving them proper instructions

TICD domains	Subdomains	Perceived barriers	Perceived facilitators
		<ul style="list-style-type: none"> • Patient sometimes think in advance that they cannot do it, because they think it is too technical for them 	
	Family and informal caregiver(s)	<ul style="list-style-type: none"> • Concerns of family may demotivate the patient to use AHMD • Insufficient level of knowledge of family and informal caregivers may raise concerns with them • Family picking patients up spontaneously without alerting the home care organisation causes alarms 	<ul style="list-style-type: none"> • Involving family or informal caregiver(s) throughout the process before and during the use of AHMD • Providing family with a sufficient level of knowledge by providing instructions (oral, video and on paper)
	Selecting patients	<ul style="list-style-type: none"> • Suitability criteria are not always clear • Not all home care professionals know about the existing patient selection tool • Cognitive impairment might be a risk <ul style="list-style-type: none"> ○ Insufficient ability to learn how to use AHMD (learnability) ○ Daily structure is provided with frequent home care visits, which are less when AHMD are used • Patients being nonadherent on purpose • Patients being familiar with medication abuse • Patients rejecting support with medication intake • Patients often being away from home • Patients also having other care: no 'extra' visit needed to hand out medication 	<ul style="list-style-type: none"> • Patients being able to learn how to use the AHMD (learnability) • Patients forgetting medication by accident, but wanting to be adherent • Patients currently being reminded through phone call or alarm clock • A patient selection tool is available. Using the selection tool helps selecting theoretically eligible patients, but the final decision in selecting a patient is tailored • Using incident reports about forgetting medication intake
	Patient motivation	<ul style="list-style-type: none"> • Technology might come across as scary, e.g. difficult words, multiple institutions involved, thick manual 	<ul style="list-style-type: none"> • Emphasising the advantages and importance

TICD domains	Subdomains	Perceived barriers	Perceived facilitators
		<ul style="list-style-type: none"> • Vision that home care professionals should not tell the elderly how to live their lives 	<ul style="list-style-type: none"> • Explaining the possibility to try it without obligations; there is a way back if needed • Explaining the need for efficiency in home care, endorsed by health insurance companies • A relationship of trust between patient and home care professional • Using YouTube videos for demonstration • Information material, e.g. brochures • Home care professionals being enthusiastic themselves
	Needs and wishes		<ul style="list-style-type: none"> • Increasing confidence by providing them with guidance, that phases out depending on whether the AHMD is being used successfully • Simplified instructions, preferably delivered by the supplier • Using tools: step-by-step instructions, YouTube videos • Having a point of contact for asking questions • Explaining the need for patience, e.g. it takes some time to get used to, do not give up immediately • Re-assessing suitability regularly
	Opinions and experiences	<ul style="list-style-type: none"> • Having seen patients who are unhappy and disappointed about AHMD, due to negative experiences 	<ul style="list-style-type: none"> • Having seen patients currently using AHMD and being happy and satisfied about it (positive experiences)
Professional interactions	Collaboration and support	<p>Internal collaboration</p> <ul style="list-style-type: none"> • COVID-19 restrictions <p>External collaboration</p>	<p>Internal collaboration:</p> <ul style="list-style-type: none"> • Supporting each other in the case of alarms (unplanned visits)

TICD domains	Subdomains	Perceived barriers	Perceived facilitators
		<ul style="list-style-type: none"> Adjusted medication sachets are required (collaboration with pharmacies) Awareness: not all pharmacies and general practitioners know about AHMD 	<ul style="list-style-type: none"> The use of AHMD should be widely supported among the home care professionals Not only involve home care professionals and patients, but also the department that receives the alarms from the device <p>External collaboration:</p> <ul style="list-style-type: none"> Start using AHMD at an earlier stage, before home care is involved, will prevent patients from needing more support from home care later on
	Communication	<ul style="list-style-type: none"> Patients or family do not always contact home care professionals when they leave the house, which might cause alarms when the AHMD distribution is not cancelled in time 	<ul style="list-style-type: none"> Communicating a uniform message towards patients
	Involving whole team (signalling role)		<ul style="list-style-type: none"> Involving the whole team in the process of using AHMD, e.g. having a signalling and advising role
	Medido Helpdesk	<ul style="list-style-type: none"> Contacting the Medido Helpdesk takes time, which sometimes causes delay in planned care visits 	<ul style="list-style-type: none"> The Medido Helpdesk is available 24/7 and are helpful and friendly Some home care professionals wish to be able to solve problems themselves, without having to call the helpdesk, e.g. adjusting settings or distribution times
Incentives and resources	Financial (dis)incentives	<ul style="list-style-type: none"> Costs of implementation Financial situation of the home care organisation currently has priority over implementation of AHMD 	<ul style="list-style-type: none"> No financial costs for patients because due to full refund by health insurance companies Sufficient amount of time should be made available
	Quality and safety assurance	<ul style="list-style-type: none"> Patients pulling the sachets from the device before the device cuts them off causes safety and technical issues 	<ul style="list-style-type: none"> Home care as a backup Well-functioning device

TICD domains	Subdomains	Perceived barriers	Perceived facilitators
Capacity for organisational change	Leadership		<ul style="list-style-type: none"> • No more loose medication sachets lying around the house • Appointing a group of super users to share positive experiences and answer questions (experience experts) • Managers giving direction towards using AHMD more Providing clarity <ul style="list-style-type: none"> • Where to ask which questions? • Administrative processes
	Priority of necessary changes	<ul style="list-style-type: none"> • Financial situation of the home care organisation currently has priority over implementation of AHMD • Another e-health implementation is currently in progress • COVID-19 restrictions • History: previous implementations were started in the home care organisation without proper attention for sustainability 	
	Registration and deregistration	<ul style="list-style-type: none"> • No confirmations and status reports from the supplier • Delivering and retrieving devices sometimes take too long, e.g. incidentally a few months 	<ul style="list-style-type: none"> • Current administrative processes are clearly structured
	Repeated attention		<ul style="list-style-type: none"> • The organisation should pay repeated attention to raise and sustain awareness (e.g. evaluation, inquiry, repeated training)

Additional files

Supplementary Table 1 COREQ Checklist

No.	Item	Applicability to this study	Location in thesis
Domain 1: Research team and reflexivity			
Personal Characteristics			
1.	Interviewer/facilitator	CM	Title page – 1
2.	Credentials	None	Title page – 1
3.	Occupation	Home care manager in traineeship	-
4.	Gender	Female	-
5.	Experience and training	The current study is the master thesis for graduation of Clinical Health Sciences at Utrecht University.	Title page – 1
Relationship with participants			
6.	Relationship established	Some, but not all, respondents have been met before or familiar, but respondents with whom a direct working relationship existed were excluded from recruitment.	-
7.	Participant knowledge of the interviewer	Respondents were briefed on the purpose of the study and understood that it was the graduation study for CM. Some, but not all, respondents were familiar with CM (occupation and prior occupation). Ethical approval had been granted, respondents reviewed the information documentation prior to giving their written informed consent to participate.	(Partly) Method, Procedures/Ethical issues – 6-7
8.	Interviewer characteristics	CM is a manager in traineeship within the same home care organisation, which was a potential source of bias.	Discussion – 13
Domain 2: Study design			
Theoretical framework			
9.	Methodological orientation and Theory	Data collection: Topic list based on Tailored Implementation for Chronic Diseases (TICD) Checklist.	Method – 6-7

No.	Item	Applicability to this study	Location in thesis
Data analysis: Deductive content analysis using the TICD Checklist.			
Participation selection			
10.	Sampling	Purposive.	Method, Population & domain – 5
11.	Method of approach	Managers were asked by email to provide contact information of eligible respondents. A selection was made based on maximum variation factors and invitations (including information documentation and informed consent letter) were sent by email.	Method, Procedures – 6
12.	Sample size	Fifteen.	Results – 8
13.	Non-participation	Three. Reasons: holiday (1), personal reasons (1), unknown (1).	Results – 8
Setting			
14.	Setting of data collection	Digitally using online video conferencing software (Microsoft Teams).	Method, Data collection – 6
15.	Presence of non-participants	No	-
16.	Description of sample	Mean age: 38.7 (SD 13.3) Three female. Educational level range: EQF 2 – EQF 6 Work experience: 0-4 years (n=2), 5-9 years (4), 10-19 years (4), 20-29 years (2), 30-39 years (2) and 40-49 years (1). AHMD experience: 0 patients (0), 1-5 patients (10), 6-10 patients (4) or more than ten patients (n=1).	Results – 8
Data collection			
17.	Interview guide	Interviews were semi-structured using an interview guide (Additional File 1). Follow-up questions were allowed and probes were used if needed. The	Method, Data collection – 6

No.	Item	Applicability to this study	Location in thesis
		interview guide was pilot tested; no changes were necessary and the interview was included for analysis.	
18.	Repeat interviews	No.	-
19.	Audio/visual recording	All interviews were audio and video recorded.	Method, Data collection – 6
20.	Field notes	Field notes were included in memos after conducting the interview.	Method, Study rigour – 8
21.	Duration	The mean duration of the interviews was 50.4 minutes (range 39–72).	Results – 9
22.	Data saturation	Thematic saturation was reached after thirteen interviews. Two more interviews were conducted to ensure that no new themes emerged.	Results – 9
23.	Transcripts returned	No.	-
Domain 3: Analysis and findings			
Data analysis			
24.	Number of data coders	CM coded all interviews. Additionally, two independent researchers coded two randomly selected interviews (four in total) for peer reviewing.	Method, Study rigour – 7
25.	Description of the coding tree	Yes.	Supplementary Table 2
26.	Derivation of themes	The domains of the TICD Checklist were used as themes. Subsequently, within the domains, themes were derived from the data.	Method, Data analysis – 7
27.	Software	NVivo 12.	Method, Data analysis – 7
28.	Participant checking	After analysing an interview, a conceptual interview scheme was developed with preliminary results: the determinants mentioned by the respondent. These schemes were sent to the respondent to provide written feedback. Two respondents did not provide feedback after three reminders.	Method, Study rigour – 7
Reporting			
29.	Quotations presented	Yes.	Results – 8-12

No.	Item	Applicability to this study	Location in thesis
30.	Data and findings consistent	Yes	-
31.	Clarity of major themes	Yes	-
32.	Clarity of minor themes	No. Further prioritisation is needed.	Discussion - 14

Additional File 1 Interview guide

Introduction:

- Thanking the respondent for participation.
- Introducing myself and the study aim.
- Does the respondent have any questions? Answer them.
- The respondent may decide to withdraw at any time.
- Check whether informed consent was received correctly.
- Time indication (± 45-60 minutes).

Topics:

Demographics

- Age.
- EQF-level and occupation.
- Geographic area of operation.
- Years of work experience.
- Total number of patients using AHMD (currently or in the past).

Experience

- What is your experience with AHMD?
Probes: opinions, (dis)advantages, feasibility/credibility/accessibility/attractiveness, concerns.
- What do patients and their family/informal caregivers think about AHMD?
Probes: needs, wishes, how to motivate them.

Implementation

- Can you tell me about the implementation of AHMD in your team?
Probes: what went well, what did not go well, influences (organisation, network, opinions of colleagues, influential people), leaders/managers.

Needs

- What do you need as a home care professional to work with AHMD successfully?
Probes: knowledge, skills, confidence.
- What does your team need to work with AHMD successfully?
Probes: collaboration, feedback and monitoring, good example.
- What do patients and their family/informal caregivers need to use AHMD successfully?
Probes: needs, wishes, knowledge and skills.

- What is needed from the home care organisation?
Probes: finances (insurance companies, indications, resources, technical support), non-financial (staff, appreciation, training, management).

Closing the interview:

- What are factors for success or failure in the use of AHMD, relevant for daily practice, that we have not yet discussed?
- Explaining how information will be processed.
- Asking whether respondent wants to participate in member check.
- Asking whether respondent wants to be updated about the results of the study.
- Thanking respondent again.

Supplementary Table 2 The final code tree including explicating descriptions per code. The TICD Checklist was used as a basis, and the code tree was constantly developed during data analysis.

Name	Description
1) Innovation factors	CATEGORY. The first domain of the TICD Checklist is 'guideline factors'. For this study, this domain is supplemented with the innovation factors of Wensing and Grol. The determinants within this domain are: advantages in practice, feasibility, credibility, accessibility, and attractiveness. The nodes within this category are deduced from this framework, but are fitted to the current study.
(Nadelen) Disadvantages in practice	SUBCATEGORY. The disadvantages of AHMD in daily practice.
Alarms + Unplannable visits	When a patient does not take out his/her medication, an alarm signal will be received by the home healthcare service. Alarms are also given in case of technical issues with the AHMD. This node is for quotes about alarms and the actions that home healthcare professionals have to undertake when this happens.
Having less control	This node is for quotes about respondents describing that a having less control in the situation is a disadvantage of using AHMD, or even a reason not to use them.
Less social contact	This node is for quotes about patients having less social contact being a disadvantage of AHMD, because home healthcare professionals visit the patient less often.
(Voordelen) Advantages in practice	SUBCATEGORY. The advantages of AHMD in daily practice.
Creative solutions	Some disadvantages are solved using creative solutions, as mentioned by home healthcare professionals. What are those solutions?
Quality of life	This node is for quotes about the influence that AHMDs have on quality of life of patients.
Quality of treatment	This node is for quotes about the influence of AHMD on the quality of treatment with medication.
Sachets are cut open	This node is for quotes about the ability of AHMD to cut open sachets, as an advantage for patients who are unable to open sachets themselves.
Self-sustainability	This quote is for nodes about the influence of AHMDs on the self sustainability of patients.
Accessibility	This node is for quotes about the accessibility of AHMDs.
Home healthcare required	AHMDs are currently only available when applied for by a home healthcare service. The home healthcare service is required to stay involved in using the AHMD. This node is for quotes about the consequences of this requirement and suggestions that home healthcare professionals bring up about this subject.

Name	Description
Attractiveness	This node is for quotes about the attractiveness of the AHMD dispenser.
Conditions	This node is for quotes about the conditions that must be met for AHMD to be a success.
Credibility	This node is for quotes about the credibility of AHMD. Do home healthcare professionals believe in the concept of AHMDs?
Efficiency in home healthcare	This node is for quotes about efficiency in home healthcare when using AHMD.
Feasibility	This node is for quotes about feasibility of AHMD.
Not portable (but early take-out possibility)	This node is for quotes about the disadvantage that the AHMD is not portable. When patients leave the house, the machine can not be taken with them, which might cause alarms.
2) Individual health professional factors	CATEGORY. The second domain of the TICD Checklist is 'individual health professional factors'. There are three subdomains within this domain, each having their own determinants: knowledge and skills, cognitions (including attitudes) and professional behaviour. The nodes within this category are deduced from this framework, but are fitted to the current study.
Cognitions (including attitudes)	First subdomain of the 'individual health professional factors'.
Feeling competent and confident	This node is for quotes about the need to feel competent and confident to work with AHMD successfully.
Feeling frustrated	This node is for quotes about home healthcare professionals feeling frustrated about working with AHMD, e.g. because of required unplanned visits.
Intention and motivation	This node is for quotes about the intention and motivation to use AHMD in daily practice.
Visions	SUBCATEGORY. How do home healthcare professionals view these underlying subjects?
Vision on AHMD	Do home healthcare professionals agree with the use of AHMD? Do they believe that it will lead to desired outcomes?
Vision on eHealth (in general)	How do home healthcare professionals view eHealth in general?
Knowledge and skills	Second subdomain of the 'individual health professional factors'.
Awareness and familiarity	This node is for quotes about being aware and familiar with AHMD and quotes about how to increase awareness and familiarity.
Clarity	SUBCATEGORY. This node is for quotes about the need for clarity about explicit agreements, who to contact for questions, et cetera.

Name	Description
Administration	This node is for quotes about the administrative actions required to work with AHMD successfully. For example: registering the use of AHMD in the file of the patient.
Make it simple (HCP)	This node is for quotes about the need to minimise the complexity of information, introduction and instruction for home healthcare professionals.
Point of contact for questions	This node is for quotes about the need for home healthcare professionals to have a point of contact for asking questions.
Products and tools (HCP)	This node is for quotes about products and tools that could be developed to help home healthcare professionals work with AHMD successfully.
Sustainability	This node is for quotes about how to optimise the sustainability of the implementation of AHMD in home healthcare.
Training	SUBCATEGORY. This node is for quotes about the training needed to optimise the knowledge and skills of home healthcare professionals to work with AHMD successfully. This subcategory contains specific nodes, but may also be used to code meaning units that do not fit these specific nodes.
AHMD dummy for practice	This node is for quotes about the need to practice with a (dummy) AHMD before implementing the device with their patients.
Coaching on the job	This node is for quotes about colleagues coaching each other in daily practice.
E-learning	This node is for quotes about using e-learning(s) to train home healthcare professionals.
Learning from others' experiences	This node is for quotes about exchanging experiences with colleagues and discussing how they work with AHMD.
Professional behaviour	Third subdomain of the 'individual health professional factors'.
(Impact of) past experiences	This node is for quotes about the way that past experiences influence the way home healthcare professionals work with AHMDs.
3) Patient factors	CATEGORY. The third domain of the TICD Checklist is 'patient factors'. Determinants within this domain are: needs, beliefs and knowledge, preferences, motivation and behaviour. The nodes within this category are deduced from this framework, but are also fitted to the current study.
Anxiety or panic	This node is for quotes about patients possibly having anxiety or panic due to the use of AHMD.
Concerns	This node is for quotes about concerns patients may have about AHMD.
Family and informal caregivers	This node is for quotes about the role of family members and/or informal caregivers.

Name	Description
Family's opinions and experiences	This node is for quotes about family's opinions/experiences and the way that influences the degree of success in using AHMD.
Involving family	This node is for quotes about the need to involve family and informal caregivers throughout the process of selecting the patient, motivation and instruction.
Needs and wishes	SUBCATEGORY. What do patients need to use AHMDs successfully? What are their demands and wishes?
(Phasing out) guidance	This node is for quotes about the need to guide patients using the AHMD and gradually phasing out this guidance.
Evaluation	This node is for quotes about the need to keep evaluating the use of AHMD to see whether the benefits still outweigh the risks.
Feeling confident	This node is for quotes about the need for patients to feel confident, in order to use AHMD successfully.
Keep or make it simple (patient)	This node is for quotes about the need to minimise the complexity of information, introduction and instruction for patients, and also the need for simplicity of the (use of the) device.
Knowledge and instructions	SUBCATEGORY. This node is for quotes about the needed knowledge and skills, and therefore instructions, for the patient.
Products and tools (patient)	This node is for quotes about products and tools that could be developed to help patients work with AHMD successfully.
YouTube videos	This node is for quotes about home healthcare professionals using YouTube videos to inform and instruct patients about AHMD.
Who to call for questions	This node is for quotes about the need for patients to know who to call when they have questions about their AHMD.
Opinions and experiences	How do patients experience the use of AHMD?
Patient motivation	SUBCATEGORY. How do healthcare professionals get patients to want to try an AHMD?
Explaining advantages	This node is for quotes about home healthcare professionals explaining the advantages of using AHMD to motivate their patients to try and use an AHMD.
Relationship of trust	This node is for quotes that describe how a relationship of trust between patient and home healthcare professional influences the way patients are motivated to use AHMD.
Trying without obligations	This node is for quotes about home healthcare professionals explaining that it is free of obligations to try an AHMD to motivate patients to start trying an AHMD.
Selecting patients	SUBCATEGORY. How do home healthcare professionals determine the suitability of AHMD for their patients? Which kind of patients do (not) benefit from AHMD?

Name	Description
Away from home	This node is for quotes about the consequences of patients going away from home (e.g. for a walk, or having diner with family) while using an AHMD.
Combination with other care	This node is for quotes about patients having other care, besides medication support and whether home healthcare professionals would choose to use AHMD or not in this case.
Forgetting medication	This node is for quotes about patients forgetting their medication and the way AHMDs are suitable for those patients.
Knowing the patient, tailored decision	This node is for quotes about the importance to know the patient when selecting for AHMD. Making a tailored decision in selecting patients.
Learnability	This node is for quotes about the precondition that patients should be able to learn new skills (like handling the buttons of the AHMD) for them to work with AHMDs successfully.
Cognitively impaired	This node is for quotes about patients that are cognitively impaired. For example: patients with dementia or amnesia.
Nonadherent on purpose	This node is for quotes about patients being nonadherent on purpose, and therefore using an AHMD might not be appropriate.
Patient selection tool	This node is for quotes about the existing patient selection tool and whether respondents are familiar with the tool.
4) Professional interactions	CATEGORY. The fourth domain of the TICD Checklist is 'professional interactions'. Determinants within this domain are: communication and influence, team processes and referral processes. The nodes within this category are deduced from this framework, but are also fitted to the current study.
Collaboration and support	SUBCATEGORY. This node is for quotes about the need for sufficient collaboration. A difference is made between internal and external collaboration.
External collaboration	Collaboration with other organisations, like pharmacies and general practitioners.
Internal collaboration	Collaboration within the home healthcare teams or service, including temporary workers.
Communication	This node is for quotes about communication that is needed to work with AHMDs successfully. For example: the way the home healthcare service informs the teams about the implementation, the way home healthcare professionals can ask questions they may have after the training has been finished, et cetera.
Involving whole team (signaling role)	The district nurse (EQF 5-6) fulfill a leading role in coordinating home healthcare and determining which interventions are needed. However, their colleagues might be able to fulfill a signaling role when it comes to AHMDs, for example in signaling and telling the district nurse whether a patient might benefit from AHMDs since district nurses don't visit all patients very often. In short: this node is for quotes about team members being the eyes and ears of district nurses and the way they can be involved.

Name	Description
Medido Helpdesk	The organisation that offers support via telephone, and sets up all settings at a distance. The phone number is written on every AHMD.
Too much time, wish to do it themselves	Some settings can not be adjusted by the home care professionals, but the Medido Helpdesk must be called. They can adjust the settings at a distance. However, sometimes it is mentioned that it takes too much time to call them, and some respondents wish they would be able to adjust the settings themselves.
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5) Incentives and resources	CATEGORY. The fifth domain of the TICD Checklist is 'incentives and resources'. Determinants within this domain are: availability of resources, financial (dis)incentives, nonfinancial (dis)incentives, information system, quality assurance, continuing education system and assistance for clinicians. The nodes within this category are deduced from this framework, but are also fitted to the current study.
Financial (dis)incentives	This node is for quotes about financial considerations.
Quality and safety assurance	This node is for quotes about the quality and safety of AHMDs.
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6) Capacity for organisational change	CATEGORY. The sixth domain of the TICD Checklist is 'capacity for organisational change'. Determinants within this domain are: mandate/authority/accountability, leadership, strength of supporters and opponents, regulations/rules/policies, monitoring/feedback, assistance for organisational changes. The nodes within this category are deduced from this framework, but are also fitted to the current study.
Leadership	Who should be in a leading position when implementing AHMDs? What kind of leadership is needed to work with AHMDs successfully?
Direction from manager	This node is for quotes about leadership in the way of managers giving direction towards using AHMD more.
Superuser	This node is for quotes about providing leadership by home healthcare professionals as 'superusers'.
Priority of necessary changes	This node is for quotes about setting priorities when implementing AHMDs. For example: timing the implementation, taking other projects into account, et cetera.
Registration and deregistration	The process of requesting an AHMD for a new client, or stopping the use of an AHMD. This node also includes quotes about delivering and returning AHMDs.
Repeated attention	This node is for quotes about the need to have repeated/continuous attention for working with AHMDs to keep it current.
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7) Social, political and legal factors	CATEGORY. The fourth domain of the TICD Checklist is 'social, political and legal factors'. Determinants within this domain are: economic constraints on healthcare budget, contracts, legislation, payer or funder policies, malpractice liability, influential people, corruption, political stability. The nodes within this category are deduced from this framework, but are also fitted to the current study.

Supplementary Table 3 Code tree converted into an overview of determinants (barriers, facilitators or both).

Domain	Determinant	Barrier	Facilitator
Innovation factors			
	Disadvantages in practice		
	Alarms + Unplannable visits	B	
	Having less control of the situation	B	
	Patients having less social contact	B	
	Advantages in practice		
	Possibility to solve problems with creative solutions		F
	Increase in quality of life, e.g. not having to wait for home care visits		F
	Increase in quality of treatment due to taking medication at prescribed times		F
	Sachets are pre-opened		F
	Increase in self-sustainability		F
	Accessibility	B	F
	Home care is required	B	F
	Attractiveness	B	F
	Conditions for success	B	F
	Credibility, e.g. whether the respondent believes in the concept of AHMD		F
	Efficiency in home care	B	F
	Feasibility, e.g. ease of use or placement in homes	B	F
	AHMD not being portable, but early withdrawal of sachets is possible.	B	F
.....			
Individual health professional factors			
	Cognitions (including attitudes)		
	Feeling competent and confident	B	F
	Feeling frustrated	B	
	Intention and motivation	B	F
	Visions		
	Vision on AHMD	B	F
	Vision on eHealth (in general)	B	F

Domain	Determinant	Barrier	Facilitator
	Knowledge and skills	B	F
	Awareness and familiarity	B	F
	Clarity	B	
	About administration	B	
	Making it simple for home care professionals	B	F
	Having a point of contact for asking questions		F
	Having and using products and tools for home care professionals		F
	Attention for sustainability of implementation	B	F
	Training		F
	Having an AHMD dummy for practice		F
	Coaching on the job		F
	E-learning	B	F
	Learning from others' experiences		F
	Professional behaviour	B	F
	(Impact of) past experiences	B	F
<hr/>			
Patient factors			
	Anxiety or panic, e.g. when alarms occur	B	
	Concerns	B	
	Family and informal caregivers	B	F
	Family's opinions and experiences and their influence on whether using AHMD will be successful	B	F
	Involving family in the process before and during the use of AHMD	B	F
	Needs and wishes of the patient		F
	(Phasing out) guidance		F
	Constant evaluation of the use of AHMD		F
	Patient feeling confident	B	F
	Keeping or making it simple for the patient		F
	Knowledge and instructions		F
	Using products and tools for the patient		F
	Using YouTube videos		F

Domain	Determinant	Barrier	Facilitator
	Having a point of contact for patients to ask questions		F
	Opinions and experiences of patients	B	F
	Needs to motivate patients	B	F
	Explaining the advantages of AHMD		F
	Knowing the patient and having a relationship of trust		F
	Trying without obligations: ensuring that there is a way back		F
	Selecting patients	B	F
	Patients going away from home frequently	B	F
	Patients also having other care (combining with AHMD)	B	F
	Patients who forget medication	B	F
	Knowing the patient, selecting is a tailored decision		F
	Learnability: the ability to learn how to use AHMD	B	F
	Cognitively impaired patients	B	
	Patients who are nonadherent on purpose	B	
	Using the existing patient selection tool	B	F
<hr/>			
Professional interactions			
	Collaboration and support		
	External collaboration (e.g. with general practitioners and pharmacies)	B	F
	Internal collaboration (e.g. with colleagues)	B	F
	Communication, e.g. email	B	F
	Involving the whole team, e.g. having a signaling role	B	F
	Helpdesk of the AHMD supplier	B	F
	Contacting them takes too much time, home care professionals want to solve problems on their own	B	
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Incentives and resources			
	Financial (dis)incentives	B	F
	Quality and safety assurance	B	F
<hr/>			
Capacity for organisational change			
	Leadership		F
	Managers giving direction		F

Domain	Determinant	Barrier	Facilitator
	Involving superusers		F
	Priority of necessary changes	B	
	Registration and deregistration of AHMD	B	F
	The organisation paying attention to AHMD repeatedly		F

Supplementary Table 4 Audit trail containing memos about context, observations and methodological choices

Date	Subject	Memo
02-02-2021	PIF + IC	Information letter (PIF) written following the CCMO format. Informed consent (IC) letter added to the information letter. Sent to supervisor for feedback.
14-02-2021	PIF + IC	Received and processed supervisor's feedback. The information letter was too extensive. Supervisor advises to simplify the letter by not using the CCMO format. Besides, BAFDIS does not target patients, but caregivers. Following this advise, I have processed all important information from the prior version in a simplified version. This version fits the target population in a better way.
16-02-2021	PIF + IC	Supervisor gives green light for the use of the PIF and IC form.
17-02-2021	Recruitment	<p>Today, recruitment of respondents started as described in the research proposal.</p> <p>First, I looked up which teams use the most, a few and no AHMD's using the Medido Portal of the home healthcare service (maximum variation factor: experience with AHMD's). For recruiting potential respondents, I selected six managers to provide names: two managers whose teams use the most AHMD's (6 and 7), two managers whose teams use a few AHMD's (1 or 2) and two managers whose teams don't use AHMD's.</p> <p>Every manager has teams in a specific geographic area of the South West of the Netherlands. By selecting six different managers, variation in geographic area is guaranteed.</p> <p>I developed a fillable respondents list in Excel. The managers were asked by email to fill in the Excel form within a week. When the list is completely filled in, a selection based on all maximum variation factors will be made.</p> <ul style="list-style-type: none">• Name of potential respondent• Function (EQF-level). Each manager was asked to provide two names per function<ul style="list-style-type: none">• 2x Helpende Plus (EQF-2)• 2x Verzorgende (EQF-3)• 2x Verpleegkundige in de wijk (EQF-4)• 2x Wijkverpleegkundige (EQF-5/6)• Team name• Age category (18-24, 25-29, 30-39, 40-49, 50-59, 60-67 years)• Work experience category (0-4, 5-9, 10-19, 20-29, 30-39, 40-49 year)

Date	Subject	Memo
24-02-2021	Reminder recruitment	I have sent a reminder by email to the managers that have not yet filled in the Excel respondents list. One manager asked whether the time the caregivers will need for the interview is declarable. I have consulted the director of home healthcare of the home healthcare service and received permission to declare the needed hours. Together, we are figuring out whether these hours can be financed by the SET subsidy the organisation has received for AHMD's among others.
01-03-2021	Recruitment	<p>I contacted the managers that have not yet filled in the Excel respondents list by phone to fill it in together. One manager promises me to provide the names on Wednesday (two days from now). I've scheduled a telephone appointment to fill it in together.</p> <p>Today I've also started selecting respondents and inviting them. I want to invite 13 respondents (12 interviews + 1 check interview). I've reserved two blank spots for the manager that has not yet provided names, so 11 respondents were selected with maximum variation in the predetermined factors. These respondents were invited by email, the PIF+IC was sent as attachment. I asked them to reply within one week if they want to participate, and to send a signed informed consent form if they do.</p>
02-03-2021	Interview 1	Conducted the first interview. This is also a test interview, to test the interview guide and my interviewing competences. The interview went well. When technical sound issues appeared, they were fixed by restarting Microsoft Teams. The recording then existed out of two videos, but this was fixed by pasting them together. The interview guide was helpful.
02-03-2021	Recruitment	Two respondents have already sent a signed IC form, so interviews are planned with them. Interview 1: Today! (2-3-2021) Interview 2: Friday 5-3-2021
03-03-2021	Transcriberen interview 1	<p>I've decided to use F4transkript for transcribing the interviews. I still have to type the entire text myself, but the program helps by providing shortcuts for rewinding (F3), pause/play (F4) and forward (F5). It also automatically switches speakers and inserts timestamps.</p> <p>I've sent the transcript to my supervisor for feedback. In my opinion, this test interview should be included in analysis because it contains useful data.</p>

Date	Subject	Memo
03-03-2021	Recruitment	I phoned the last manager to fill in the Excel respondents list together. After this phone call, the respondents list is complete! Two male respondents are selected, since only one other male caregiver was provided by the managers. After I invited these two respondents, my targeted 13 respondents are all invited. When they send me their informed consent, an interview can be planned.
04-03-2021	Recruitment	A few more IC forms have been received. Options for dates for the interview are sent to the respondents.
04-03-2021	E-mail contact with supervisor	Today, I received feedback from my supervisor about the first transcript. My supervisor agrees to include the interview in the data analysis.
05-03-2021	Interview 2	Conducted the second interview. Again, the interview guide was helpful and the interview contains useful information. No technical issues appeared.
05-03-2021	Transcribing interview 2	I transcribed the entire interview with the help of F4transkript. I sometimes caught myself asking steering closed questions. When I did, I wrote it down in the comment-section as self-reflection. This way, the feedback is included in the transcripts in a traceable way and I can improve my interviewing skills.
05-03-2021	Recruitment	Again, IC forms have been received and interviews are being planned. At this point, four interviews are planned and eight IC forms have been received.
08-03-2021	Recruitment	Four potential respondents who have been asked to participate have not yet responded on my email. In the first email, I asked to respond within a week, which is over today. Therefore, I sent a reminder via email asking to respond by Wednesday at the latest (two days from now). I also announced that they will receive a phone call if they have not responded by then. Next to the email, I've sent a so-called ONS-message. ONS is the electronic patient file system in which caregivers can also communicate with each other. This way, the potential respondents are contacted in multiple ways.
08-03-2021	Interview 3	Today I've interviewed the third respondent. The interview went well. Interview guide was helpful. Information that was new in prior interviews have been checked in this interview.
09-03-2021	Transcribing interview 3	Interview 3 was transcribed using F4transkript. Reflective points were added in the transcript.

Date	Subject	Memo
10-03-2021	Interview 5	After the fifth interview, the interview guide still fits the research question. By the use of probes and further questioning as a reaction to what respondents say, comprehensive information about the AHMD is received. Also, during the interviews I notice that respondents are already repeating themselves. I am also noticing less new information compared to prior interviews.
10-03-2021	Recruitment	One respondent who has been invited one week ago has not answered. I've sent a reminder via email and the internal communication system (ONS).
15-03-2021	Coding inductively on paper interview 1	I coded the interview on paper, with a pencil and a colored pen. I underlined meaning units and wrote a comment/code in the margin. On a separate piece of paper, I've made a two-column-table, barriers & facilitators (conceptual interview scheme). From the interview, I've written down the first analysis of barriers and facilitators. I have not yet induced the codes in the TICD framework. I will ask feedback about the interpreted barriers and facilitators (member check). After receiving and processing the feedback, I will import the transcript in Nvivo software and will again code the meaning units. This time, inducing it in the TICD determinants. I have decided not to alter the interview guide, because it is still fitting te research question and supporting my questioning during the interviews.
17-03-2021	Coding inductively on paper interview 2	I've used the same method as interview 1. I reach the same conclusion: the interview guide is still fitting the research question and my interviews.
19-03-2021	Recruitment	One invited respondent declined participation. Therefore, I've selected another name on the respondents list. I've sent an invitation and got a reply that the respondent wants to participate, but that she can not fill in the informed consent form. I've requested the reason why it does not work, so I can come up with a solution. Also, I've already sent two date options for the interview. The informed consent form can be filled in after scheduling the interview.
20-03-2021	Conceptual interview scheme interview 1	The first conceptual interview scheme is developed. I will develop the same scheme for a few more interviews after paper-coding them. On 31-3, during a meeting with my supervisor, I will present the conceptual interview schemes and propose to member check these.

Date	Subject	Memo
21-03-2021	Conceptual interview scheme interview 4	After developing four conceptual interview schemes, I can conclude that the interview guide does not need adjusting. The questions and probes provide enough room to elaborate further during the interviews. Also, I don't think that I have missed important information. On the contrary: it seems that information is being repeated during an interview. I have a feeling that reaching data saturation in 12 interviews is feasible.
24-03-2021	Interview 10	The interview guide still proves to be helpful. I don't seem to be missing information. respondents are sometimes repeating things they have already told me. Some new information is still added to the prior interviews, so data saturation has not yet been reached. However, the amount of new information is becoming less and less.
24-03-2021	Recruitment	After the first respondent declining participation, two more respondents that I'd invited to replace the first declining respondents have declined. At this point, all EQF-2 and EQF-3 employees from the wealthiest geographical area have declined. I've decided to prioritize the geographic area over EQF-level and invited an EQF-4 employee from the wealthy geographic area. If needed, a 14th interview can be conducted by inviting an EQF-2 or 3 employee from another geographical area, or by asking the manager of the team to provide another name.
28-03-2021	Transcribing interview 6	This interview was a little different than other interviews, because this respondent is currently testing the new prototype of the Medido dispenser. The respondent described barriers and facilitators for both the new type as the regular type of dispenser. Notable is that the new prototype has some enhancements that turn barriers for the old version into facilitators for the new version. Luckily, the respondent also has experience and information about the 'regular' version, so the interview does not need excluding. It is a rich interview!
29-03-2021	Interview 11	This respondent was sometimes difficult to understand. The respondent speaks Dutch well enough, but has an accent. Also, the answers of the respondent were sometimes limited. Also, she frequently repeated her previous answers, which were not always an adequate answer to my questions. With the use of the probes, it worked better. However, no new information was gained with this interview. Data saturation might be approaching.
29-03-2021	Interview 12	During this interview, a lot of new information was gained. It appeared that this respondent has no experience with the AHMD within the current home healthcare service, but has plenty of experience in another home healthcare service. This might cause a difference in experienced barriers and facilitators. It is clear that data saturation has not yet been reached, and a minimum of two more interviews are necessary to reach data saturation with a check interview. One more respondent will be recruited.

Date	Subject	Memo
02-04-2021	Interview 13	Prior to conducting this interview, the interview guide was altered using the new information I derived from interview 12 so I could check this information with this new respondent. In this interview, some new information was again added, so data saturation has not yet been reached. I intend to recruit at least two more respondents. I hope to reach data saturation in interview 14, and then do a check interview in interview 15.
02-04-2021	Recruitment	I have invited two more potential respondents for the study.
07-04-2021	Recruitment	One of the invited potential respondents declined participation, because she feels she hasn't got sufficient experience with AHMD. I've replied her email by telling her that I'm also interested in talking to people with no experience with AHMD. She has not responded yet. For now, I assume this respondent will not be participating and I've decided to invite another potential respondent just in case.
08-04-2021	Data analysis	Based on the codings on paper and the conceptual interview schemes I've developed, a code tree is notable. I've put the code tree in Nvivo, so I can use the code tree to code following transcripts in Nvivo. Also, my supervisor has agreed to co-code two random interviews. I will share the code tree with him to do so. When there are too much discrepancies, my supervisor will code a third transcript.
11-04-2021	Data analysis	I've decided to stop coding on paper. The process of coding four interviews on paper has given insight in the preliminary code tree that I've imported in Nvivo. Now, I'm coding all interviews in Nvivo. I've also made cases and attributes to keep record of the characteristics of the respondents, that I can later on use in queries. Now I want to figure out whether I can make summaries of preliminary findings per interview, that I can use for member checking.
11-04-2021	Data analysis	My supervisor is going to co-code two random interviews. To randomly select those interviews, I've used a random number picker. For evidence, I've screen recorded this process. Following this process, my supervisor will co-code interviews 5 and 15. Today I will send him the code tree that is developed after coding four interviews and the fifth transcript. It is not yet possible to send the 15th transcript, since my 14th and 15th respondent are yet to be recruited.
11-04-2021	Member check interviews 1-4	The conceptual interview schemes that were developed after coding interviews 1-4 on paper have now been sent to the respondents for member checking. They are asked to provide written feedback within a week time. When at the end of next week no feedback has been received, reminders will be sent.

Date	Subject	Memo
13-04-2021	Recruitment	I've sent reminders using ONS (electronic filing system used in the home healthcare service, which has a communication function). I've asked the potential respondents to respond on Friday at the latest whether they want to participate or not. If they don't want to participate, or if I don't receive a reaction, I will invite another potential respondent from the respondents list.
13-04-2021	Data analysis	After consulting my supervisor, we've concluded it is not a feasible option to co-code interview 15. Therefore, I've randomly selected another interview, using the same process as before. Following this process, my supervisor will co-code interviews 3 and 5. Some nodes in the code tree don't have a description. My supervisor provided feedback about this. I've added descriptions for all nodes so transparency will be guaranteed in the code tree, making the coding process more transparent and therefore more successful. After this, I have sent the code tree, transcript 3 and the screen record evidence of randomly picking interview 3 to my supervisor.
13-04-2021	Member check interview 2	Respondent 2 has provided written feedback on the conceptual interview scheme. The respondent agrees with the findings. The respondent said she missed one subject. It is a subject that we had not discussed yet. I've added the full feedback as a memo in Nvivo. The new subject has been coded in Nvivo.
15-04-2021	Interview 14	Today I conducted the 14th interview using the same interview guide as interview 13. No new information was gained in this interview. Data saturation might have been reached. Interview 15 will be a check interview.
15-04-2021	Data analysis + Member check	A conceptual interview scheme, similar to those of interviews 1-4, is developed and sent to the respondent for member checking.
16-04-2021	Data analysis + Member check	A conceptual interview scheme, similar to those of interviews 1-5, is developed and sent to the respondent for member checking.
18-04-2021	Data analysis + Member check	A conceptual interview scheme, similar to those of interviews 1-6, is developed and sent to the respondent for member checking.

Date	Subject	Memo
19-04-2021	E-mail contact with supervisor	For peer reviewing, I'm collaborating with one of my peers. She has asked me to code two of her interviews. These interviews are not selected randomly, but based on information richness. This made me second guess my decision to select my interviews for co-coding randomly. Therefore I've made contact with my supervisor. Since the reason for co-coding is to reach consensus about the coding, the information richness is not an essential factor. Therefore, selecting the interviews randomly provides transparency. Also decided is that I'll ask my peer to co-code two interviews of mine too. I've randomly selected the interviews; interviews 4 and 14 will be co-coded by her.
20-04-2021	Interview 15	The 15th interview was conducted. Though it's minimal, new information was gained. However, it has become clear that data saturation has not yet been reached. It would be best to recruit a minimal of two/three extra interviews. However, due to time reasons, I've decided to first focus on transcribing and analyzing interviews 8-15. If it is feasible in the available time, I will add more interviews. This has been consulted with my supervisor and he's agreed.
20-04-2021	Transcribing interview 14	Interviews 8-13 have not yet been transcribed. However, since my peer will code interview 14, I've decided to transcribe this interview ASAP, so I can send it to her.
24-04-2021	Data analysis	I've decided to code this interview before coding interviews 10-13, since my peer will co-code interview 14 and we will discuss the coding on the 7th of May. I wanted to have the interview ready as soon as possible for discussion.
26-04-2021	Meeting with supervisor (discussing peer review)	<p>During this meeting, the two interviews that were co-coded by my supervisor were discussed. Notable was that my supervisor coded word by word, whereas I have been coding meaningful units of text. Overall, the selected codes were largely the same. Texts that my supervisor coded with question marks were codes that did not exist at the time that my supervisor was coding, but had been added to the code tree in the meanwhile. Agreement on the coding has been reached.</p> <p>During this meeting also was decided to stop adding extra interviews. While some new information was still gained in the interviews, the information was on detail level. When looking at it thematically, no new big themes have arised in interviews since interview 13. Therefore, thematic saturation was reached at interview 13, and the following interviews were check interviews where no new themes have arised. Thematic saturation has been reached!</p>

Date	Subject	Memo
27-04-2021	Writing results	After consulting my supervisor, I've decided to start writing my concept thesis with the 10 interviews I have coded thus far. For the definitive version, I will process the results that will be added to the analysis. This way, I have more time to analyze the results without compromising my concept version.
07-05-2021	Discussing peer review	During this meeting, the two interviews that were co-coded by my peer were discussed. We went through both interviews code by code and discussed the differences. I was challenged to explain why I chose a certain code. Overall, no big differences were notable in the coding. No new themes have arised.
15-05-2021	Data analysis	With this step, all meaning units of prior interviews will be reviewed again, to see whether it is still coded at the correct code, or whether in the process a new code has been created that fits the meaning unit better. (Constant comparison).
16-05-2021	Data analysis	<p>I've made an Excel file with the codebook as a reference. I've added the following information:</p> <ul style="list-style-type: none"> - How many respondents mentioned the code (Nvivo: how many files per node) - How many meaning units were mentioned within the code (Nvivo: how many references per node) - A new column with the summed files and references (Nvivo: made a file-copy and coded all meaning units of the subcodes into the main codes. Doubles are exluded this way). <p>Based on this information, three main themes can be identified as high-relevant based on how many respondents and meaning units were included in the nodes:</p> <ol style="list-style-type: none"> 1) Innovation factors > 15 respondents, 219 references 2) Individual health professional factors > 15 respondents, 297 references 3) Patient factors > 15 respondents, 365 references 4) Professional interactions > 15 respondents, 77 references 5) Incentives and resources > 14 respondents, 62 references 6) Capacity for organisational change > 10 respondents, 61 references 7) Social, political and legal factors > 3 respondents, 5 references <p>Due to the big difference above, three main factors are identified as high relevant: innovation factors, individual health professional factors and patient factors. Social, political and legal factors were hardly mentioned, so will not be reported in the thesis.</p>

Date	Subject	Memo
02-06-2021	Data analysis	Including quantitative information about the barriers and facilitators was not written in the methods of the thesis. Also, we've come to the conclusion that the number of references per domain is less important than the amount of determinants (barriers, facilitators or both) per domain. That is why I've changed this in the final version of the thesis.
