

Patients' views on Self-administration of Medication during hospitalisation: a mixed-methods study

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Abstract

Background: Inpatient Self-administration of Medication (SAM) increases patient involvement in medication management and may increase medication safety. Its implementation is impeded. Successful and sustainable implementation of SAM strongly depends on patients' willingness to participate. This study aimed to identify and quantify patients' views on SAM, related (dis)advantages and prerequisites, patient's willingness to engage in SAM schemes, and their preferences in medication management during hospitalisation.

Methods: A mixed-methods study was conducted among hospitalised adult patients in four Dutch hospitals during December 2018 and March 2019. Semi-structured one-to-one interviews were performed to identify patients' views on SAM. Interview transcripts were subjected to thematic-content analysis. These outcomes were used to construct a questionnaire about patient's willingness to engage in SAM schemes, their preferences for inpatient medication management and level of agreement with statements about SAM's (dis)advantages and prerequisites of SAM. Data were descriptively analysed.

Results: Nineteen hospitalised patients [mean (standard deviation; SD) age 61.0 (13.4) years old; 52.6% male] were interviewed. Most patients had a positive view on SAM, but some doubted the necessity to change standard care. Also, patients expressed concerns about medication safety. Prerequisites for SAM implementation were identified. These covered four main themes: information provision, accessible and safe storage, assurance of safety, and clear responsibilities. A total of 234 patients [mean (SD), age 65.3 (13.5) years; 54.7% male] participated in the questionnaire. Although 50.0% of the patients were willing to self-administer medication, patients were ambivalent as only 36.5% preferred SAM over nurse-led administration.

Conclusion: The majority of patients were positive about SAM. Although half of the patients were willing to perform SAM, most patients did not prefer SAM over standard care. This ambivalent attitude may be overcome when the stated prerequisites are met and patients experience SAM in clinical practice. Based on patients' views, it can be concluded that implementation of SAM seems possible.

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Plain Language Summary

Research to identify patients' views on Self-administration of Medication during hospitalisation

Background: Patient involvement is desired by patients. Nevertheless, currently healthcare providers take over patient's medication management when hospitalised. Capable patients administering their own medication during hospitalisation, known as 'Self-administration of Medication' (SAM) is one possible way to increase patient involvement in hospital care

and to improve medication safety. Understanding patients' views on SAM, before its actual practice, could help to successfully implement it. In this research, we aimed to identify and measure

- patients' views on SAM,
- (dis)advantages of and requirements for SAM stated by patients,
- patients' willingness to self-administrate medication,
- patients' preferences in medication management during hospitalisation.

Methods: Our study consisted of two parts and was conducted among hospitalised adult patients in four Dutch hospitals during December 2018 and March 2019. First, patients were interviewed to identify patients'

- views on SAM,
- requirements for SAM.

Second, the outcomes of these interviews were used to construct a questionnaire aiming to identify patient's

- willingness to self-administrate,
- preferences for self- or nurse-led medication administration,
- level of agreement with statements about SAM's (dis)advantages and requirements.

Results: Nineteen hospitalised patients were interviewed. Most patients had a positive view on SAM, some doubted the necessity to change nurse-led medication administration. Patients mentioned many advantages of SAM, such as increased patient empowerment and contribution to sustainability. Some patients had concerns about medication safety, for example, risking omissions or double administrations.

In total, 234 patients completed the questionnaire. Half (50%) of the patients were willing to self-administer medication. However, only 37% of patients preferred SAM over nurse-led medication administration which indicates that the majority of patients were hesitant to actually self-administer medication. The most important requirements for SAM by patients were, 'I want to be informed before my hospitalisation that I have to bring my own medication' (80% agreed) and 'Healthcare professionals must assess per patient whether the patient is able to manage and use his or her own medication' (74% agreed).

Conclusion: Most patients mentioned many advantages and had positive views on SAM. Although half of the patients were willing to perform SAM, most patients did not prefer SAM over nurse-led medication administration. This reservation may be overcome when the stated requirements are met and patients experience SAM when admitted to hospital.

Keywords: hospitalisation, implementation science, inpatient, mixed methods, patient, prerequisites, qualitative, quantitative, self-administration, view

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Background

Traditionally during hospitalisation, patients lose control over their medication management as the responsibility for the storage and administration of medication is handed over to the hospital staff.¹⁻³ However, several studies demonstrated

that patients prefer to be more engaged in their medication management.^{4,5} This desire for more engagement is in line with patient-centred care which is pursued in many countries and empowering patients is recommended by the World Health Organization (WHO).⁶⁻¹²

A strategy to increase patient involvement in medication management during hospitalisation is the concept of Self-administration of Medication (SAM). With SAM, patients are responsible for storing and administering their own medication during hospitalisation, if capable.¹³ Hereto patients bring their own medication into the hospitals, according the concept of Patients' Own Medication (POM) use. Furthermore, a healthcare professional acts as a medication educator and supervisor of patients in this process.¹³ This increases patient's responsibility in medication management, promotes and maintains patient's independence and autonomy, and prepares patients to adequately use their medication at home.¹⁴⁻¹⁶ Moreover, it enables continuity of care as patients keep using their own medication, without substitution to hospital's formulary and remain responsible for their medication management.¹⁷ Besides the benefits for patients, SAM is cost-effective as it has a positive impact on medication safety and it reduces waste and staff time spent on the medication process.^{15,16,18-20}

As patients are the key stakeholder in the SAM process, a successful and sustainable implementation in clinical practice strongly depends on their views and willingness to participate in SAM schemes. Although quantitative studies concluded that the majority of patients prefer SAM,^{16,21} qualitative studies also illustrated that patients reported disadvantages, such as nurse's loss of or relinquish in medication administration routines.^{22,23} In addition, the setting, the self-administered medication and patient-related conditions were mentioned as prerequisites for successful SAM implementation.²²

Although SAM implementation seems to have benefits, it is hardly implemented in routine clinical care.⁵ Reasons include difficulties to implement SAM in existing routines in hospitals, in which the hospital pharmacy is responsible for the medication distribution and nurses for administration.⁵ Moreover, there are barely any evidence-based guidelines supporting SAM.¹ Despite this, multiple developments are currently facilitating the implementation of SAM, which include (1) the current transition in care from a paternalistic model towards patient-centred care, (2) the growing evidence that SAM improves medication safety and (3) the

increasing hospital staff shortages.^{11,16,20,24-26} Putting all this together, there is a need to better understand the factors that influence a sustainable implementation. According to the Consolidated Framework for Implementation Research (CFIR), successful implementation depends on multiple domains, including the characteristics of individuals, which in case of SAM, this refers to patients.²⁷ CFIR recommends to understand, among others, patients' belief in their own capabilities to practice SAM and their attitude towards and value placed on it, to foster its implementation. Therefore, this study aimed to qualitatively and quantitatively identify patients' views on SAM, the impact of SAM (advantages and disadvantages), and prerequisites for implementation of SAM in clinical practice. Furthermore, patient's willingness to engage in SAM schemes and their preferences in medication management during hospitalisation were studied.

Methods

Study design and setting

A multicentre mixed-methods study with an explanatory sequential design was conducted. First, a qualitative study, with semi-structured one-to-one interviews, was performed to identify views of hospitalised patients on SAM. To ensure comprehensive reporting, the COREQ checklist was used.²⁸ Thereafter, these outcomes were used to construct a questionnaire that was distributed among a larger group of hospitalised patients to quantify patients' views. Interviewees were recruited from hospitals in The Netherlands, namely, Elisabeth-TweeSteden hospital in Tilburg (a teaching hospital with 790 beds), Radboudumc in Nijmegen (a university hospital with 630 beds) and Sint Maartenskliniek in Nijmegen (a specialised hospital with 320 beds). In the quantitative phase, a fourth hospital was added: the Jeroen Bosch hospital in 's-Hertogenbosch (a teaching hospital with 640 beds). Data were collected from December 2018 until March 2019.

Qualitative phase

Participants. Hospitalised adult patients who self-managed their medication at home, thus no structural assistance from a healthcare professional or

an informal caregiver, were eligible for inclusion when they used at least one medication, prescription and non-prescription, before hospitalisation and were physically and mentally able to have a conversation with the researcher in Dutch (based on the nurse's insight). Patients were recruited from the following wards: urology, gynaecology, kidney transplantation care, cardiology, pulmonology and orthopaedics. All patients received nurse-led medication administration during hospitalisation, except kidney transplant patients. They received medication guided-administration, meaning patients self-administer medication in the presence of a nurse. The responsibility of medication administration remained with the nurse. A ward nurse screened hospitalised patients on eligibility. Eligible patients were directly approached by a researcher (N.C.) who provided them with written information about the study and obtained informed consent. Purposive sampling was used to ensure comprehensive data based on sex, age and ward of admission.

Data collection: interviews. In-depth semi-structured one-to-one interviews with hospitalised patients were conducted using an interview guide, see Supplementary file 1. A draft interview guide was grounded on a literature review of relevant literature about SAM,^{22,23,29,30} and augmented with expertise from research group members based on their experience with patient interviewing, implementing medication process changes (such as POM use) and pilot testing of SAM. The interview guide was pilot-tested with two hospitalised patients to identify problems related to the wording and clarity of the questions. Based on the pilot tests, minor adaptations were made. Each interview started with an introduction where patients were asked about their views on the current inpatient medication process. Thereafter, patients were interviewed about their view on SAM, perceived advantages and disadvantages, and prerequisites for SAM. Patient's characteristics (age, profession, living situation and number of medications in use at home) were registered. All interviews took place during admission and were audio recorded. The audio records were transcribed verbatim. Interviews were collected until data saturation was reached.

Data analysis. Transcripts were analysed, by research team members trained in qualitative data analysis, using thematic-content analysis with an

explanatory descriptive approach using ATLAS.ti 8.3.20. First, relevant text fragments were identified and selected with open codes by one researcher (N.C.) and reviewed by a second researcher (C.L.B.). The first interview was coded independently. To harmonise the open coding process, the codes of the first interview were discussed by both coders, thereafter N.C. coded all other transcripts and C.L.B. checked all codes; disagreements were discussed until consensus was reached. Then, axial and selective coding was applied by two researchers (N.C. and L.J.M.v.H.-M.) independently and fully discussed with members of the research team (B.J.F.v.d.B. and C.L.B.). During axial coding, open codes were placed into categories. Overarching themes were formulated during selective coding. Outcomes were discussed with members of the research team (B.J.F.v.d.B., C.L.B. and L.J.M.v.H.-M.). Disagreements in coding were resolved through discussion until consensus was reached.

Quantitative phase

Participants. Hospitalised adult patients were eligible for inclusion if their Dutch language skills and disease status allowed them to fill in a questionnaire. Patients were recruited from all wards in the four participating hospitals. Patients admitted in intensive care units, emergency departments, day clinics and geriatrics were excluded due to the limited possibilities of SAM on these wards. During their hospitalisation, patients did not experience SAM. At one random chosen day per ward, all hospitalised patients were screened by a nurse, based on the criteria above, and asked to participate. Thereafter, a researcher (N.C.) approached the screened patients, informed them and handed a self-administered paper questionnaire if they were verbally consenting to participate. The questionnaire was collected at the end of the day by the researcher (N.C.).

Data collection and outcome: questionnaire. Based on the results of the qualitative phase, the research team developed a questionnaire, see Supplementary file 2. First, three researchers (C.L.B., N.C., L.J.M.v.H.-M.) distilled a preliminary questionnaire from the results of the qualitative phase and discussed the content with another researcher (B.J.F.v.d.B.). Thereafter, the concept questionnaire was sent

Table 1. Characteristics of interviewed patients.

Patients (N = 19)	n (%)
Male	10 (52.6)
Age ^a	61.2 (13.4)
Level of education	
Elementary school	4 (21.1)
Lower secondary education	7 (36.8)
Upper secondary education	5 (26.3)
Bachelor's degree or higher	3 (15.8)
Working in healthcare (%)	3 (15.8)
Living situation (%)	
Alone	3 (15.8)
Together	16 (84.2)
Number of medications in use at home	
1–4	6 (31.6)
≥5	13 (68.4)
^a Mean (standard deviation).	

to all members of the research team, and based on their comments, adaptations were made. Thereafter, the questionnaire was pilot-tested with four patients. They provided feedback on clarity and readability. This led to further textual refining and resulted in the final version. The questionnaire consisted of two multiple-choice questions about patient's willingness to perform SAM (answer options: willing, not willing and I do not know, and preferences in medication management, answer options: nurse-led administration, SAM, no preference or I do not know). In addition, the questionnaire consisted of nineteen 5-point Likert-type scale statements covering the following domains: (1) patient's views on SAM (three statements), (2) the impact of SAM (seven statements) and (3) prerequisites for SAM (nine statements). These statements had the following answer options: strongly agree, agree, neither agree nor disagree, disagree, strongly disagree, no opinion. Furthermore, patients reported their demographics (sex, age, nationality, educational level), having work experience in healthcare, number of medications in use at home, medication management

strategy at home (original medication packs, dose-dispensing system, unit-dose dispensing by pharmacy or others), usage of an aid to remind of medication administration, receiving (professional) assistance with medication management at home, being hospitalised in the past year, and having an acute or scheduled current hospitalisation.

Data analysis. Data were analysed using SPSS (IBM Corp. Release 25.0.0.1. IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp). Patient's characteristics were presented as counts and percentages, except for the continuous variable age which was reported as mean and standard deviation (SD). Patients' responses to the multiple-choice questions were operationalised as proportions. Patient's level of agreement with statements were shown in proportions of patients that had either no opinion (representing answer: no opinion), a positive (representing answer: agree or totally agree), neutral (representing answer: neither agree nor disagree) or negative (representing answer: disagree or totally disagree) view. Missing data were excluded from data analyses.

Results

Qualitative phase

In total, 19 interviews were conducted. The mean age of the included patients was 61.2 (SD = 13.4) years, and 10 patients (52.6%) were male (patients characteristics in Table 1). The mean interview duration was 14 min (range, 8–30).

Patients' views on SAM

Most patients were positive towards SAM. The majority expressed that SAM should be the standard of care and that patients should have a choice to participate in a SAM programme. Patients indicated that it takes no effort to bring their own medication into the hospital. In the situation that medication is absent, a relative should be asked to bring this into the hospital. Some patients stated that they had experienced SAM already during their hospital stay, mostly for over-the-counter medications that were not available in hospital's stock. When asked, many patients did not mention disadvantages of SAM. Despite that, some patients did not see any added value of SAM and preferred no change in the medication process.

Some indicated that the current medication process is convenient and does not require any change. Interviewees emphasised that patient safety should be prioritised when SAM is practised and that the risks should be studied.

A good idea [implementing SAM as standard care], because you have to do it [medication management] yourself at home. (Male, 21 years old)

The impact of SAM on healthcare

Patients oversaw multiple effects of SAM during hospitalisation, including increased patient empowerment and the benefit of comparable responsibilities for patients in medication management during hospitalisation and at home. It was also mentioned that with SAM, patients are more in control and autonomy is respected.

Yes, actually I think that they [healthcare professionals] should implement SAM anyway, because at the end of the day it's a good thing. I'd say it is about my own body, so I'd want to do it for myself. (Female, 73 years old)

When SAM is implemented, patients are supposed to bring their own medication to the hospital. According to the interviewees, this brings an advantage as this medication is recognisable for them and labelled appropriately. Participants postulated that SAM decreases medication errors during hospitalisation because patients are in control. Moreover, according to patients, SAM improves medication use at home as it increases the opportunity to practise medication management and to ask questions during hospitalisation.

Yes it comes through practise [that my confidence in medication management increases]. If I manage [medication] and do it by myself, then I know for sure that I can trust it because at home I do exactly the same thing. (Male, 50 years old)

Patients stated that SAM could make healthcare more sustainable as less medication may be disposed of, which they currently experience during hospital stay and at home.

If they [nurses] take it over [home medication supply] here [in the hospital], you'll have medication left over at home. The three monthly repeat prescriptions will keep coming and there will be medication for eight or nine days left, that eventually

will have to be disposed of. I think that's a bit of a waste. (Female, 73 years old)

Furthermore, patients voiced that with SAM, the time nurses spend on the medication process could be reduced, which provides them the opportunity to spend their sparse time on other care tasks.

Well, that [with SAM] the nursing is relieved and they probably have time to do something else. (Female, 65 years old)

Interviewees were concerned that some patients might be stubborn and might not administer their medication at all. They also mentioned that SAM might introduce a risk of omissions or double administrations, especially if nurses are not fully aware of which patients do and do not self-administer.

If they [patients] do it [SAM] then they have to do it themselves, and then they [nurses] shouldn't ask the patient if they self-administer or not, as this results in errors. Because then someone [patient] says 'no, I haven't had that [medication] yet' and then it turns out that they did [resulting in double medication]. (Female, 63 years old)

Prerequisites for embedded implementation of SAM in clinical practise

During the interviews, prerequisites for SAM were identified. These prerequisites covered four main themes: information provision, accessible and safe storage, assurance of safety, and clear responsibilities (see Figure 1).

Information provision. It was voiced that adequate and clear information about SAM is essential. Information should include what is expected of the patient when he or she self-administers and which medication to bring. Interviewees mentioned it is important to have access to background information about their pharmacotherapy, such as common side effects and usages instructions. Different communication channels were suggested for this information, including the patient portal and information letter. Early information about the SAM process prior to hospitalisation was requested in order to have time to review the information with relatives.

. . . it [medication management] is also an awareness of what you put into your body, what it does to your

Prerequisites	Information provision	<ul style="list-style-type: none"> • through different information channels • about the process of self-administration • about which medication to use and pharmacotherapeutic information
	Accessible and safe storage	<ul style="list-style-type: none"> • nearby the patients • locked or not? • accessible for healthcare professionals
	Assurance of safety	<ul style="list-style-type: none"> • (selection of) capable patients • alternative medication process for incompetent patients or unsuitable medication • medication administration check by nurses
	Clear responsibilities	<ul style="list-style-type: none"> • healthcare professional as medication coach • appoint who is responsible for correct medication use

Figure 1. Overview of the prerequisites for implementation of Self-administration of Medication in clinical practice per main theme stated by patients.

body . . . of course you do not want to know all the side effects, but you do need information about what side effects can occur, so that you will be able to act if you notice a side effect . . . I think that these are essential things to know, and when you have it [medication] under your own management you just have to have access to this information. I also want to know why I take something. I'm not somebody who just blindly swallows everything. (Female, 50 years old)

Accessible and safe storage. Patients reported different preferences concerning medication storage conditions but all voiced that medication should be stored at patient's side for easy access. Options for storage were suggested such as a drawer in the nightstand or a box in the wardrobe. Some patients preferred this storage place to be locked because of the possibility of medication misuse by others. Other patients were against a lock. It was mentioned that healthcare professionals may have access to patient's medication.

Well, I'd like to have it [my own medication] as close to hand as possible, for instance in the bedside cabinet drawer. (Female, 73 years old)

Assurance of safety. Interviewees stated that only capable patients should perform SAM and that healthcare professionals should decide who is competent and who is not. As not all patients nor all medications (e.g. injectables) are suitable for self-administration, interviewees mentioned that

healthcare professionals should assist patients and there should be an alternative medication process for this. Moreover, during SAM, most patients preferred a medication administration check by nurses, especially to prevent omissions.

I think that it can be asked [if a patient is capable to self-administer], but an assessment must also be done by a healthcare professional, because someone can say 'yes, I can do it myself' and then it turns out that they cannot after all. It seems smart to me to have a double check [a medication administration check]. You want to avoid mistakes, don't you? (Female, 63 years old)

Clear responsibilities. Healthcare professional's role may change when SAM is implemented. It was mentioned that a more coaching approach of providing care is desired to support patients to self-administer and to optimise medication use at home. Patients had opposite opinions about who is responsible for correct medication use, for example, patients themselves, the physician or both. According to the interviewees, clear defined responsibilities are essential to ensure medication safety.

If someone takes a pill wrong, it has serious consequences. So it's also a matter of risk management. Risk management starts with the physician, who in turn puts the execution of this risk management with the nurse and the practical execution [of using medication] with the patient. (Male, 60 years old)

Quantitative phase

In total, 234 patients (79.3% response rate) completed the questionnaire, 54.7% were male and the mean age was 65.3 (SD, 13.5) years. Participants' characteristics are presented in Table 2. The reasons not to participate were refused to participate (45.8%), partially occupied during time of research (25.0%), too ill (18.8%) and insufficient understanding of the Dutch language (10.4%).

Patients' views on SAM

Half of the patients (50.0%) were willing to self-administer their medication themselves during hospitalisation, see Figure 2. More than a third of patients (36.5%) preferred SAM during hospitalisation, whereas 51.9% preferred medication management by nurses, 11.2% had no preferences, and 0.4% did not know their preference. The majority of patients (60.0%) were positive towards implementing SAM as standard care, although most patients (63.1%) preferred to be able to choose between self- and nurse-led administration of medication (Table 3).

The impact of SAM

According to patients, the greatest advantages of self-administration were the fact that patients could use their medication like they do at home (65.5%) and that SAM increased nurse's time to spend on other tasks (63.8%; Table 4). A third (33.3%) of the patients thought that SAM would lead to increased knowledge of their medication.

Prerequisites for embedded implementation of SAM in clinical practice

Table 5 gives an overview of patient's reported prerequisites for SAM implementation. Eighty percent of patients wanted to be informed about bringing their medication into the hospital before hospitalisation. Furthermore, 68.6% would like to have their medication nearby, not necessarily locked away (80.8%). The most frequently positively answered prerequisite about safety was that healthcare professionals must assess patient's capability to self-administer (73.9%). Almost three-quarters of the patients (70.2%) stated that they are responsible for their own medication use when SAM is implemented. Moreover, 40.1% of

patients saw a role for nurses in this responsibility too.

Discussion

In this mixed-method study, most patients expressed positive views on inpatient SAM and identified multiple advantages of SAM providing that different prerequisites are fulfilled. These prerequisites covered four main themes: information provision, accessible and safe storage, assurance of safety, and clear responsibilities. Despite these reported advantages and the self-reported capability to perform SAM, the majority of the patients preferred nurse-led administration (standard care) over SAM. Nonetheless, half of the patients were willing to self-administer medication.

During the interviews, patients reported different advantages of SAM for themselves, such as respecting patient's autonomy and the opportunity to practise medication management in the controlled environment of the hospital. These results are consistent with patients' views reported in previous studies.^{21–23} Notable is that, in our population, the benefit of increased medication knowledge was only partly recognised by patients (33%) whereas in literature, it has been marked as strength of SAM.²² Indeed, two recent studies confirmed a significant improvement in patient's medication knowledge after SAM implementation when compared with nurse-led administration.^{20,31} This improvement seems relevant as patient's medication knowledge is reported to be insufficient.^{32–34} Nevertheless, our population did not recognise the opportunity of SAM to improve their knowledge. This may be due to the fact that our population did not experience SAM during hospitalisation and consequently were not put in the position to gain knowledge. Another explanation is the fact that previous studies tested patient's actual medication knowledge rather than patients' perception of medication knowledge. Indeed, Kerzman *et al.*³⁵ already reported that there is a large difference between patients' perception of their knowledge and their actual knowledge about medication.

Patients stated that SAM might decrease the workload of nurses, which is in line with previous research.^{22,23} Studies towards the actual impact of SAM on nurse's time reported a decrease or equal

Table 2. Patients' characteristics.

Patients (N = 234)	n (%)
Hospital	
Elisabeth-TweeSteden hospital	78 (33.3)
Jeroen Bosch hospital	57 (24.4)
Radboudumc	78 (33.3)
Sint Maartenskliniek	21 (9.0)
Sex (male)	128 (54.7)
Age ^{a,b}	65.3 [13.5]
Nationality (Dutch) ^c	224 (97.0)
Educational level ^c	
Elementary school	45 (19.5)
Lower secondary education	65 (28.1)
Upper secondary education	72 (31.2)
Bachelor's degree	37 (16.0)
Master's degree or higher	12 (5.2)
Work experience in healthcare? ^d (yes)	36 (15.5)
Number of medications in use at home	
0	26 (11.1)
1–4	103 (44.0)
≥5	105 (44.9)
Medication management strategy at home ^{e,f}	
Original medication package	118 (58.1)
Medication organiser box	48 (23.6)
Pre-packaged medication (by an automated dispensing system)	28 (13.8)
Other	9 (4.4)
Usage of an aid to remember to administer medication? ^{d,e} (yes)	15 (8.7)
Receiving informal assistance with medication management at home? ^{e,g} (yes)	29 (14.4)
Receiving professional assistance with medication management at home? ^{d,e} (yes)	8 (3.9)
Hospitalisation in the past year? ^h (yes)	115 (49.6)
Scheduled hospitalisation ^d	146 (62.7)
^a Mean [standard deviation]. Missing data of: ^b Ten patients. ^c Three patients. ^d One patient. ^e If applicable, when a participant answered not to use medication, these questions were skipped. Missing data of: ^f Five patients. ^g Six patients. ^h Two patients.	

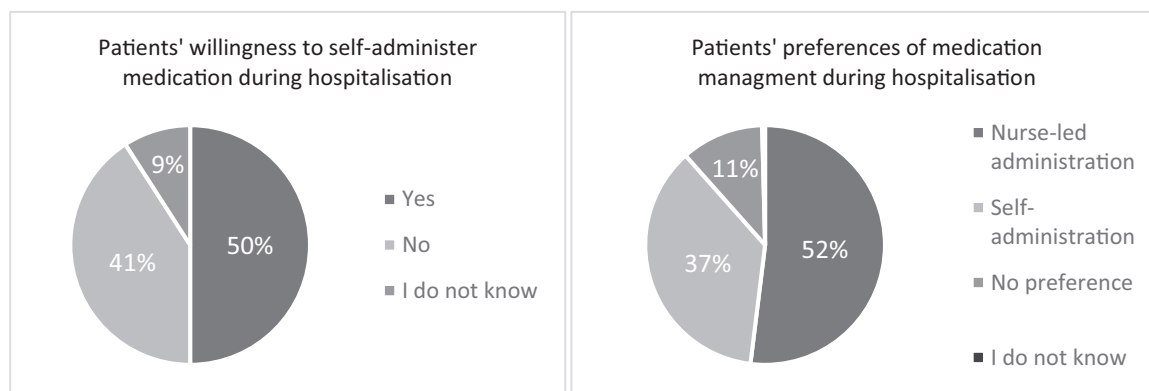


Figure 2. Overview of patients' willingness to self-administer medication and their preferences in medication management both during hospitalisation (N=234).

Table 3. Patients' level of agreement with statements about their views on Self-administration of Medication during hospitalisation.

Statements about patients' views on Self-administration of Medication	Positive view	Neutral view	Negative view	No opinion	Responses
	n (%)	n (%)	n (%)	n (%)	n (%)
Patients should be encouraged to manage and use their medication during hospitalisation, as they are used to at home.	111 (49.3)	48 (21.3)	52 (23.1)	14 (6.2)	225 (96.2)
Self-administration of Medication during hospitalisation may become the standard, if the patient is able to do so.	135 (60.0)	24 (10.7)	54 (24.0)	12 (5.3)	225 (96.2)
I always want to have the choice to either self-administer the medication or delegate medication administration to the nursing staff.	142 (63.1)	49 (21.8)	24 (10.7)	10 (4.4)	225 (96.2)

Table 4. Patients' level of agreement with statements about the impact of Self-administration of Medication during hospitalisation.

Statements about the impact of Self-administration of Medication	Positive view	Neutral view	Negative view	No opinion	Responses
	n (%)	n (%)	n (%)	n (%)	n (%)
Self-administration of Medication during hospitalisation will ensure that . . .					
I am in control of my own medication.	115 (51.1)	49 (21.8)	51 (22.7)	10 (4.4)	225 (96.2)
My knowledge about medication improves.	74 (33.3)	63 (28.4)	67 (30.2)	18 (8.1)	222 (94.9)
I can use my own medication.	129 (57.6)	48 (21.4)	30 (13.4)	17 (7.6)	242 (95.7)
I can use my medication during hospitalisation like I am used to at home.	146 (65.5)	39 (17.5)	27 (12.1)	11 (4.9)	223 (95.3)
Less medication will be disposed of.	132 (58.9)	28 (12.5)	44 (19.6)	20 (8.9)	224 (95.7)
There is a reduction in healthcare costs because less medication is wasted.	130 (58.3)	37 (16.6)	39 (17.5)	17 (7.6)	223 (95.3)
Nurses will have more time for other tasks.	143 (63.8)	34 (15.2)	34 (15.2)	13 (5.8)	224 (95.7)

Table 5. Patient's level of agreement with statements about prerequisites for implementation of Self-administration of Medication in clinical practice.

Prerequisite theme	Statements about prerequisites for implementation of Self-administration of Medication	Positive view	Neutral view	Negative view	No opinion	Responses
		<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
	When I manage and self-administer my medication during hospitalization . . .					
Information	I want to be informed before my hospitalisation that I have to bring my own medication.	177 (80.1)	12 (5.4)	20 (9.0)	12 (5.4)	221 (94.4)
Storage	I would like to have my medication within reach.	151 (68.6)	31 (14.1)	30 (13.6)	8 (3.6)	220 (94.0)
	My medication must be stored locked up.	42 (19.2)	42 (19.2)	118 (53.9)	17 (7.8)	219 (93.6)
Safety	I would like a nurse to check me on my medication use.	142 (64.0)	33 (14.9)	38 (17.1)	9 (4.1)	222 (94.9)
	I would like a daily reminder of my medication use by a nurse.	118 (53.2)	37 (19.2)	56 (25.2)	11 (5.0)	222 (94.9)
	Healthcare professionals must assess per patient whether the patient is able to manage and use his or her own medication.	167 (73.9)	16 (7.1)	34 (15.0)	9 (4.0)	226 (96.6)
	I am currently able to manage and use my medication myself during my hospitalisation.	159 (71.0)	26 (11.6)	31 (13.8)	8 (3.6)	224 (95.7)
Responsibilities	I am responsible for my own medication use.	153 (70.2)	21 (9.6)	33 (15.1)	11 (5.0)	218 (93.2)
	The nurse is ultimately responsible for my medication use.	89 (40.1)	32 (14.4)	85 (38.3)	16 (7.2)	222 (94.9)

time spent for nurses.^{18–20} Moreover, a study on one aspect of SAM, namely POM use, demonstrated a reduction in nurse's time spent.³⁶ Thus, in accordance with patients' views, it is expected that SAM will decrease nurse's time spent on the medication process. This could positively influence healthcare professional's workload. Another frequently mentioned advantage of SAM was its positive impact on sustainable healthcare, including less medication wastage and associated costs. This is in line with the increased attention for sustainable healthcare.³⁷ In a Dutch initiative where patients were asked to report observed spillage in healthcare, medication waste was the second most frequently stated form of waste.³⁸ Hence,

this emphasises that now is the right time to implement SAM as there is an urge to contribute to sustainability in healthcare with regard to deployment, costs and the environment.

An important prerequisite for patients was the fact that medication safety should be ensured. Similar results were found in previous publications.^{16,20,31} Although literature indicates that SAM actually has the capability to make medication use safer,^{16,20} not all patients in our study acknowledged this. Notably, it emerged from the interviews that some patients did forecast a safety improvement by implementing SAM, especially patients who had experienced safety issues in the current medication

process. Nevertheless, many patients indicated that safety should be prioritised when SAM is implemented and further research into safety is recommended.

Although patients mentioned that increased patient empowerment in medication management is an important advantage of SAM, still most patients preferred a medication administration check by nurses when SAM is implemented. This might be explained because patients worry about medication omissions when they self-administer. A medication administration check by a nurse could function as a reminder resulting in less omissions. Patients had differing opinions about who should be held responsible for their inpatient medication use when participating in SAM schemes. Almost half of the patients stated that this should be a nurse. Remarkably, half of these patients (56.8%) also stated they should be responsible themselves for their own medication use when hospitalised. Therefore, joint decision-making and responsibility is recommended when implementing SAM.

As mentioned before, patients were willing to self-administer medication but were hesitant when it comes to SAM as preferred process. This ambivalent point of view could be explained by the fact that participants did not actually experience SAM but faced an imaginary 'what if' situation. How SAM will work out during an actual admission might be hard to imagine for patients. Therefore, patients might have a conservative attitude and consequently may prefer to leave everything as it is. Indeed, patient satisfaction was mostly high when patients experienced SAM.^{16,30} This may confirm the hypothesis that more patients will be in favour of SAM once they have experienced it. Therefore, it is recommended to implement SAM and to evaluate its implementation on patient's preferences.

Notable is the relatively young study population. Because of the absence of patient age in previous qualitative studies, we were unable to compare our results with others to make a statement about the effect of our relatively young patient population on our outcomes.^{22,23} Studies that researched the effect of SAM after implementation reported outcomes of patients comparable in age (mean age = 62.8 and 59.2 years).^{16,20} Therefore, we believe that our population's mean age represents

patients who will self-administer. Still it is interesting to focus on the views of older patients on SAM in future research and to investigate what is necessary to engage these patients, if capable, in executing SAM.

This is the first mixed-methods study combining both a qualitative inventory and a quantitative scoring of patients' view towards SAM. Data in our qualitative phase were saturated and in the quantitative phase, a broad patient inclusion was achieved with a high response rate. This revealed a broad spectrum of patients' views on SAM, its impact on healthcare and prerequisites for implementation in clinical practice. Nevertheless, some limitations should be acknowledged. First, selection bias may have occurred as nurses selected eligible patients in both study phases. This could lead to the inclusion of more motivated patients for SAM. However, this reflects the situation when SAM is implemented, as nurses are likely to be responsible for selecting capable patients to perform SAM too. Therefore, it can be assumed that these results can be generalised to other patients eligible for SAM. On the contrary, patient's capability of SAM was not assessed, as SAM was not implemented. This may have resulted in the inclusion of patients who were incapable to self-administer. Whether this may have led to other outcomes is unknown. Second, the used questionnaire was not an existing validated one. Nonetheless, the results are considered relevant as the questionnaire was based on the results of the interviews in the qualitative phase of this study which enabled insight into the importance of patients' views. Finally, this study reports a discrepancy between patients' willingness and their preferences towards SAM, this may be the result of social-desirability bias.

In conclusion, this study showed that most patients had positive views on SAM and mentioned many advantages thereof. However, some patients questioned the need for a change in medication management during hospitalisation. Although half of the patients were willing to engage in SAM schemes, and even more patients found themselves capable, patients were hesitant to prefer SAM over standard care. This ambivalent attitude could be overcome when the stated prerequisites are met and patients experience SAM in clinical practise. Based on patients' views, it can be concluded that implementation of SAM in clinical practice seems possible.

Declarations

Ethics approval and consent to participate

This study was approved by the Medical Research and Ethics Committee of the Radboudumc, reference 2018-4929.

Consent for publication

Patients consented for the anonymous scientific processing of their data.

Author contributions

Loes Johanna Maria van Herpen-Meeuwissen: Conceptualization; Data curation; Formal analysis; Investigation; Project administration; Visualization; Writing – original draft.

Charlotte Linde Bekker: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Supervision; Validation; Writing – review & editing.

Nicky Cornelissen: Conceptualization; Data curation; Formal analysis; Investigation; Methodology; Project administration; Writing – review & editing.

Barbara Maat: Conceptualization; Methodology; Supervision; Writing – review & editing.

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Availability of data and materials

Data are available upon reasonable request.

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Supplemental material

Supplemental material for this article is available online.


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