

Knowledge and perspectives of Dutch home healthcare nurses regarding medication frequently used by older people

Carolien G.M. Sino MSc, RN

Research Centre for Innovation in Health Care, University of Applied Sciences Utrecht, Utrecht, The Netherlands

Aukje Munnik MSc, RN

Research Centre for Innovation in Health Care, University of Applied Sciences Utrecht, Utrecht, The Netherlands

Department of Rehabilitation, Nursing Science & Sports, University Medical Centre Utrecht, Utrecht, The Netherlands

Marieke J. Schuurmans PhD, RN

Research Centre for Innovation in Health Care, University of Applied Sciences Utrecht, Utrecht, The Netherlands

Department of Rehabilitation, Nursing Science & Sports, University Medical Centre Utrecht, Utrecht, The Netherlands

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Correspondence:

Carolien G.M. Sino

Research Centre for Innovation
in Health care

University of Applied Sciences Utrecht

P.O. Box 85182

3508 AD Utrecht

The Netherlands

Telephone: +31 088 4815073

E-mail: carolien.sino@hu.nl

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Background. Home healthcare nurses in their roles as caregivers, educators and administrators of medications are particularly well positioned to act on a preventive way to be alert of adverse drug reactions. However, knowledge about medication and a professional attitude is required.

Aim. To describe medication-related knowledge and perspectives of Dutch home healthcare nurses regarding frequent used medication by older people.

Method. A cross-sectional study was conducted among home healthcare nurses (n=146) in the Netherlands based on the ten most frequently used drugs by older people.

Finding. The mean score for total medication knowledge was 76.2% of the maximum score. Most home healthcare nurses (80.3%) felt responsible for improving older patients' medication use. Three-quarters of the home healthcare nurses agreed with the statement: "By taking appropriate action at the right time, I am able to prevent a medication-related hospital admission".

Conclusion. Although most home healthcare nurses felt responsible for their older patients' proper medication use and agreed with the statement that they played a role in preventing older patients' medication-related hospital admissions, their knowledge regarding medications could be improved.

Implications for practice. Home healthcare nurses should profit as a professional from gaining more knowledge of medication frequently used by older people.

Key words: home care, home health care, home health nurse, nurses knowledge, knowledge attitudes, medication

Background

Owing to increasing life expectancy, the proportion of the population over 65 years of age has increased significantly since the beginning of the twentieth century. The current 14% of older people in the Dutch population will have increased to 21% by 2025 (Blokstra *et al.*, 2007). In the Netherlands, medication consumption in this group is three times higher than the national average. For people aged 75 and older, this consumption even increases to four times the level of the average Dutch person. (SFK, 2008).

In the Netherlands, the majority (82%) of the patients who receive home healthcare are 65 years of age or older (Velden van der *et al.*, 2011). Owing to their age-related medication use, older (home healthcare) patients are vulnerable to medication-related problems, like over- and underuse of (inappropriate) medicines, as described by Meredith *et al.* (2001) and Parsons *et al.* (2011). General practitioners and pharmacists can play an important role in avoiding these problems by regularly reviewing the medication of their older patients (Stuijt *et al.*, 2008; Vinks *et al.*, 2009).

Nurses' involvement in drug-safety monitoring is also believed to improve the identification rate of adverse drug reactions and patient outcomes (Ellenbecker *et al.*, 2004; Nakanichi, 2006; Backstrom *et al.*, 2007; Ulfvarson *et al.*, 2007). Besides, nurses can play a role in medication management in transitional care (Setter *et al.*, 2009, 2012; Corbett *et al.*, 2010). However, previous studies have shown that nurses are inadequately prepared and lack sufficient knowledge to be capable of observing and recognising medication-related problems (Ives *et al.*, 1996, King, 2004; Grandell-Niemi *et al.*, 2005, 2006; Ndosi & Newell, 2008; Offredy *et al.*, 2008; Dilles *et al.*, 2010; Sulosaari *et al.*, 2010). Lim *et al.* (2010) identified the need to improve nurses' pharmacological knowledge, medication administration and management in healthcare facilities for older people.

As elaborated in the study of Arnold (Arnold, 1999) and Kovner *et al.* (2005), nurses in their roles as caregivers, educators and administrators of medications are particularly well positioned to act preventatively and alertly to adverse drug reactions in their older patients. However, knowledge about medication, side effects and interactions are required for nurses to recognise these adverse drug reactions at an early stage in older people at home. In the Netherlands, there are two levels of home healthcare nurses: nurses with vocational education and nurses with a higher vocational education (bachelor's degree).

To our best knowledge, there is no information about the medication-related knowledge and perspectives regarding the medication of older people in the two levels of home healthcare nurses.

Objective

The aim of this study was to describe the current knowledge and perspectives among home healthcare nurses with regard to medication frequently used by older people. The results of this survey could provide insight into the possibilities of the home healthcare nurses in recognising medication-related problems at an early stage.

Methods

This study is a report of a study to describe the level of knowledge and perspectives of Dutch home health care nurses regarding medication frequently used by older home healthcare patients.

Design

A cross-sectional survey was conducted using an electronic questionnaire administered via the Internet.

Participants

The study population consisted of Dutch home healthcare nurses (with vocational education or with a higher vocational education/bachelor's degree) who were members of the national professional organisation of primary care nurses and who agreed to participate in this study ($n = 146$). These home healthcare nurses were invited to participate in the study via email, newsletters and website requests. The criterion for inclusion was that the nurses had to meet homecare patients on a daily basis.

Table 1 Top 10 medicines most commonly used by persons 75 + years of age

1	Furosemide
2	Acetylsalicylic acid
3	Carbasalate calcium
4	Temazepam
5	Oxazepam
6	Paracetamol
7	Metoprolol
8	Omeprazole
9	Digoxin
10	Lactulose

The questionnaire

To gain insight into the knowledge of home healthcare nurses about medication-related issues for older people, the 'Home Healthcare Nurses and Medication Questionnaire' was used. This questionnaire was developed in 2005 (Van Vliet & Rutgers, 2005); it contains 29 questions on medication knowledge. The authors extended the questionnaire with nine statements about perspectives of medication-related issues with a 5-point Likert scale ranging from 'strongly disagree' to 'strongly agree'. The questionnaire in the Dutch language starts with questions regarding demographic characteristics such as sex, age, highest education level and years of work experience in home healthcare. The basis for the knowledge questions in the questionnaire were the 10 drugs most frequently used by persons older than 75 in the Netherlands according to the Dutch Foundation for Pharmaceutical Statistics (Table 1). From these 10 most commonly used medications, 29 multiple choices questions about nurses' knowledge were formulated and divided into five questions about drug interactions (50 points), 16 questions about side effects (160 points) and eight questions about (contra) indications (80 points). For the entire questionnaire, a maximum of 290 points could be scored (10 points per question). The contents of the perspectives' statements were based on literature. Statements on responsibility, self-confidence and fear regarding medication-related issues were formulated. The face validity of the questionnaire was judged by a panel of experts (five home healthcare nurses and two nursing scientists) and tested for feasibility in a pilot study with nine bachelor nursing students in their fourth year just before graduation (Bouzariouh, 2006). After the questionnaire had been minimally modified, based on the judgement of the expert panel and the pilot study, the developers of the questionnaire agreed on the appropriateness of the contents and the cut-off scores.

Data collection

The 'Home Healthcare Nurses and Medication Questionnaire' was introduced to the department of primary care nurses in December 2008 in several ways. Firstly, the introduction started with an announcement in the magazine for members of the primary care nurses association with a request to complete the questionnaire. All members received this magazine in their mailbox. Secondly, members with an updated email address also received an electronic newsletter that highlighted the research and contained a direct hyperlink to the questionnaire. Finally, members who visited the website of the primary care nurses association were asked

to complete the questionnaire that was attached in a hyperlink.

A reminder was sent by email to all the members of the primary care nurses association, on the first and second month after the initial request. The data collection started in December 2008 and was completed in March 2009.

Ethical considerations

Participation of the home healthcare nurses in this study was entirely voluntary. All participants were informed about the study through a written introduction. Consent was assumed through the participants' submission of the electronic questionnaire. The anonymity of the respondents was guaranteed, and it was not possible to trace the answers back to the participant. The data obtained from the participants were used only for this study. Participants were informed that all findings would be reported as group results and would be submitted for publication.

Data analysis

Data were analysed using SPSS for Windows version 14.0 (SPSS Inc., Chicago, IL, USA). Demographic data and perspectives of home healthcare nurses regarding medication frequently used by older people were summarised using frequencies and percentages. The number of correct answers per category was calculated, including percentages, mean, range and standard deviation.

Table 2 Demographic characteristics ($n = 146$)

	<i>n</i>	%
Sex		
Male	6	4.1
Female	140	95.9
Age (years)		
18–34	30	20.5
35–50	60	41.1
51–65	56	38.4
Nursing degree		
Secondary vocational education	18	12.3
Bachelor degree	123	84.2
Master degree	3	2.1
Other	2	1.4
Working experience (years)		
1–10	50	34.2
11–20	44	30.1
21–30	32	21.9
31–40	18	12.3
41–48	2	1.4

Table 3 Knowledge of medication among home healthcare nurses ($n = 146$)

		<i>n</i>	%	Mean points	Range	SD
A. Knowledge regarding interaction				38.8	26.5–47	4.7
Five multiple choice questions (0–50 points)*						
<i>Points</i>	<i>% Correct answers[†]</i>					
0–25	(0–50)	0	0			
> 25–30	(> 51–60)	5	3.4			
> 30–35	(> 61–70)	33	22.6			
> 35–40	(> 71–80)	35	24			
> 40–45	(> 81–90)	66	45.2			
> 45–50	(> 91–100)	7	4.8			
B. Knowledge regarding side-effects				123.8	100–152	11.3
16 Multiple choice questions (0–160 points)*						
<i>Points</i>	<i>% Correct answers[†]</i>					
0–99	(> 0–62)	0	0			
> 99–110	(> 63–69)	18	12.3			
> 110–120	(> 70–75)	43	29.5			
> 120–130	(> 76–81)	44	30.1			
> 130–140	(> 82–88)	26	17.8			
> 140–150	(> 89–94)	14	9.6			
> 150–160	(> 95–100)	1	0.7			
C. Knowledge regarding (contra) indication				58.2	37.5–75	6.8
Eight multiple choice questions (0–80 points)*						
<i>Points</i>	<i>% Correct answers[†]</i>					
0–34	(0–43)	0	0			
> 34–44	(> 44–55)	4	2.7			
> 44–54	(> 56–68)	38	26			
> 54–64	(> 69–80)	85	58.2			
> 64–74	(> 81–93)	18	12.3			
> 74–80	(> 94–100)	1	0.7			
Total knowledge (A + B + C)				220.9	173.5–264.5	17.2
29 Multiple choice questions (0–290 points)*						
<i>Points</i>	<i>% Correct answers[†]</i>					
0–170	(0–59)	0	0			
> 170–190	(> 60–66)	5	3.4			
> 190–210	(> 67–72)	32	21.9			
> 210–230	(> 73–79)	65	44.5			
> 230–250	(> 80–86)	37	25.3			
> 250–270	(> 87–93)	7	4.8			
> 270–290	(> 94–100)	0	0			

*Min-Max score.

[†]Percentage correct answers on 'Home healthcare nurses and medication questionnaire'.

SD, standard deviation.

The relationship between the outcome level of knowledge and age and years of experience was analysed using linear regression. The association between the level of education and level of knowledge was assessed using Spearman's coefficient. The relationship between perspectives with regard to medication frequently used by older people (fear, yes/no; responsibility, yes/no; and self-confidence, yes/no) and 'level of knowledge' of the home healthcare nurses was analysed using logistic regression.

Results

Personal characteristics of sample

A total of 146 (18.25%) home healthcare nurses completed the questionnaire. The mean age of these nurses was 45 (SD 10.2), with a range between 18 and 61. The mean years of work experience in healthcare were 17.2 years (SD 11.0), with a range between 1 and 42 years. Almost all of the nurses

Table 4 Perspectives of home healthcare nurses (*n* = 142) regarding older patients' medication use

	Disagree		Neutral		Agree	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Fear						
I sometimes experience actions involving medication as stressful	67	47.2	42	29.6	33	23.2
I feel unsure if I unexpectedly have to help a patient take his/her medication	101	71.1	26	18.3	15	10.6
Sometimes I have the feeling that I incorrectly inform patients about medication	95	66.9	32	22.5	15	10.6
Responsibility						
When I observe that the medication is not being taken properly during a visit, I feel responsible for improving this situation	17	12.0	11	7.7	114	80.3
It is the patient's own responsibility to take medication on time	37	26.1	52	36.6	53	37.3
I'm not the right person to identify potential side effects of the medication	117	82.4	11	7.7	14	9.9
Self confidence						
I feel confident when medication is part of the treatment visit	26	18.3	31	21.8	85	59.9
If I don't feel comfortable in a situation with medication, I will contact a general practitioner or a pharmacist immediately	10	7.0	5	3.5	127	89.4
By intervening in time, I can avoid a hospital admission for the patient	14	9.9	18	12.7	110	77.5

(95.2%) were women. Most respondents (84%) had a bachelor's degree in nursing (Table 2).

Level of knowledge of medication among home healthcare nurses

As shown in Table 3, the mean score for total knowledge was 220.9 points (SD 17.2) of a maximum score of 290 points, which implied 76% accuracy. The mean score for knowledge of drug interactions was 38.8 (SD 4.7) of a maximum score of 50 points (77% accuracy), with a range between 26.5 and 47 points. The mean score for knowledge of side effects was 123.8 (SD 11.3) of a maximum score of 160 points (77% accuracy). Finally, the mean score for knowledge of (contra) indications was 58.2 (SD 6.8) of a maximum score of 80 points (73% accuracy).

Perspectives of home healthcare nurses regarding medication

The perspectives of home healthcare nurses regarding medication frequently used by older people were assessed by means of the answers to the nine statements related to feelings

of fear, responsibility and self-confidence (Table 4). Almost half of the home healthcare nurses (47%) disagreed with the statement 'I sometimes experience actions involving medications as stressful', and almost a quarter (23%) of the respondents agreed with this statement. Most of the home healthcare nurses (80%) agreed with the statement 'When I observe that the medication is not being taken properly during a home visit, I feel responsible for improving this situation'. Most home healthcare nurses (82%) disagreed with the statement 'I am not the right person to identify the potential side effects of the medication'. Almost 60% of the home healthcare nurses agreed with the statement 'I feel confident when medication is part of the treatment visit'. Another 18% the home healthcare nurses disagreed with this statement and 22% felt neutral. More than three-quarters of the nurses (78%) agreed with the statement 'By intervening in time, I can avoid a medication-related hospital admission'.

Regression analysis and correlations

No linear relation was observed between the level of knowledge and age ($r^2 = 0.00$, $P = 0.945$) and years of working experience ($r^2 = 0.007$, $P = 0.318$). Also, no associ-

ation was observed between the level of knowledge and level of education (Spearman $r = 0.108$, $P = 0.194$). No relationship was observed between level of knowledge on the one hand and perspectives of fear ($P = 0.942$), responsibility ($P = \text{value } 0.593$) and self-confidence ($P = 0.686$) on the other. Effect of gender could not be analysed because the home healthcare nurses were predominately women (95%).

Discussion

Although the respondents were dealing with medication-related questions about the medication most frequently used by older people, only 30.1% of the nurses scored between 80% and 100%.

These results are consistent with the findings of Ives *et al.* (1996), Kapborg and Svensson (1999), King (2004), Sohda *et al.* (2002), Sohda *et al.* (2002), Offredy *et al.* (2008). They found that the nurses' lack of knowledge in the areas of drug effects, side effects, indications, contra-indications and interactions could be improved. This underscores the importance of emphasising the need for better medication-related knowledge, particularly in home healthcare, where nurses typically work independently and polypharmacy related to the percentage of older patients is prevalent.

Knowledge of the interactions and side effects was better than the knowledge concerning the contra-indications. The lack of knowledge may make it more difficult for the home healthcare nurses to observe and instruct patients about their medications. Therefore, nursing education should prepare nurses to become competent professionals who can provide and improve the patients' quality of care (Banning, 2003). However, other studies have shown that pharmacological education is not at the required level (Latter *et al.*, 2000b; Bullock & Manias, 2002).

Providing medication information and monitoring drug therapy are primarily seen as medical or pharmaceutical tasks. Doctors focus on making diagnoses and initiating therapy, whereas nurses focus on *the consequences for the patient* of these diagnoses and treatments. Medication-related problems can be seen as consequences of treatment. Therefore, observing the consequences of medication and giving early warnings of drug-related problems for the patient are clearly components of nursing work. According to Bulechek *et al.* (2007), medication management is pre-eminently a nursing intervention and described as the facilitation of the safe and effective use of prescription and over-the-counter drugs. Dilles *et al.* (2010) demonstrated that nurses regularly engage in pharmacotherapeutic practices, such as providing drug information, monitoring treatment adherence and recognising ADRs.

Based on the results, it appears that most home healthcare nurses feel responsible for their patients' medication use (80%). However, almost 20% of the home healthcare nurses did not agree with (12%) or were neutral (7.7%) toward the statement 'When I observe that medication is not being taken properly during a home visit, I feel responsible for improving this situation'. Almost a quarter (23%) of the home healthcare nurses sometimes experienced actions involving medication as stressful; this finding is consistent with what has been reported in the literature. Different studies have reported that nurses experience some fear when handling medication-related issues (Kapborg & Svensson, 1999; King, 2004; Grandell-Niemi *et al.*, 2005). The results regarding self-confidence in relation to the patients' medication were comparable to other studies in the literature. It appears that home healthcare nurses did not have much self-confidence with respect to medication. Previous studies have reported different findings in relation to the perspectives of nurses regarding medication. It was reported that nurses sometimes lacked self-confidence. Sohda *et al.* (2002) cited the number of years of experience as a probable cause of a lack of self-confidence regarding patients' medication use. We could not confirm this finding in our study. In our study, almost 60% agreed with the statement 'I feel confident when medication is part of the treatment visit'. Eighteen per cent did not agree. A possible explanation for the nurses who disagree with the statement is that the system of medication administration is not clear to home healthcare nurses and needs to be improved. Most home healthcare nurses (77.5%) were convinced that they played a role in preventing patients' medication-related hospital admissions.

Limitations of the research

To appreciate the present results, a number of aspects need to be discussed with regard to the scope and limitations of this study. The Dutch Professional Association of Nurses and Caregivers (Verpleegkundigen & Verzorgenden Nederland) consists of several departments and groups including the Association of Primary Care Nurses. This study also included home healthcare nurses who were members of the Association of Primary Care Nurses. It is plausible that members of a professional association are better informed and more up-to-date on their medication knowledge than the average Dutch home healthcare nurse.

In addition, because random sampling was not used, this could have introduced some selection bias in the results. The home healthcare nurses were invited collectively to participate, but the participants decided for themselves whether or not to participate. Because of this self-selection, it is plausible that more home healthcare nurses with greater

interest, better knowledge and better perspectives on medication-related issues participated as compared to home healthcare nurses who were not interested in such issues. Consequently, the mean knowledge of the average home healthcare nurse in the Netherlands will likely be lower and the perspectives less positive than those of the average nurse in our study.

In addition, the 'Home Healthcare Nurses and Medication Questionnaire' was electronically accessible. Because of this, the questionnaire could be opened at any time and place. This offered the respondents the chance to complete the questionnaire with the help of outside information sources and colleagues. Because of this lack of control, there was the potential for information bias. We attempted to overcome this lack of control by collecting detailed, written participant information, and we asked participants not to complete the questionnaire using extra sources of information.

Assuming the number of members of the Association of Primary Care Nurses with an up-to-date email address (800), then the response rate of 146 members (<20%) was low. This low response rate reduces the generalisability of the findings of the study, although this was expected given the similar response rate in the self-report survey of Mayo and Duncan (2004) and the questionnaire survey of Ives *et al.* (1996). Based on the description of the demographic characteristics of the respondents, the education levels were different from what was expected. For example, almost 80% of the respondents in this study had a bachelor's degree, unlike 5% of all of the home healthcare employees in the Netherlands (Velden van der *et al.*, 2011). In addition, only 5% of the home healthcare nurses were men. This is significantly lower than the national average of 15% male nurses (LEVV, 2008). This may have contributed to biased results.

We did not find a correlation between the demographic data and the knowledge or attitudes of the nurses regarding medication. It is possible that this was because of the small number of participants.

Conclusion and recommendations

Although most home healthcare nurses in this study feel responsible for promoting proper medication use by their older patients and agree with the statement that they play a role in preventing older patients' medication-related hospital admissions, their knowledge regarding medications could be improved. Nursing refresher courses, congresses, workshops and meetings are examples of venues where nurses can expand their knowledge of medication. The home healthcare nurses included are not always self-confident when taking actions to

address their patients' medication-related issues. Further research in a larger population is recommended to investigate the association between medication-related knowledge and self-confidence in regard to handling medication-related issues.

Implications for practice

- Home healthcare nurses should profit from gaining more knowledge as a professional. Nursing congresses, workshops and meetings are examples of where nurses can expand their medication knowledge.
- The role of home healthcare nurses in the Netherlands in the management of patients' medications, especially behind closed doors during home healthcare should be studied in greater detail in a follow-up study.

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Contributions

Study design: CS, AM, MS; data collection and analysis: CS, AM, MS and manuscript preparation: CS, AM, MS.

Conflict of interest

No conflicts of interest are declared by the authors.

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