EMPIRICAL RESEARCH QUALITATIVE

Thinking strategies used by registered nurses during drug administration in nursing homes—An observational study

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Abstract

Aim: To explore registered nurses' thinking strategies during the drug administration process in nursing homes.

Design: An exploratory qualitative design.

Methods: Eight registered nurses, one male and seven female, in five nursing home wards in Mid-Norway were observed during 15 drug dispensing rounds (175 drug dispensing episodes). Think Aloud sessions with follow-up individual interviews were conducted. The Think Aloud data were analysed using deductive qualitative content analysis based on Marsha Fonteyn's description of 17 thinking strategies. Interview data were used to clarify missing information and validate the content of Think Aloud data.

Results: The registered nurses used all 17 thinking strategies described by Fonteyn, including several variants of each strategy. The three most frequent were 'providing explanations', 'setting priorities' and 'drawing conclusions'. In addition, we found two novel thinking strategies that did not fit into Fonteyn's template, which were labelled 'controlling' and 'interacting'. Among all strategies, 'controlling' was by far the most used, serving as a means for the registered nurses to stay on track and navigate through various interruptions, while also minimising errors during drug dispensing.

Conclusion: The study highlights the diverse thinking strategies employed by registered nurses in nursing homes during medication administration. The findings emphasise the multifaceted nature of medication administration and underscore the importance of skilled personnel in ensuring medication safety. Recognising the significance of these findings is crucial for maintaining patient well-being and upholding medication safety standards in healthcare settings.

Relevance to Clinical Practice: Understanding the thinking strategies employed by registered nurses can inform training programmes and enhance the clinical judgements of health care professionals involved in medication administration, ultimately leading to improved patient outcomes and reduced medication errors in practice.

Patient or Public Contribution: Patients were involved in this study as recipients of drugs which the nurses distributed during the observations. The patients were involved as a third party and consent to the observations was either given by the

1 | INTRODUCTION

Registered nurses (RNs) play a crucial role in drug administration and ensuring drug safety in long-term care settings (Dilles et al., 2011). The process of drug administration encompasses multiple steps and challenges that are particularly relevant and can be crucial in the care of older individuals (Quian et al., 2018).

Patients in nursing homes are highly susceptible to adverse events and injuries associated with medication treatment, a vulnerability that can be attributed to factors such as age, cognitive impairment, and complex medical conditions and treatment regimens (Al-Jumaili & Douchette, 2017; Morin et al., 2016). Moreover, RNs working in nursing homes often contend with heavy workloads, characterised by numerous tasks, interruptions and the care of patients with significant disease burdens, all within the constraints of limited personnel and expertise (Odberg et al., 2018). During drug dispensing, RNs confront unforeseen challenges that demand their knowledge and discretion to navigate successfully (Solberg et al., 2022).

Drug administration is governed by a comprehensive set of regulations, in terms of both professional standards and legal requirements (Norwegian Directorate of Health, 2015; Norwegian Ministry of Health and Care Services, 1999). Errors in the drug administration process can occur at any stage, and contributing factors can be attributed to both individual and systemic levels (World Health Organization [WHO], 2016). Medication administration errors are reportedly common both in Norway (Mulac et al., 2020) and internationally (Salmasi et al., 2018).

Drug administration is an essential competency in nursing education, encompassing a range of knowledge and skills such as critical thinking, decision-making, application, critical assessment and clinical judgement (Bourbonnais & Caswell, 2014). However, studies conducted in Norway among RNs in hospitals and primary healthcare settings have revealed shortcomings in their knowledge and understanding of pharmacology (Simonsen et al., 2011).

By delving into the strategies employed by RNs, encompassing both cognitive and intuitive approaches, we can enhance our understanding of the complexities associated with medication management. This knowledge serves as a valuable learning opportunity, driving our collective efforts to bolster patient safety in long-term care settings. To achieve this, we studied the thinking strategies of RNs during the administration of drugs to patients residing in nursing homes.

> **What does this paper contribute to the wider global community?**
>
> - The many and varied thinking strategies used by the registered nurses in this study reflect the complexity of the drug dispensing process in nursing homes.
> - The findings emphasise that medication administration is a multifaceted process that goes beyond technical procedures, highlighting the need for skilled personnel to ensure medication safety.
> - The identification of two novel thinking strategies adds to our understanding of registered nurses' clinical judgements in this context.

2 | BACKGROUND

Clinical judgement is recognised as both a complex process and an outcome, drawing on RNs' experience, understanding of patients' reaction patterns, consideration of patient concerns and awareness of the contextual and cultural factors in the care unit (Tanner, 2006). Concept analysis has determined that clinical judgement is a 'reflective and reasoning process' that uses all available data, relying on an 'extensive knowledge base', and results in a 'clinical conclusion' (Connor et al., 2022). This definition includes both a process and an outcome compatible with Tanner (2006), but it differs by describing the increased importance of a 'knowing landscape' as a 'fundamental basis' in nursing (Connor et al., 2022, p. 3336).

In nursing, practising thinking skills and making wise judgements towards correct clinical decisions are important, even 'decisively between life and death' in many situations (Fonteyn, 1998). Recognising and being mindful of one's thinking strategies enhances the capacity for metacognition, allowing for reflection and implementation (Fonteyn, 1998). These skills are cultivated when RNs reflect on their patient experiences and manifest as 'knowledgeable, intuitive practice' (Fonteyn, 1998, p.15).

Information process theory (IPT) is one theory of cognition that underpins critical thinking. It describes two memory banks: short-term memory (STM) and long-term memory (LTM; Fonteyn & Fisher, 1995; Ritter & Witte, 2019). The increased STM capacity of experts in a field gives the ability to gather information in patterns (thinking strategies), and the information is thus easily remembered (Ritter & Witte, 2019, p. 236). The LTM is seen as an infinite

information bank and refers to the person's whole competence, both experiences and schooling they have acquired, but it takes longer to access (Fonteyn & Fisher, 1995; Ritter & Witte, 2019). Interviewing gives access to such information (Fonteyn & Fisher, 1995).

How RNs reason has been studied in clinical settings. This has been found to give valuable insight and a broader understanding of clinical reasoning and decision-making processes (Fonteyn & Fisher, 1995; Johnsen et al., 2016; Simmons et al., 2003). Experienced RNs reasoned more effectively by using heuristics (Simmons et al., 2003). Several thinking strategies were used during triage in acute care settings, and the decision-making was perceived as complex (Göranson et al., 2007). During simulation scenarios on care planning for preventing malnutrition and pressure ulcers, the three most frequently used thinking strategies, comparable with heuristics, by RNs were 'making choices', 'forming relationships' and 'drawing conclusions' (Fossum et al., 2011). Even newly graduated RNs were found to use both simple (thinking strategies and heuristics) and complex cognitive processes in a home-care context (Johnsen et al., 2016).

To our knowledge, thinking strategies during drug administration among RNs have not been studied before. Therefore, we believe that this study will contribute new knowledge to this field.

3 | THE STUDY

3.1 | Aim

This study aimed to explore RNs' thinking strategies during the drug administration process in nursing homes.

4 | METHODS

4.1 | Design

This study used an explorative qualitative design, using observation with a passive approach (Shin & Miller, 2022). Think Aloud (TA) sessions with follow-up interviews[1] were chosen because this can provide in-depth insight into the reasoning and decision-making processes through the participants verbalising their thoughts when performing a task (Fonteyn et al., 1993; Fonteyn & Fisher, 1995; Simmons et al., 2003). The TA method has been used since the early 20th century to understand cognitive processes. It has its roots in IPT and is used to build knowledge-based computer systems by asking people to think aloud when reasoning or solving problems (Fonteyn & Fisher, 1995). It is a widely used methodology within clinical settings and nursing and health research (Fonteyn, 1998; Fonteyn & Fisher, 1995; Fossum et al., 2011; Göranson et al., 2007; Johnsen et al., 2016; Laukvik et al., 2022). The Consolidated criteria

for reporting Qualitative research (COREQ) checklist was used as a guide to ensure the reporting of this study was transparent, comprehensive and explicit (Tong et al., 2007). See Data S1.

4.2 | Study setting and participants

The study was conducted in five different nursing home wards in three municipalities in Mid-Norway. The nursing homes were chosen strategically to ensure demographic variety, comprising one urban and two rural municipalities. In Norwegian nursing homes, RNs and social workers and educators are authorised to dispense drugs. Auxiliary nurses (ANs) may gain temporary exemptions for dispensing medicines after undergoing special training (theoretical and practical training under supervision from RNs, then dispensation from the nursing leaders). Nursing home physicians, most often employed hourly and present at the nursing home once a week or more, are responsible for prescribing drugs to patients in the electronic patient record systems. Nursing home wards often have a trolley where the pill organisers and multidose packages are kept. The pill organisers are prepared by the RNs for 1 week at a time, and the multidose packages are prepacked and ordered from the pharmacy. Both systems are based on the medication chart prescribed by the physician. The trolley can be moved while dispensing the drugs, and drugs are normally given at fixed times in connection with meals.

A purposive sampling method was employed to select participants, with the managers of the nursing homes assisting in the recruitment process by extending invitations and facilitating contact with eligible RNs. The inclusion criteria were being an RN actively involved in drug dispensing at the nursing home and expressing a willingness to participate in the study.

4.3 | Data collection

A brief instruction was given when the meeting time with the participants was scheduled, either by telephone or email from the first author. The observations of the participants and the drug dispensing rounds were conducted by the first author between August 2020 and June 2021. A total of 28 h of observations of the RNs were undertaken, which indirectly involved 48 patients. Some RNs were observed at three dispensing rounds, others one or two. See Table 1 for an overview of the observational data.

The participants were instructed on how to verbalise their thoughts in the TA sessions before each round started. A portable tape recorder was hung around each participant's neck. The first observation was planned to be an exercise but was later included in the analysis because it contained rich and detailed data. During the TA sessions, the researcher reminded the participant to think aloud by saying 'Please, continue thinking aloud,' in line with Fonteyn and Fisher (1995). The first author tried to keep quiet and was near the participants during the drug dispensing, taking written notes about

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[1]In the literature, Think Aloud session transcripts are referred to as concurrent data, and the follow-up interviews are referred to as retrospective data (Fonteyn et al., 1993; Fonteyn & Fisher, 1995).

TABLE 1 Overview of observational data.

Nurse	Patients[a]	Drug dispensing rounds	Type of shift	Drug dispensing episodes
A	16	3	Morning, Lunch, Evening	48
B	13	3	Morning, Lunch, Evening	39
C	13	3	Morning, Lunch, Evening	39
D	11	2	Morning, Lunch	22
E	3	1	Morning	3
F	13	1	Morning	13
G	3	1	Morning	3
H	8	1	Morning	8
Total	_43_	_15_	_8 Morning; 4 Lunch; 3 Evening_	_175_

[a]The drug dispensing rounds of nurses B, C and F, and nurses E and G, included the same patients.

what the participants were doing, their preparations, whether the drug was modified, how the drug was given and situations that needed to be clarified later. These notes were the basis for the questions asked during the follow-up interviews, which were held in either a quiet area or a suitable room at the nursing home right after the TA session. Examples of the questions given during the interviews were 'Can you tell me a bit more of the situation when you…', 'You did not find anyone to double-check that drug, what do you usually do…', and 'How did you reason when…'.

4.4 | Analysis

The observation data (concurrent data) and interview data (retrospective data) were (first) separated, and only the observation data were included in the further analysis. The unit of analysis was the concurrent data from TA sessions, which were analysed using NVivo version 11 software (QSR International Pty Ltd. 2020). The retrospective data were read and used to clarify missing information or validate the content of TA data. A manifest content analysis with a deductive approach was performed (Graneheim et al., 2017; Graneheim & Lundman, 2004) based on Fonteyn's (1998) categorisation of 17 thinking strategies. A quantification of the thinking strategies was performed. Fonteyn's thinking strategies have explicit definitions, and these were used as a coding template for the analysis. First, all the text was read through to obtain an overall impression of the material. Then, sentences and paragraphs in the text that contained information about the RNs' cognitive processes were coded according to the thinking strategies. Furthermore, a more detailed analysis was made for each strategy, which resulted in several variants of each thinking strategy. All authors analysed one of the transcripts jointly. The rest of the data were discussed regularly until an agreement was reached between all authors. During the deductive analysis, we became aware of significant content in the data that did not fit Fonteyn's categorisation of thinking strategies. This content reflected strategies that the RNs consistently used to ensure that the dispensing of drugs was according to prescriptions and procedures, to avoid errors and irresponsible practices and ensure that the patient took the drug.

4.5 | Trustworthiness of data

To ensure rigour and trustworthiness, the authors used Lincoln & Guba, 1985 evaluation criteria of credibility, transferability, dependability and confirmability. _Dependability_ and _confirmability_ were enhanced by making the analysis transparent and discussing both the different sequences of the analysis and the findings between all four authors regularly until a consensus was reached. To enable each reader to judge the _transferability_ of the study findings to other contexts, a description of participants, data collection and analysis is given. _Credibility_ was obtained by including an adequate number of RN participants (Fonteyn & Fisher, 1995) and all four authors (three RNs and one pharmacist) participating and performing the analysis (Lincoln & Guba, 1985).

4.6 | Ethical considerations

The health administration of each municipality gave permission to perform data collection, and the Norwegian Centre for Research Data approved the study (project number: 209812). Before all observations, written informed consent was obtained from both the participants and the patients. For patients who were unable to provide consent themselves, consent was obtained from their competent relatives.

5 | RESULTS

5.1 | Characteristics of the participants

The final sample comprised eight participants, consisting of seven women and one man, with ages ranging from 25 to 49 years (average age 33.5 years). The participants had varying lengths of experience at their current workplace, ranging from ½ to 20 years, with a median of 3 years. One of the participants had advanced education in geriatric nursing. An overview of the participants is presented in Table 2.

TABLE. 2 Overview of participants.

Participant	Age (years)	Type of ward	Experience at this nursing home (years)
A	41	Long-term	3
B	33	Long-term	10
C	49	Long-term	20
D	32	Acute care	8
E	32	Long-term	3
F	29	Acute care	½
G	25	Acute care	½
H	27	Long-term	1

5.2 | Thinking strategies corresponding to Fonteyn's categorisation

According to Fonteyn's framework (1998), all 17 thinking strategies were used by the participants in our study. However, not every participant employed all of the thinking strategies. Nonetheless, the four most frequently employed strategies—*providing explanations*, *setting priorities*, *drawing conclusions* and *qualifying*—were used by all participants. We identified two additional thinking strategies, labelled c*ontrolling* and *interacting*, which did not align with Fonteyn's framework (1998). Section 5.2 elaborates on these strategies, providing examples and quotations for better understanding. A comprehensive overview of all thinking strategies, including their explanations and frequency of occurrence, is presented in Table 3.

The RNs used the 19 different thinking strategies mainly when considering the drug in question, the patient's condition or a combination of both. Examples of the analysis are shown in Table 4, including examples of situations where the participants used at least two thinking strategies at the same time. In Table 5, the thinking strategies and their variations used during deductive analysis are explained.

The *providing explanations* strategy was used during the interaction with the patient while informing them about the drugs given and explaining what was going to happen. The RN said: 'I'm bringing you the tablet for bone fragility... your drugs... you must sit, I'll help you... take some water first, then it gets easier to swallow them... and here are two paracetamol as well' (Nurse B). The explanatory strategy was also observed when RNs argued and were reasoning about the choice of drug formula or whether to modify the drug. One RN said: '[Name] has swallowing difficulties and wants to take the drug with yoghurt and wants it modified. Even if it doesn't taste good... he cannot swallow well... it is quite big, that tablet, and the patient can have a suppository, but it is not easy when he gets four a day, so... It is better that he gets a tablet, not with jam, but with yoghurt' (Nurse A).

Certain patient groups needed to be prioritised before others during drug administration. The participants used the *setting priority strategy* when they prioritised the order of patient visits based on the drug in question or the patient's condition or indication. One RN said: 'First, I plan to dispense levodopa to one patient, which is going

TABLE 3 Overview of thinking strategies by Fonteyn (1998) used during drug administration.

Thinking strategy	Total quotations	Participants represented with quotations
Providing explanations	92	8
Setting priorities	46	8
Drawing conclusions	40	7
Qualifying	38	6
Pondering	35	8
Asserting a practice rule	32	6
Making assumptions	21	4
Making predictions	19	6
Making choices	16	6
Stating a proposition	14	4
Searching for information	13	8
Recognising a pattern	9	4
Forming relationships	8	3
Judging the value	7	3
Generating hypothesis	5	3
Posing questions	5	2
Making generalisations	3	2
*Controlling	174	8
*Interacting	49	8

*New thinking strategies, did not fit into Fonteyn's (1998) framework.

to get... because he gets at fixed times' (Nurse D). Another RN was made aware by her colleagues of one patient who was in pain and therefore acted spontaneously: 'I'll dispense to [Name] because she has hip pain and needs those drugs and the painkillers before she gets up' (Nurse F).

The RNs also used the *setting priority strategy* when they reasoned about drugs that needed extra precautions, such as modify-released drugs related to the time given and the conditions of the patients. The drugs had to be given so they even expedited the time if the patient was going to bed early. Being prepared and awake was a prerequisite to being given the drugs at all. The best situation was if the patients were sitting at the breakfast table, ready to have drugs dispensed, and many could be given in a short time. One RN explained: 'I usually take... dispense drugs to those patients who sit up... first, at the breakfast table, then I rather go several rounds, and then we'll see...' (Nurse C).

The thinking strategy *drawing conclusions*, which encompasses both reaching a decision and forming an opinion, shows how the RNs juggled pragmatic arguments with theoretical knowledge and practice rules before reaching a decision. As expressed by one RN: 'This is a small tablet, and when we crush it there is a possibility for some waste. I think about that sometimes; however, there will be a greater waste if she spits the tablet out. So we need to scrape thoroughly' (Nurse A). This strategy was especially prominent in the interaction with the patient, and an extra dimension to the strategy was to cope

TABLE 4 Examples of the analysis process.

Examples from the observation data	Thinking strategies and variations
(Speaking to the patient) It is paracetamol, painkillers, and then you have something for your blood pressure, and something to thin out the blood, and a vitamin tablet. (The patient asks if she has high blood pressure) No, your blood pressure is fine and stable.	Providing explanations: *Indication of the drug* Drawing conclusions: *Blood pressure is ok*
Sometimes it's difficult to persuade her to take tablets, so then I focus on the Sinemet. I give her that one first. Then the other tablets can be given in priority order.	Making assumptions: *About the patient's behaviour* Setting priorities: *Some drugs must be taken before others*
(Speaking to the patient) You are totally exhausted tonight. Then I think we'll wait with the Sobril.	Drawing conclusions: *About patient status* Making choices: *Postpone drug dispensing*
The blood pressure is too low. Thus, I have to take a look in the patient record, check what pressure he has had in the past.	Drawing conclusions: *About patient status* Searching for information: *About blood pressure*
One of the patients uses a lot of time at the mealtime … very long time to drink something, and this patient eats only mashed food … Albyl E is not breakable … therefore, the person sitting there, feeding her … I'll let a colleague dispense the drugs…	Qualify: *Reasoning about not following the ordinary dispensing routine*
If the insulin is not well-mixed, you may receive too large or too small a dose … and we use to pull up the syringe and have someone double-check it right away. We don't pull up the syringe and just leave it there.	Providing explanations: *Correct/incorrect drug administration* Asserting a practice rule: *about control and storage of drug dose*
She is an RN, so I'm asking her to dispense the drugs to the patient … Can you give this to (Name)? I've prepared Minifom as well … Furix, Pentaprazol and Metoprolol … but we need a dialogue, and I know if they are taken or not…	Interacting: *Cooperating with a colleague about drug dispensing* Controlling: *Ensure that the patient receives her drugs*
I'll put the tablets here (Name), and please help him [addressed to AN], (Name) has the medication training, and she can dispense drugs, not directly from the trolley, but from me.	Interaction: *Delegating to dispense the drug* Qualifying: *Optimal drug dispensing not followed*

with older people who both could and could not contribute with useful information leading to a conclusion. In some situations, the patient could express their preference and in this way contribute: 'We have tried Movicol powder, but she prefers Lactulose. She thinks it works better' (Nurse B). In other situations, the patient was not able to express whether the situation was better, so the RN concluded after having examined the patient: 'The steroids will have a positive effect on your skin as well… then I'll put the lotion on your hand… afterwards, I'll tell the physician about it… The leg was less red and swollen, and actually less painful, so we'll continue the cure' (Nurse A).

The RNs did *qualify* when adapting the drug administration to the patient's condition or preferences but also to handle the many tasks of everyday life at the unit. They expressed dilemmas of being aware of pushing boundaries but experiencing the pragmatic solutions chosen to function for the patients. As one RN expressed: 'A patient needs his epilepsy medicines which ideally should be given twice a day, at nine a.m. and nine p.m., but because the patient often gets more restless in the evening, it is better to dispense them earlier than that it is not given at all' (Nurse A).

All the participants used the strategy of *pondering*. This was in situations where they stopped and reflected on parts of the drug management routines or the condition of the patients. One participant pondered over whether to give a drug or not: 'No, I don't know… [the participant becomes silent for a short while] I'm… I'm a bit unsure because the patient's spouse says that the patient often gets reactions to new drugs. And he started on a new drug yesterday, and the enrolled nurse said he is not in good condition. I wonder if I should remove the medicine from the pill box, at least until I have observed the patient' (Nurse A).

The *asserting a practice rule* strategy was used when the RNs adapted patient-centred and cooperative actions, where they adjusted their drug dispensing practice to their patients' needs and wishes. As one RN said: 'First, he needs a spoon with yoghurt to moisten the mouth, then a spoon with yoghurt with a tablet in, then a spoon with yoghurt again, and then he is hopefully done' (Nurse A). The same RN also reflected on the way she used to persuade her patients to take modified medicine hidden in jam: 'When I crushed the tablets and put them into jam, I always used to say to the patients: *Here are your drugs, together with jam!* I know for sure that the word jam is what they hear—and not the word drugs. But I don't think I'm deceiving them' (Nurse A).

When the participants knew their patients well, and they mainly did, they could perform person-centred drug dispensing based on their needs. When using the *making assumptions* thinking strategy, it was based on that specific knowledge. One RN said: 'He has just got his breakfast, so I think I'll wait a bit with the drugs… he suffers from dementia, he is easily disturbed. If he gets red paprika on the bread… it's confusing him… I'll not interrupt the meal but dispense the drug to him later on' (Nurse A).

TABLE 5 The thinking strategies and it is variations.

Thinking strategy	Definition	Variations of thinking strategies
Providing explanations	Offering reasons for actions, beliefs or remarks	About informing the patient for medical treatments made
		About explaining own actions
Setting priorities	Ordering concepts in terms of importance or urgency	About nurses judgements/drawing conclusions about patient status and interventions/actions
Drawing conclusions	Reaching a decision or forming an opinion	About drawing conclusions about patient status
		About drawing conclusion of the drugs effect
Qualifying	Modifying, limiting or restricting, as by given exceptions	About deviating from optimal drug dispensing
Pondering	Mentally pausing to reflect on the meaning of a piece of information	About drug routines
		About the patient's conditions and situation
Asserting a practice rule	Asserting a truism that has been shown to consistently hold true in practice	About adapting individualised medication
		About drug dispensing routines
Makings assumptions	Taking for granted or supposing	About knowing the patient and his individual needs
Making predictions	Declaring in advance	About knowing the patient and his habits when taking the drugs
Making choices	Selecting from a number of possible alternatives to decide on and pick out	About personalised/patient centred drug dispensing
		About preparing the drugs
Stating a proposition	Stating a rule governed by if-then	About the patient situation
		About drug dispensing methods
Searching for information	Mentally looking for missing or concealed information	About status and conditions of the patient
		About using encyclopaedia/medication prescriptions
Recognising a pattern	Identifying characteristic pieces of data fit together	About the patient's current status
Forming relationships	Connecting information to further understanding	About connecting the patient's status, drug dispensed or, the other way around
Judging the value	Forming an opinion or evaluation about worth in terms of usefulness	About routines and dispensing insulin
		About observing effects of medication
Generating hypothesis	Asserting tentative explanations that account for a set of facts	About patient status, cause of symptoms and the need for drugs
Posing questions	Asking for answers without really expecting to receive them	About what to do next
Making generalisations	Inferring from many particulars	About patient's reaction to the drugs
Interaction	Cooperating with others (patients and colleges)	About facilitating the drug adherence
Controlling	Controlling own work/Assures that own work is correct/follows the guidelines	About keeping focus (on track)
		About avoiding mistakes
		About a supportive practice

The _making predictions_ thinking strategy was used to illustrate what the participant was going to do soon, again based on the knowledge of the patient's individuality, preferences and needs: 'He is going to get five drops of Laxoberal. No, it is not prescribed, but I know that he wants it… if we ask him' (Nurse B). Another RN said to the patient: 'I'll get you your tablets… take something to drink, and I'll soon be back' (Nurse C).

Six RNs used the _making choices_ thinking strategy, both to let the patients' preferences and needs come forwards and when the situation demanded different considerations and actions of the RN. One participant described a situation where both aspects were involved: 'A mobility-impaired patient had an appointment at the local hospital and, therefore, would not take her diuretics because of the need of going often to the toilet.' The RN argued: 'I replied to the patient that we could delay those medicines… She certainly needs them, but she would refuse to meet at that appointment, if I didn't suggest it' (Nurse B).

The _stating a proposition_ thinking strategy was used when the participants reasoned about the need for individualisation of the drug dispensing and knew the patient well. One RN explained: 'I see that [Name] has got his breakfast by the bedside. That means that he is awake, and that is not a given, eh… but that means I can try to dispense the morning drugs to him. If he is tired, he is not cooperative, but if he is awake, then it goes great' (Nurse A). In another situation, she made a quick decision when a patient did not want to take her drugs: 'Don't you want your Parkinson's medicines, ok… [to the patient] then I'm taking it back to the trolley'. The RN reasoned about the situation: 'It is difficult… it doesn't work arguing with the patient, but rather make alliances with one of my colleagues and dispense them later on' (Nurse A).

The _searching for information_ thinking strategy was used by RNs to gain further insight and familiarise themselves with drugs unknown to them. When searching in a drug-specific instruction

manual, one RN said: 'I'm not sure how the drugs look, then I'm looking up the drugs that I'm not familiar with… there is a picture… let me see… I know that one… these pictures of the drugs are great' (Nurse E). In other situations, the participants were trying to gain an overview of the status and condition of the patients, where they were, how their daily form was, and whether they were awake and sitting by the table, by communicating with their colleagues.

When the RNs were dispensing drugs, they applied special consideration to some patients, such as those with cognitive impairment and swallowing difficulties. The experience of the RNs and the knowledge of the exact patient were visible in the *recognising a pattern* strategy. Based on how the patients managed, or patterns of behaviour noticed by the RNs, one said: 'He usually chews his tablets; therefore, I gave him one at a time and reminded him… because he easily forgets… he usually takes them all at once and chews, and they should not be chewed, especial not the Exelon capsules and the Venlazid [antidepressants] depot tablet… but the others may be split and modified… they just leave a bad taste in the mouth' (Nurse B).

When the RNs combined the patient's symptoms or diseases with the drugs about to be dispensed, they used the *forming relationships* thinking strategy, but only a few participants did that. One said: 'Yes, then I think that the chest pain, that… we have something to hang onto, and I will dispense Gaviscon to her' (Nurse A).

Judging the value was used before the RNs dispensed insulin injections, when they had to know the blood sugar level or gain an overview of the blood pressure level to make decisions on whether they should give the ordinary dose. The following quotation is an example of this: '[Name] has diabetes, we usually are measuring the blood sugar, I reckon that the person responsible for the room has done that. I found a note from my colleague: 5.7… lock ahead. He gets Lactulose [laxantia] and drugs from multidose and prepares 28 units of insulin' (Nurse B).

The *generating hypothesis* thinking strategy was used by three participants when they reasoned about the symptoms of the patient, which type, and the need for drugs. One of the RNs addressed the patient: 'You have a stomach ache now? [The patient answers yes]. Would you like a tablet for your indigestion problems…?' The RN further argues: 'This man may be given indigestion tablets as pro re nata; therefore, I asked him if there is a need for it' (Nurse D).

The *making generalisations* thinking strategy was used by only two participants. One offered her beliefs and experiences concerning medical treatment with one of the drugs: '…Yes, many patients are having side-effects of the Exelon plaster, she is going to get capsules instead' (Nurse C).

Posing questions was used by only two of the participants. This was mainly in situations where they wondered what to do next, for example: 'Let me see, where was I…?'

5.3 | 'New' thinking strategies

Interacting with the patient emerged as a prominent and consciously employed strategy by the RNs in our study. This strategy involved adapting and individualising communication with the patient, aiming to facilitate cooperation and ensure the effective administration of medication. It was particularly evident and used when distributing drugs to patients with cognitive or sensory impairments. One RN explained, 'I always try to get his attention, make eye contact, and speak loudly and clearly so I don't startle him… to prevent him from getting scared or resistant' (Nurse A). Another RN highlighted the importance of motivation and explanation, stating, 'Sometimes it can help to motivate or explain to her… occasionally, using a slightly authoritative voice can be beneficial, but it can also be effective to wait and maybe seek assistance from a colleague… you have to assess the patient and the situation in the moment… and it shouldn't take too long either' (Nurse A).

The same strategy of interacting was employed by the RNs when consulting their colleagues. They engaged in discussions regarding the form and type of drugs to be administered, as well as questionable prescriptions from physicians. An example of the latter was given by Nurse E, who addressed a colleague:

Nurse E: 'Should she [the patient] stop taking Lyrica completely? It is no longer on the medicine card on the iPad'.
Colleague: 'No, it was supposed to be scaled down… but we could not enter it digitally'.
Nurse E: 'Ok, so she will have two tablets today and one tonight?'
Colleague: 'Yes, that's right'.
Nurse E: 'Ok, then it will be fine. Then I take the two tablets and add them to the pill organiser… Like that!'

The RNs demonstrated a constant concern for maintaining a reasonable timetable while ensuring efficient and accurate medication administration. Our observations revealed that the strategy of *controlling* served as a means for the RNs to stay on track and navigate through various interruptions while minimising errors during drug distribution. One RN explained her approach, stating, 'I try to sign continuously, noting the date over here… and for weekends, we use coloured markers to make them more visible. Then, I record whether it's a multidose and mark the corresponding time in the column below' (Nurse D).

Interruptions were common during the medication distribution process. As one RN mentioned, 'I just have to check the phone [a patient has pressed the alarm]—Yes, it was "my lady", I have to go as soon as I have given these eye drops… [the phone rings again] It was the trolley with the dinner that someone must pick up in the lift. I'll go and inform a colleague about it, and I'll be right back. [The nurse returns to the trolley.] Let's see… I'll sign off on the person who received the eye drops before I left, because I hadn't done that' (Nurse D).

6 | DISCUSSION

The results of our study demonstrate that RNs employed a diverse range of thinking strategies during the administration of medications, encompassing all 17 categories identified by Fonteyn (1998). Moreover, our analysis unveiled two novel thinking strategies that

have not been previously documented. This exploration and description of thinking strategies during drug administration in nursing homes represents a unique contribution to the existing knowledge base because no prior studies have investigated this aspect comprehensively. These findings emphasise that medication administration is a multifaceted process that extends beyond a purely technical procedure.

Our findings have certain similarities, but also differences, compared to other studies on RNs' thinking strategies. We believe that some of these differences can be attributed to the significance of both the context and the nurse action being studied.

Among thinking strategies in line with Fonteyn's framework (1998), *providing explanations* and *setting priorities* were the most frequent in this study—a finding that differs from previous studies quantifying RNs' use of thinking strategies. Both Fossum et al. (2011) and Moon and Park (2016) reported lower frequencies of explanations and priorities. One possible explanation could be the different contexts in which the studies were conducted and the varying needs of the RNs for interaction with others. Unlike Fossum et al. (2011) and Moon and Park (2016), who observed RNs in quiet rooms without patients or colleagues present, our study took place in a real clinical setting. The nursing home patients, of whom many had dementia, required extensive explanations from the RNs regarding the medications they received and general information about upcoming procedures. Notably, 'providing explanations' to patients was also identified as a frequently used thinking strategy during newly qualified RNs' home-care visits, as observed by Johnsen et al. (2016). However, Johnsen et al. (2016) did not report the exact number of thinking strategies, only that 'providing explanations' was the second most used strategy.

Context may also explain why *setting priorities* was often used by the RNs in our study. As reported in one of our previous studies (Solberg et al., 2022), drug dispensing in nursing homes is a complicated process that involves many priorities. Not only must the RNs prioritise the dispensing of certain drugs due to time constraints, but they also have to prioritise so that the dispensing suits each patient and their circadian rhythm.

The two novel thinking strategies identified in this study, *interacting* and *controlling*, were among the most frequently used among the RNs. The *interacting* strategy involved conscious communication and trust-building behaviours that were strategically chosen based on the RNs' previous experiences with the patients. This strategy bears some similarity to Johnsen et al. (2016) 'making personal connection' thinking strategy, although their study did not explore interactions with colleagues—only interactions with patients. In our study, the *interacting* strategy was also employed by the RNs when discussing and consulting about medication administration with their colleagues.

Controlling was by far the most observed thinking strategy in our study. It was used by the RNs to maintain focus, manage interruptions and reduce errors during drug dispensing. The RNs demonstrated a high level of commitment to ensuring drug administration to patients, which comes as no surprise considering the stringent legislation and guidelines in this area (Norwegian

Health Directorate, 2015; Norwegian Ministry of Health and Care Services, 1999). The RNs walk a fine line because improper drug administration can have serious and immediate consequences for patients. Compared to other nursing activities, such as promoting nutrition, failure in medication administration also may have a more profound and acute impact. RNs who make medication errors may face personal and professional consequences. In addition to being a 'second victim', where the guilt, fear and anxiety associated with causing patient harm can be overwhelming (Ozeke et al., 2019), the RN may face disciplinary action, legal consequences or damage to their professional reputation.

The *interacting* and *controlling* strategies seem closely linked to each other, in that interacting may involve an interruption in the drug dispensing process that, in turn, requires the RN to regain control. Interruptions can disrupt workflow and potentially contribute to adverse drug events (Dilles et al., 2011; World Health Organization, 2016), but interruptions can also have positive effects on medication safety and be an inherent part of conducting safe clinical practices (Alteren, 2022; Odberg et al., 2018). An example of the latter was when an RN in our sample conferred with a colleague regarding ambiguities on the medicine card.

The many and varied thinking strategies used by the RNs in this study reflect the complexity of the drug dispensing process in nursing homes. On one hand, the nurses' cognitive processes during this procedure are primarily focused on ensuring the safety and well-being of their patients. On the other hand, they are also mindful of the need to maintain correctness and compliance with regulations. This also supports findings from our previous study (Solberg et al., 2022) that drug dispensing involves challenges that require RNs to use their discretion and make various adaptations to ensure medication safety. Drug dispensing is not a simple technical procedure that can be carried out based on rigid standards and guidelines. The challenges encountered in drug dispensing necessitate the use of clinical judgement skills by RNs (Tanner, 2006). It is important to highlight the significance of these findings, particularly in the context of task shifting. Task shifting, which involves delegating health care tasks from higher-skilled professionals to lower-skilled personnel, has been proposed as a potential solution to address labour shortages in the healthcare system (World Health Organization, 2008). However, crucially, drug dispensing cannot be delegated to just anyone without considering the complexity and risks involved. To mitigate the heightened risk associated with medication administration, it is imperative to establish clear and consistent regulatory and governance frameworks, alongside appropriate policies, skills, training, and supervisory arrangements that adequately support the process (Shore et al., 2022).

6.1 | Strengths and limitations

This study has some limitations. First, the qualitative design does not allow generalisation, but the findings can be transformed and applied to other nursing homes and similar contexts and acts. Nonetheless, Lincoln and Guba (1985) evaluation criteria were

followed, and an effort was made to be transparent. Second, the sample had a predominance of women, although we acknowledge that including more men could have enriched the interview data. However, this gender distribution is in line with Norwegian nursing homes, which are staffed mainly by women. Third, based on COREQ criteria, the participants are recommended to verify the analysis (Tong et al., 2007). However, member checking is not required in TA studies because the participants do not have the opportunity to re-call what they were thinking during the situations explored (Fonteyn et al., 1993; van Someren et al., 1994). Conducting TA studies during drug administration takes longer than ordinary drug administration and could thus be an exhausting exercise for RNs. Despite that, the findings indicated that rich and in-depth knowledge of drug admin-istration emerged, and the problem-solving accessed through TA was mainly conducted in line with Fonteyn and Fisher (1995) and Fonteyn et al. (1993). We assessed that the data collected from the eight nurses who consented provided sufficient information to ensure content validity. We were able to identify all 17 strate-gies outlined in the theory, in addition to uncovering two additional strategies not previously documented. Furthermore, it's essential to evaluate the validity of the findings in light of the descriptions of the participants, the context, and the research procedures. We have made every effort to communicate these aspects as clearly and transparently as possible.

The four authors have different backgrounds—three RNs and a pharmacist—which influenced the interpretation during the analysis. This point is thoroughly accounted for in the analysis section. The first author has many years of working experience from hospital set-tings. She conducted all observations and interviews independently, with support and guidance from the second and fourth author which have extensive experience from healthcare research and nursing in long term care settings.

7 | CONCLUSION

Our study demonstrates that RNs in nursing homes employed a diverse range of thinking strategies during medication administra-tion. The identification of two novel thinking strategies adds to our understanding of RNs' clinical judgements in this context. The find-ings emphasise that medication administration is a multifaceted pro-cess that goes beyond technical procedures, highlighting the need for skilled personnel to ensure medication safety. It is essential to recognise the significance of these findings and the importance of knowledgeable health care professionals in maintaining patient well-being and medication safety.

7.1 | Relevance to clinical practice

Understanding the thinking strategies employed by RNs can in-form training programmes and enhance the clinical judgement of both nursing students during simulation exercises and health care

professionals involved in medication administration. This can ulti-mately lead to improved patient outcomes and reduced medication errors in practice.

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