



Utrecht University

**Identifying the needs among Dutch pharmacists
in clinical decision-making: a qualitative study**

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IDENTIFYING THE NEEDS OF DUTCH PHARMACISTS IN CLINICAL DECISION-
MAKING: A QUALITATIVE STUDY

Master Thesis Pharmacy

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I hope you enjoy reading this thesis!

Salma Bouzeryouh
Utrecht, February 4th 2022

Samenvatting

Achtergrond Klinische besluitvorming wordt beschouwd als een kerncompetentie van apothekers. Echter, er is beperkt inzicht in wat apothekers nodig hebben om klinische besluiten te nemen.

Doelstelling Het doel van dit onderzoek was om de benodigdheden voor klinische besluitvorming door Nederlandse apothekers in kaart te brengen.

Methode Een exploratief, kwalitatief onderzoek is opgezet. Tussen augustus en december 2021 zijn tien diepte-interviews afgenomen met apothekers die werkzaam zijn in de eerstelijns- of tweedelijnszorg. Hierbij werden semigestructureerde vragen gebruikt. De interviews werden opgenomen en woordelijk getranscribeerd. Vervolgens is een thematische analyse uitgevoerd om thema's binnen de data te identificeren, analyseren en rapporteren.

Resultaten De bevindingen zijn onderverdeeld in drie thema's. Het eerste thema, de kenmerken van de apotheker omvatte vier sub-thema's: 1- kennis; 2- vaardigheden; 3- attitude; 4- autonomie. Het tweede thema, klinische casus, omvatte drie sub-thema's: 1- trigger; 2- patiëntendossier; 3- patiëntgesprek. Het laatste thema is de werkomgeving met drie sub-thema's: 1- bronnen; 2- faciliteiten; 3- collega's.

Discussie Samengevat draagt deze thesis bij aan het begrip van de benodigdheden van Nederlandse apothekers in hun klinische besluitvorming en introduceert het aspecten waarin apothekers gefaciliteerd kunnen worden. De randvoorwaarden van dit model kunnen verder worden gebruikt om farmaciestudenten klinische besluitvorming beter aan te leren.

Abstract

Background Clinical decision-making is considered a core competence of pharmacists. However, there is limited understanding on what pharmacists need to make clinical decisions.

Objective The objective of this study was to identify the needs among Dutch pharmacists in clinical decision-making in pharmacy practice.

Methods An explorative, qualitative study was designed. Ten in-depth interviews using semi-structured questions were conducted with pharmacists working in a clinical role in primary or secondary care between August 2021 and December 2021. The interviews were audio-recorded and transcribed verbatim. Thematic analysis was then performed to identify, analyze and report themes within the data.

Results The findings were categorized into three themes. The first theme, pharmacist's attributes, included four subthemes: 1- knowledge, 2- skills, 3- attitude and 4- autonomy. The second theme, clinical case, included three subthemes: 1- trigger, 2- patient record and 3- patient conversation. The final theme was the workplace environment with three subthemes: 1- sources, 2- facilities and 3- colleagues.

Discussion In summary, this thesis contributes to the understanding of the needs among Dutch pharmacists in clinical decision-making and introduces aspects that pharmacists could be facilitated in. The preconditions of this model can be further used to support teaching clinical decision-making among pharmacists and pharmacy students.

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1 Introduction

In this introduction chapter, the background and objective of the research are explained. The chapter ends with a brief overview of the structure of this thesis.

1.1 Context

Pharmacists play an important role in healthcare.¹ Their expertise spans several areas, including product care, medication policy, quality assurance and patient care. In recent years, the focus within these areas has shifted from product to patient.²⁻⁴ This change has been driven, in part, by the dispensing technology advancements that reduce the necessity of pharmacists in the distribution process.^{4,5} Among others, these technological advancements have allowed pharmacists to focus more on assuring appropriate medication therapy management.⁴ By doing so, pharmacists are now becoming a more integral part of the health care delivery team. They are expected to be collaborative, patient-centered practitioners, taking greater responsibility and accountability for patient care and working side-by-side with other health professionals.¹ As a result, pharmacists are now confronted with a wide range of challenging clinical problems. However, there is a lack of understanding of what pharmacists need to come to a decision when working through these problems.

Clinical decision-making in pharmacy practice can be understood as a set of cognitive processes and skills that enable pharmacists to make a patient-centered, therapeutic decision.⁶ As proposed by Wright et al. ⁶, the clinical decision-making process in pharmacy practice consists of four steps: information gathering, clinical reasoning, clinical judgement and enacting the decision. The first step, information gathering, includes tasks such as identifying the need for a decision and evaluating data as laboratory findings and patient characteristics. The second step, clinical reasoning, refers to the interpretation of the gathered data resulting in a set of options. The third step, clinical judgement, can be thought of as the process of weighing the options available, or in other words the benefit-risk assessment. The final step in clinical decision-making considers enacting the decision, which is commonly made in consultation with the patient and/or physician. It is important to note that in this study, clinical reasoning is considered part of the entire clinical decision-making process, while these terms are used interchangeably in other studies.⁶

Pharmacists conduct clinical decision-making addressing a diverse set of clinical scenarios, including self-care cases and multidisciplinary management of illness in hospitalized patients. Pharmacists apply clinical decision-making in services as medication reviews and pharmacotherapy consultations to optimize individual patient therapeutic outcomes. With the expanding role of pharmacists as health professionals, the clinical decision-making process is becoming even more important to pharmacists.⁷ Various articles regarding clinical decision-making are available for other health care professions such as nurses and general practitioners, but when it comes to clinical decision-making by pharmacists, a distinct lack of literature is noticeable.^{8,9} As a result, there is limited understanding on what pharmacists need to make clinical decisions.

Experts on clinical decision-making have stated that the ability to reason is dependent on a well-developed knowledge base.¹⁰ This knowledge base can either be analytical or experiential, or a combination of both.¹¹ In literature, the importance of knowledge for clinical decision-making has mainly been described for medicine and nursing practice.¹² Several studies regarding clinical decision-making have described a difference in knowledge base for medical students and physicians.¹³⁻¹⁵ Because medical students have little or no clinical experience, their clinical reasoning process consists of chains of small steps based on analytical knowledge.¹² It is likely that the same applies to pharmacy students, since emphasis is still more on analytical knowledge acquisition in pharmacy education.^{7,16} It is unclear whether this analytical knowledge base is sufficient for the clinical decision-making process, or if clinical experience is also necessary.

In addition to the importance of knowledge, various essential skills to conduct clinical decision-making are described in literature. For instance, cognitive skills such as interpretation and evaluation are mentioned as core skills in nursing practice.^{17,18} It is plausible that these skills could also be translated to pharmacy practice. Other core skills that emerge from the literature are communication skills.^{19,20} These skills are essential for improving patient drug adherence and achieving optimal therapeutic outcomes.¹⁹ Nonetheless, communication skills are only mentioned as general skills a pharmacist should have, while specific skills to conduct clinical decision-making remain undefined.

Along with knowledge and skills, a certain attitude is also considered necessary for clinical decision-making.^{17,18} In nursing practice, it has been stated that personal behavior is a critical component to participate in effortful clinical decision-making, specifically, curiosity and

motivation.¹⁷ Additionally identified characteristics were analytical, truth-seeking, open-mindedness, self-confidence, and maturity.²¹ For general practitioners, it is described that the ability to conduct clinical decision-making depends on having the following characteristics: motivation, perseverance, fair-mindedness, and deliberate and careful attention thinking.²² Again, these characteristics have yet to be studied in pharmacy practice.

The importance of analytical and experiential knowledge, certain skills and certain characteristics in conducting clinical decision-making in the nursing and medical practice have been described. In addition, interpersonal relationships with colleagues, patient conditions and availability of resources are mentioned as important influences of clinical decision-making.²²

Clinical decision-making by pharmacists has significant implications for patient outcomes. To improve patient outcomes, the identification and understanding of the factors needed to make clinical decisions is required to facilitate and optimize this process. From an educational perspective, this research is important in order to meet the learning needs of pharmacists and pharmacy students to conduct clinical decision-making.

This research was conducted as part of a larger project defining the concept of clinical reasoning by pharmacists in the Dutch healthcare setting in order to develop teaching strategies.

1.2 Objective

The objective of this research is to identify the needs among Dutch pharmacists to conduct clinical decision-making. This has been translated into the following research question:

What do Dutch pharmacists need to conduct clinical decision-making in pharmacy practice?

1.3 Thesis outline

The remainder of this thesis consists of three chapters. *Chapter two* explains and reflects upon which methods were applied in this study. This chapter is also known as a methodology. *Chapter three* presents all results from qualitative data that were uncovered through research. *Chapter four*, the last part of this report, interprets the results in the form of a conclusion and discussion of the research with regards to the research question. Additionally, this chapter discusses the strengths and limitations, and recommendations for practice and education.

2 Methodology

In this chapter, the applied methods for this study are being discussed. First of all, the research team is introduced. Second, the chosen study design and method are explained. Third, the sample selection is discussed. Last, data collection and data analysis method are described.

2.1 Research team

This research was conducted by a master pharmacy student (SB). As previously stated, this research was conducted as part of a larger project, which is carried out by a research team consisting of the following team members: Josephine F. Mertens, MSc. (JM), dr. Ellen S. Koster (EK), dr. Vera H.M. Deneer (VD), prof. dr. Marcel L. Bouvy (MB), and prof. dr. Teun van Gelder (TvG). It is important to note that this is a multidisciplinary research team with expertise in medical education as well as expertise in pharmacy practice (JM, MB, VD), medical practice (TvG) and qualitative research methodologies (EK).

2.2 Study design

An exploratory, qualitative research design is considered most suitable to clarify the needs among pharmacists to conduct clinical decision-making. An inductive approach was used to form a general theory on their needs. A clear overview of the research process is given in Figure 1.

The methodology used in this thesis is grounded theory (GT), that was first introduced by Glaser & Strauss in 1967.²³ One of the defining characteristics of GT is that it aims to generate theory that is ‘grounded’ in actual data.²³ GT involves concurrent data collection and data analysis in the form of several levels of coding, as well as ongoing comparative analysis.²³

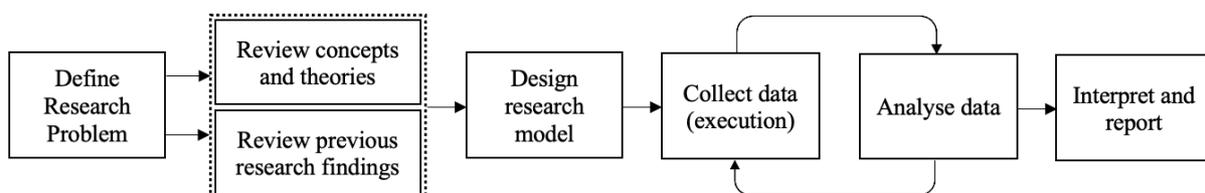


Figure 1 – Research process in flowchart

2.3 Sample selection

To develop the sample of this research, the method of purposive sampling was used. This is a common form of sampling used in GT studies.²³ Purposive sampling is a type of non-probability sampling in which researchers rely on their own judgment when choosing participants for the study. According to this method, participants are selected based on their knowledge, relationships and expertise regarding a research subject.²⁴ In this study, participants who could provide in-depth and detailed information about their approaches and needs in clinical decision-making in pharmacy practice were recruited. Given the range of disciplines in pharmacy, pharmacists in both primary and secondary care were recruited.²⁵ Furthermore, because it is unknown how experience affects pharmacists' clinical decision-making, participants with varying years of experience were included in this study. Participants were recruited within the network of the research team. Interviews were conducted up to the point of data saturation, which is described as when additional incoming data offers little or no new information to answer the research question.²⁶ The minimum number of interviews was stated on five pharmacists employed in primary care and five pharmacists employed in secondary care. This number was also influenced by the short time frame of six months in which this study had to be completed.

2.4 Data collection method and tools

Semi-structured, in-depth interviews were used in this study. These type of interviews are utilized extensively as interviewing format by different health professionals in their research.²⁷ Semi-structured interviews are a type of interview with loosely structured questions to give the interviewees more opportunities to fully express themselves. This type of interview can be conducted in multiple ways (i.e., face to face, telephone, text/email, individual, group). For this study, face-to-face interviews were conducted, because these allow for more in-depth data collection and comprehensive understanding. Moreover, body language and facial expressions are clearly identified and understood, and the interviewer can probe for explanations of responses. The interviews were conducted in-person or online with the use of Microsoft Teams. Preference was given to in-person interviews because these offer a higher level of engagement. However, if it was not convenient for the interviewer or interviewee to meet in person, the interview was conducted online.

As far as data collection tools were concerned, the conduction of the research involved the use of a semi-structured questionnaire, which was used as an interview guide by the researcher. This interview guide consisted of three themes to appoint: work experience and clinical role, clinical decision making, and learning and teaching clinical decision-making. Specific questions were prepared per theme to help the researcher guide the interview towards meeting the research objectives. These questions aimed to explore pharmacists' experiences on making clinical decisions and, more specifically, how they would approach a case scenario of determining medication appropriateness. Several questions regarding the needs when conducting clinical reasoning have been implemented in the interview guide. These questions range from questions about general needs to questions about specific needs from the physician or patient. Personal qualities were also discussed in the interviews. The interview guide is presented in Appendix I.

2.5 Procedure

Interviews were conducted from August to December 2021. All interviews were conducted by the same person, JM, to ensure consistent data collection. JM is a researcher, lecturer and pharmacist, who has completed a training on qualitative interviewing and was therefore most suitable for conducting the interviews. Potential participants received a Participant Information Sheet (PIS) outlining the purpose of the interview and objectives of the research by email (Appendix II). Before participating to the study, the participants were asked to sign the Informed Consent Form (ICF) as can be seen in Appendix III. Participants were allowed to withdraw from the study at any time and did not receive an incentive to participate. Interviews were intended to last approximately 45 to 60 minutes. JM informed the pharmacists about the procedure of data collection. The data was collected at a time the participants perceived to be convenient and free of interruptions. In-person interviews were conducted in a private room or via Microsoft Teams, where there was a minimum amount of noise and distraction. Audio recordings were used to capture the interview, to focus on the interview content and to generate a verbatim transcript of the interview. Field notes were made by the author of this thesis, SB, during the interviews and included in the data analysis.

2.6 Data analysis plan

All recorded interviews were transcribed verbatim by SB. These transcriptions were reviewed for accuracy at random intervals. To ensure that questionable answers or sarcastic remarks were well understood from the transcript, terms as [uhm] and [laughing] were used during transcribing. Each transcript was anonymized by assigning a pseudonym to each participant.

A general inductive approach was used to analyze the transcripts, whereby the researcher allows the theory to emerge from the data.²⁸ This approach was used to identify themes in the data that were related to the research objective.

Themes were identified by systematically reading and coding the transcripts using qualitative data analysis software (ATLAS.ti version 9). To assess the trustworthiness of the data analysis, consistency checks were done using independent parallel coding, whereby relevant text passages from each transcript were coded independently by two different people (JM and SB). Discrepancies in coded text passages and code names were resolved through discussion together or with a third researcher (EK). Codes were placed in categories, and categories were later conceptualized into broad themes with subthemes. The developed framework of (sub)themes was discussed and further refined with the research team. The continuous revision and refinement of the category system and developed framework was an important part of the data analysis.

3 Data analysis

In this chapter, the findings from this research are reported. This chapter starts with general information on the conducted interviews and emerged themes. After this, each theme with the associated subthemes is discussed individually.

3.1 Interviews

Ten pharmacists participated in this study until data saturation was reached, which was confirmed by the fact that the developed categories remained unchanged after the last interviews conducted. In addition, few or no new codes emerged from the last interviews. The interviewees consisted of hospital pharmacists (n=5) and community pharmacists (n=5). Within the subgroup of community pharmacists the distinction was made between community pharmacists working in an outpatient pharmacy (n=3) and community pharmacists working in a community pharmacy (n=2). An approximately equal distribution in gender was achieved (60 % female). The participating pharmacists' experience in a clinical role ranged between 2 and 18 years. The duration of the interviews varied, as envisioned, between 45 to 60 minutes. An overview of the socio-demographic characteristics of the participants and the duration of the interviews is presented in Table 1.

Table 1 – Sociodemographic characteristics of participants and duration of interviews

Participant No.	Pseudonym	Gender	Discipline	Years of clinical experience (in years)	Duration of interview (in min)
P1	Anne	Female	Hospital	11	46
P2	Sophie	Female	Community	8	53
P3	Daphne	Female	Hospital	10	50
P4	Charlotte	Female	Outpatient	8	49
P5	James	Male	Hospital	2	45
P6	Gerard	Male	Community	3	51
P7	Arif	Male	Outpatient	6	46
P8	Brian	Male	Hospital	11	56
P9	Christel	Female	Community	8	46
P10	Louise	Female	Hospital	18	58

3.2 Emerged themes

After coding ten transcripts in ATLAS.ti, a total of 178 codes were identified. These codes were grouped into three emerged themes relevant to clinical decision-making. The first theme, pharmacist's attributes, included four subthemes: 1- knowledge, 2- skills, 3- attitude and 4- autonomy. The second theme, clinical case, included three subthemes: 1- trigger, 2- patient record and 3- patient conversation. The final theme was the workplace environment with the three subthemes: 1- sources, 2- facilities and 3- colleagues. A conceptual framework of these (sub)themes is depicted in Figure 2. A more comprehensive figure that includes an additional detail layer can be found in Appendix IV.

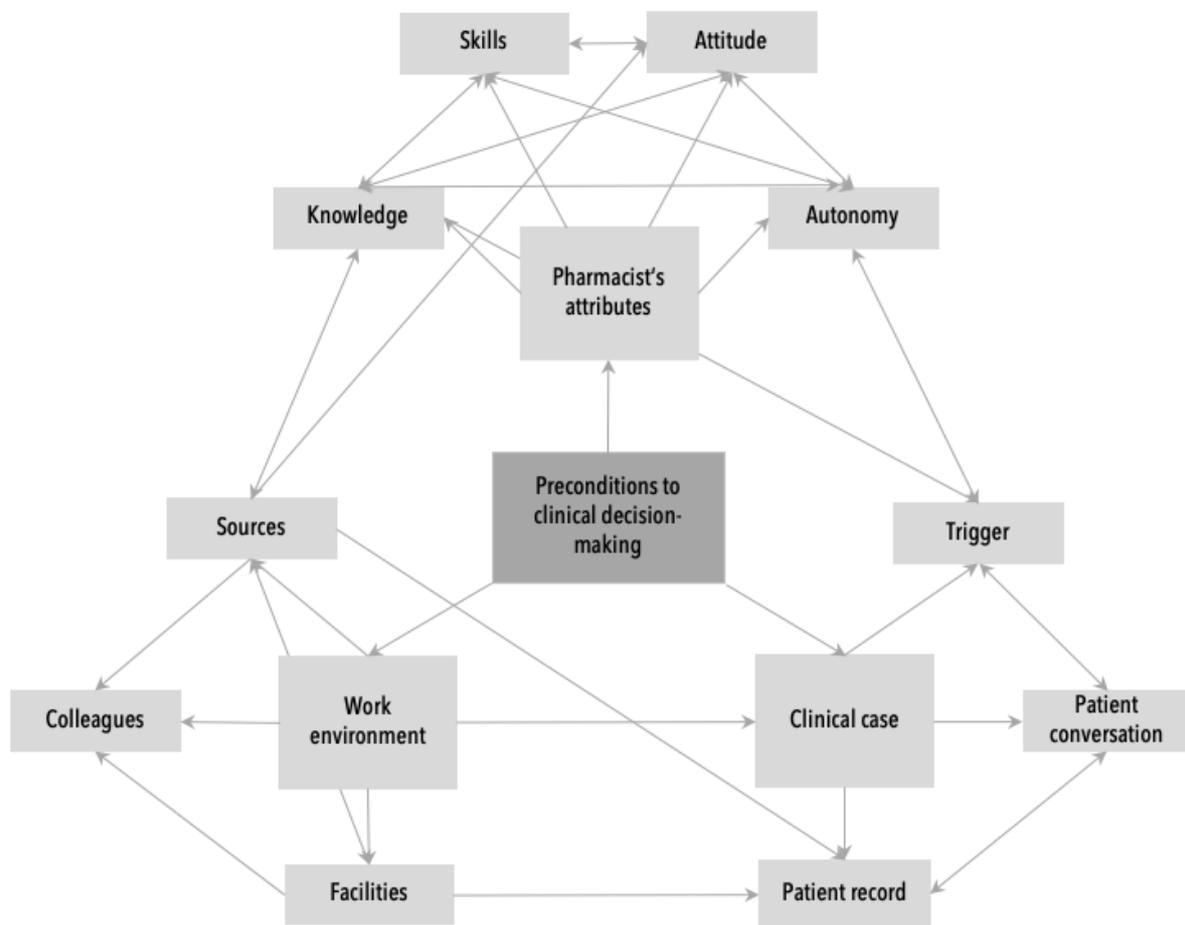


Figure 2 – Preconditions to clinical decision-making: emerged themes and subthemes

3.3.1 Pharmacist's attributes

During the interviews it became clear that a number of preconditions could be attributed to the pharmacist as an individual. These preconditions were grouped under the theme “pharmacist's attributes”. As shown in Figure 2, these attributes are divided into the subthemes: knowledge, skills, attitude, and autonomy.

Knowledge

Pharmacists pointed out knowledge as an important precondition to be able to conduct clinical decision-making. Pharmacists indicated that they initially gathered their knowledge, the ground for clinical decision-making, during their pharmacy education.

'Of course, as a pharmacist, you just have a certain expertise and completed pharmacy education and a lot of knowledge about medication. As a result, you rely on that knowledge to advise the patient.' – Sophie, community pharmacist

Pharmacists stated that they needed knowledge on hand, but also made use of sources (see: 3.3.3 work environment). Knowledge on hand involved basic pharmaceutical concepts such as pharmacokinetics and pharmacodynamics, and general knowledge about medication groups. This type of knowledge is also known as analytical or textbook knowledge.

'Well, I think a very important one is that you have a, by all means not completely perfect, but general understanding of, for example, which substances are cleared by the kidneys and when liver function is vital, and so on. And that you have a rough idea of, what, say, side effects or interactions are for each medication group.' – James, hospital pharmacist

According to the interviewees, next to analytical knowledge, experiential knowledge was essential in order to make clinical decisions. It was mentioned that the more experience, the sooner one was on the right track during the clinical decision-making process.

'But yes, practical experience is essential to be able to do this well.' – Sophie, community pharmacist

Monitoring given advices was assigned to feed this experiential knowledge, contributing to the ability to make clinical decisions in the future.

'What's really essential, [...], is that you monitor things during your learning process.' – Brian, hospital pharmacist

In addition to the above, it was considered important to have knowledge of which sources provide which kind of information. When asked what type of knowledge was needed to make a clinical decision, the following pharmacist replied:

'First and foremost, knowledge of sources. Second, general knowledge about every subject, since you will be asked so many different types of questions and have so many different conversations that you need to have knowledge of every subject. However, you may search for the details later.' – Christel, community pharmacist

Knowledge was mentioned as one of the first preconditions in the interviews. Pharmacists considered their knowledge about medication to be crucial in making clinical decisions.

Skills

Aside from knowledge, a number of skills were mentioned as preconditions to clinical decision-making. Pharmacists explicitly emphasized the significance of communication skills, for instance, when contacting patients or physicians. They indicated that the posed question was frequently quite vague or that there was a different question behind the posed question. As a result, they had to rely on their communication skills to identify the problem.

'You need to be able to figure out the question behind the question. [...] So I believe communication is essential. But you can only figure out the question, I think, if you have enough knowledge.' – Brian, hospital pharmacist

The last part of this quote also indicates that communication skills are directly aligned with knowledge, which is a subtheme explored previously in this chapter. Other mentioned skills aligning with knowledge were research skills such as using sources and filtering relevant information from articles.

'Also very important is being able to find information very quickly. Because it is actually impossible to know everything, say, as knowledge on hand. So it's very valuable if you know where to find it, and can interpret it well.'
– James, hospital pharmacist

In addition to communication skills and research skills, cognitive skills were mentioned as preconditions to clinical decision-making. For example, interpretation of collected data was indicated as an important skill for the clinical reasoning step in clinical decision-making.

I believe that all the information you need is available to you. What you have to do as a pharmacist is to interpret that information. – Arif, outpatient pharmacist

Other cognitive skills were related to the clinical judgment or benefit risk assessment, whereby pharmacists need to consider the benefits and drawbacks of the potential therapeutic options and select the most appropriate option for a specific patient.

'I believe it is critical that you understand that assessment. [...] That you consider the potential consequences.' – Anne, hospital pharmacist

Attitude

The Dutch pharmacists also spoke of a certain attitude that is needed to make adequate clinical decisions. Some of the attitudes mentioned were friendly, sincere, critical, and confident. Furthermore, curiosity emerged as an essential quality of pharmacists in clinical decision-making. However, some pharmacists referred to this attribute rather as a promoting factor. Promoting factors are not further studied in this research.

'What do I need as a pharmacist to be able to fill in this train of thought.. Hmm.. Well, experience.. having a lot of conversations.. and curiosity.' – Christel, community pharmacist

Pharmacists also stated that their curiosity is sometimes accompanied by excessive gathering of data. In addition, curiosity would lead to longer conversations with the patient than desired. It would therefore be important to find a balance between gathering enough information to make an informed decision and, on the other hand, avoiding gathering of needless data.

'First of all I think curiosity, because you come across a lot of things that you just don't know and you have to be curious. And I think, and that is difficult, that you have to find a balance between on one hand gathering enough information, to formulate a good advice, but to do that within a certain amount of time.' – James, hospital pharmacist

Next to curiosity, respect was expressed several times in the interviews. Pharmacists stressed the need of treating physicians and other health care providers with respect, as well as respecting patients.

'I really think you should respect everyone, and everyone has a certain expertise.' – Charlotte, outpatient pharmacist

Another attribute that emerged from the interviews, and which was mentioned by half of the interviewees as being essential for clinical-decision making, was “being certain”. For example, in the process of information gathering pharmacists indicated that they needed to be certain that no relevant data was overlooked. Certainty about their knowledge on hand was also mentioned as needed by pharmacists. When it came to the benefit risk assessment, pharmacists noted they needed certainty that their clinical decision did not pose any unnecessary risks to the patient.

'I only deliver when I'm 100% certain it has no risk.' – Arif, outpatient pharmacist

Autonomy

The fourth and final subtheme of pharmacist' attributes is autonomy, which entails making your own decisions and respecting the decisions of others, independency, responsibility, and trust. These aspects came up as preconditions to clinical decision-making, although not always clearly, reflecting the fewest number of codes.

'An example is if drugs are not available. That's where you, as a pharmacist, play a role in choosing the alternative – one, I believe, much more than the other. And, in certain cases, without contacting a physician. [...] And so I am quite quickly inclined to decide the alternative medicine myself. So there is also a bit of that professional autonomy involved.' – Sophie, community pharmacist

The physician's trust was also mentioned in this theme, as it influences the pharmacist's responsibilities in part. The importance of knowing each other's responsibilities was also emphasized.

'It's also.. understanding your responsibilities as a pharmacist.'
– Arif, outpatient pharmacist

3.3.2 Clinical case

The second key theme that emerged from the interviews involves the clinical case, which is divided into three subthemes: trigger, patient record, and patient conversation. This theme covers everything that has to do with the case in which clinical decision-making is conducted.

Trigger

From the interviews, it emerged that pharmacists need a trigger to initiate their clinical decision-making process. This would be, for instance, a medication monitoring signal or clinical rule from the medication monitoring system.

‘There must be a trigger, I’d say. [...] There must be a trigger that initiates the thinking process.’ – Louise, hospital pharmacist

Other possible triggers mentioned were the physician’s or patient’s problem statement or question. When pharmacists were asked what they need in order to make clinical decisions, the problem was mentioned several times first.

‘What do I need?.. The problem. So, I think that’s paramount: What is the problem? And or what are the problems?’ – Gerard, community pharmacist

Pharmacists indicated that possible triggers could also emerge from experience. They claimed experience helps in being more attentive to certain errors in practice that occurred in the past. The development of a so-called "gut feeling" is a part of experience and can also serve as a trigger.

‘That, I believe, is your experience.. You always see: Oh, but it’s always this and this together.. why is the Ascal missing now? Or something like that.. And that’s the trigger.’ – Daphne, hospital pharmacist

Patient record

During the interviews it became clear that reading the patient record was an important part of the data collection of clinical decision-making among pharmacists. The participants indicated that after receiving a trigger, the first thought that came up is almost always to open up the patient record. Hospital pharmacists have access to complete patient records, while patient

information is often limited in the community pharmacy. Community pharmacists more often appointed the need to contact the physician or patient due to lack of necessary data such as lab values and medical history. Hospital pharmacists, on the other hand, stated their patient records provided sufficient data in most of the cases.

'You can simply extract a lot of information from the patient record.' – Anne, hospital pharmacist

When pharmacists were asked what information they need from these records, they gave a variety of responses. Community pharmacists mostly looked at basic patient characteristics such as age, gender, and weight, as well as the indication and lab values if these were available. The need for an indication list was specifically mentioned in case of medication reviews.

'I believe one method is to compare the indications and prescribed medication side by side, together with the lab, and all of that data with the input of a conversation.' – Sophie, community pharmacist

Hospital pharmacists not only took in account the indication and lab values, but also indicated the need of items such as why the patient was admitted to the hospital, which department the patient was in, and what the clinical condition was.

'So what department is the patient in, what is the medical history, what does the clinical condition look like and what are the indications for the various drugs.' – Brian, hospital pharmacist

Patient conversation

In addition to the patient record, the conversation with the patient was also considered needed to conduct clinical decision-making. Particularly when performing medication reviews, the patient conversation was mentioned as an essential element to retrieve additional patient data.

'But I also think that a lot of other things often come from the patient themselves [uhm] and you cannot analyze them from your system. Therefore, you really need that conversation.' – Sophie, community pharmacist

When physicians approach pharmacists with a medication-related question, it was indicated that a patient conversation was not primarily necessary. For example, relevant information about the patient was told verbally by the physician itself or could be retrieved from the patient record. Hospital pharmacists mentioned the need of a patient conversation less often than community pharmacists. The following outpatient pharmacist also stated he does not need a patient conversation. This is because, like hospital pharmacies, most outpatient pharmacies, including the one he works at, have access to complete patient records.

'I don't talk to the patient for that reason. So it's patient data, basically. All things that are just on the prescription. Comedication, potassium, that sort of things. These are all things that are on the prescription or that you don't need a patient for' – Arif, outpatient pharmacist

3.3.3 Work environment

The work environment is the last theme that emerged from the data. This theme includes three subthemes: sources, facilities, and colleagues.

Sources

A majority of the pharmacists reported that sources were consulted during the clinical decision-making process. As became clear from the knowledge paragraph, pharmacists stated they need knowledge on hand about basic pharmaceutical principles. Considering the fact that pharmaceutical knowledge is very extensive and not everything can be remembered, hence, the need for sources. Pharmacists reported extensive use of sources during their clinical decision-making. For instance, guidelines were used as a guide for therapeutic treatments. When it comes to high-risk patients such as children, The Children's Formulary, a drug database for children's dosages was consulted. In many other cases, The Informatorium Medicamentarium in The KNMP Knowledge Bank, another drug database, was consulted.

'Then I'll take a look at The Knowledge Bank to.. assuming you don't know- but very often you do know which dosages are common. But you could look, if you don't know, to see if it's a bit of a normal dose.' – Anne, hospital pharmacist

Study databases, for instance PubMed, were also mentioned as commonly used sources by the interviewees, mostly by hospital pharmacists. These type of sources were mainly consulted when local guidelines and drug databases provided insufficient information for the case.

'Don't go right away.. I'd say, dive into international literature if you might also have local guidelines or agreements. Or local resources. So start locally, and if you don't find anything, then start searching in PubMed.' – Louise, hospital pharmacist

Searching for information in sources is strongly connected with having experience and knowledge. The more knowledge on hand, possibly through experience, the less these pharmacists reported to consult sources. When one pharmacist was asked about how he came to the judgement that a given dose was, for example, too high for a particular age group, he replied:

'Well.. knowledge, expertise.. what is written in all guidelines and in The Informatorium.. and also experience.' – Gerard, community pharmacist

The connection between sources, knowledge, and experience in clinical decision-making was also mentioned in another interview:

'Imagine someone comes up with a side effect. Could this be a side effect? So now you have your knowledge and experience of, oh, I've seen that a lot of times. If that's not the case, you'll have to dive into the literature. First, the obvious sources such as The Knowledge Bank, and so on. And otherwise you'll dig deeper to decide if that's really the case.' – Sophie, community pharmacist

In addition, the need of certainty is also linked with the need of consulting sources in the clinical decision-making process (see also: attitude). In case of uncertainty, pharmacists consult sources. The following pharmacist said:

'Well, I need to be sure enough. So it's either that.. that it's just knowledge on hand that you have. And if not, I'll dig into it a little more. So that's when I'm going to consult guidelines, or yeah, well.. all the sources out there.' – Daphne, hospital pharmacist

Facilities

The interviews also revealed some preconditions that could be considered facilities. These include the medication monitoring system pharmacists use to carry out part of their work. In addition, a consulting room was also considered an important precondition to clinical decision-making. In particular, if the patient was involved in the clinical decision-making process and there was a confidential patient conversation going on. Furthermore, access to the right sources and complete patient records also emerged from the interviews as being needed in clinical decision-making. As mentioned in the patient record paragraph, access to complete records differ between community pharmacists and hospital pharmacists. One community pharmacist indicated that access to lab values is indeed important. However, this access is not always granted.

‘And you include as much as possible all information that you have in the system in any case. Sometimes that’s episodes, sometimes lab values.. If the patient has given permission to view them. – Gerard, community pharmacist

Colleagues

The last subtheme related to the work environment concerns colleagues, in which the distinction can be made between pharmacists and other health professionals. Often, pharmacists reported the need of a colleague-pharmacist to consult in their decision-making process. This involved, for example, when a colleague-pharmacist was more specialized in a particular subject relevant to the question or case.

‘Or if there are issues that I can't quite figure out myself or when I can't quite structure my thoughts, I sometimes walk, for example, to the hospital pharmacy and ask: would you like to think along?’ – Charlotte, outpatient pharmacist

The importance of having a good collaboration with other health professionals, such as general practitioners, was also emphasized. Physicians were mentioned as being needed in any scenario where a prescription is changed, because pharmacists are not authorized to do so:

‘If the prescription is modified or if a different drug is required, you need a physician.’ – Gerard, community pharmacist

4 Discussion

In this last chapter, the results from data analysis are discussed. In addition, the strengths and limitations of this study are pointed out. Finally, the overall conclusion is given and recommendations are proposed.

4.1 Discussion of results

The importance of knowledge, skills, attitude, colleagues, and sources is reported in literature amongst nurses and physicians, and have now come forward for pharmacy practice as well. Specific identified essentials for pharmacists for the clinical decision-making process include autonomy, triggers, patient records, patient conversations, and facilities.

The results suggest that the *pharmacist's attributes* play an important part in clinical decision-making amongst Dutch pharmacists. The need for knowledge is in line with literature of other health professions.¹⁰ It's worth noting that pharmacists referred to knowledge and experience as two distinct essentials; nevertheless, as evidenced by literature, the term knowledge in this research encompasses both experiential and analytical knowledge.¹¹ The need for analytical knowledge might be explained by the fact that the knowledge domain of pharmacy is specific to pharmacists, and hence regarded an essential part of their expertise. The need for experiential knowledge may be explained by the idea that pharmacists who have more opportunities to conduct clinical decision-making and follow up on their decisions and interventions receive more feedback on their decisions and interventions, potentially leading to better clinical decisions in the future. The latter implies the importance of experiential learning in pharmacy education to teach clinical decision-making.

Regarding the pharmacist's attitude, one noteworthy finding was the need for curiosity, which has been described as an essential component in clinical decision-making in nursing practice.¹⁷ It is debatable whether or not this is a precondition to clinical decision-making. Curiosity, on the one hand, encourages the gathering of data, which is part of the first step in the clinical decision-making process as proposed by Wright et al.⁶ Without curiosity, it's probable that essential information would be lacking that would allow for an informed clinical decision. Moreover, it could be that curiosity promotes an open mind, which ensures that conclusions are not drawn too quickly in the decision-making process. On the other hand, curiosity has a

possible drawback of leading to the collection of unneeded data, thereby complicating or delaying the clinical decision-making process. It can therefore be stated that while curiosity is a necessary component for clinical decision-making, the downsides must be considered. These findings suggest that pharmacy students should be encouraged to use their curiosity as much as possible, and that they should be taught that while obtaining answers can be difficult, asking the right questions with an open mind is the most important place to start. Another notable finding was the need for “certainty” in clinical-decision making, which appears to be a unique precondition to pharmacists. One possible explanation to this is that, unlike physicians, pharmacists frequently do not monitor or have the patient in sight after making a clinical decision. This strengthens the argument for being certain in the decision that is made. However, in many cases, the decision is not straight forward. As a result, pharmacists must learn to deal with the element of uncertainty that is inherent in clinical practice as an unavoidable component of clinical decision-making.¹

With regard to the professional autonomy, it became evident that the pharmacist’s independence in clinical decision-making was partly determined by the physician’s trust in the pharmacist. Given that pharmacists in the Netherlands do not have prescribing rights, any modifications to the prescription must be in accordance with the physician. However, the greater the physician's trust in the pharmacist, the greater the pharmacist's autonomy to, for example, make these changes on its own, provided that agreements have been made. The degree of professional autonomy of the pharmacist therefore depends partly on the extent to which the physician grants that autonomy.²⁹ This finding underlines the importance of regular collaboration between pharmacists and physicians, as this can help to build mutual trust and respect for each other's knowledge and experience, enhancing the pharmacist's professional autonomy in clinical decision-making.

Within the paragraph *clinical case*, it was determined that triggers could be related to a signal from an automated system or a signal from yourself, “a gut feeling” based on previous experience. These findings suggest that pharmacists act reactive, as their thinking process must be initiated by a trigger. Furthermore, these findings emphasize the need for experiential knowledge, in particular the gut feeling mentioned earlier in the clinical decision-making process. Another notable finding within this theme is a clear difference in the need for a patient conversation between hospital pharmacists and community pharmacists. A probable explanation is the difference in access to patient records. Where hospital pharmacists have

access to complete patient records, community pharmacists are often limited to a patient record that only contains medication dispensations. As a result, community pharmacists often still have to consult the physician or patient due to lack of necessary data such as lab values and medical history. Therefore, the need for a patient conversation seems bigger for community pharmacists than hospital pharmacists. Another probable explanation for this difference is the fact that community pharmacists conduct more medication reviews. To conduct these services, it is important to tailor the chronically used medication to the patient's needs. Therefore, the patient conversation is considered essential, since data emerges from the conversation that cannot be retrieved from the pharmacy system. Lastly, because of a difference in work setting, hospital pharmacists and community pharmacists deal with a different type of patient cases. Therefore, hospital pharmacists consider additional patient data such as why the patient was admitted to the hospital and which department the patient was in.

Regarding the results on the *work environment*, it became clear that source consultation is an important part of the clinical decision-making process among pharmacists, inherent to other health professions. Hospital pharmacists seem to consult PubMed more than community pharmacists, potentially because they often may have to deal with more complicated and rarer cases and have paid access to this study database through the hospital. Another probable explanation for this difference is that hospital pharmacists seem more likely to have obtained their PhD or be active in research, making them more familiar with the use of PubMed than community pharmacists. With regard to the consultation of patient records, it can be suggested that community pharmacists face a barrier since they do not always have access to complete patient records, despite the fact that this is essential for the clinical decision-making process. Another suggested barrier pharmacists may face is the fact that pharmacists appoint physicians as needed in their decision-making, such as when modifying a prescription. Physicians would have to be consulted less frequently if pharmacists had all the patient data needed and could adjust the prescription themselves. It's important to note that autonomy also plays a role here: while some pharmacists are more independent in their decisions, others tend to rely more on the physician's input and approval. As evidenced by observational studies, complete access to electronic health records could be a potential tool to help pharmacists and physicians communicate information and work toward a collaborative approach.³⁰

4.2 Strengths and limitations

This was a study of ten Dutch pharmacists working in primary and secondary care. The small number of participants limits the research, so the results may not be generalized to all Dutch pharmacists. However, as with all qualitative research, our goal was to gain a thorough understanding of our participants' needs rather than statistical representation. Our study is based on self-reports. Observational studies are needed to verify that what pharmacists reported is actually what they need. Furthermore, it is important to note that the developed framework represents the consensus of this research team, but that with a different research team consensus might have been reached otherwise. Additionally, because the purposive sampling took place within the network of the research team, it is prone to researcher bias. A final limitation is the uncertainty about truly achieving data saturation. Despite the fact that this decision was mostly based on the fact that few new codes emerged from the interviews conducted lastly, time constraints also played a role. If more interviews were conducted, it is possible that the developed framework would need adjustments. Although this framework informs pharmacists' preconditions to clinical decision-making, it does not cover all possible preconditions. However, we believe that it provides a clear summary of the most essential preconditions. The shown relationship between the several (sub)themes, which reveals that the distinct preconditions are not independent from each other, is a major strength of the framework.

4.3 Conclusion

This research contributes to the understanding of the needs among Dutch pharmacists to conduct clinical decision-making. The pharmacist's attributes, the clinical case and the work environment each play an essential role in making clinical decisions.

Results of this research on the preconditions needed in making clinical decisions among pharmacists can be used to meet the learning needs of pharmacists and pharmacy students. Moreover, it is of importance to facilitate pharmacists in the mentioned preconditions. In particular, our finding that patient records and collaboration with physicians are essential for pharmacists in order to be able to make clinical decisions, underscore the importance of facilitating access to medical data and creating a collaborative culture. To make clinical decision-making among pharmacists more successful, more qualitative and quantitative research on or relevant to this subject is needed.

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Appendix I: Interview guide

Thank you very much for giving us the opportunity to interview you for our study on clinical decision-making by pharmacists. The questions I would like to ask during this interview are about how you, as a pharmacist, come to a decision when addressing a patient case: which thinking steps do you take? As a pharmacist, researcher and teacher, I am interested in this topic. There are no right or wrong answers here. The interview will last for about 45 minutes and consists of a number of questions regarding the making of decisions and a patient case.

Your participation in this study is voluntary and your answers will be treated confidentially. You can stop with or withdraw from the interview at any time. This interview will be recorded so that the interview may be reconstructed accurately. The recording will be deleted at the end of the study. I would really appreciate it if you could sign the consent form and send it to me by email. Do you have any questions beforehand?

Shall we begin?

A. Professional experience and clinical role

- How many years have you been working as a pharmacist in pharmaceutical patient care?
- Which of your current pharmacy activities are directly related to the patient? (prescription processing, medication review, etc.)

B. Clinical decision-making

- What logical steps do you take in these work activities to come to a decision?
 - Does this process differ between the different work activities? If so, how?
- What do you need to make a decision?
- What do you use to make a decision?
 - Dig deeper: knowledge, skills, attitude
 - What would you like to improve?
- What hinders you in your decision-making?
- What promotes your decision-making?
- What do you need from the physician to make a decision?
- What does the physician need from you?
- Is the patient involved in your decision making? If so, how?
- What do you need from the patient to make a decision?

B. Learning and teaching clinical decision making

- Are you an educator of pharmacists or pharmacy students? If so:
 - How do you teach others to deal with patient cases?
 - How do you rate this among others?
 - What do you think an educator needs to teach this?
 - Dig deeper: knowledge, skills, attitude, preconditions
 - Example of a successful training moment?

Your experience from practice have already been very helpful, for which I would like to thank you. I would like to know how you come to a decision on a short case. Would you like a short break?

C. Clinical reasoning

- This is an abbreviated patient case from practice. I would like to know how you come to a decision. There is no correct or incorrect answer. Can you guide me through your train of thought by thinking out loud when reading the case and come to a decision on the right therapy?

Situation (primary care)

You assess the medication of an 85-year-old patient during a medication review. She would like to reduce her amount of medication. She lives independently and is mobile but does use a rollator. The lady hardly drinks alcohol and does not smoke. She tries to eat healthy with little salt. She indicates that the last few days she cannot do her shoes because of swollen lower legs and feet.

Situation (secondary care)

You assess the medication of an 85-year-old patient. She would like to reduce her amount of medication. She lives independently and is mobile but does use a rollator. The lady hardly drinks alcohol and does not smoke. She tries to eat healthy with little salt. She indicates that the last few days she cannot put on her shoes because of swollen lower legs and feet.

Current medication

Acenocoumarol according to scheme Thrombosis Service [since 10 years]

Amlodipine 10mg 1dd 1 tablet [since 2 weeks]

Enalapril 10 mg 1dd 1 tablet [since 12 years]

Metoprolol 100 mg 1dd 1 tablet [since 10 years]

Pantoprazol 40 mg 1dd 1 tablet [since 10 years]

Simvastatine 40 mg 1dd 1 tablet [since 10 years]

Lab values (<1 month ago determined)

eGFR: 40 ml/min/1.73m²

Potassium: 4 mmol/L

Sodium: 142 mmol/L

LDL: 3,2 mmol/L

- Which thinking steps did you make?
- What characteristics did you use to make a decision?
- What prevented you in your decision-making?
- What promoted you in your decision-making?
- What information would you need from the physician?
- What information would you need from the patient?
- What would you have done differently in real life practice?
- What did you find difficult about the case?

Your thoughts on this case are very helpful to our research. Did I forget to ask something in your opinion, or do you want to add something?

Thank you very much for your time and answers to our questions. We will send you the transcript afterward. If you have any questions or comments regarding our conversation and/or the transcript, please do not hesitate to contact us.

Appendix II: Participant Information Sheet

Clinical decision-making by pharmacists

Information for interview participants



Created by Makarenko Andrey
from Noun Project

We would like to invite you to participate in a study on clinical decision-making by the pharmacist. This research is being conducted by researchers from the Leiden University Medical Center (LUMC) and Utrecht University (UU). Participation in the study consists of a one-time interview. In this letter, we provide you with information about the study, so that you know exactly what will happen.

Why this study?

We want to find out more about how pharmacists come to a decision in practice, so that we can develop appropriate education for pharmacists and pharmacy students.



Created by Vectors Market
from Noun Project

What does it mean to take part in this study?

Participation in this study is voluntary. If you agree to take part, you will be contacted by the researcher for a one-time interview (duration approximately 45 minutes). This can be done by video calling or on location, whatever is more convenient for you. Topics relating to decision-making and a case will be discussed during this interview. There are no correct or incorrect responses here. We're interested in hearing about your experiences.

How do we handle your data?

Your personal information will not be used or stored in any way.. The interview will be recorded with a voice recorder. All data is then processed under a research code and not under your name.

Will I be notified of the study's findings?

Once the research has been completed, the findings will be published in the LUMC and UU newsletters, as well as in the Pharmaceutical weekly.

Questions?

If you have any questions concerning the study's content, please contact Josephine Mertens-Stutterheim, MSc. via j.f.mertens@lumc.nl.

Appendix III: Informed Consent Form

- I give researchers from Leiden University Medical Center and Utrecht University permission to use the information I provided during the interview for this study.
- My data will only be used for this research.
- My data cannot be traced back to me for the researchers.
- I am aware that the interview is recorded and that the researchers will only use the recording to analyze the conversation. When the study is completed, the recordings will be deleted.

YES, I want to take part in this study and give permission to participate.

Name:.....

Address:

Residence:

E-mail address:.....

Phone number:

Appendix IV: Overview of emerged preconditions

