



**samen voor  
medicatieoverdracht**

# Analysis of medication overviews

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## Abstract

**Background:** Due to large variations in medication overviews mistakes are easily made. To prevent this, a uniform medication overview is needed. To develop a uniform format for a medication overview, it is important to know what information is being exchanged right now. **Objective:** To analyse the differences in medication overviews that health care professionals used for medication transfer. **Method:** An observational study was performed. Medication overviews exchanged between healthcare providers were requested in five healthcare sectors. The medication overviews were studied by using a self-developed scoring list. Furthermore, the overall readability and the used definitions of the medication overviews were assessed. **Main outcome measure:** The average number of differences (+/- standard deviation) between the collected medication overviews and the scoring list. **Results:** In total, 27 medication overviews were received. On average 7.39 (SD 5.18) differences were found between the collected medication overviews and the scoring list. 37% of medication overviews used icons, all medication overviews used abbreviations. Most of the icons and abbreviations were not explained. **Conclusion:** There is no uniformity in the medication overviews being exchanged now. Medication overviews differ in the displayed information, usage of icons and abbreviations, used definitions, and the layout.

# Index

<b>1</b>	<b>Introduction</b>	<b>4</b>
<b>2</b>	<b>Aim of the study</b>	<b>5</b>
<b>3</b>	<b>Methods</b>	<b>6</b>
3.1	Study design	6
3.2	Requesting medication overviews	6
3.2.1	Dummy patients	6
3.3	Differences in medication overviews for health care professionals	7
3.3.1	Scoring list	7
3.3.2	Clarity	7
3.3.3	Used definitions	7
3.4	Questionnaire	7
3.5	Patient overviews	8
3.6	Outcomes	8
3.7	Data analysis	8
<b>4</b>	<b>Results</b>	<b>9</b>
4.1	Medication overviews for health care professionals	9
4.2	Differences in medication overviews	9
4.3	Clarity	12
4.4	Used definitions	14
4.5	Questionnaire	14
4.6	Patient overviews	15
<b>5</b>	<b>Discussion</b>	<b>17</b>
5.1	Number of differences	17
5.2	Intolerances, contraindications, and allergies	17
5.3	Current medication	18
5.4	Recently discontinued medication	18
5.5	Laboratory values	18
5.6	Layout	19
5.7	Guideline	19
5.8	Patient overviews	20
5.9	Strengths and limitations	20
<b>6</b>	<b>Conclusion</b>	<b>22</b>
<b>7</b>	<b>Acknowledgements</b>	<b>23</b>
<b>8</b>	<b>References</b>	<b>24</b>
<b>9</b>	<b>Appendix</b>	<b>26</b>
A.	Scoring list	26
B.	Questionnaire	28
C.	Laboratory values	29

# 1 Introduction

Every year approximately 1,000 people die due to inappropriate use of medication. Besides this, there are almost 50,000 hospital admissions each year due to inappropriate medication use. Half of these medication incidents are preventable. Incidents involving medication mostly occur with vulnerable people, such as the elderly with multiple disorders which are treated by various healthcare providers. This problem will continue to grow because of the increasing use of medicine and the aging population [1][2].

Because of the fragmented structure of the Dutch healthcare system, patients are being treated by various healthcare providers. Sometimes, these healthcare providers do not have complete access to the patient's medication-related information [3]. This can lead to discontinuity of care when patients are being transferred between healthcare settings. Uitvlugt, et al. shows that only 63% of medication-related information was complete upon discharge from the hospital. This incompleteness of medication information may result in patient harm [4]. Medication related information is not only incomplete during hospitalisation of patients. In the home environment, in as much as 81% of the patients, the medication information between pharmacists and GPs differs with the patient's medication use [5]. These numbers show how important correct medication transfer is and that clear communication and documentation between healthcare providers are necessary.

To address this problem the Healthcare Inspectorate took the initiative to compose a guideline for secure transfer of medication information. This guideline was published in 2008. It stated that a medication overview must be available during every contact with a prescriber and should be transferred to the next healthcare provider to achieve continuity of care. It also described the minimum information the medication overview should contain [6].

The perception of medication transfer is a moving target. Therefore, the guideline for secure transfer of medication was revised in 2018/2019. In this version of the guideline a full medication overview with a prescriber was no longer required during every contact. Instead, a risk assessment for safe pharmaceutical care was introduced. This risk assessment determines the degree of medication reconciliation a healthcare provider must perform before prescribing. This guideline also introduced the term 'Basisset medicatiegegevens' (BMG). The BMG is the updated list of minimum information which the medication overview must contain [7].

In 2013, the User Requirements Specification (URS) Medicatieoverzicht 2.0 was published, based on the 2008 guideline. The URS Medicatieoverzicht 2.0 is a format for a uniform medication overview. It formulates requirements for the information elements that must minimally be present on the medication overview and requirements concerning the layout [8].

Software suppliers deliver the software needed to compose the medication overviews. Each healthcare sector works with numerous software suppliers. This has led to a lot of different versions of the medication overview which are now available, despite the URS Medicatieoverzicht 2.0. Due to these variations in medication overviews, mistakes are easily made [9]. Therefore, there is a great need for a uniform medication overview for all healthcare sectors.

At the moment, a format for a uniform medication overview is being developed based on the revised guideline of 2018/2019. However, before a format can be composed, it is important to know the information that is exchanged right now. Therefore, a study was designed to gain insight into the differences between medication overviews in several healthcare sectors.

## 2 Aim of the study

The primary aim of this study was to analyse the differences in medication overviews that health care professionals used for medication transfer.

The secondary aim was to measure the needs of healthcare providers across different healthcare sectors regarding the content of information they regarded necessary on the medication overview.

The tertiary aim was to determine which medication information is provided for patients.

## 3 Methods

### 3.1 Study design

An observational study was performed in the Netherlands from February to June 2021 at Nictiz. This study contained three components. First, medication overviews for healthcare providers and patients were gathered. This was followed by analysing the differences between the medication overviews for health care providers. Next, a questionnaire was developed, measuring the needs of health care providers regarding the content of the medication overview. Finally, the information on the patient overviews was evaluated.

### 3.2 Requesting medication overviews

Medication overviews exchanged between healthcare providers as well as medication overviews provided for patients were requested in five healthcare sectors: secondary care, general practitioner care, community pharmacy care, mental health care, and nursing home care. These are five out of ten healthcare sectors involved in the implementation of the new guideline for medication transfer. This sample size was chosen for feasibility reasons. Furthermore, these are five of the larger sectors in the Dutch healthcare system.

One medication overview was requested per software supplier in that healthcare sector. At least five medication overviews were requested at five different health facilities for software programs in which healthcare providers can configure the medication overview.

To achieve the highest possible response, reminders were sent to the health care providers after two to three weeks. Furthermore, individual health care providers were approached in addition to the project leaders of the involved healthcare sectors to request the medication overviews. Approximately 40 medication overviews were expected to be received.

#### 3.2.1 Dummy patients

Medication overviews of dummy patients were requested. Information on medication overviews was not related to patient-specific data. There were various requirements formulated to the dummy patients. The dummy patients needed to contain at least the following items:

- patient records.
- current medication: medication that was currently in use.
- recently stopped medication: medication that was stopped in the last two months.
- intolerance or allergy.
- contra-indication.
- laboratory values: for example, renal function, sodium- or potassium levels.

When no dummy patient was available, healthcare providers were asked to supply a medication overview of a real patient. All patient-specific information had to be anonymized. The real patients had the same requirements as the dummy patients.

## 3.3 Differences in medication overviews for health care professionals

### 3.3.1 Scoring list

Differences in the displayed information on medication overviews were studied by using a self-developed scoring list. In this scoring list the presence of information elements on the medication overviews was scored. This scoring list was based on the URS Medicatieoverzicht 2.0 and the BMG from the guideline of 2018/2019 (see appendix A for scoring list). It was divided into a mandatory and a non-mandatory part. The mandatory part included all information elements that must always be present on the medication overview according to the URS Medicatieoverzicht 2.0 and the BMG from the guideline of 2018/2019. The non-mandatory part included all other information elements from the URS Medicatieoverzicht 2.0 and the BMG from the guideline of 2018/2019. Furthermore, all information elements found on the medication overviews that were not mentioned in the URS Medicatieoverzicht 2.0 were added to this part of the scoring list. The scoring list was used to determine which elements were present on the medication overviews and in which way it was presented. An element was scored 1 if it was present on the medication overview and 0 if it was not present. If an element was present but not in the right form according to the URS Medicatieoverzicht 2.0, it was scored 0.5. For example, according to the URS Medicatieoverzicht 2.0 the dose must be shown by using quantity, e.g., 1 piece daily. If it was shown using e.g., the number of tablets or milligrams it was scored as 0.5. The scoring list was divided into seven parts: requirements regarding basic patient data; intolerances, contraindications, and allergies (ICA); current medication; recently discontinued medication; laboratory values; general requirements; and layout.

### 3.3.2 Clarity

To assess the overall readability of the medication overviews exchanged between healthcare providers, the clarity of the medication overviews was determined. The use of icons and abbreviations as well as the layout of the medication overviews were assessed. The number of overviews using icons and abbreviations was determined. Next, an overview was made of all the icons and abbreviations used on the medication overviews. Whether icons and abbreviations were explained in the medication overviews was also assessed.

### 3.3.3 Used definitions

The used definitions on the medication overviews, as well as the way that fields were filled in were assessed. For example, under medication, possible used definitions were current medication vs active medication vs medication profile. An example of the way this field was filled in is drug name – dosage form – dosage vs drug name – brand – dosage – dosage form. The information elements on the mandatory part of the scoring list were checked in all medication overviews to determine the most prevalent definitions. The same was done to determine the way the information elements were filled in.

## 3.4 Questionnaire

To measure the needs of healthcare providers across different healthcare sectors regarding the content of information that they regarded necessary on the medication overview, a questionnaire was designed. The questionnaire was sent to healthcare providers in the same healthcare sectors as named in paragraph 3.2. The questionnaires were distributed to healthcare providers connected to the Nictiz program. Furthermore, the project leaders of the involved healthcare sectors distributed the

questionnaire to healthcare providers in their sector. In March and April, the questionnaires were received, allowing a response period of two months. The questionnaire contained three multiple choice questions, five open questions and one question with a ranking of importance of several information elements on the medication overview [see appendix B for questionnaire].

### **3.5 Patient overviews**

There are often different medication overviews provided for patients than those that are exchanged between healthcare providers. However, there is no guideline to what medication information should be present on these patient overviews. For this reason, the medication overviews provided for patients were not scored. An overview of the types of documents provided and a general overview of the information provided was made.

### **3.6 Outcomes**

The primary outcome was the average number of differences (+/- standard deviation) between the collected medication overviews and the mandatory part of the scoring list. Also, the frequency that each element on the mandatory part of the scoring list was present on medication overviews was assessed. Further, the information elements on the non-mandatory part of the scoring list that were present in >50% of the medication overviews was assessed.

Other outcomes included: the clarity of the overviews, the used definitions, the items healthcare professionals regarded necessary for patients (as stated in the questionnaire) and a count of the different types of documents that patients received for information transfer purposes.

### **3.7 Data analysis**

All data were analysed using Microsoft Excel 2019. Descriptive analyses were used for all outcomes.

## 4 Results

### 4.1 Medication overviews for health care professionals

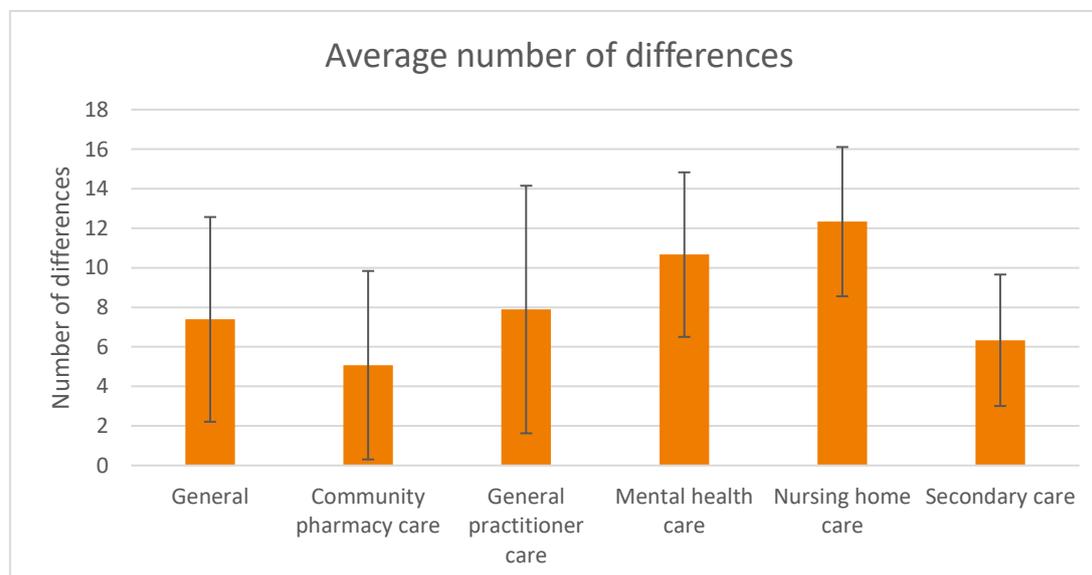
In total, 27 of the approximately 40 expected medication overviews that are exchanged between health care providers were received (see table 1). Five of these were used in multiple healthcare sectors. Most medication overviews came from the general practitioner care sector with nine medication overviews. The least amount of medication overviews was received in the nursing home care sector (n=3) and the mental health care sector (n=4).

**Table 1.** Number of medication overviews received per health care sector. Five of these medication overviews were used in multiple health care sectors.

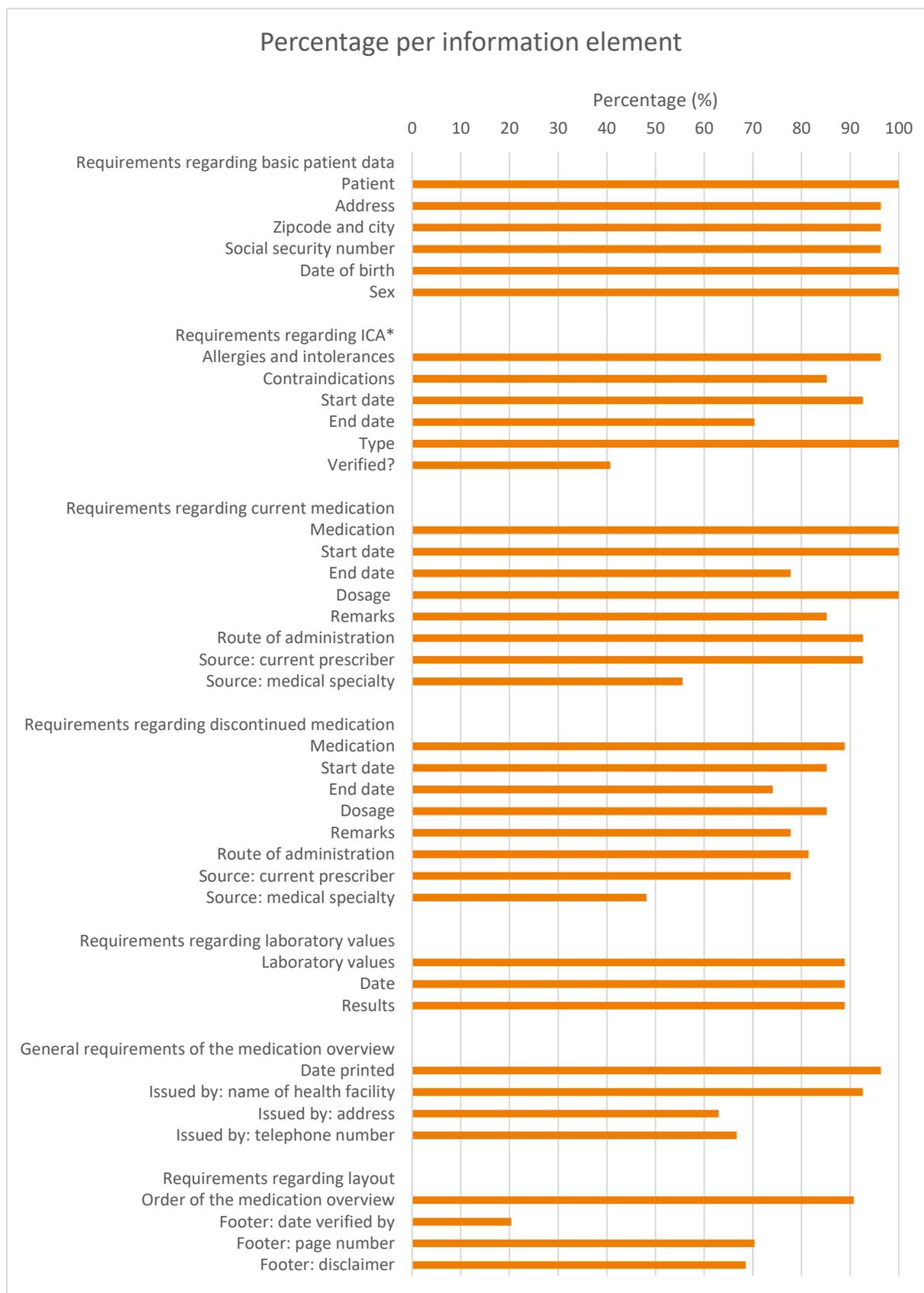
Healthcare sector	Number of medication overviews
Community pharmacy care	7
General practitioner care	9
Mental health care	4
Nursing home care	3
Secondary care	7

### 4.2 Differences in medication overviews

The average number of differences between the collected medication overviews and the mandatory part of the scoring list was 7.39 (SD 5.18) (see figure 1). Medication overviews from the community pharmacy care sector showed the lowest number of differences, namely 5.07 (SD 3.77). The nursing home care medication overviews displayed the highest number of differences, namely 12.33 (SD 3.32).



**Figure 1.** Average number of differences between the collected medication overviews and the mandatory part of the scoring list.



**Figure 2.** Percentages of medication overviews containing an information element from the mandatory part of the scoring list, divided into seven parts.

\* ICA = Intolerances, contraindications, and allergies

Figure 2 shows the percentages of medication overviews containing an information element from the mandatory part of the scoring list, i.e., the requirements regarding basic patient data; intolerances, contraindications, and allergies (ICA); current medication; recently discontinued medication (last 90 days); laboratory values; general requirements; and layout.

The information elements from the requirements regarding basic patient data were almost all present on all the medication overviews. Looking at the information elements regarding ICA, most overviews showed allergies and intolerances, while contraindications were less often present (96.3 vs 85.2%). 40.7% of the medication overviews indicated whether an ICA was verified.

For the requirements regarding current medication, the start date was always present (100%). The end date was displayed in 77.8% of the medication overviews. The prescriber (source) of the medication was shown in 92.6% of the medication overviews. 55.6% of the medication overviews also showed the medical specialty of the prescriber.

All the medication overviews contained 'dosage' for current medication and 85.2% of the overviews contained 'dosage' for discontinued medication. However, in 29.6% of the medication overviews 'dosage' for current medication was displayed in agreement with the requirements of the URS (table 2). Dosage was scored an 0.5 point if it did not meet the requirements.

**Table 2.** Percentage of medication overviews in which the following elements were displayed in agreement with the requirements of the URS Medicatieoverzicht 2.0

	Percentage in agreement with the URS Medicatieoverzicht 2.0
<b>Current medication</b>	
Medication	92.6
Dosage	29.6
<b>Recently discontinued medication</b>	
Medication	95.8
Dosage	30.4

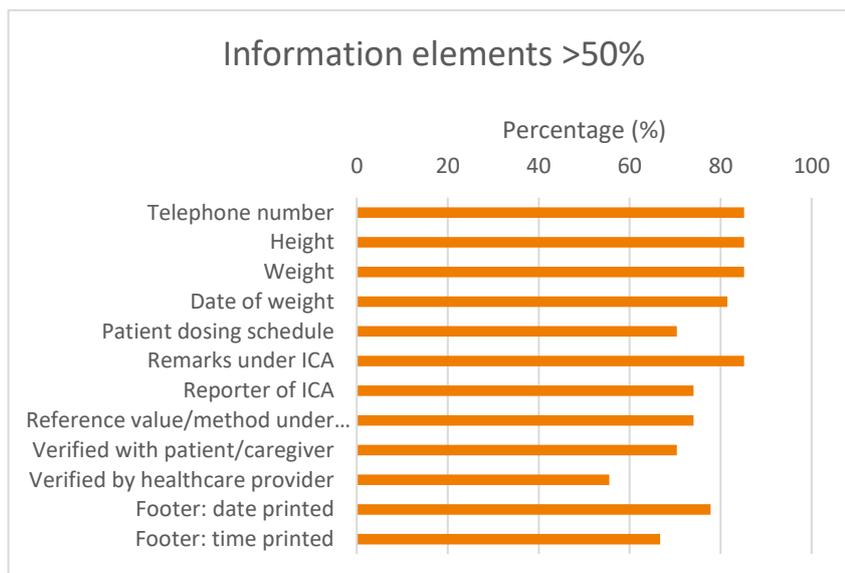
The same is true for 'medication', this could also be scored 0.5 depending on the prescription level. Medication should be displayed using the prescription code (PRK-level) to be scored 1. When it was displayed using the trade product code (HPK-level) it was scored as 0.5. 100% of the medication overviews contained 'medication' for current medication, in 92.6% of the medication overviews was 'medication' displayed in agreement with the requirements of the URS.

Recently discontinued medication was not present on all medication overviews, 24 (88.9%) of the medication overviews contained this part. All medication overviews containing recently discontinued medication contained 'medication', while 95.8% of these medication overviews displayed 'medication' according to the requirements of the URS Medicatieoverzicht 2.0. Of the 24 overviews containing recently discontinued medication 23 (95.8%) contained the dosage. In 30.4% of these medication overviews was the dosage displayed according to the requirements of the URS Medicatieoverzicht 2.0.

Laboratory values, date, and results were present in 88.9% of the medication overviews. When looking at the general requirements of the medication overview, the date the overview was printed as well as the health facility that issued the overview was present on almost all medication overviews.

The order of the medication overview from the requirements regarding layout was maintained in 90.1% of the medication overviews. 20.4% of the medication overviews contained the date of verification by a health care provider.

Finally, there were twelve information elements from the non-mandatory part of the scoring list that were present on >50% of the medication overviews (see figure 3). All these elements were scored either 1 or 0, there were no requirements to these information elements according to the URS Medicatieoverzicht 2.0. The elements included mostly elements from the requirements regarding patient data: telephone number, height, weight, date of weight, and patient dosing schedule. There were two information elements for the requirements regarding ICA (remarks and reporter); one element for laboratory values (reference value/method); two elements for general requirements of the overview (verified with patient/caregiver and verified by healthcare provider); and two elements for the requirements regarding layout (footer: date and time printed).



**Figure 3.** Information elements from the non-mandatory part of the scoring list present in >50% of the medication overviews.

\* Reference value/method under laboratory values.

There were some differences between health care sectors. Both the nursing home care sector and the mental health care sector did not display the reference value/method under laboratory values, general requirement, and requirements regarding layout elements in >50%. In addition, the secondary care sector also displayed the medical specialty of the prescriber in >50% of the medication overviews for both current medication (100%) and recently discontinued medication (87.5%). The community pharmacy care medication overviews also contained in >50% of the overviews the date until the drugs were dispensed (71.4% for current medication and 57.1% for recently discontinued medication).

### 4.3 Clarity

37.0% (n=10) of the medication overviews used icons. Figure 4 shows all the icons that could be found on the medication overviews. Often the meaning of these icons was not explained in the medication overview, making the interpretation difficult.

All medication overviews used at least one abbreviation. Table 3 shows the abbreviations that could be found on the medication overviews. Several standard abbreviations were not included, e.g., the abbreviation for social security number (BSN), abbreviations concerning laboratory values (mg, mmol, etc.), month abbreviations, and abbreviations for gender. Some of the abbreviations shown in table 3 are well known, for example Geb. Datum and tel. Other abbreviations were more difficult to understand e.g., OS, Q, and L/B/Z.



**Figure 4.** All the icons that were found on the medication overviews.

**Table 3.** The abbreviations that could be found on the medication overviews.

C/K/Z/N	CI	OR	1D1T	ZA	ONT
Geb. datum	OS	NI	ICA	CR	Voorschr. arts
Tel.	A	Ingangsdat.	ABR	d.d.	AMO
Dat. laatste verstr.	PA	Afgel. tot	KRECO FB	dd	Tel. nr.
ATC	AI	AGB	T	EXTRA-A-MN	Oculair bd
Toed. weg	Geb. dat.	MDN	Gew.	LO	Gelev. tot
Geverif.	MO	Rx	VV	JJ	JN
ADC	Q	Startd.	Eindd.	L/B/Z	BEM
MGB	TA	MA			

The medication overviews differed from one another regarding the layout. Figure 5 shows three examples of medication overviews. All three software suppliers built the medication overview differently. For example, two of them were oriented vertically, while the third was oriented horizontally. The overviews also showed the differences in the usage of colours, as well as the use of icons and abbreviations.

**A. Medicatieoverzicht per 8-mrt-2021**

Patient: Dhr. Test, T. BSN: 999904978 Gecontroleerd door zorgverlener: Ja / Nee  
 Adres: Krolweg 1002 Gebortedatum: 01-jan-1900 Geverifieerd met de patiënt: Ja / Nee  
 Postcode & Plaats: 9999 ZZ Sittwerd Lengte: 170 cm Patiënt heeft innameschema: Ja / Nee  
 Telefoon: 0623368449 Gewicht: 80 kg  
 Apotheek: Kuiper Apotheek huisarts IJeroort Datum gewicht: 03-mrt-2021

Allergie / Bijwerking	Datum	Einddatum	Ernst	Opmerking	Geregistreerd door
amoxicilline	29-10-2019		Mild	diarree	
amoxicilline/ampicilline	29-10-2019		Mild	diarree	
penicillines	29-10-2019		Ernstig (anafylactisch)		
geen	12-01-2021				

Aandoening	Datum	Einddatum	Geregistreerd door
levercirrose	21-03-2019		
coelakie	26-03-2019		
merfanctie, verminderde	29-10-2019		
morbidie obesitas	22-01-2021		

Huidige medicatie (op ATC code)	Startdatum	Stopdatum	Dosering	Toelichting/indicatie	TW	Actuele voorschrijver
METOPROLOLSUCCINAAT SANDOZ RET 50 TAB MSA 47,5MG	08-03-2021	-	1 x per dag 1 stuk		oraal	

Recent beëindigde medicatie (afgelopen 30 dagen)	Startdatum	Stopdatum	Dosering	Toelichting/indicatie/Stopreden	TW	Actuele voorschrijver
ONTSLAG ZONDER MEDICATIE	06-04-2020	09-02-2021		ontslagrecept zonder medicatie	nvt	

Labwaarden (meest recente)	Datum	Uitslag	Referentiewaarden
Natrium (mmol/l)			
Kalium (mmol/l)			
INR			
HCPR			
Creatinine (umol/l)			

Opmerking:  
 De medicatieoverzicht is met grote zorgvuldigheid samengesteld. Het bevat de gegevens die bekend zijn bij deze zorgverlener en behoort daarom niet compleet te zijn.  
 Dit geneesmiddelenoverzicht heeft de eigen verantwoordelijkheid om de apothek op de hoogte te stellen van een geneesmiddelengebruik.  
 De zorgverlener is niet aansprakelijk voor fouten in dit medicatieoverzicht, tenzij er sprake is van opzet of grove schuld.

Patient: Dhr. Test, T. Algeveerd door: 08-mrt-2021 18:25  
 Geboortedatum: 01-jan-1900 Pagina 2 van 2

**B. Medicatieoverzicht per: 20-sep-2020**

Patient: Dhr. LSC TEST BSN: onbekend Gecontroleerd door zorgverlener: Ja / Nee  
 Adres: Geb. datum: 02/06/2002 Geverifieerd met patiënt/mantelzorg: Ja / Nee  
 Plaats: Geslacht: M Patiënt heeft innameschema: Ja / Nee  
 Telefoon: onbekend Lengte/gewicht: 176 cm / 99 kg  
 Datum gewicht: 19/02/2020 Startdatum laatste klinische opname

Intoleranties, Contra-indicaties, Allergieën (ICA)	Type	Startdatum	Einddatum	Opmerking	Geverifieerd	Melder
hypertensie	CI	21-aug-2017				
verkeersdeelname	CI	01-mrt-2019				
amoxicilline	OS	17-feb-2015		huiduitslag		

Huidige medicatie	Type	Startdatum	Einddatum	Afgelev. tot	Dosering	Toelichting	TW	Bron
scopolaminebutyl injfist 20mg/ml		28-aug-2014					pa	
buscopan injfist 20mg/ml ampul 1ml		28-aug-2014						
tilamcolonacetone injsusp 10mg/ml		28-aug-2014					ai	
keracort a 10 injectiesuspensie 10mg/ml ampul 1ml		28-aug-2014						
clatopram tablet onthuld 20mg		27-mrt-2014			1 maal per dag 1 tablet	continu	or	
clatopram tablet onthuld 20mg		06-apr-2018						
salbutamol aerosol 100ugido		09-jan-2015			uc	continu	ni	
salbutamol aerosol 100ugido		09-jan-2015						
clemastine injfist 1mg/ml		28-aug-2014					pa	
clemastine injfist 1mg/ml		28-aug-2014						

Recent beëindigde medicatie (gedurende meest recente ziekenhuisopname / gedurende afgelopen 90 dagen)	Geneesmiddel op ATC code	Type	Startdatum	Einddatum	Afgelev. tot	Dosering	Toelichting	TW	Bron

Aanvullende labwaarden op aanvraag	Lab	Datum	Uitslag	Methode / referentiewaarde
	natrium	18-feb-2020	120 mmol/l	135-145

Opmerking:  
 Dit medicatieoverzicht is met grote zorgvuldigheid samengesteld. Het bevat de gegevens die bekend zijn bij deze apothek en behoort daarom niet compleet te zijn. Als geneesmiddelenoverzicht heeft ook u de eigen verantwoordelijkheid om de apothek op de hoogte te stellen van een geneesmiddelengebruik. De apothek is niet aansprakelijk voor fouten in dit medicatieoverzicht, tenzij er sprake is van opzet of grove schuld.

einde overzicht Datum verificatie zorgverlener: 20-sep-2020

**Deze AMO bevat informatie over de medicatiegegevens na ontslag uit het ziekenhuis**

**Medicatieoverzicht op 02-apr-2021**

Naam: BSN: -- Beoordeeld door zorgverlener: Afgedrukt door: Ja (31-mrt-2021)  
 Adres: Geboortedatum: Doseerschema: Ja / nee  
 Postcode & plaats: Wettelijk geslacht:  
 Tel.nr. thuis: Lengte:  
 Meest recente opnamedatum: Gewicht: 24-mrt-2021

**Allergieën vanaf 1-4-2021**

Geconstateerd	Reactietype	Initiële melder	Reacties	Opmerking
03-02-2020	Allergie		Overgevoeligheid	Penicilline: krachtsverlies en sensibilisatoornissen, door arts gewaarschuwd dat ze er dood van kan gaan.
12-02-2021				Penicillines
04-02-2020				Pipamperon info patient - keel dicht/stikken
12-02-2021				Pipamperon Keel dicht/stikken

**Huidige medicaties**

Type	Medicatie	Start	Stoppen	Dosis	Toedieningsweg	Opmerking	Bron
	Pantoprazol (PANTOZOL) 20mg MSR tablet	1x daags	voor ontbijt 20 mg	oraal		Patient (gedocumenteerd door (Apothekers))	

**Gestopte medicaties**

Type	Medicatie	Start	Stoppen	Dosis	Toedieningsweg	Opmerking	Bron
	Metoclopramide 10mg tablet	30-mrt-2021	Zonodig 3x daags 5 mg	oraal	Beëindigingsreden: Therapie afgerond	Patient (gedocumenteerd door (Apothekers))	

**Ziekenhuismedicatie**

Type	Medicatie	Start	Stoppen	Dosis	Toedieningsweg	Opmerking	Bron
	Pantoprazol 20mg MSR tablet	25-mrt-2021	1x daags voor ontbijt 20 mg	oraal		(Interne geneeskunde)	

**Laatste resultaat componenten**

Resultaatcomponent	Datum	Waarde	Referentiebereik
EGFR (CKD-EPI)	29-mrt-2021	5 kl/1,73m <sup>2</sup>	60 - kl/1,73m <sup>2</sup>
KREATININE	29-mrt-2021	732 umol/l	45 - 84 umol/l

**Apotheek**

**Figure 5.** Three examples of medication overviews.

## 4.4 Used definitions

There were many different definitions and terms found on the medication overviews. One that stood out was the many different forms in which the dosage was shown (see table 4). Most often the dosage was shown by using the number of tablets a patient needed to take (n=15; 55.6%). However, quantity (n=8; 29.6%) and number of milligrams (n=4; 14.8%) were also used. The health care sector that stands out is the secondary care sector. This sector was the only health care sector to display dosage in milligrams. Furthermore, the secondary care sector did not use the number of tablets on their medication overviews to display the dosage. The other four health care sectors displayed the dosage in both quantity and number of tablets.

**Table 4.** Different forms in which dosage was represented on the medication overviews.

Dosage	Number of overviews
1 x per dag 500 milligram	1
1 dd (07u) 500 mg	1
1x daags 500 mg	2
1 x per dag 1 stuk	7
1 x daags 1 stuk	1
1 maal per dag 1 tablet	8
1 maal per dag 1 tablet om 7u	2
1 x per dag 1 tablet	3
1 keer per dag 1 tablet	1
1D1T	1

## 4.5 Questionnaire

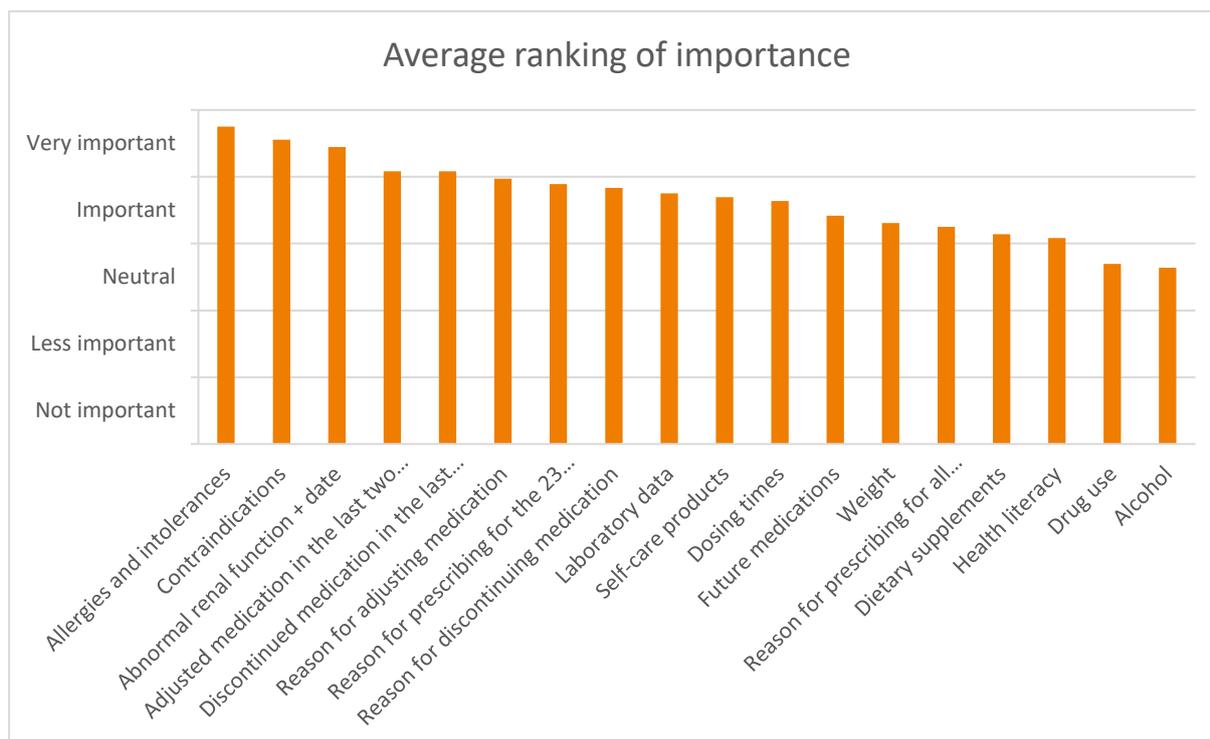
In total, 36 health care providers responded to the questionnaire. Most responses came from the general practitioner care sector (41,7%) and the community pharmacy care sector (30.6%), although there has been at least one answer from all sectors (see table 5). 18 (50.0%) of the health care providers were prescribers, 15 (41.7%) were pharmacists and 3 (8.3%) were administrators.

For laboratory values, 32 (88.9%) health care providers wished to see the renal function of the patient on the medication overview. 22 (61.1%) wanted to see the sodium levels and 23 (63.9%) wanted to see potassium levels on the medication overview. This number was lower for the INR (n=13; 36.1%) and drug concentrations (n=12; 33.3%). Three (8.3%) of the health care providers did not want to see any laboratory data on the medication overview (see figure A1, appendix C).

**Table 5.** Responses to the questionnaire per health care sector

Healthcare sector	Number
Community pharmacy care	11
General practitioner care	14
General practitioner with pharmacy	1
Mental health care	2
Nursing home care	3
Secondary care	5
	<b>36</b>

In the questionnaire 18 information elements needed to be ranked on how important the presence of that element was on the medication overview according to the health care provider. This ranged from very important to not important. Figure 6 shows the average ranking of importance of the information elements ranked from the most important to least important according to health care providers. There were five elements ranked between important and very important: allergies and intolerances, contraindications, abnormal renal function + date, adjusted medication in the last two months, and discontinued medication in the last two months. On the other side, two information elements were ranked between neutral and less important: drug use and alcohol. The other information elements were all ranked between neutral and important. The information elements future medications, weight,



**Figure 6.** Averages of ranking of importance of 18 information elements. The information elements are sorted from most important to least important.

\*Reason for prescribing for the 23 legally required medicines.

reason for prescribing all medications, dietary supplements, and health literacy leaned more towards neutral. Dosing times, self-care products, laboratory data, reason for discontinuing medication, reason for prescribing for the 23 legally required medicines, and reason for adjusting medication leaned more towards important.

In an open question, health care providers were able to indicate which data they often miss on the medication overview. Health care providers mostly missed whether and why medication has been stopped, changed, or started (n=14). Furthermore, health care providers wanted more information regarding the stop/start date and the intended duration of therapy (n=11). Concerning administering of medication missing data was about the dosing times, as well as the body site of injection and the ability of a patient to manage their own medication. Administration of medication falls outside of this study and belongs to the medication administration list. Other data mentioned by the health care providers that is often missing on the medication overview were laboratory values (n=5), discontinued medication (n=4) contraindications and allergies (n=3), the original prescriber (n=2), medication used during hospitalisation (n=2), self-care products (n=1), and weight (n=1).

## 4.6 Patient overviews

In most cases the same medication overview that is exchanged between health care providers is also provided for patients. However, some health facilities did have medication overviews specifically made for patients. These are the ones that were analysed.

In total, nine different medication overviews provided for patients were received. All overviews either came from secondary care sector or community pharmacy care sector. There were several different types of documents provided: medication passports (n=4), medication administration lists (n=3), and

medication summaries specifically made for patients (n=2). Figure 7 shows examples of the three different types of documents.

All medication overviews documented patient data to some extent. All overviews displayed at least the patient's name and date of birth. Other elements that were often present (n=6; 67.7%) on the overviews were address, zip code and city, social security number, and sex. Information regarding ICA was displayed in 67.7% of the medication overviews. Allergies and intolerances were present in 67.7% of the overviews and contraindications in 33.3% of the overviews. All medication overviews contained information about the current medications. All overviews presented the name of the medication as well as the dosage. Furthermore, 67.7% also indicated the route of administration. 22.2% of the overviews included information about the start date or current prescriber. Three (33.3%) of the medication overviews contained information about the recently discontinued medication. One of these overviews showed the end date besides the name of the medication. None of the overviews displayed information about laboratory values.

## A. Medication summary for patient

### Medicatie Overzicht

patiënt:	Dhr. Test, T.	beh. arts:	
patiëntnummer:	3922156	afd:	afgedrukt op: 08-03-2021 18:24
geb. datum:	01-01-1900	opn. datum:	Pagina 1 van 1
Aandoening :	LEVERCIRROSE	Allergie :	AMOXICILLINE
Aandoening :	COELIAKIE	Allergie :	AMOXICILLINE/AMPICILLINE
Aandoening :	NIERFUNCTIE, VERMINDERDE		
Aandoening :	MORBIDE OBESITAS	Allergie :	PENICILLINES
		Allergie :	Geen
BENZYLPENICILLINE PDR V INJ 10MILJ E	Startdatum: 01-03-2021	Hoeveelheid:	Toedientijd:
BENZYLPENICILLINE PDR V INJ 10MILJ E	Stopdatum:	ME	08:00
2 x per dag 0,5 ME/Uur ; 12 ME/24 continue infusie	INTRAVENEUS	ME	18:00
; 12 ME/24 continue infusie			
Voorschr. arts:			
CIPROFLOXACINE INFVLST 2MG/ML	Startdatum: 10-02-2021	Hoeveelheid:	Toedientijd:
CIPROFLOXACINE	Stopdatum:	MG	08:00
2 x per dag 400 mg	INTRAVENEUS	MG	18:00
Voorschr. arts:			
FLUCLOXACILLINE PDR V INJVLST 1000MG	Startdatum: 23-02-2021	Hoeveelheid:	Toedientijd:
FLUCLOXACILLINE	Stopdatum:		
1 x per 24 uur 12000 mg/Dg continu infuus d.m.v. infuuspomp	INTRAVENEUS		
continu infuus d.m.v. infuuspomp			
Voorschr. arts:			
FUROSEMIDE INFOPL CONC 10MG/ML	Startdatum: 10-02-2021	Hoeveelheid:	Toedientijd:
FUROSEMIDE	Stopdatum:		
480 mg/Dg	INTRAVENEUS		
Voorschr. arts:			
METOPROLOLSUCCINAAT SANDOZ RET 50 TAB MGA 47,5M	Startdatum: 08-03-2021	Hoeveelheid:	Toedientijd:
METOPROLOL	Stopdatum:	1 ST	08:00
1 x per dag 1 stuk	ORAAL		
Voorschr. arts:			
MIDAZOLAM INJVLST 5MG/ML	Startdatum: 23-02-2021	Hoeveelheid:	Toedientijd:
MIDAZOLAM	Stopdatum:	MG	08:00
1 x per dag 2,08 mg/Uur (1 mg/ml)	INTRAVENEUS		
(1 mg/ml)			
Voorschr. arts:			
NATRIUMCHLORIDE INFVLST 3% ZAK 500ML CZE	Startdatum: 06-03-2021	Hoeveelheid:	Toedientijd:
NATRIUMCHLORIDE	Stopdatum:	1000 ML	08:00
1 x per dag 1000 milliliter	INTRAVENEUS		
Voorschr. arts:			

## B. Medication administration list

TOEDIENLIJST MEDICATIE												
Clifit:	B. Baster	Art:		Apothek:								
Telefoonnummer:		Telefoonnummer:		Telefoonnummer:								
Gebortedatum:	02-04-1956			Faxnummer:								
BSN:	oebeknd			E-mail:								
Patiëntnr:	4543											
Adres:												
Postcode/Plaats:												
Afdeling/Kamer nr:	postcode	Sikproblemen:	ja/nee									
LET OP VERANDERING: GESTOPT GDS Metoclopramide 10mg tablet per 15-03-2021												
GESTOPT GDS Gishemclamide 2,5mg tablet per 15-03-2021												
GESTOPT GDS Hydrochlorothiazide 12,5mgf per 15-03-2021												
Periode: 23-Maart-2021 t/m 29-Maart-2021												
GDS medicatie												
Medicatie	Stopdatum	Doosring	Bemerk-/gebruikvoorschrift	Wijze van toediening	TiG	D1	Wo	D4	Vj	Z4	Zo	M4
SPIRONOLACTON 12,5 MG		1 maal per dag 1 capsule		Niet ingev.	08:00	1	1	1	1	1	1	1
Dompersidon 10mg tablet		1 maal per dag 1 tablet	Ten minste 15 minuten VOOR het eten.	Oraal	22:00	1	1	1	1	1	1	1
Pandolol 5mg tablet		1 maal per dag 1 tablet		Oraal								
Atenolol 30mg tablet		2 maal per dag 1 tablet		Oraal	12:00	1	1	1	1	1	1	1
Enalapril 10mg tablet		1 maal per dag 1 tablet		Oraal	22:00	1	1	1	1	1	1	1
niet GDS medicatie												
Medicatie	Stopdatum	Doosring	Bemerk-/gebruikvoorschrift	Wijze van toediening	TiG	D1	Wo	D4	Vj	Z4	Zo	M4
Fentanyl 12ug/uur pleister		3 maal per week 1 pleister.	Pas op met alcohol. Kan het reactievermogen verminderen.	Transderm	17:00				1			1

## Medicatiepaspoort | Medication survey

Datum | Date: 16-03-2021

Patiënt	
Adres   Address	
Postcode & Plaats   Postal code & City	
Geb Datum   Date of birth	
Geslacht   Gender	Man   Men

## Geneesmiddelen | Medicines

De volgende geneesmiddelen draagt bovengenoemde persoon mogelijk bij zich.  
The person mentioned above may carry the following medicines.

Stofnaam   Generic Name	Gebruik   Daily use	ATC-Code
Simvastatine tablet fo 10mg (Simvastatine accordoet tablet filmorhold 10mg)	1 maal per dag 1 tablet	C10AA01
Diclofenac-natrium tablet msr 50mg (Diclofenac natrium cf tablet msr 50mg)	1 maal per dag 1 tablet	M01AB05

## Intoleranties, Contra indicaties, Allergieën | Intolerances, Contraindications and Allergies (ICA)

Omschrijving   Description	Soort   Type
Tarwegluten	Allergie   Allergy
Psyaudfenomeen	Contra-Indicatie   Contraindication

Ende | End

**Figure 7.** Examples of medication overviews exchanged to patients. A. Medication summary specifically made for patients. B. Medication administration list. C. Medication passport.

## 5 Discussion

In this study, the differences in medication overviews that health care providers use for medication transfer were analysed. In addition, the needs of health care providers regarding the content of information they regarded necessary on the medication overview was assessed by a questionnaire. Finally, the medication information that is provided for patients was determined.

An average of 7.39 differences between the medication overviews and the self-developed scoring list was found. When looking at the percentages of medication overviews containing an information element the most notable elements are the medical specialty of the prescriber at 55.6% for current medication and 48.1% for recently discontinued medication, and the laboratory values at 88.9%. Next, the clarity was assessed. 37.0% of the medication overviews used icons, which were often not explained. This made interpretation difficult. All medication overviews used abbreviations, some of which were hard to understand. The medication overviews differed a lot from each other concerning the layout and the used definitions, which can cause differences in the interpretation of the medication overviews. In the questionnaire, we found that the laboratory values health care providers wanted to see most are the renal function, and potassium and sodium levels. The presence of allergies and intolerances; contraindications, and abnormal renal function were the information elements health care providers found the most important on the medication overview. Finally, we found that different types of medication overviews are provided for patients (medication passports, medication administration lists, and medication summaries specifically made for patients), all varied heavily in the information presented.

### 5.1 Number of differences

The average number of differences between the medication overviews and the scoring list was 7.39 (SD 5.18), with the most differences found in the nursing home care sector (12.33; SD 3.32). This shows that the URS Medicatieoverzicht 2.0 is not unambiguously implemented, with differences across health care sectors. Therefore, revision of the URS Medicatieoverzicht 2.0 is advised. This revision should be based on the guideline for secure transfer of medication from 2018/2019. The revised version needs to be implemented unambiguously across health care sectors.

### 5.2 Intolerances, contraindications, and allergies

Intolerances, contraindications, and allergies (ICA) are important to note on the medication overview. In the questionnaire, health care providers ranked intolerances and allergies as well as contraindication the highest of all the information elements. Both were ranked between important and very important, leaning towards very important.

In Dutch, there is an umbrella term for allergies and intolerances ('overgevoeligheden'). Because no distinction is made in this term, it is important to describe the reaction. In addition, the seriousness needs to be described as well as the policy. An adverse drug reaction (ADR) can range from minor common side effects to potentially life-threatening situations [10]. In life-threatening situations, avoidance of the drug is required. While with minor common side effects it is possible to prescribe the drug again. In 92.6% of the medication overviews, there was an option for remarks under ICA. Of these medication overviews 40.7% already filled-in this field to some extent. Some mentioned the reaction of the patient, while others stated whether it was possible to dispense the drug again. In this section of remarks under ICA, the reaction, severity of the reaction, and policy can be described. It is important

that this field is filled in, so that a health care provider can assess the seriousness of the ADR, and the possibility of future exposure.

### 5.3 Current medication

Incomplete medication information can lead to discontinuity of care and patient harm [4]. It is estimated that 11-59% of the medication history errors are clinically important [11]. It is therefore important that the part of the current medication is complete and clearly formulated. An essential element of the current medication is the correct registration of the dose. Approximately 24% of transmural medication errors concern incorrect dosages. Possible causes are, among others, interpretation errors and incompleteness of the medication overview [12]. To prevent such errors in the future, there must be uniformity in displaying the dose. Dosage is currently being exchanged in either quantity (29.6%), milligrams (14.8%) or number of tablets (55.6%). The display of dosage for this solid form is still relatively simple. Bigger problems can occur when concerning, for example, liquid dosage forms [13]. Misunderstandings can arise around millilitres and milligrams, which can be dangerous for the patient. The dosage is just one example of the wide variety of terms that are used on the medication overviews. Agreements need to be made about a uniform way of displaying the dosage. The safest option for both health care provider and patient must be established. This requirement must be well defined and used alike in all health care sectors.

Furthermore, the prescriber of the drug should be specified for continuity of care. 92.6% of the medication overviews displayed the current prescriber. However, only 55.6% of the medication overviews also showed the medical specialty of the prescriber. It can be difficult to discover the right prescriber when only a name is given. This can especially be a problem for prescribers with a common surname or for residents who switch often from departments in care settings. Therefore, for quick and effective consultations the medical specialty should be displayed.

### 5.4 Recently discontinued medication

Recently discontinued medication is another essential part on the medication overview. 82% of the discontinued medication was not remembered correctly by patients after hospital discharge [14]. Therefore, correct documentation is needed. In the questionnaire health care providers ranked discontinued medication in the last two months as important. 88.9% of the medication overviews already contained recently discontinued medication. 48.1% of the medication overviews also displayed the medical specialty of the prescriber. Documenting the prescriber and their medical specialty is as important for recently discontinued medication as it is for current medication previously described.

### 5.5 Laboratory values

88.9% of the medication overviews showed laboratory values, including the date and results. In addition, 74.1% also showed a reference value or the used method. Displaying laboratory values can be essential. One important laboratory value could be the renal function. Approximately 1,7 million people (over 10% of the population) in the Netherlands have chronic kidney disease [15]. Often, doses need to be adjusted for patients with renal impairment. Helldén, et al. showed that one-third of ADRs in elderly that led to hospitalisation are related to an impaired renal function [16]. To prevent problems like this, it is important that the renal function is exchanged on the medication overview. The results from the questionnaire showed that 88.9% of the health care providers wished to see the renal function on the medication overview. In addition, abnormal renal function was one of the elements ranked between important and very important by health care providers. Other laboratory values health care providers indicated in the questionnaire they wished to see are sodium levels (61.1%) and

potassium levels (63.9%). The old guideline (2008) did not specify which laboratory values need to be exchanged. This changed in the new guideline of 2018/2019. The guideline now states that abnormal renal function needs to be exchanged, as well as electrolytes, INR, and drug concentrations [7]. The date of collection also needs to be mentioned. This needs to be implemented during revision of the URS Medicatieoverzicht 2.0.

## 5.6 Layout

There is currently a wide variety in the layout of medication overviews. The medication overviews differ from one another in, among others, the use of icons and abbreviations, the orientation of the overview, and used terminology. To reduce errors and increase the readability of the medication overviews, a uniform format is required. The more consistent the medication overviews, the easier they are to understand and interpret. This will probably lead to fewer medication errors being made. However, not every detail about medication overview can be determined since software suppliers must maintain a certain freedom in their products.

## 5.7 Guideline

Several elements in the BMG were not required in the old guideline from 2008 and were therefore not included in the URS Medicatieoverzicht 2.0. Consequently, these elements are generally not yet present in the current medication overviews. However, these do need to be included in the to be revised version of the URS Medicatieoverzicht. By registering and exchanging these elements each health care provider in the medication chain will be correctly informed.

An example of a missing element is adjusted medication in the last two months. None of the medication overviews contained this part. After being discharged from the hospital, 58% of the patients do not know which medications have been changed [5], nor do patients always know why this has been done [17]. In the questionnaire, adjusted medication in the last two months was also ranked high by the health care providers. To prevent errors, clear documentation of adjusted medication is therefore needed and should be added to the medication overviews.

Other elements not yet included in the URS Medicatieoverzicht 2.0, but mentioned in the BMG are the reason for prescribing/adjusting/discontinuing medication. There are 23 different drugs for which the reason for prescribing is required. The reason for prescribing of those 23 different drugs was ranked between neutral and important by health care providers, leaning heavily towards important. However, the reason for prescribing for all medications was ranked leaning more towards neutral. The reason for adjusting and discontinuing medication were both ranked between neutral and important by health care providers in the questionnaire, both leaning more toward important. Moreover, the reason for prescribing/adjusting/discontinuing were the elements most often missed on the medication overview as indicated by health care providers in the questionnaire. It is therefore advised to include the reason for prescribing/adjusting/discontinuing medication on the medication overview.

Self-care products are now only exchanged when a prescription from a doctor is present. This will change when the new guideline is implemented. Self-care products will not become a separate category but will be implemented in current medication. Patients will be able to indicate themselves which self-care products they use. In the questionnaire, health care providers ranked self-care products between neutral and important.

Finally, health literacy, drugs and alcohol are new elements in the guideline that are not yet included in the URS Medicatieoverzicht 2.0. These three elements were ranked lowest by the health care

providers. Health literacy was ranked neutral, and drugs and alcohol were ranked between neutral and not important. This is in line with a study from 2009 that showed that only 25% of health care providers wished to see alcohol and drug use on the discharge medication list [18]. Privacy can also play a part in the exchange of these three information elements. When implementing the new guideline, these elements do need to be included. However, they do not have the highest priority.

## 5.8 Patient overviews

There was no uniformity among the received medication overviews provided for patients. In most cases the same medication overview for health care providers was provided for patients. These can be very difficult for patients to interpret and have never been developed for patient use. There were also medication summaries received specifically made for patients. However, these varied in the types of documents provided and in the information displayed. It is advised to develop a format for a medication summary specifically made for patients. This format must contain uniformity in language. The language use must be understandable for patients without any medical knowledge. Furthermore, agreements must be made on the use of abbreviations and icons, and the data must be presented clearly. Agreements also need to be made on which medication information will be displayed.

## 5.9 Strengths and limitations

The main strength of this study is that multiple health care sectors were included. Five out of ten health care sectors were considered. These are five of the larger health care sectors in the Dutch health care system. Furthermore, patient overviews were also checked. Most studies focus on medication overviews for health care professionals and do not include patient overviews.

However, some limitations need to be discussed. First, the low number of medication overviews received for both health care providers and patients. For health care providers, we hoped to acquire more medication overviews, mainly in the mental health care and nursing home care sector. Furthermore, we wished to receive at least five medication overviews from different health facilities for software programs in which health care providers can configure the medication overview. This unfortunately did not happen. This study included two different software suppliers in which health care providers could configure the medication overview. For one, three different overviews were received and for the other four different medication overviews. For patients, we received an even lower number of medication overviews than for healthcare providers. This can, in part, be explained because there are often no separate medication overviews for patients. However, these overviews came from only two health care sectors instead of five. These low numbers of medication overviews and uneven distribution among health care sectors can make it hard to generalize the found results. These results show a general picture and are cause for further discussions.

Second, there was a relatively low response rate to the questionnaire. This may have led to selection bias, because only health care providers more involved in the program may have responded. Generalisation to all health care providers is therefore more difficult.

Third, the responses to the questionnaire were not proportional to the health care sectors. Over 70% of all the answers came from the general practitioner care sector and the community pharmacy care sector, with low response rates in the other three health care sectors. Therefore, the answers might be an overrepresentation of general practitioner care and community pharmacy care and an underrepresentation of the mental health care, nursing home care, and secondary care.

Further studies should be conducted with a larger sample size to increase the precision of the findings. Studying other health care sectors should also be considered. To measure the needs of health care providers more accurately, a higher response rate is needed with more evenly distributed answers across the different health care sectors. This to paint a clearer picture of the actual needs and to prevent an overestimation or underestimation for some health care sectors.

## 6 Conclusion

There is no uniformity in the medication overviews being exchanged now. Medication overviews differ in the displayed information, usage of icons and abbreviations, used definitions, and the layout. This study shows that the URS Medicatieoverzicht 2.0 is not unambiguously implemented, with differences across health care sectors. Furthermore, this study indicates how the URS Medicatieoverzicht 2.0 can be optimised. All the data from the BMG and additional set needs to be implemented. In addition, specific attention is needed for indicating the seriousness and policy for allergies and intolerances; displaying prescriber of the drug, including the medical specialty; correctly displaying recently discontinued and recently adjusted medication; and including the reason for prescribing/adjusting/discontinuing medication. Agreements need to be made concerning the display of dosage, the use of icons and abbreviations, and the use of uniformity in language. It is essential that the optimised/revised version of the URS Medicatieoverzicht 2.0 will be unambiguously implemented across all health care sectors. In addition, a format for patients needs to be developed, with special attention to the comprehensibility of the medication overview. Agreements must be made about the medication information that will be exchanged.

The revision of the URS Medicatieoverzicht 2.0 will be accomplished by the Nictiz program of medication transfer. Health care providers from all health care sectors will be involved in the revision.

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## 9 Appendix

### A. Scoring list

Shows the mandatory part of the scoring list.

Information element	Number of overviews	Remarks
<b>Requirements regarding basic patient data</b>		
Patient		
Address		
Zipcode and city		
Social security number		
Date of birth		
Sex		
<b>Requirements regarding ICA</b>		
Allergies and intolerances		
Contraindications		
Start date		
End date		
Type		
Verified?		
<b>Requirements regarding current medication</b>		
Medication		
Start date		
End date		
Dosage		
Remarks		
Reason for prescribing		
Open text field		
Route of administration		
Source: current prescriber		
Source: medical specialty		
<b>Requirements regarding recently discontinued medication</b>		
Medication		
Start date		
End date		
Dosage		
Remarks		
Reason for prescribing		



## B. Questionnaire

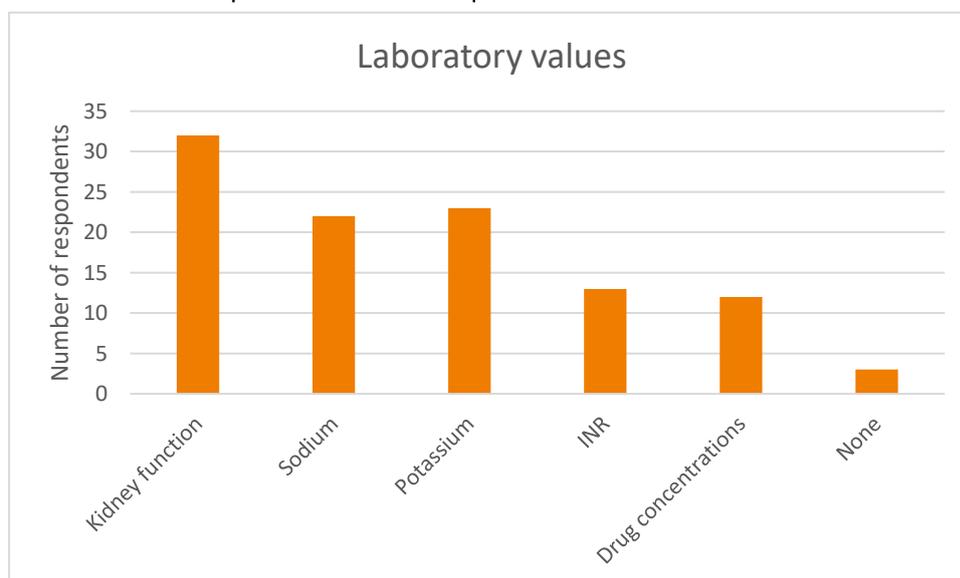
The questionnaire that was distributed among health care professionals:

1. In which healthcare sector do you work?
  - a. Community pharmacy care
  - b. General practitioner care
  - c. Mental health care
  - d. Nursing home care
  - e. Secondary care
  - f. Other: ...
2. Software
3. Which function do you have?
  - a. Prescriber
  - b. Pharmacist
  - c. Administer
4. Which data do you often miss on the medication overview?
5. Which laboratory data do you want to see on the medication overview?
  - a. Renal function
  - b. Sodium
  - c. Potassium
  - d. INR
  - e. Drug concentrations
  - f. None
  - g. Other: ...
6. Indicate how important you think that the following elements are present on the medication overview. [Options: not important – less important – neutral – important – very important].
  - a. Dosing times.
  - b. Discontinued medication in the last two months.
  - c. Reason for discontinuing medication.
  - d. Adjusted medication in the last two months.
  - e. Reason for adjusting medication.
  - f. Reason for prescribing for the 23 legally required medicines.
  - g. Reason for prescribing for all medications.
  - h. Future medications.
  - i. Allergies and intolerances.
  - j. Contraindications.
  - k. Abnormal renal function + date.
  - l. Laboratory data.
  - m. Health literacy.
  - n. Weight.
  - o. Alcohol.
  - p. Drug use.
  - q. Self-care products.
  - r. Dietary supplements.
7. Can we contact you if we have any questions? If yes, please leave your contact information below.

8. Are there important topics not covered in this questionnaire?
9. Other comments?

## C. Laboratory values

The number of respondents from the questionnaire that wanted to see certain laboratory values.



**Figure A1.** Number of respondents that want to see the laboratory element on the medication overview.