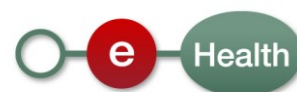


COOKBOOK

Business project: the medication scheme



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1 DOCUMENT MANAGEMENT

1.1 History of the document

Version	Date	Description of the amendments / comments
0.2	30/01/2012	Initial (draft) version of the cookbook, based on the template.
...
5.3	20/07/2017	Update Cookbook: -Addition of the Vitalink Gateway -addition of NIS-code -changes regarding RFC's
5.4	08/08/2017	Annotation by RSW/RSB in the context of the action point 3 of the eHealth roadmap. - Highlighting of regional "safe" specificities
5.5	08/12/2017	Additional business validations: - 'beginmoment' does not contain 'time' - 'regimen' cannot be combined with hourly 'periodicity' - 'posology' or 'regimen' is mandatory - All 'unit' have the same value within the transaction
5.6	01/09/2018	Extra information added concerning what codes to use of CD-ADMINISTRATIONUNIT: not allowed: 0025 CD-DRUG-ROUTE: not allowed: 00003->00004 00006->00007 00014->00032 00036->00044 00047->00048 00050 00057->00059 00061->00063 00065 00069 (This information existed previously outside this document in "Vitalink_Medicatieschema_Vertaaltabellen_v1 5.pdf")
5.7	08/05/2020	This version is a general refresh of the document without major changes. Added for <instructionforoverdosing> = deprecated Added Time Unit constraints in chapter 4.2.2 Added advice for situation when more than 1 medication scheme exist in vault response in chapter 3.3
5.8	31/03/2021	Minor descriptive additions and examples: - Added 'how to end a medication' - Treatment suspension is always temporarily - ...

Introduction

As part of the set of documents available to software developers, this document provides a general overview of the business project pertaining to the medication scheme.

To verify if you have the latest version of this document, please consult the website of E-health platform

This document contains the following information:

- It contains functional and technical information with regard to the medication scheme.
- It describes the data to be exchanged and their specific structure;
- It translates the functional use cases to the use of vault services;
- Functional requirements are given regarding the visualisation into end-user software applications;

The information contained in this document, together with all other technical information that is offered should enable a software developer or the IT department of an organisation to achieve integration with the vault webservice solution for the “medication scheme”.

This document was historically established specifically for the Vitalink platform. In 2016, in the context of the eHealth roadmap v2 :

- RSW/RSB adopted the structuration defined by Vitalink for the medication scheme; the specification of this structuration is the main goal of the present document that was then consequently just “annotated” by RSW/RSB.
- Vitalink adopted (a new version) of the “intrahub hubservices” used in the “hubs & metahub” namely the *intrahub webservices v3*; the reader should consult the cookbook¹ ‘Safe operations : functional description’ dedicated to these services before to go deeper in the present document.
- A general “architecture between the three vaults” was defined. This architecture specifies the storage and exchange principles between the vaults. In a few words, those principles applied to the medication scheme are :
 - The medication scheme is stored in the vault determined by the residential place of the patient.
 - The care-giver connects to the vault of his region.
 - The required exchanges to fulfil the two previous points are organized between the vaults. The software package of the end user only has to connect to his regional vault initially, and the request is routed throughout all regional vaults to provide a complete response.

The present version of this cookbook aims to refresh the description of the medication scheme structuration to provide a more accurate and actual (with respect to the effective implementation within the three vaults) specification. However, there are no main changes introduced in this structuration. The “annotations system” is also abandoned.

¹ This cookbook is available on the RSW, RSB and Vitalink websites.

2 INTRODUCTION TO THE MEDICATION SCHEME

2.1 Context

The ICT working group, a working group of the Primary Health Care Collaboration Platform in Flanders, decided in April 2011 to start with a project to provide a patient's medication scheme to all authorized care providers. These medication schemes were to be stored in a central and secured platform, a “vault”.

The project had mainly 2 objectives :

- To provide an overview of all the medication that a patient is supposed to take at a particular time
- To indicate for each individual medicine, during which period, which dose should be taken/administered at which time (duration, frequency and dosage).

Later on, the project was adopted by the other regions. Soon, the concept of a medication scheme was available in all of the three Belgian vaults so all patients could have a medication scheme that could be shared by all authorized care providers.

2.2 The users of the medication scheme

If there wouldn't be a central medication scheme, it would be hard for a care provider to know which medication a patient uses, what are the relevant dosages, what is the overall treatment, ... After all, several doctors can prescribe medication for a patient. Therefore, It's crucial for the wellbeing of a patient that as much parties as possible, all involved in the care of the patient, have access to the medication scheme on the vault. But this access should always be in relation with the role of the party in healthcare (a doctor has more rights than a nurse), the proportionality of the involvement (therapeutic link with the patient) and the personal desires of the patient (exclusions, consent, ...).

These access-rights are documented in the Belgian Access-matrix which is discussed in the concerned working group. This matrix regulates the access to the medication scheme stored in the vaults.

e.g. :

- Patients have only read access to their own medication scheme
- Specific care providers have read access to the medication schemes of their patients
- Pharmacists have write access in relation to their patients
- Healthcare providers authorized to prescribe medicines have write access and can create new medication schemes
- Etc...

Organizations like home care and hospitals can gain access-rights on an organizational level and can grant these rights to users working within their organization. This results in a situation where the organization itself becomes accountable for the protection of the privacy of the patient.

Access-rights are one thing, but without an application that can access the vault (and the medication scheme) there is no possibility for the patient/care worker to access the data. This Cookbook is an essential element for allowing the integration of the medication scheme in the software packages.

USE OF THE VAULT FOR STORING AND CONSULTING THE MEDICATION SCHEME

The medication scheme in the vault allows end users to share information about the actual medication use of a patient with other care providers. This chapter explains the general principles concerning the storage and consultation of such data.

Some important points of attention:

- The unit of processing a medication scheme is the global (current) scheme. The details therefore need to be displayed, validated and checked in their entirety.
- With the 'current scheme' all the medication is intended that is taken at that time by the patient in question. Medication that has already been stopped or has not been taken within the vaults medication scheme, does therefore not fall under 'current scheme'.
- The author of the last adaptation to one or more medication scheme elements is the author of the global scheme.

The typical CRUD operations (Create, Read, Update, Delete) are offered by the vault :

- Save medication scheme (refer to 'create' and 'update');
- Consultation on medication scheme, retrieval of indication of 'last change' and consulting details to be validated (refer to 'read');
- Deleting medication (refer to 'delete').

Comment: For the removal of a medication from the active medication scheme, an update needs to be made for the complete medication scheme from which that obsolete medication is actually removed.

These different operations are placed in different use cases that describe the functionality of the parts of the medication scheme. Each use case can be implemented by one (or several) operations within the vault. This chapter clarifies this "mapping" of use cases to the services of the vault to be used. For the elements related to the specification of those services such as the authentication mechanisms, the reader should consult the cookbook^[1] 'Safe operations : functional description'.

Apart from calling up the operation of the vault prior steps also often have to be carried out by the end users software application. After execution, the vault will also give feedback on whether or not the operation has been successful.

The table below gives an overview of the various use cases and their corresponding service and refers to a following paragraph where additional explanations can be found with regard to the actions that need to be executed beforehand (and possibly afterwards) by the end users software application.

^[1] This cookbook is available on the RSW, RSB and Vitalink websites.

Use case title	Corresponding service	Additional explanation (reference to following paragraphs)
Addition of new medication details to the medication scheme	PutTransactionSet	3.1.1 Addition of new medication details to the medication scheme (refer to create)
Modification of existing medication details	PutTransactionSet	3.1.2 Modification of existing medication details (refer to update)
Retrieval of current medication scheme	GetTransactionSet	3.2.1 Retrieval of current medication scheme
Retrieval of indication of last change	GetLatestUpdate	3.3 Retrieval of indication of "last change"
Delete medication by emptying the medication scheme	PutTransactionSet	3.4 Delete medication by omitting all medications from the medication scheme

The following paragraphs give an explanation regarding the expected functionality that needs to be built into the end users software application to develop the use cases explained above. As part of the reference implementation this will also be used as basis for the unitary code examples.

3.1 Save medication scheme

Every medication that forms part of the medication scheme is saved separately within the vault. Saving 'the medication scheme' therefore technically involves the addition or modification of medication details. We expect that the End User software, each time, sends the complete actual scheme. We expect that the user doesn't manipulate the VitalinkURI, or RSWID/RSBID for the Medication Scheme² anymore.

Around the vault the following interpretations will be done:

- A new element will be added to the vault . No URI will be given for this element.
- A missing element will be deleted from the vault.
- A modified element will be updated, the <Date> and <Time> of the transaction are more recent than those of the transaction saved in the vault .
- An un-modified element will be ignored. The <Date> and <Time> of the transaction match those saved in the vault.

We distinguish two use cases when saving the medication scheme. On the one hand there is the situation where a new medication must be added to the scheme, on the other hand there is medication that is already in the scheme and for which the information needs to be modified.

It is important to know that it is not necessary as such to create a medication scheme. The addition of a first medication element will automatically imply its creation.

Since the medication scheme always needs to be interpreted as a whole, the vault, when saving new medication details, will check whether this has been based on the last version of this scheme. This check will be carried out on the basis of the version number of the medication

² Vitalink requested the user to build this URI in different ways, depending on the desired action (eg Addition of "/new") where RSB/RSW requested this through the unique identifier ID.

scheme; (version number at node level of the vault) that needs to be provided with each request.

A list of unique identifiers will be submitted with the response message.

For RSB/RSW, the ID of the Medication Scheme will be returned, for Vitalink this will be the generated URI.

In this list you'll find the active medication of the complete medication scheme. So these are the unchanged, added and modified medications.

Fields that are not included in the Cookbook but are part of the KMEHR standard can indeed be uploaded to the Vaults. However, there are no rules on the use of these fields and it may therefore not be assumed that other healthcare providers update or even read them. Other users can ignore them, overwrite them or use them in a different way.

3.1.1 Addition of new medication details to the medication scheme (refer to create)

If a new medication needs to be added to the medication scheme, then use must be made of this use case. Account needs to be taken with a few points:

- Firstly, as stated above, a valid eHealth platform session must be initiated. Additionally the patient for whom the action will be carried out must be uniquely identified based on his/her NISS. These are basic requirements of the vault. These conditions apply to all following use cases and will not be repeated again.
- The 'business data' of the medication element must be drawn up in accordance with the Kmehr standard A valid Kmehr message (as XML) must be provided.
- The medication details are also accompanied within the vault with a list of metadata (see 4.1). This list will be partly completed by the vault itself. However, another part of this needs to be provided by the end users software application. This must be made available by the software application in the SOAP-message
- The system recognizes a new medication by the lack of a LOCAL id. This vault dependant local id can be recognized:

- For Vitalink: VitalinkURI, (a composed unique string including the insz of the patient)

```
<transaction> <!-- for Vitalink platform -->
  <id S="LOCAL" SL="vitalinkuri" SV="1.0">...</id>
  ...
</transaction>
```

- For RSW: RSWID (a unique identifier of a document at the server level.)

```
<transaction> <!-- for RSW platform -->
  <id S="LOCAL" SL="RSWID" SV="1.0">...</id>
  ...
</transaction>
```

- For RSB: RSBID (a unique identifier of a document at the server level.)

```
<transaction> <!-- for RSB platform -->
  <id S="LOCAL" SL="RSBID" SV="1.0">...</id>
  ...
</transaction>
```

Because of this, no assertion can be made on the internal structure or the value of that ID (also referred as URI in the Vitalink context).

Common to all platforms, the version of the transaction is indicated by the <version> element.

```
<transaction> <!-- for all platforms -->
```



```

...
<version>1</version>
</transaction>

```

- When adding a new medication the vault will automatically generate a unique code as identification of the medication element as well as assigning the version number 1. This information, after being successfully saved in the vault, is treated vault specific:
 - For Vitalink: this information is returned to the end users software application by means of the URI of the data element. This URI contains both the vault specific unique code and the version number.
 - For RSW/RSB: this information is returned to the end users software application by means of a meaningless numerical LOCAL identifier (RSWID, RSBID resp.). Care must be taken when a client's software save the medication scheme locally. This because a local version could be rapidly outdated with multidisciplinary usage. Reading the entire medication scheme should be required in advance to further updates, since the local versions of the individual medication lines could not be in use anymore.
- It is recommended to implement this unique identifier in the end users software application. This unique identifier will indeed be used to save newer versions of this element.
- Finally, the vault will also provide feedback, more specifically whether saving the medication details was successful and if not, the reason(s) why.

3.1.2 Adaptation of existing medication details (cfr. update)

If an already existing medication element needs to be modified, then use must be made of this use case. A few points need to be taken into account. These are explained below.

The steps and procedure as described in paragraph 3.1.1 creating a new entry are also applicable here, with these differences:

- Since it concerns a modification of existing medication, there is already a medication (MSE) available. To implement a modification, the transaction *LOCAL id* of this medication scheme element must be available.
- Since the vault wants to avoid that information is lost, no information will be overwritten. Every modification of a medication scheme element will therefore ensure that a new version of this medication scheme element is created within a new medication scheme. (=updated versionnumber of MS). Every request for a patients medication scheme, will result in a collection of the most recent version of every medication scheme element. To achieve this, the vault requires that the modifications is based on the most recent version of the medication scheme that is stored at that time within the vault. With the request to save, the end user (software) will therefore have to indicate on which version the modifications are based (this by means of specifying the LOCAL ID, as well as the version number of the whole medication scheme).

3.2 Consultation of medication scheme (cfr. read)

3.2.1 Retrieval of current medication scheme

The medication scheme must always be considered as one functional whole for the end user. It is therefore the intention that all medication elements are always displayed together as one consolidated whole. The use case “retrieval of current medication scheme” satisfies the requirement to provide the current medication scheme, including actual as well as future medication to be taken, to the end user.

The vault operation that can satisfy this requirement, is 'getTransactionSet'. Using this action will retrieve the complete medication scheme, not just one medication line.

The following steps need to be provided before and after calling the vault platform service:

- The search criteria for this operation need to be defined as input parameters of the web service method (request/select): the patient identification (NISS), and the type of transaction (`<cd S="CD-TRANSACTION" SV="1.6">medicationscheme</cd>`)
- The end users software application must be able to interpret the Kmehr xml structure that is returned as business data. All these medication elements then need to be displayed to the end user as one functional whole.
- It is recommended that the information with regard to the individual medication elements (such as the LOCAL ID's , version numbers and time stamps that can be retrieved from `getLatestUpdate`) is maintained as a function of future communication with the vault. LOCAL ID's and version numbers are necessary to add new versions of medication elements and time stamps are used to indicate whether an up-to-date version of the medication scheme is still being used.
- The field `isValidated` is not used and will always be set to 'true'.

3.3 Retrieval of indication of 'last change' (GetLatestUpdate)

This use case enables the end users software application to check whether the local data in the system is still up-to-date with the data in the vault . In this (fast) way, the software can check whether or not new medication elements need to be retrieved. This operation can be carried out in the background without impact for the end user.

The following steps need to be taken account of when calling up this service:

- The end users software application needs to know what the time stamp / 'revision number' is of the local data. As described in paragraph 3.2.1 it is recommended to implement this data during the retrieval or writing of data.
- There must be a list of patients available (from NISS) for which this indication is required. It is recommended to only carry this out for those patients for which this is useful or for which the end user has specifically indicated this.
- After receiving these indications it can be appropriate to request any new medication details for the patients where the local time stamp / 'revision number' is no longer the same as that in the vault .
- If more than 1 MS exists in the response of the vault, we choose the most recent medication scheme to work with, based on the field `<recorddatetime>`.

3.4 Delete medication (cfr. delete)

The deletion of a medication happens while saving a new version (via `PutTransactionSet`) by omitting this medication. This way the medication scheme from the latest `PutTransactionSet` matches each time with the central saved medication scheme.

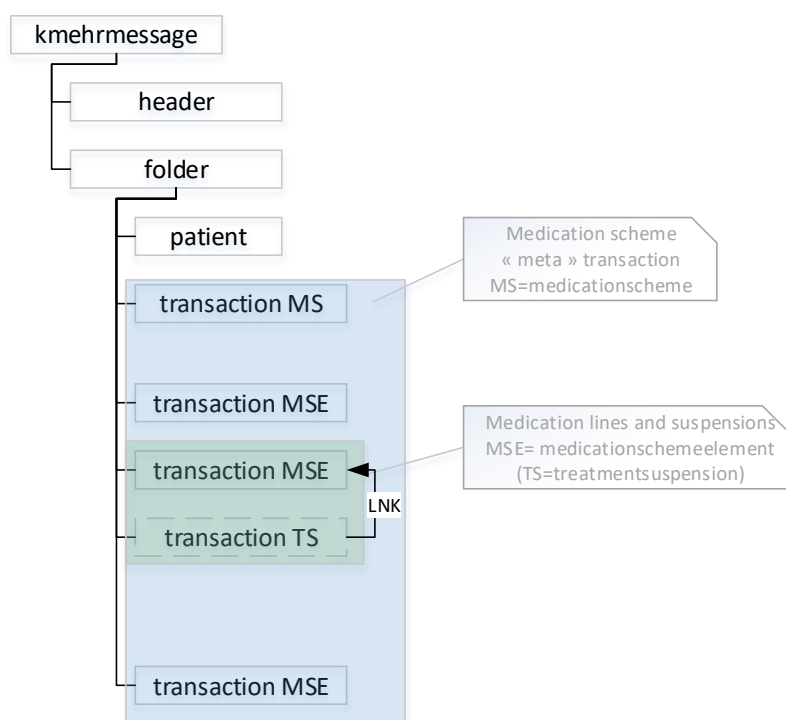
Deleting an entire medication scheme is done by omitting all its medication lines and saving a new version to the vault. In other words, deleting a medication scheme is equal to emptying the entire medication scheme.

Remark: we **do not** use the method `RevokeTransaction`.

4.1

Structure of the Kmehr message

For a medication scheme data element the data needs to be delivered to the vault as a XML KMEHR message (Kind Message for Electronic Healthcare Record) of the type: 'medicationscheme' (and additional 'medicationschemeelement' and 'treatmentsuspension'). For more information about the Kmehr standards as such, please refer to the eHealth platform. The Kmehr message in the context of the medication scheme, has the following high-level structure:



As already stated earlier in this document: 1 Kmehr message contains a complete medication scheme.

It is the task of the end users software application to be able to compose such a Kmehr message and to also be able to open, interpret and (visually) present it to the end user.

Validation of this data is also necessary. The validation will occur in two steps:

- XSD validation
- Additional validation

The validation will be carried out automatically within the vault but should also be implemented by the end users software application to be sure that data will be accepted by the vault platform. To avoid errors and delays it is recommended that the software application composes this Kmehr message in the correct manner.

4.1.1 KMEHR validation

The XML scheme definition, and all related information regarding the Kmehr-standard (.XSD file) can be found at the eHealth platform with URL:
<https://www.ehealth.fgov.be/standards/kmehr/>

At this time, the medication scheme data element must satisfy version “20161201-kmehr” of the XSD definition (these XSD definitions can be downloaded via the URL:
<https://www.ehealth.fgov.be/standards/kmehr/en/page/xschema>).

Along with the XSD scheme validation, the Kmehr message will also be subjected to a general structure validation. This structure validation will on the one hand produce errors and on the other hand warnings. In the event that errors occur during the validation, the action will be suspended and the error reported. In the event that there are only warnings, the request will be dealt with. The final response will however be enhanced with the warnings, to construct a correct request.

4.1.2 Additional validation

The Kmehr standard defines all kinds of different types of messages with regard to the healthcare sector. Within the medication scheme project only Kmehr messages of the type “medicationscheme” (and additionally “medicationschemeelement” and “treatmentsuspension”) are accepted. Additional validation is therefore also necessary before data can be sent to the vault .

The table below describes the various checks (extra business rules to supplement the Kmehr validation) that will be carried out.

Description
‘cd’ in ‘standard’ must be ‘20161201’
‘id’ in ‘header’ must be entered ³
‘cd’ in ‘hcparty’ (sender, recipient and author) is mandatory and requires a value from table CD-HCPARTY
‘name’ in ‘recipient’ must be ‘RSW’, ‘RSB’ or ‘Vitalink’
‘cd’ in ‘recipient’ must be ‘application’
Contains exactly 1 ‘folder’
‘firstname’, ‘familyname’ and ‘id’ in ‘patient’ must be entered
When using a ‘date’, this ‘date’ must have a full date format (day, month and year) Example: ‘beginmoment’ or ‘endmoment’
Each transaction contains exact 1 ‘URI’: ‘id’ with S=“LOCAL” and for every regional vault a specific SL=“RSWID” / “vitalinkuri” / “RSBID” For each transaction, being an addition or an update, the author must match with the one from the SAML token
Contains exactly 1 ‘medicationscheme’ transaction for which:
Contains exact 1 ‘version’
Contains transaction(s) ‘medicationschemeelement’ for which:
Contains exactly 1 item ‘medication’ for which:
Contains exactly 1 ‘beginmoment’
‘beginmoment’ cannot contain a ‘time’, this should be specified in the ‘regimen’
Contains exactly 1 of: ‘medicinalproduct’, ‘substanceproduct’, ‘compoundprescription’
If ‘compoundprescription’ is included: contains exactly 1 associated ‘text’ field

³ When it is possible within the Kmehr standard to add the tag several times, it is checked whether there is at least or exactly one entered tag present.

If 'medicinalproduct' or 'substanceproduct' is included: 'intendedcd' and 'intendedname' must be entered
If 'compoundprescription' is included: 'compoundprescription' and 'text' field must be entered
If 'temporality' is included: 'CD-TEMPORALITY' allows only following values: "acute", "chronic" and "oneshot".
If 'frequency' is included:
'frequency' makes use of 'periodicity'
For 'periodicity' the values 'Per 5h (UQ)', 'Per 7h (US)', 'Per 9h (UN)', 'Per 10h (UX)' and 'Per 11h (UE)' are not permitted
If the values 'Per hour (U)', 'Per 8h (UA)', 'Per 3h (UD)', 'Per half hour (UH)', 'Per 2h (UT)', 'Per 4h (UV)', 'Per 12h (UW)' or 'Per 6h (UZ)' are used, then the use of 'regimen' is not allowed.
Contains exactly 1 'posology' or 'regimen' (they do not occur together)
If 'posology' is included: 'posology' makes use of a free 'text' field
If 'text' filled: no control on unit in 'text' field
If 'regimen' is included:
For 'dayperiod' the values 'aftermeal', 'betweenmeals', 'afternoon:', 'evening', 'night' are not permitted
'dayperiod' is only allowed once per day per 'regimen'
If 'quantity' is included:
Contains exact 1 element 'unit'
All 'unit' elements have the same value within the transaction
For all 'healthcareelement':
Contains exactly 1 'cd' with list 'CD-ITEM-MS' (permitted values: 'medicationuse', 'begincondition' or 'endcondition')
If 'medicationuse' is included: contains exactly 1 completed 'text' field
Included as 'begincondition': contains exactly 1 completed 'text' field
If 'endcondition' is included: contains exactly 1 completed 'text' field
The Kmehr-element 'Instructionforoverdosing' is not being used, therefor will not be mentioned in the medication scheme
For all 'treatmentsuspension' transactions:
Contains exactly 1 item 'medication' for which:
Contains exactly 1 of: 'medicinalproduct', 'substanceproduct', 'compoundprescription' (identical to the definition in the transaction 'medicationschemeelement')
Contains exactly 1 'start moment'
Contains exactly 1 'lifecycle' with list 'CD-LIFECYCLE' (permitted values: 'suspended')
Contains exact 1 'lnk' (the validation on 'exact 1 lnk' applies to the type 'treatmentsuspension'. Since a folder now contains multiple medications, there must be a link with a treatmentsuspension to the correct medication. See also 4.3.5 TreatmentSuspension) for which:
Attribute URL:XPath to the concerning 'medicationschemeelement'
Attribute Type: isplannedfor

4.2

Code lists

The medication scheme data element makes use of several lists that are defined within the Kmehr standard. In the most recent Kmehr version there are four new project specific lists added that are discussed briefly below.

4.2.1

CD-ITEM-MS

To include certain project specific information (extra info) within the medication scheme data element, use can be made of 'healthcareelement' items.

In order to further refine these items, CD-ITEM-MS can be used with the following permitted values:

- medicationuse
- begincondition
- endcondition

Hereby an example in which it is explained how these 'healthcareelement' items need to be set up:

Option : text field

```
<item>
  <id SV="1.0" S="ID-KMEHR">2</id>
  <cd SV="1.3" S="CD-ITEM">healthcareelement</cd>
  <content>
    <cd SV="1.0" S="CD-ITEM-MS">medicationuse</cd>
  </content>
  <content>
    <text L="nl">For stomachache</text>
  </content>
</item>
```

When using 'medicationuse', 'begincondition' or 'endcondition', a text field should be used to add the required information. No validation will be done on these fields.

The values adaptationflag, origin and medicationtype are not permitted within CD-ITEM-MS.

KMEHR defined lists

Apart from the project specific lists, use is also made within the medication scheme of several lists that are defined on the Kmehr website. Below is the list of the used lists with the used and non-permitted values.

List	Used values ⁴	Non-permitted values
CD-ADMINISTRATIONUNIT ⁵		- 0025
CD-DAYPERIOD		- aftermeal - betweenmeals - afternoon - evening - night
CD-DRUG-ROUTE		- 00003->00004 - 00006->00007 - 00014->00032 - 00036->00044 - 00047->00048 - 00050 - 00057->00059 - 00061->00063 - 00065 - 00069
CD-ITEM	- healthcareelement - medication - transactionreason	
CD-ITEM-MS	-medicationuse -begincondition -endcondition	-adaptationflag -medicationtype - origin
CD-LIFECYCLE	- suspended	- stopped
CD-PERIODICITY		- on demand - per 5h (UQ) - per 7h (US) - per 9h (UN) - per 10h (UX) - per 11h (UE)
CD-STANDARD	20161201	
CD-TEMPORALITY	- Acute - Chronic - Oneshot	- reactivation - remission - subacute
CD-TIMEUNIT	- a - d - mo - wk	

⁴ If there are no values stated next to 'used values' then all values (with the exception of those stated under 'non-permitted values') are permitted.

⁵ Version 1.1 of the list CD-ADMINISTRATIONUNIT was published on 1/10/2013. This contains modifications that are of importance for the medication scheme project. It is therefore also recommended to support the most recent version of this list.

CD-TRANSACTION	<ul style="list-style-type: none"> - medicationscheme - medicationschemeelement - treatmentsuspension
----------------	--

4.3 Advanced description of KMEHR elements

The tables below give an overview of the various information elements that can be included within a medication scheme data element. However the Kmehr standard also allows other information to be included. The information below is therefore indicative and only the information fields that are enforced at the level of the Kmehr xsd or the additional vault validation are guaranteed.

4.3.1 Author and patient

‘Author’ and ‘patient’ are two core concepts within Kmehr and for the medication scheme. The target patient is described at a single place: at the folder level.

Author elements are provided for each transaction. The author of the **medicationscheme (MS) transaction** corresponds to the actor responsible of the last global update of the medicationscheme (e.g. addendum 1) whereas the author of the **medicationschemeelement (MSE) transaction** corresponds to the actor responsible of the last posology update performed on the medication line described by this transaction (e.g. addendum 2).

Note: the author of the MSE may only change if the posology was deliberately changed. E.g. if only the medication name of a MSE would be replaced by the software application, because it uses a different external medication database, this MSE needs to be left unchanged in writing to the vault so the author of that MSE remains the same.

Concept	Purpose and fields
Author	<p>A medicationscheme has one responsible author. This author must be identified as an individual, but can furthermore also be part of an organisation.</p> <p>Fields (as hub) [0-1]:</p> <ul style="list-style-type: none"> - Type (=hub) [1-1]: CD-HCPARTY - Name [0-1]: name of the hub <p>Fields (as organisation) [0-1]:</p> <ul style="list-style-type: none"> - INAMI/NIHII [0-1] : ID-HCPARTY - Type of organisation [1-1]: CD-HCPARTY - Name [0-1]: name of the organisation <p>Fields (as individual) [1-1]:</p> <ul style="list-style-type: none"> - INAMI/NIHII [0-1] - SSIN [0-1] - Type of individual [1-1]: CD-HCPARTY - Name [0-1] - First name [0-1]

Patient	<p>A medication scheme data element is linked to one patient. This patient is identified by his/her NISS/INSZ/SSIN number.</p> <p>Fields :</p> <ul style="list-style-type: none"> - id (SSIN) [1-1] - Family name [1-1] - First name [1-1] - Sex [1-1]: CD-SEX - ... (other optional available fields)
---------	---

4.3.2 Medicationscheme information

Information with regard to the complete scheme will be included in a transaction of the 'medicationscheme' type.

Concept	Purpose and fields
Scheme information	<p>Information with regard to the medication scheme.</p> <p>Fields :</p> <ul style="list-style-type: none"> – The version number of the scheme will be included using the tag <version>[1-1]

4.3.3 Medication information

Information with regard to the medication can be included in four different ways. The method that is used depends on whether:

- the medication is prescribed on product name;
- the medication is prescribed on substance name ;
- the medication is a pharmaceutical compound.

Option1: In the case of product name.

Concept	Purpose and fields
Medication information	<p>Information with regard to the medication.</p> <p>Fields :</p> <ul style="list-style-type: none"> – Description [0-1]: (medication use) with regard to the purpose of the medication⁹ – Start date of treatment [1-1] – End date of treatment [0-1] or Duration of the treatment [0-1] – The medication is defined with the help of the tag <medicinalproduct> [1-1] : <ul style="list-style-type: none"> - Name [1-1] : <intendedname> - Medication code [1-1]: <intendedcd>: CD-DRUG-CNK + code

It is possible along with the prescribed medication to also specify the delivered medication:

- Name [0-1] : <deliveredname>
- Medication code [0-1]: <deliveredcd>: CD-DRUG-CNK + code

Option 2: In the case of prescribed on substance name (POS).

Concept	Purpose and fields
Medication information	<p>Information with regards to the medication.</p> <p>Fields :</p> <ul style="list-style-type: none"> – Description [0-1]: (medication use) with regard to the purpose of the medication³ – Start date of treatment [1-1] – End date of treatment [0-1] or Duration of the treatment [0-1] – The medication is defined with the help of the tag <substanceproduct> [1-1] : <ul style="list-style-type: none"> - Name of POS [1-1]: <intendedname> - Medication code POS [1-1]: <intendedcd> : CD-VMPGROUP + code - Name of delivered medication [0-1]: <deliveredname> - Medication code of delivered medication [0-1]: <deliveredcd>: CD-DRUG-CNK + code

Option 3: In the case of a pharmaceutical compound.

Concept	Purpose and fields
Medication information	<p>Information with regard to the medication.</p> <p>Fields :</p> <ul style="list-style-type: none"> – Description [0-1] : (medication use) with regard to the purpose of the medication³ – Description [1-1] : A textual description of the pharmaceutical compound : <compoundprescription> – Name [1-1] : A descriptive name of the pharmaceutical compound : <text>. The following information should be included as name of the compound: the compound number + active components + dose per unit or content. – Start date of treatment [1-1] – End date of treatment [0-1] or Duration of the treatment [0-1]

4.3.4 Posology

The information below about the posology information of a medication gives a description of the various ways, within the Kmehr standard, in which this information can be included.

4.3.4.1 General posology information

General information about the posology of the medication:

Concept	Purpose and fields
General posology information	Fields : <ul style="list-style-type: none">– Posology type [0-1] : CD-TEMPORALITY– Means of administration [0-1] : CD-DRUG-ROUTE– Comments for patient [0-1] : <instructionforpatient>– Start condition [0-1]³– End condition [0-1]³

4.3.4.2 Specific posology information

Other information about the posology can be included in two ways:

- With the help of <posology>: written text.
- Via <regimen>: structured.
- The element <posology> is mutually exclusive with the element <regimen>.

Option 1: In the case of <posology>

Concept	Purpose and fields
Posology information	Information with regard to the posology of the medication. When use is made of the <posology> tag, then this is still to write the ingestion pattern in textual form. For a structured ingestion pattern use is made of the tag <regimen>. Fields : <ul style="list-style-type: none">– Text [1-1]

Option 2: In the case of <regimen>

Concept	Purpose and fields
Posology information	Information with regard to the posology of the medication. When using <regimen> one (or a set of) specific ingestion time(s) are defined. It is then also possible within one <regimen> tag, to use the series of elements several times. Fields [1-*] : <ul style="list-style-type: none">- Unit [0-1] : CD-ADMINISTRATIONUNIT

- Quantity [1-1]
- Time of the day [1-1] : <time> OR <dayperiod>
- Day of ingestion [0-1] : this can be included in various ways :

Option 1 : date

- Date [1-1]

Option 2 : weekday

- Weekday [1-1] : CD-WEEKDAY

Option 3 : day number

- Day number [1-1]

When the ingestion pattern displays a cyclic behaviour, then the period can be indicated by using a 'frequency':

- Frequency [0-1] : <frequency>⁶

4.3.5

Treatmentsuspension

With the help of the 'treatmentsuspension' it is possible to indicate that a medication is temporarily paused. This 'treatmentsuspension' must be included within the Kmehr standard in a separate transaction ('treatmentsuspension'). If necessary, several suspensions can be included within the same message. These are then placed in separate transactions. (e.g. Addendum 3)

Ending a medication can only be done by setting or updating an <endmoment> in the transaction and adding a <text> field containing the reason for ending this medication. (e.g. Addendum 4)

Concept	Purpose and fields
Treatment suspension	<p>Information about the treatment suspension of the medication.</p> <p>Fields [0-*] :</p> <ul style="list-style-type: none"> - Decision date [0-1] : <date> - Decision taker [1-1] : <author> - Medication [1-1]: the identification of the medication (as already made earlier, must be named again in this transaction) - Date of suspension [1-1] : <start time> - Re-start date [1-1] : <end time> - Temporary [1-1] : <lifecycle>=suspended - Reason [1-1] : <item> (transactionreason) - Link [1-1]:<link> (using a link to the transaction of the medicine will be defined) <p>ex:</p> <pre><lnk URL="//transaction[id[@S='ID-KMEHR']='5']" TYPE="isplannedfor"/></pre> <p>Where 5 is the ID-KMEHR of the medicine to be suspended.</p>

⁶ The <frequency> tag may only occur once within the <item> tag.

5.1 Unit

The relation between the unit and the dosage has to be unambiguously clear in the visualization of the medication scheme. Whether the daily medication scheme is visualized or the weekly medication scheme.

5.2 Author MS + Author MSE

Whenever the medication scheme from the vault is visualized, the caregiver (+role) who last adapted the medication scheme to the vault should be visualized as well as the author (+role) for every medication line (MSE).

5.3 Version number + update moment (date + time)

Whenever the medication scheme from the vault is visualized, the version number must be visualized as a reference for the patient and/or caregiver as well as the moment of the most recent upload (date + time).

5.4 Minimum set of visualized fields:

For optimal understanding, a specified set of fields of the Kmehr message must be visualized. Although more fields are available to give more context, this is a list of indispensable information fields:

- Patient firstname + familyname
- Caregiver firstname + familyname
- Medication name (deliveredname or if not available intendedname)
- or
- Compound prescription (magistraltext or formularyreference)
- Frequency (periodicity)
- Temporality
- Begin moment
- End moment
- *In case of regimen:
 - Quantity (dosage)
 - Drug administration unit
 - Intake moment (dayperiod)
- *In case of posology:
 - Free text posology (text)
 - Drug administration route
 - Instruction for patient
 - Medication use
 - Treatment Suspension (if not expired)
 - o Beginmoment

- o Endmoment
- o Reason (if provided)
- o Suspended

6 ADDENDAE.

6.1 Addendum 1.

```
<transaction>
  <id S="ID-KMEHR" SV="1.0">14</id>
  <id S="LOCAL" SL="RSWID" SV="1.0">[RSWID]</id>
  <cd L="fr" S="CD-TRANSACTION" SV="1.4">medicationscheme</cd>
  <date>2020-11-16</date>
  <time>12:52:49.2310000</time>
  <author>
    <hparty>
      <id S="ID-HCPARTY" SV="1.0">1990000035</id>
      <cd S="CD-HCPARTY" SV="1.1">hub</cd>
      <name>RSW</name>
    </hparty>
    <hparty>
      <id S="ID-HCPARTY" SV="1.0">[NIHII caregiver]</id>
      <id S="INSS" SV="1.0">[SSIN caregiver]</id>
      <cd S="CD-HCPARTY" SV="1.1">[TYPE caregiver]</cd>
      <firstname>[FIRSTNAME caregiver]</firstname>
      <familyname>[LASTNAME caregiver]</familyname>
      <address>
        <cd S="CD-ADDRESS" SV="1.0">home</cd>
      </address>
    </hparty>
  </author>
  <iscomplete>true</iscomplete>
  <isvalidated>true</isvalidated>
  <version>62</version>
</transaction>
```

6.2 Addendum 2.

```
<transaction>
  <id S="ID-KMEHR" SV="1.0">2</id>
  <id S="LOCAL" SL="RSWID" SV="1.0">[RSWID]</id>
  <cd S="CD-TRANSACTION" SV="1.4">medicationschemeelement</cd>
  <date>2020-11-14</date>
  <time>14:02:13.0000000Z</time>
  <author>
    <hparty>
      <id S="ID-HCPARTY" SV="1.0">[NIHII caregiver]</id>
      <id S="INSS" SV="1.0">[SSIN caregiver]</id>
      <cd S="CD-HCPARTY" SV="1.2">[TYPE caregiver]</cd>
      <firstname>[FIRSTNAME caregiver]</firstname>
      <familyname>[LASTNAME caregiver]</familyname>
    </hparty>
  </author>
  <iscomplete>true</iscomplete>
  <isvalidated>true</isvalidated>
  <item>
    <id S="ID-KMEHR" SV="1.0">1</id>
    <cd S="CD-ITEM" SV="1.4">healthcareelement</cd>
    <content>
      <cd S="CD-ITEM-MS" SV="1.0">adaptationflag</cd>
      <cd S="CD-MS-ADAPTATION" SV="1.0">medication</cd>
    </content>
  </item>
  <item>
    <id S="ID-KMEHR" SV="1.0">2</id>
    <cd S="CD-ITEM" SV="1.4">medication</cd>
    <content>
      <medicinalproduct>
        <intendedcd S="CD-DRUG-CNK" SV="LOCALDB">2732808</intendedcd>
        <intendedname>Pantomed (PIP) maagsapresist. tabl. 56x 40mg</intendedname>
      </medicinalproduct>
    </content>
    <beginmoment>
      <date>2020-11-18</date>
    </beginmoment>
  </item>
</transaction>
```

```

<transaction>
  <id S="ID-KMEHR" SV="1.0" 3 /id>
  <id S="LOCAL" SL="RSWID" SV="1.0">[RSWID]</id>
  <cd S="CD-TRANSACTION" SV="1.4">medicationschemeelement</cd>
  <date>2020-10-04</date>
  <time>14:12:23.0000000Z</time>
  <author>
    <hparty>
      <id S="ID-HCPARTY" SV="1.0">[NIHII caregiver]</id>
      <id S="INSS" SV="1.0">[SSIN caregiver]</id>
      <cd S="CD-HCPARTY" SV="1.2">[TYPE caregiver]</cd>
      <firstname>[FIRSTNAME caregiver]</firstname>
      <familyname>[LASTNAME caregiver]</familyname>
    </hparty>
  </author>
  <iscomplete>true</iscomplete>
  <isvalidated>true</isvalidated>
  <item>
    <id S="ID-KMEHR" SV="1.0">1</id>
    <cd S="CD-ITEM" SV="1.4">healthcareelement</cd>
    <content>
      <cd S="CD-ITEM-MS" SV="1.0">adaptationflag</cd>
      <cd S="CD-MS-ADAPTATION" SV="1.0">medication</cd>
    </content>
  </item>
  <item>
    <id S="ID-KMEHR" SV="1.0">2</id>
    <cd S="CD-ITEM" SV="1.4">medication</cd>
    <content>
      <medicinalproduct>
        <intendedcd S="CD-DRUG-CNK" SV="LOCALDB">2732808</intendedcd>
        <intendedname>Pantomed (PIP) maagsapresist. tabl. 56x 40mg</intendedname>
      </medicinalproduct>
    </content>
    <beginmoment>
      <date>2020-11-18</date>
    </beginmoment>
    <temporality>
      <cd S="CD-TEMPORALITY" SV="1.0">chronic</cd>
    </temporality>
    <frequency>
      <periodicity>
        <cd S="CD-PERIODICITY" SV="1.1">D</cd>
      </periodicity>
    </frequency>
    <regimen>
      <daytime>
        <dayperiod>
          <cd S="CD-DAYPERIOD" SV="1.1">beforebreakfast</cd>
        </dayperiod>
      </daytime>
      <quantity>
        <decimal>1</decimal>
        <unit>
          <cd S="CD-ADMINISTRATIONUNIT" SV="1.2">00005</cd>
        </unit>
      </quantity>
    </regimen>
  </item>
</transaction>

```


Related Treatment Suspension:

```
<transaction>
  <id S="ID-KMEHR" SV="1.0">4</id>
  <id S="LOCAL" SL="RSWID" SV="1.0">[RSWID]</id>
  <cd S="CD-TRANSACTION" SV="1.3">treatmentsuspension</cd>
  <date>2020-04-19</date>
  <time>14:27:53</time>
  <author>
    <hcparty>
      <id S="ID-HCPARTY" SV="1.0">[NIHII caregiver]</id>
      <id S="INSS" SV="1.0">[SSIN caregiver]</id>
      <cd S="CD-HCPARTY" SV="1.2">[TYPE caregiver]</cd>
      <firstname>[FIRSTNAME caregiver]</firstname>
      <familyname>[LASTNAME caregiver]</familyname>
    </hcparty>
  </author>
  <iscomplete>true</iscomplete>
  <isvalidated>true</isvalidated>
  <item>
    <id S="ID-KMEHR" SV="1.0">2</id>
    <cd S="CD-ITEM" SV="1.4">transactionreason</cd>
    <content>
      <text L="nl">Tijdelijke TS</text>
    </content>
  </item>
  <item>
    <id S="ID-KMEHR" SV="1.0">1</id>
    <cd S="CD-ITEM" SV="1.4">medication</cd>
    <content>
      <medicinalproduct>
        <intendedcd S="CD-DRUG-CNK" SV="1.0">2329969</intendedcd>
        <intendedname>Aspirine 500 mg (36 bruistabletten)</intendedname>
      </medicinalproduct>
    </content>
    <beginmoment>
      <date>2030-03-02</date>
    </beginmoment>
    <endmoment>
      <date>2030-03-03</date>
    </endmoment>
    <lifecycle>
      <cd S="CD-LIFECYCLE" SV="1.3">suspended</cd>
    </lifecycle>
    <lnk TYPE="isplannedfor" URL="//transaction[id[@S='ID-KMEHR']='3']"/>
  </item>
</transaction>
```

```

<transaction>
  <id S="ID-KMEHR" SV="1.0">2</id>
  <id S="LOCAL" SL="vitalinkuri" SV="1.0">[VITALINKURI]</id>
  <cd S="CD-TRANSACTION" SV="1.4">medicationschemeelement</cd>
  <date>2018-04-19</date>
  <time>14:27:53</time>
  <author>
    <hparty>
      <id S="ID-HCPARTY" SV="1.0">[NIHII caregiver]</id>
      <id S="INSS" SV="1.0">[SSIN caregiver]</id>
      <cd S="CD-HCPARTY" SV="1.0">[TYPE caregiver]</cd>
      <firstname>[FIRSTNAME caregiver]</firstname>
      <familyname>[LASTNAME caregiver]</familyname>
    </hparty>
  </author>
  <iscomplete>true</iscomplete>
  <isvalidated>true</isvalidated>
  <item>
    <id S="ID-KMEHR" SV="1.0">1</id>
    <cd S="CD-ITEM" SV="1.11">healthcareelement</cd>
    <content>
      <cd S="CD-ITEM-MS" SV="1.0">adaptationflag</cd>
      <cd S="CD-MS-ADAPTATION" SV="1.0">medication</cd>
    </content>
  </item>
  <item>
    <id S="ID-KMEHR" SV="1.0">2</id>
    <cd S="CD-ITEM" SV="1.11">medication</cd>
    <content>
      <medicinalproduct>
        <intendedcd S="CD-DRUG-CNK" SV="1.0">3434792</intendedcd>
        <intendedname>Atorvastatine Teva 40 mg (100 stuks)</intendedname>
      </medicinalproduct>
    </content>
    <text L="nl">Stopzetting vanwege hartritmestoornissen</text>
    <beginmoment>
      <date>2030-03-05</date>
    </beginmoment>
    <endmoment>
      <date>2030-03-17</date>
    </endmoment>
    <temporality>
      <cd S="CD-TEMPORALITY" SV="1.0">chronic</cd>
    </temporality>
    <frequency>
      <periodicity>

```