eMedication Plan CHMED16A

Author	ccr, twa, tne
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2. Introduction

Medication plans are a central pillar of any eHealth solution. To enable interoperability between eHealth systems in Switzerland, the organisation "IG eMediplan" was founded in 2016. Its aim is to support and provide public, open source, medication plan formats used by a broad group of stakeholders from the public and private sectors.

This paper describes the currently proposed specification and reference implementation of the object model for a medication plan, the so-called CHMED16A.

The reference consists of two major parts:

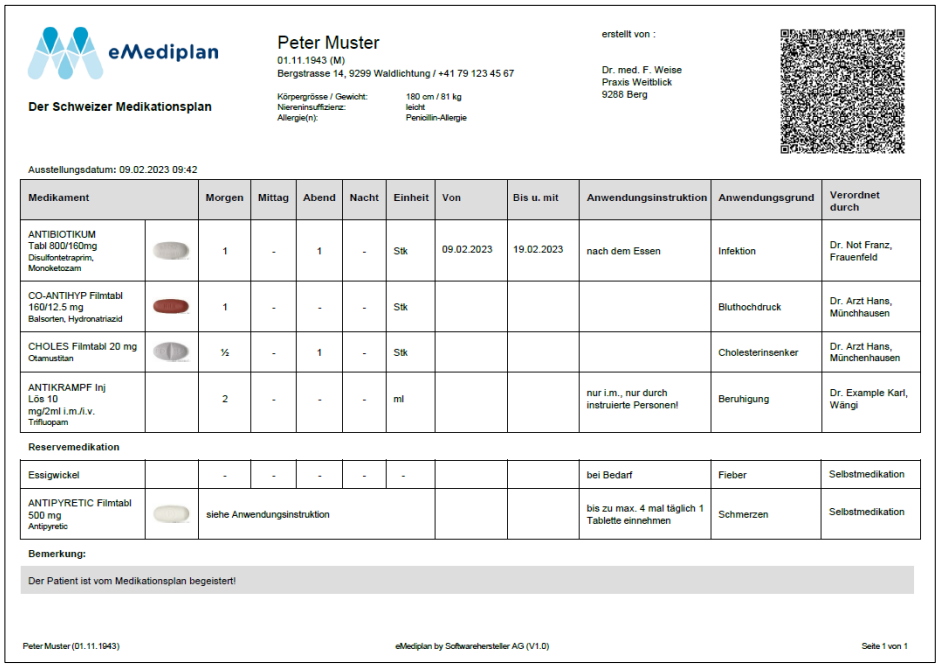
- the content and layout specification for the electronic document, a string/text file containing a header such as "CHMED16A1" and the (compressed, encoded) medication plan as a JSON object in UTF-8
- the content and layout specification for a paper-based layout used in print/PDF scenarios

This allows IT systems to store and transmit electronic medication plans as simple strings or text files in UTF-8. It also makes it possible to transmit the medication in a print-based form by using 2D barcodes. Therefore, the medication plan is readable by users and systems alike. This is necessary to guarantee a simple handling.

A typical CHMED16A object would look like this:

CHMED16A1H4sIAAAAAAAAEAMVU3W7TMBR+lcq3S4SPHdtx7raVAaKFqutAAnoREreJ2jpT4gKj6ptxx4txnCw
VSKQSu0GVqvPX7+flpwdyuXcFSYiSFCjloGKtNQnI2GGRUZAh1SGwBUASyYTqC8oSSnHgVe4HZM7z1UqF6
WcqwkhxjCKdhcJkWc650GIlcXZq8sXDvSEJtHGZpTtjXUOSj4cORyuIpWpRu0EekFnVDYzxmwbtZ+l13dTV7g9t
5lj1eZVicfYWMRab9byxmF1urMH8zpbezO3iNTkGj4RRJIHH7Bwj/J2RhUAHGa+2e/fF1PnPH9bu7XqAnHEhZH
zGrqeGJ5EXVVbk9T7bfHr20tTfBwRAxCQHen7f/y7guqi2pnGmLm1j7MbUA/Qx1VLz8/aftvvf7L9Pm2ZQAQgBT
EX/QwL+dJa6Et8/SQ7kqr0z0DGEFPxbDsh16R48lqktZjdv8FYwnabfyl2KhRfG5giasIBMTj3nWp4JPrmEjJ93J+fx
x5PGTY3X1tbSzuHpGDthCPUu3eKM4O2Kujbr29C3QcSd9ex0udibYyKUWvbLZX3Au54EdupFfSD6QD4CCBE
IBcsjjpJZUVnv6yJCxlEsYMRk+59z62pj/MLuLBreoe2vZj2KsfOhvMcyp0yhAzLfbbzj4y8tzloh3gQAAA==

In addition, the layout specification for printer-based eMediplans facilitates the quick and secure reading of medication plans. This benefits healthcare professionals and patients. The documents are available in a uniform layout, independently of the individual IT systems.



eMediplan

Der Schweizer Medikationsplan

Peter Muster
01.11.1943 (M)
Bergstrasse 14, 9299 Waldlichtung / +41 79 123 45 67

Körpergrösse / Gewicht: 180 cm / 81 kg
Niereninsuffizienz: leicht
Allergie(n): Penicillin-Allergie

erstellt von :

Dr. med. F. Weise
Praxis Weitblick
9288 Berg

Ausstellungsdatum: 09.02.2023 09:42

Medikament		Morgen	Mittag	Abend	Nacht	Einheit	Von	Bis u. mit	Anwendungsinstruktion	Anwendungsgrund	Verordnet durch
ANTIBIOTIKUM Tabl 800/160mg Disulfontetraprim, Monoketozam		1	-	1	-	Stk	09.02.2023	19.02.2023	nach dem Essen	Infektion	Dr. Not Franz, Frauenfeld
CO-ANTIHYP Filmtabl 160/12.5 mg Balsorten, Hydronatriazid		1	-	-	-	Stk				Bluthochdruck	Dr. Arzt Hans, Münchhausen
CHOLES Filmtabl 20 mg Otamustitan		½	-	1	-	Stk				Cholesterinsenker	Dr. Arzt Hans, Münchenhausen
ANTIKRAMPF Inj Lös 10 mg/2ml i.m./i.v. Trifluopam		2	-	-	-	ml			nur i.m., nur durch instruierte Personen!	Beruhigung	Dr. Example Karl, Wängi
Reservemedikation											
Essigwickel		-	-	-	-	-			bei Bedarf	Fieber	Selbstmedikation
ANTIPYRETIC Filmtabl 500 mg Antipyretic		siehe Anwendungsinstruktion							bis zu max. 4 mal täglich 1 Tablette einnehmen	Schmerzen	Selbstmedikation

Bemerkung:

Der Patient ist vom Medikationsplan begeistert!

Peter Muster (01.11.1943) eMediplan by Softwarehersteller AG (V1.0) Seite 1 von 1

Figure 1 eMediplan example

3. The CHMED16A eMedication object

3.1. Overview of the object model

The hierarchy of the object model is quite simple. Each medication object includes:

1 *Patient*
- n *Identifiers* (a number of identifiers/numbers/codes to connect the patient to IT systems)
- 1 *Medical status* (a description of the patient's medical situation)
  - n *Risks* (all the risks of the patient's medical situation, based on public risk lists)
  - n *Measurements* (measurements of the patient's medical status)
- 1 *Medication* (the current medication plan)
  - n *Medicaments* (all currently used medicaments)
    - n *Posology* (the dosage information)
      - n *Taking times* (the intake timetable)

3.2. Using JSON as the object model format

The object model format is JSON, which was chosen for its openness, flexibility, simplicity and language independence. JSON can be implemented for most programming languages and platforms. The JSON format uses human-readable text, so patient data is clearly identifiable, making the JSON format easy to use for documentation, development and integration.

As the number of primary types supported by JSON is very small, we make intensive use of strings in combination with a specific format, e.g. dates or posology. During serialization, the cost of tags is quite high; therefore we have chosen rather short field names. We recommend to omit optional fields when they are null or empty.

3.3. Object model

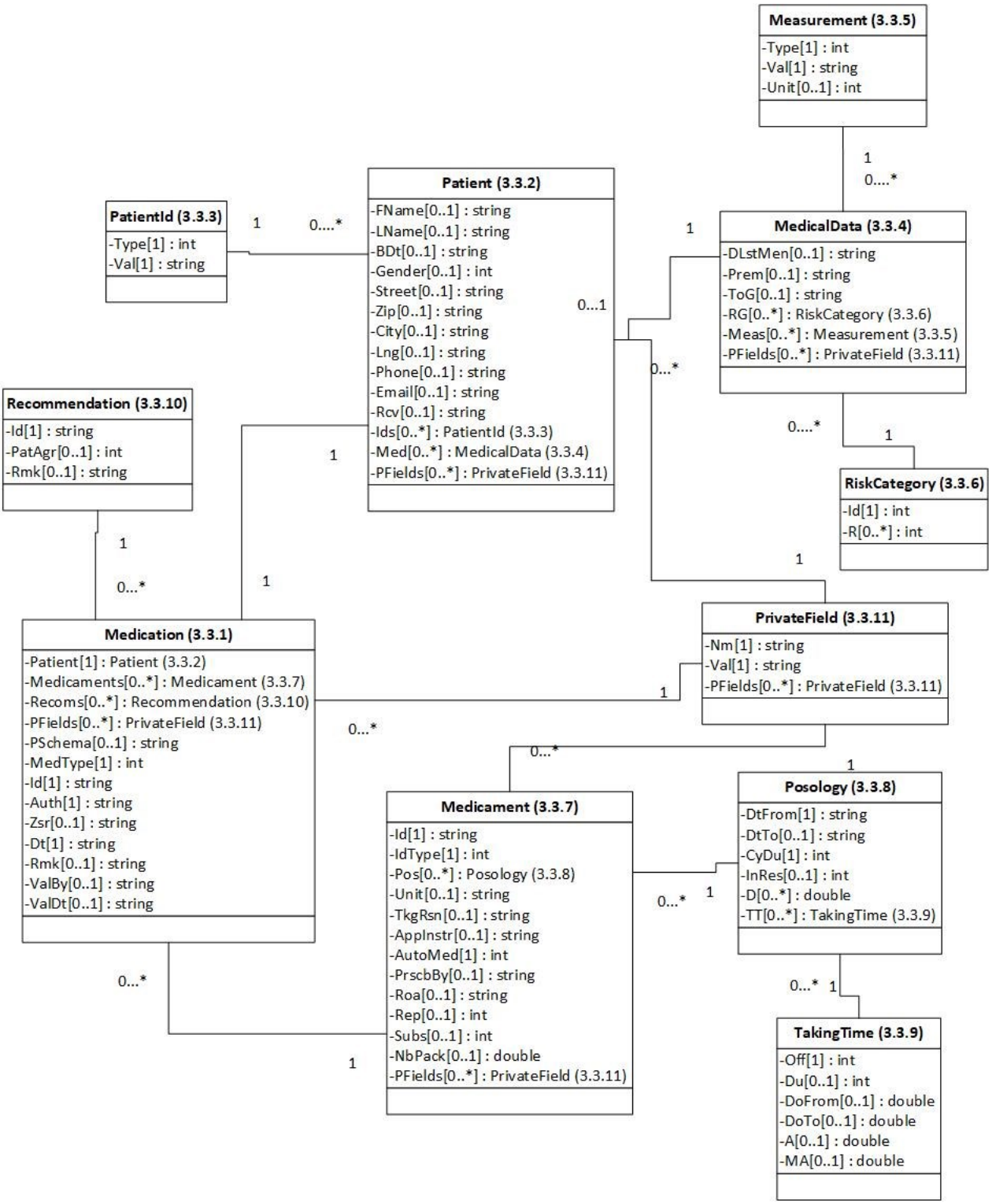


Figure 2 Object model

3.3.1. Medication (Med)

The *Med* object is the main one; it contains exactly one *Patient* object and at least one *Medicament* object.

Name	Type	Usage			Description
		MP	PMC	Rx	
Patient	*Patient*	R[1]	R	R	The patient. Please refer to 3.3.2 *Patient*
Medicaments	list of *Medicament*	0-N	0-N	0-N	The list of medicaments. Please refer to 3.3.7 *Medicament*
Recoms	list of *Recommendation*	-	0-N	-	The list of recommendations. Please refer to 3.3.10 *Recommendation*
PFields	list of *Private Field*	0-N	0-N	0-N	The list of private fields. Please refer to 3.3.11 *Private Field*
PSchema	string	O[2]	O	O	The schema of the private fields. When empty or not specified, all private fields must be ignored.
MedType	number	R	R	R	The type of the *Medication* object Possible values: 1: MedicationPlan (MP) 2: PolymedicationCheck (PMC) 3: Prescription (Rx)
Id	string	R	R	R	The ID of the *Medication* object
Auth	string	R	R	R	Author (GLN[3] if available, otherwise name) eMediplan: GLN of a person or organisation ePrescription: GLN of a person The patient can also be the author of the eMediplan. In this case, the minimum requirement is that the term "patient" is used to designate the author. Optionally, the patient's first name, last name and date of birth can also be specified additionally.
Zsr	string	-	-	O	ZSR[4] number of the author himself/herself or his/her organisation
Dt	string	R	R	R	Date of creation, Format: yyyy-mm-ddThh:mm:ss+02:00 (ISO 8601[5] Combined date and time in UTC) (e.g. 2016-01-16T16:26:15+02:00)
Rmk	string	O	-	O	Remark (any information/advice the author would like to share independently of a specific medicament)

The table continues on the next page.

[1] R: Required

[2] O: Optional

[3] Global Location Number (GLN): https://www.refdata.ch/de/partner/abfrage

[4] Zahlstellenregister (ZSR): https://www.sasis.ch/de/Angebot/Produkt/ProductDetail?topMenuId=447

[5] ISO 8601: https://en.wikipedia.org/wiki/ISO_8601

The table starts on the previous page.

Name	Type	Usage			Description
		MP	PMC	Rx	
ValBy	string	O	O	-	Validate by: the GLN[6] of the healthcare professional who has validated the medication plan.
ValDt	string	O	O	-	Validate date: Date of validation, Format: yyyy-mm-ddThh:mm:ss+02:00 (ISO 8601[7] Combined date and time in UTC)

[6] Global Location Number (GLN): https://www.refdata.ch/de/partner/abfrage

[7] ISO 8601: https://en.wikipedia.org/wiki/ISO_8601

3.3.2. Patient

Name	Type	Usage			Description
		MP	PMC	Rx	
FName	string	O	R	R	First name
LName	string	O	R	R	Last name
BDt	string	O	R	R	Date of birth, Format: yyyy-mm-dd (ISO 8601[8] Date)
Gender	number	O	O	O	Gender of patient Possible values 1: Male 2: Female
Street	string	O	O	O	Street
Zip	string	O	O	O	Zip code
City	string	O	O	O	City
Lng	string	R	-	-	Patient's language (ISO 639-1[9] language code) (e.g. de)
Phone	string	O	O	O	Phone number
Email	string	O	O	O	E-mail address
Rcv	string	-	-	O	Receiver (GLN) of the electronic prescription. To be used if the electronic prescription is to be transmitted electronically to a healthcare professional.
Ids	list of *PatientId*	0-N	0-N	0-N	The list of patient identifiers. Please refer to 3.3.3 *PatientId*
PFields	list of *Private Field*	0-N	0-N	0-N	The list of private fields. Please refer to 3.3.11 *Private Field*
Med	*MedicalData*	O	-	-	Medical data information. Please refer to 3.3.4 *MedicalData*

3.3.3. PatientId

Name	Type	Usage			Description
		MP	PMC	Rx	
Type	number	R	R	R	Type of the ID Possible values 1: Insurance card number
Val	string	R	R	R	The ID value

[8] ISO 8601: https://en.wikipedia.org/wiki/ISO_8601

[9] Language code ISO 639-1, full list: https://en.wikipedia.org/wiki/List_of_ISO_639-1_codes

3.3.4. MedicalData

Applies only to MedicationPlan.

Name	Type	Usage	Description
		MP	
DLstMen	string	O	Only required in case of *Risk Id* 78 in *RiskCategory* 3 First day of last menstruation, Format: yyyy-mm-dd (ISO 8601[10] Date)
Prem	number	O	1 if it is a premature baby, 0 otherwise (only if age <= 18 months)
ToG	string	O	Time of gestation (only if premature baby (Prem) == 1) Format: {week}-{day}
Rc	list of *RiskCategory*	0-N	The risk categories. Please refer to 3.3.6 *RiskCategory*
Meas	list of *Measurement*	0-N	The measurements. Please refer to 3.3.5 *Measurement*
PFields	list of *Private Field*	0-N	The list of private fields. Please refer to 3.3.11 *Private Field*

3.3.5. Measurement

Applies only to MedicationPlan.

Name	Type	Usage	Description
		MP	
Type	number	R	The type of measurement Possible values 1: Weight 2: Height
Val	string	R	The value of the measurement
Unit	number	R	The unit of the measurement Possible values 1: Centimetre (only applicable for type 2: Height) 2: Kilogram (only applicable for type 1: Weight)

[10] ISO 8601: https://en.wikipedia.org/wiki/ISO_8601

3.3.6. RiskCategory

Applies only to MedicationPlan.

Name	Type	Usage	Description
		MP	
Id	number	R	ID of the risk category (*RC Id*) Possible values 1: Renal insufficiency 2: Liver insufficiency 3: Reproduction 4: Competitive athlete 5: Operating vehicles/machines 6: Allergies 7: Diabetes
R	list of number	0-N	The list of risks (*Risk Id*) within the risk category (*RC Id*)

If the risk category is specified without any risk specified in the list of risks (R), the entire risk category is considered to be explicitly excluded. If the risk category does not exist, the risks are considered to be unknown.

The possible risks are listed below. The allergies have not been listed here, you can find them in the CDSCODE schema of the INDEX database by HCI Solutions AG (CCHTYP: 'CHA').

RC Id	Risk Id	German	French
1	597	Niereninsuffizienz, terminale (Clcr <15 ml/min)	Insuffisance rénale, terminale (Clcr <15 ml/min)
1	575	Niereninsuffizienz, schwere (Clcr ≥15–29 ml/min)	Insuffisance rénale, sévère (Clcr ≥15–29 ml/min)
1	576	Niereninsuffizienz, mittelschwere (Clcr ≥30–59 ml/min)	Insuffisance rénale, modérée (Clcr ≥30–59 ml/min)
1	577	Niereninsuffizienz, leichte (Clcr ≥60–89 ml/min)	Insuffisance rénale, légère (Clcr ≥60–89 ml/min)
2	572	Leberinsuffizienz, schwere (Child-Pugh C)	Insuffisance hépatique, sévère (Child-Pugh C)
2	573	Leberinsuffizienz, mittelschwere (Child-Pugh B)	Insuffisance hépatique, modérée (Child-Pugh B)
2	574	Leberinsuffizienz, leichte (Child-Pugh A)	Insuffisance hépatique, légère (Child-Pugh A)
3	78	Schwangerschaft	Grossesse
3	77	Stillzeit	Allaitement
3	612	Frauen im gebärfähigen Alter	Femmes en âge de procréer
4	580	Leistungssportler	Sportifs de compétition

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RC Id	Risk Id	German	French
5	615	Potenziell gefährlichen Situationen ausgesetzt, wie beispielsweise dem Führen von Fahrzeugen, dem Bedienen von Maschinen oder dem Arbeiten in grossen Höhen	Exposés à des situations potentiellement dangereuses, comme la conduite de véhicules, machines ou travaillant en haute altitude
6	The allergies have not been listed here, you can find them in the CDSCODE schema of the INDEX database by HCI Solutions AG (CCHTYP: 'CHA').		
7	779	Diabetes mellitus Typ 1	Diabète de type 1
7	780	Diabetes mellitus Typ 2	Diabète de type 2

3.3.7. Medicament

Name	Type	Usage			Description
		MP	PMC	Rx	
Id	string	R	R	R	The ID defined in the *IdType* below. If *IdType*: 'None' then free text description.
IdType	number	R	R	R	The type of the *Id*. Possible values: 1: None 2: GTIN 3: Pharmacode 4: Product number (not for Rx)
Pos	list of *Posology*	0-N	0-1	0-1	The list of posologies. Please refer to 3.3.8 *Posology*
Unit	string	R	O	O	The quantity unit. Mandatory if *Pos* is defined. (The unit must be based on the standardized substance in the INDEX database.) Possible values: CDTYP 9 in INDEX database/CODE schema
TkgRsn	string	O	O	-	Taking reason (the reason for the medication treatment)
AppInstr	string	O	O	O	Application instructions (further information on how to apply the medication, e.g. take before meals)
AutoMed	number	R	R	-	Automedication (self-medication), 1 if it is automedication, 0 otherwise. Self-medication = The patient self-administers treatment without prescription from physician.
PrscbBy	string	O	-	-	Prescribed by: the GLN or designation of the person who prescribed the medicament (e.g. physician, pharmacist etc.)
Roa	string	O	-	-	Route of administration. Possible values: CDTYP 26 in INDEX database/CODE schema
Rep	number	-	-	O	Integer which defines the number of repetitions in months, e.g. permanent prescription for 6 months
Subs	number	-	-	O	1 if medicament should not be substituted, 0 otherwise. Default: 0
NbPack	number	-	-	O	Number of packages to be delivered. Default: 1
PFields	list of *Private Field*	0-N	0-N	0-N	The list of private fields. Please refer to 3.3.11 *Private Field*

3.3.8. Posology

Name	Type	Usage			Description
		MP	PMC	Rx	
DtFrom	string	R	R	-	From date (start date of medication treatment), Format: yyyy-mm-dd (ISO 8601[8] Date) (e.g. 2016-01-16)
DtTo	string	O	O	O	To date (end date of medication treatment), Format: yyyy-mm-dd (ISO 8601[8] Date). The *DtTo* must be considered as inclusive. For example DtTo: 2015-05-01, the patient must apply the medicament also on 2015-05-01.
CyDu	number	O	-	-	The cycle duration (cycle length) for posology in seconds Default: 86'400 seconds => one day Will be ignored if TT is not specified
InRes	number	O	-	-	1 if in reserve, 0 otherwise. Default: 0
D	list of number	0-4	0-4	0-4	Simplified version of taking times. Describes the doses to be applied in the morning, at noon, in the evening and at night. Will be ignored if TT is specified
TT	list of *Taking Time*	0-N	-	-	The list of complex taking times (to be used when the simplified dosing schedule (morning, noon, evening, night) cannot be applied). Please refer to 3.3.9 *Taking Time*

3.3.9. Taking Time

Applies only to MedicationPlan.

Name	Type	Usage	Description
		MP	
Off	number	R	The offset (in seconds) for the *Taking Time* after cycle start. First cycle starts at DtFrom = dd.MM.yyyy 00:00:00 (midnight)
Du	number	O	Duration of the medication application in seconds (e.g. 0 for a pill, 1'800 for an intravenous medication infusion of 30 minutes) Default: 0
DoFrom	number	O	Dose from (starting dose) Required if InRes = 0
DoTo	number	O	Dose to (ending dose) Default: DoFrom
A	number	O	Amount Required if InRes = 1
MA	number	O	Maximum amount per cycle

3.3.10. Recommendation

Applies only to PolymedicationCheck.

Name	Type	Usage	Description
		PMC	
Id	string	R	The ID or description of the recommendation Possible values: 1: Week dosing system by the pharmacist 2: Intensified compliance support 3: Repeat check in ... months 4: Forwarding to doctor/other specialist 5: Analysis needed (e.g. interactions, side effects, duplications)
PatAgr	number	O	1 if patient agrees, 0 otherwise
Rmk	string	O	Remarks on the PolymedicationCheck

3.3.11. Private Field

Name	Type	Usage			Description
		MP	PMC	Rx	
Nm	string	R	R	R	The name of the field
Val	string	O	O	O	The value of the field
PFields	list of *Private Field*	0-N	0-N	0-N	The list of private fields

3.4. Example of a JSON medication object


```
{
  "Auth": "7601003178999",
  "Dt": "2016-09-12T11:46:09+02:00",
  "Id": "26d3dff7-ab05-4737-a49c-5eccd33595f6",
  "MedType": 1,
  "Medicaments": [
    {
      "Id": "971867",
      "IdType": 3,
      "Pos": [
        {
          "D": [
            0,
            0,
            0,
            0
          ],
          "DtFrom": "2016-09-12"
        }
      ],
      "Roa": "PO",
      "TkgRsn": "Akne",
      "Unit": "STK"
    },
    {
      "Id": "4461382",
      "IdType": 3,
      "Pos": [
        {
          "D": [
            0,
            1,
            0,
            0
          ],
          "DtFrom": "2016-02-10"
        }
      ],
      "Roa": "PO",
      "TkgRsn": "Blutverdünnung",
      "Unit": "STK"
    },
    {
      "Id": "2355687",
      "IdType": 3,
      "Pos": [
        {
          "D": [
            1,
            0,
            1,
            0
          ],
          "DtFrom": "2016-02-10"
        }
      ],
      "Roa": "PO",
      "TkgRsn": "Bluthochdruck/Herz",
      "Unit": "STK"
    },
```

```
    {
      "Id": "1426310",
      "IdType": 3,
      "Pos": [
        {
          "D": [
            0,
            0,
            1,
            0
          ],
          "DtFrom": "2016-02-10"
        }
      ],
      "Roa": "PO",
      "TkgRsn": "Cholesterinsenker",
      "Unit": "STK"
    },
    {
      "Id": "809693",
      "IdType": 3,
      "Pos": [
        {
          "D": [
            1,
            0,
            0,
            0
          ],
          "DtFrom": "2016-02-10"
        }
      ],
      "Roa": "PO",
      "TkgRsn": "Bluthochdruck/Wasser",
      "Unit": "STK"
    },
    {
      "Id": "1551274",
      "IdType": 3,
      "Pos": [
        {
          "D": [
            1,
            0,
            0,
            0
          ],
          "DtFrom": "2016-02-10"
        }
      ],
      "Roa": "PO",
      "TkgRsn": "Bluthochdruck/Wasser",
      "Unit": "STK"
    }
  ],
  "Patient": {
    "BDt": "1981-01-12",
    "City": "Bern",
    "FName": "Maxima",
    "Gender": 2,
    "LName": "Matter",
    "Lng": "DE",
```

```
    "Med": {
      "DLstMen": "",
      "Meas": [
        {
          "Type": 1,
          "Unit": 2,
          "Val": "53"
        },
        {
          "Type": 2,
          "Unit": 1,
          "Val": "158"
        }
      ],
      "Rc": [
        {
          "Id": 1,
          "R": [
            577
          ]
        },
        {
          "Id": 2
        },
        {
          "Id": 3,
          "R": [
            612
          ]
        },
        {
          "Id": 4
        },
        {
          "Id": 5
        },
        {
          "Id": 6,
          "R": [
            555,
            571
          ]
        }
      ]
    },
    "Phone": "+4158 851 2600",
    "Street": "Untermattweg 8",
    "Zip": "3027"
  },
  "Rmk": ""
}
```

3.5. Encapsulation of the JSON medication object

The aim was to have a compact, single string representation of the complete document in UTF-8 to make any object exchange between IT systems as easy as possible. In addition, the chosen solution also allows the inclusion of a 2D barcode on printed documents.

To achieve this, the JSON object is optionally compressed and base64-encoded and then prefixed with a simple header. Therefore, the string representation is divided into two main parts, the “header” and the “content”:

- The header contains general information about the *Medication* object, its version and compression mode.
- The content is the *Medication* object JSON (the *Patient* and a list of *Medicaments* as described in chapter 3.1).

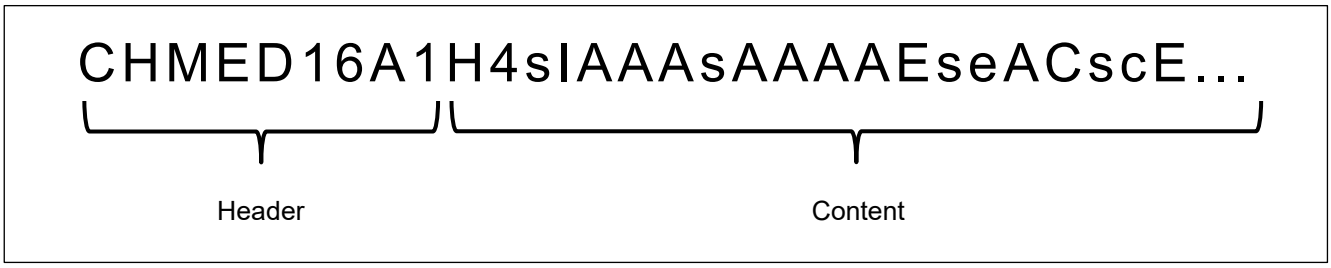


Figure 3 Encapsulated MED Object structure

Example data (Header part marked in blue, Content part in black)

CHMED16A1H4sIAAAAAAAEAMVU3W7TMBR+lcq3S4SPHdtx7raVAaKFqutAAnoREreJ2jpT4gKj6ptxx4txnCw
VSKQSu0GVqvPX7+fIpwdyuXcFSYiSFCjloGKtNQnI2GGRUZAh1SGwBUASyYTqC8oSSnHgVe4HZM7z1UqF6
WcqwkhxjCKdhcJkWc650GIlcXZq8sXDvSEJtHGZpTtjXUOSj4cORyuIpWpRu0EekFnVDYzxmwbtZ+I13dTV7g9t
5lj1eZVicfYWMRab9byxmF1urMH8zpbezO3iNTkGj4RRJIHH7Bwj/J2RhUAHGa+2e/fF1PnPH9bu7XqAnHEhZH
zGrqeGJ5EXVVbk9T7bfHr20tTfBwRAxCQHen7f/y7guqi2pnGmLm1j7MbUA/Qx1VLz8/aftvvf7L9Pm2ZQAQgBT
EX/QwL+dJa6Et8/SQ7kqr0z0DGEFPxbDsh16R48lqktZjdv8FYwnabfyl2KhRfG5giasIBMTj3nWp4JPrmEjJ93J+fx
x5PGTY3X1tbSzuHpGDthCPUu3eKM4O2Kujbr29C3QcSd9ex0udibYyKUWvbLZX3Au54EdupFfSD6QD4CCBE
IBcsjjpJZUVnv6yJCxlEsYMRk+59z62pj/MLuLBreoe2vZj2KsfOhvMcyp0yhAzLfbbzj4y8tzloh3gQAAA==

3.5.1. Header

The header is composed of a fixed string length of 9 characters. The structure is shown in the figure below.

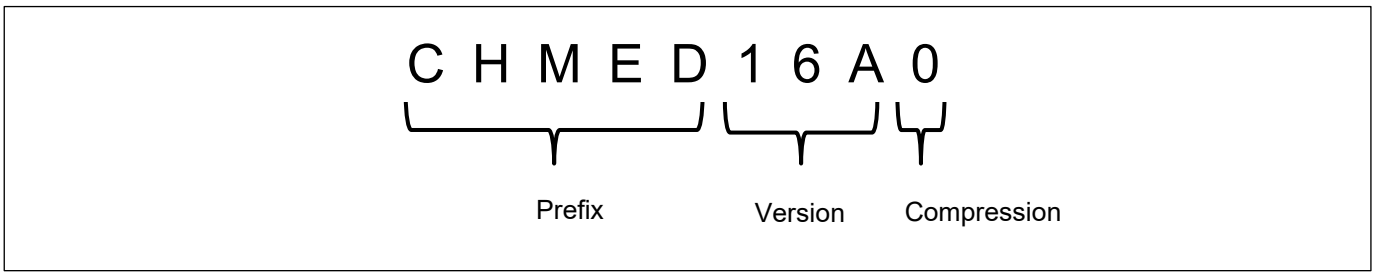


Figure 4 Header structure

1.1.1.1 Prefix (5 characters)

The prefix is related to the *Medication* object; it always reads “CHMED” (CH: Switzerland/MED: Medication).

1.1.1.2 Version (3 characters)

Release year (2 numeric digits) and version sequence (1 alphabetic character).

1.1.1.3 Compression (1 character)

Boolean value to show whether the following content is compressed or not (base64-encoded GZIP of the JSON).

3.5.2. Content

The content is composed of a single medication plan JSON object, serialized as a string.

It may or may not be GZIP compressed. If it is compressed (which we suggest), it must be base64-encoded.

3.5.3. Reading the example data

If you have an object that seems to be or should be in the CHMED format, proceed as follows:

- It should be a text file or string in UTF-8
- Take the first 8 characters of the object
- Verify that it starts with CHMED
- Find out if the data is compressed: bCompressed = (substr(8,1) == 1)
- Find out what the CHMED version is: chmedv = substr(5,3)
- Read the rest of the string/file into a separate string for processing
- If the file is compressed, base64-decode the string, then GZIP-decompress it
- Deserialize the result from JSON to your object class corresponding to the CHMED version

3.6. In software: the shared libraries

The "IG eMediplan" website provides a free DLL that can be used in Windows-based software projects. In addition, the full source code of the library (written in C#) is available on request. This software speeds up the mapping from a customer implementation to the JSON object. Just include it in your software project and then add it as a reference (Ch.Emediplan.ChMed16A).

3.6.1. How to deserialize an existing CHMED string

```
var chmedString = "CHMED16A1....";
var medication = Ch.Emediplan.ChMed16A.Serializer.ReadObject(chmedString);
```

3.6.2. How to serialize your own object to a CHMED string

```
//Create an instance of the object
var medication = new Ch.Emediplan.ChMed16A.DataContracts.Medication();
// Fill the structure
…
//Serialize it
var chmedString = Ch.Emediplan.ChMed16A.Serializer.WriteObject(medication, true);
```

4. The medication plan

The medication plan is one of the major documents in establishing a patient's medical status. Therefore, high interoperability between IT systems is essential. Technically, this can be achieved by the CHMED specifications. However, from the perspective of the users involved, such as doctors, pharmacists and patients, a second level of interoperability must be achieved: the document must always "look and feel" the same, no matter on what IT system the printout was generated.

Therefore, "IG eMediplan" proposes a standardized paper (or PDF) document for medication plans in Switzerland. This chapter shows the requirements in terms of content and layout. In addition, the inclusion of the CHMED object as part of a 2D barcode on the form allows a technical data transfer using a paper-based format. This is a simple but practical solution that allows for user consent and data persistence using only the printed document.

The medication plan has the following elements, arranged on an A4 paper in landscape format:

- A header section using the top 30 % of the page
  - The left-hand 25 % contains the logo of "IG eMediplan" (or the user's software) and the subtitle ("Medikationsplan" or "Plan de médication" depending on the language version)
  - The middle 50 % contains patient identification data: name, address, date of birth, reproductive state, height/weight, insufficiencies, allergies
  - The right-hand 25 % contains a 2D barcode of the complete encapsulated compressed CHMED object
- A body section using the remaining 70 % of the page and the full 100 % of subsequent pages
  - The date of the document generation or printout
  - A table of the complete medication
    - The name of the medication and its main substance/s
    - Optionally: an identa image of the medication/pill
    - The medication plan details according to the CHMED object, as described below

As a third measure to boost interoperability and as the only "business rule", eMediplan reading and printing functionalities must be provided by IT systems at no additional cost.

4.1. Examples of eMediplans

Two examples are presented in this chapter:

Example 1

- An eMediplan with 3 medicaments showing especially:
  - simple dosing schedule (morning, noon, evening, night)
  - “from” and “to” date
  - divisible medicament (1/2 tablet in the morning)
  - remark

Example 2

- The same eMediplan as in Example 1 with additionally:
  - complex dosing
  - reserve medication
  - medication self-administered by the patient

eMediplan

Der Schweizer Medikationsplan

Peter Muster

01.11.1943 (M)
Bergstrasse 14, 9299 Waldlichtung / +41 79 123 45 67

Körpergrösse / Gewicht: 180 cm / 81 kg
Niereninsuffizienz: leicht
Allergie(n): Penicillin-Allergie

erstellt von :

Dr. med. F. Weise
Praxis Weitblick
9288 Berg

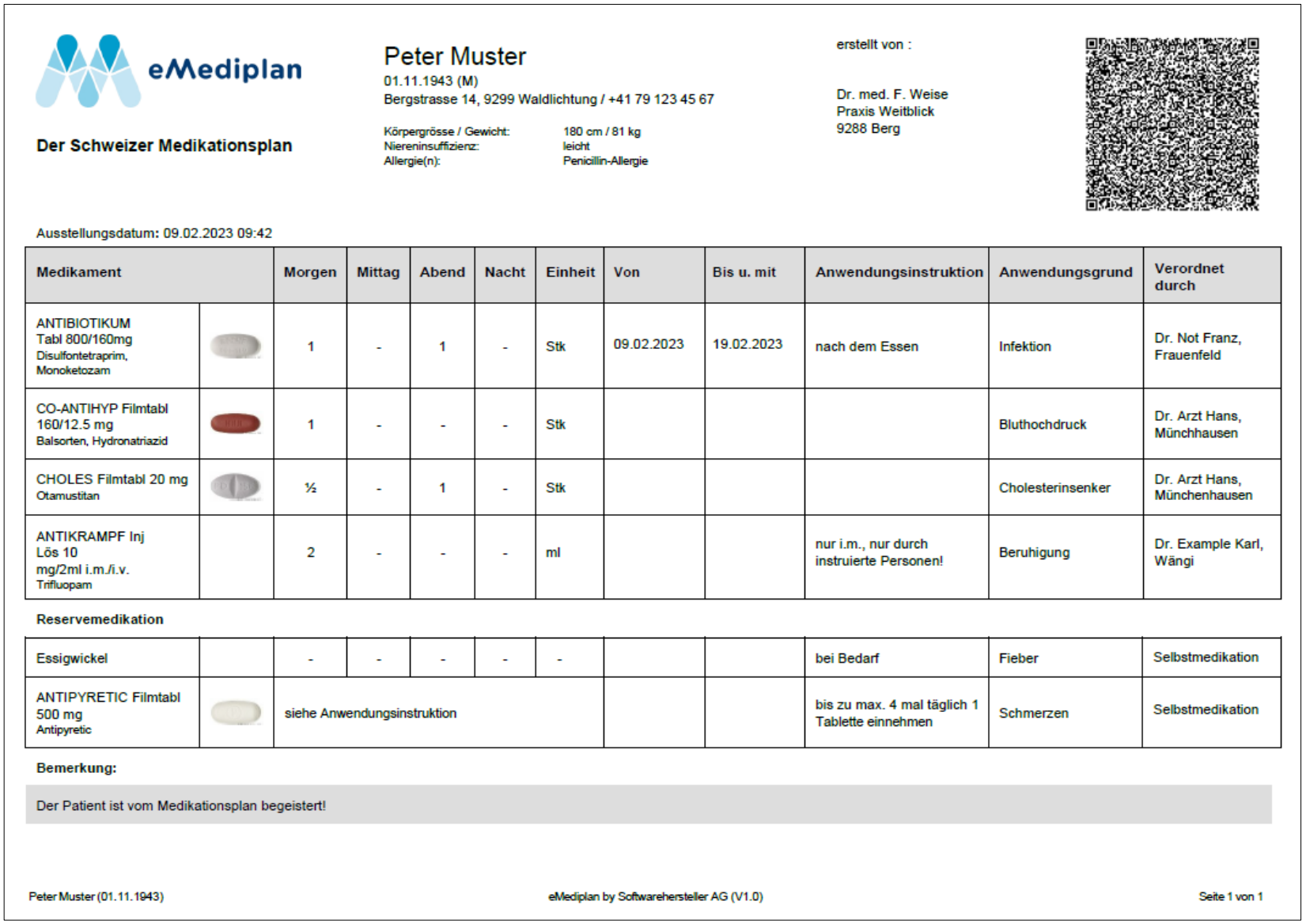
Ausstellungsdatum: 09.02.2023 09:42

Medikament		Morgen	Mittag	Abend	Nacht	Einheit	Von	Bis u. mit	Anwendungsinstruktion	Anwendungsgrund	Verordnet durch
ANTIBIOTIKUM Tabl 800/160mg Disulfontetraprim, Monoketozam		1	-	1	-	Stk	09.02.2023	19.02.2023	nach dem Essen	Infektion	Dr. Not Franz, Frauenfeld
CO-ANTIHYP Filmtabl 160/12.5 mg Balsorten, Hydronatriazid		1	-	-	-	Stk				Bluthochdruck	Dr. Arzt Hans, Münchhausen
CHOLES Filmtabl 20 mg Otamustitan		½	-	1	-	Stk				Cholesterinsenker	Dr. Arzt Hans, Münchenhausen

Bemerkung:

Der Patient ist vom Medikationsplan begeistert!

Figure 5 Example 1



eMediplan

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Körpergrösse / Gewicht: 180 cm / 81 kg
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9288 Berg

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Medikament		Morgen	Mittag	Abend	Nacht	Einheit	Von	Bis u. mit	Anwendungsinstruktion	Anwendungsgrund	Verordnet durch
ANTIBIOTIKUM Tabl 800/160mg Disulfontetraprim, Monoketozam		1	-	1	-	Stk	09.02.2023	19.02.2023	nach dem Essen	Infektion	Dr. Not Franz, Frauenfeld
CO-ANTIHYP Filmtabl 160/12.5 mg Balsorten, Hydronatriazid		1	-	-	-	Stk				Bluthochdruck	Dr. Arzt Hans, Münchhausen
CHOLES Filmtabl 20 mg Otamustitan		½	-	1	-	Stk				Cholesterinsenker	Dr. Arzt Hans, Münchenhausen
ANTIKRAMPF Inj Lös 10 mg/2ml i.m./i.v. Trifluopam		2	-	-	-	ml			nur i.m., nur durch instruierte Personen!	Beruhigung	Dr. Example Karl, Wängi

Reservemedikation

Essigwickel		-	-	-	-	-			bei Bedarf	Fieber	Selbstmedikation
ANTIPYRETIC Filmtabl 500 mg Antipyretic		siehe Anwendungsinstruktion							bis zu max. 4 mal täglich 1 Tablette einnehmen	Schmerzen	Selbstmedikation

Bemerkung:

Der Patient ist vom Medikationsplan begeistert!

Peter Muster (01.11.1943) eMediplan by Softwarehersteller AG (V1.0) Seite 1 von 1

Figure 6 Example 2

4.2. Overview

To be more precise, a printout of an eMediplan has the following layout blocks:

Header (full width section at the top of the document, minimum height of 4 cm, no border lines)

- Identification (far left)
- Patient (middle)
- Service provider (right)
- 2D barcode (far right)

Medication (full width section)

Comment (optional, full width section below the medication block)

Footer (full width section at the end of the document)

<table>
<tr><td>Identification</td><td>Patient</td><td>Service Provider</td><td>QR/2D-Barcode</td></tr>
<tr><td colspan="4">Medication</td></tr>
<tr><td colspan="4">Comment</td></tr>
<tr><td colspan="4">Footer</td></tr>
</table>

4.2.1. Printing rules

Single-sided printing only, margin of 0.8 cm on all sides.

4.3. Header/Identification

The identification block is located at the top left of the eMediplan and has a width of approximately 7 cm. The height depends on the patient block and the service provider block. It consists of the “eMediplan” logo and the identification name “The Swiss medication plan” (text according to the patient’s language).

4.3.1. Logo

The logo can be found on the “IG eMediplan” website under *Downloads (⭳)* in the chapter “Spezifikationen”: https://emediplan.ch/downloads/.

Name	Description	Characteristics
Logo	eMediplan	300dpi / jpg / 1.63 cm x 5.95 cm

4.3.2. Identification

Name	Description	Characteristics
Der Schweizer Medikationsplan	Label of the document	Arial 11 pt bold

4.4. Header/Patient

The patient block contains the patient information, which is divided into personal data and medical and risk parameters.

The block is located to the right of the identification block and has a width of approximately 10 cm. The height of this block depends on the length of the information contained in the personal data and the medical and risk parameters. If the content exceeds the provided width, then a word wrap is allowed, which in turn provokes shifting the medication table.

4.4.1. Personal data

The personal data consists of the patient's first name and last name. Below the first name and last name, the patient's birth date and gender are shown, with the gender abbreviated and in parentheses. Below the birth date and gender, the address is shown. The individual parts of the address (street, postal code, place) are separated from each other by blank spaces and commas. If there is a phone number, the address is followed by the symbol "/" and then the phone number. First name and last name, birth date and gender are considered as mandatory fields.

Name	Description	Characteristics	CHMED16	Field
First name	Patient's first name	Arial 16 pt bold	3.3.2 Patient	FName
Last name	Patient's last name	Arial 16 pt bold	3.3.2 Patient	LName
Birth date	Patient's date of birth	Format: DD.MM.YYYY **Printed as:** Born on:	3.3.2 Patient	BDt
Gender	Patient's gender **Possibilities:** • M = male • F = female	The gender is shown in parentheses () after the birth date.	3.3.2 Patient	Gender
Street	Street name and house number of the patient's address	Arial 8 pt	3.3.2 Patient	Street
Postal code	Postal code of the place of the patient's address	Arial 8 pt	3.3.2 Patient	Zip
Place	Name of the place of the patient's address	Arial 8 pt	3.3.2 Patient	City
Phone	Patient's phone number	Arial 8 pt Format: +41 58 123 45 67	3.3.2 Patient	Phone

4.4.2. Medical and risk parameters

The individual medical and risk parameters allocated to the patient may contain the following parameters: time of gestation, reproduction, height, weight, renal insufficiency, liver insufficiency, diabetes, competitive athlete, operating vehicles/machines and allergies. To enhance the optical distinction between medical and risk parameters and personal data a separation of the two by blank space is recommended. Arial 8.5 pt is recommended as the font and font size.

The medical and risk parameters have to be shown one below the other in the following way:

Name	Description	Characteristics	CHMED16	Field
Premature infant	Information as to whether the baby is premature	**Printed as:** Premature infant:	3.3.4 MedicalData	Prem
Gestation (week / day)	Week and day of childbirth	**Printed as:** Gestation (week / day):	3.3.4 MedicalData	ToG
Reproduction	Information as to whether the patient is currently pregnant or nursing. In case of pregnancy, the date of the last period is shown. **Possibilities:** • Childbearing age • Lactation • Pregnant (first day of last menstruation)	**Printed as:** Reproduction:	3.3.6 RiskCategory	Id
Height	Patient's height in cm	**Printed as:** Height / Weight:	3.3.5 Measurement	Unit
Weight	Patient's weight in kg	**Printed as:** Height / Weight:	3.3.5 Measurement	Unit
Renal insufficiency	Information as to whether the patient suffers from renal insufficiency and if so, at what stage. **Possibilities:** • light (Clcr 60 – 90 ml/min) • moderate (Clcr 30 – 60 ml/min) • severe (Clcr 15 – 30 ml/min) • terminal (Clcr <15 ml/min)	**Printed as:** Renal insufficiency:	3.3.6 RiskCategory	Id
Liver insufficiency	Information as to whether the patient suffers from liver insufficiency and if so, at what stage. **Possibilities:** • mild Child-Pugh A • moderate Child-Pugh B • severe Child-Pugh C	**Printed as:** Liver insufficiency:	3.3.6 RiskCategory	Id

The table continues on the next page.

The table starts on the previous page.

Name	Description	Characteristics	CHMED16	Field
Diabetes	Information as to whether the patient suffers from diabetes and if so, what type of diabetes. **Possibilities:** • Diabetes mellitus type 1 • Diabetes mellitus type 2	**Printed as:** Diabetes:	3.3.6 RiskCategory	Id
Competitive athlete	Information as to whether the patient is a competitive athlete.	**Printed as:** Competitive athlete:	3.3.6 RiskCategory	Id
Operating vehicles/machines	Information as to whether the patient operates vehicles and machines.	**Printed as:** Operating vehicles/machines:	3.3.6 RiskCategory	Id
Allergy	Information as to whether the patient suffers from allergies and if so, which ones.	**Printed as:** Allergy(ies):	3.3.6 RiskCategory	Id

4.5. Header/Service Provider

The service provider block is located next to the patient block (to the right) and has a minimum height of 4 cm and a width of approximately 6.5 cm. The height depends on the patient block. This block represents the author of the eMediplan. It is possible to display the author's company logo.

4.5.1. Logo service provider or organisation

Name	Description	Characteristics	CHMED16A	Field
Logo	Logo of the service provider or the organisation	300dpi.jpg Height 0.26 cm Width 2.36 cm **Printed as:** Created by:		

4.5.2. Service provider

There are no instructions concerning depiction or content.

Name	Description	Characteristics	CHMED16A	Field
Printed by	Details of either the eMediplan creator or the person/organisation that last edited the eMediplan.	Arial 8.5 pt		

4.6. Header/2D barcode

The 2D barcode is located next to the service provider block (to the right) and has a minimum height of 4 cm and a width of approximately 4.5 cm. The height depends on the patient block, nevertheless the 2D barcode must be displayed as a rectangle of 4 x 4 cm. In addition, a blank space of about 0.3 cm should be maintained all around the 2D barcode.

4.7. Medication

The medication block is located below the header (identification block, patient block, service provider block and 2D barcode). Between these areas the medication block should maintain a distance of about 0.5 cm. Arial 8.5 pt is recommended as the font and font size.

The medication block is vertically arranged in columns or horizontally in medication rows and has a width of about 28 cm. The height depends on the number of medication rows. Approximately 15 medicaments can be listed on a single page, depending on their column height. If a second page is required, the column title should also be shown on the following page. It is allowed to provide column surfaces with a light grey background colour. Additionally the medication block must be framed.

The height and width of the columns are defined by the content. In the following table the sequence and the column titles are defined:

Name	Description	Characteristics	CHMED16A	Field
Medication	Drug description including picture Alternatively, a medicament can be displayed as free text, but without a picture.	The order of the medicaments is not predetermined and is left to the discretion of the eMediplan creator.	3.3.7 Medicament	IdType
Morning (08:00) **Noon (12:00)** **Evening (18:00)** **Night (22:00)**	Dosing schedule, the time of ingestion/application	**Numbers for divisibility:** ½, 1/3, ¼, 2/3, ¾, 1/8 **Special dosage (alternative to the "morning-noon-evening-night dosing schedule) printed as:** See instructions	3.3.7 Medicament	Pos
Quantity	Suitable unit for dosing		3.3.7 Medicament	Unit
From	Start date of the medication treatment	Date, format: dd.mm.yyyy	3.3.8 Posology	DtFrom
Up to and including	End date of the medication treatment (including last day of ingestion/application)	Date, format: dd.mm.yyyy	3.3.8 Posology	DtTo
Instructions	Application instruction for the patient, e.g. after the meal		3.3.7 Medicament	AppInstr
Reason	Brief description of the reason for the medication treatment in patient-friendly language, e.g. fever		3.3.7 Medicament	TkgRsn

The table continues on the next page.

The table starts on the previous page.

Name	Description	Characteristics	CHMED16A	Field
Prescribed by	Information about the person prescribing the medicament (e.g. physician, pharmacist). Alternatively, it can be indicated here if the patient is self-administering the medication (self-medication).	**Self-medication printed as:** Self-medication	3.3.7 Medicament	PrscbBy/ AutoMed
Reserve medication	Medication taken/applied in reserve The reserve medication must be shown in a separate medication block.		3.3.8 Posology	InRes

4.7.1. Issue date

Below the identification block and above the medication block, the date and time of the creation or modification of the eMediplan are shown in the formats DD.MM.YYYY and hh:mm.

Name	Description	Characteristics	CHMED16A	Field
Issue date	Date and time of creation or modification of the eMediplan	Arial 8.5 pt **Printed as:** Issue date:	3.3.1 Medication (Med)	Dt

4.8. Comment (optional)

The comment block is only shown below the medication block if content is available. This block has a width of about 28 cm, the height varies depending on the content. This block is meant for advice that the service provider would like to share with the patient independently of the medication.

Name	Description	Characteristics	CHMED16A	Field
Remark	Remark box	Arial 8.5 pt	3.3.1 Medication (Med)	Rmk

4.9. Footer

The footer is composed of the following parts: on the left-hand side the patient's first name, last name and birth date, in the middle the software provider with the annotation "by" followed by the version in parentheses and on the right-hand side the number of pages (current page number and total page number, e.g. page 1 of 3).

Name	Description	Characteristics	CHMED16A	Field
-	Footer	Arial 8.5 pt Page 1 of n		

4.10. Translations

The fields are translated into the following languages:

- German
- French
- Italian
- Rumantsch grischun
- English
- Turkish
- Albanian
- Spanish
- Portuguese
- Serbian

The translations can be found on the “IG eMediplan” website under *Downloads (⭳)* in the chapter “Spezifikationen”: https://emediplan.ch/downloads/