VIS - VEPRO Information System

Version 10
HL7 Conformance Statement

Version 1.3, July 2022

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1 Introduction

1.1 Overview

The application described in this conformance statement, the VEPRO Information System (VepRIS), is a Radiological Information System (RIS). It provides order- and workflow-management and also provides the modality worklist for DICOM resources. In an IHE environment, it acts as an Order Filler actor (OF).

VepRIS allows the transfer of messages according to the HL7 standard, version 2.3 or 2.5. Supported message types are listed below:

Functional area	Functional area plus event code	Event description	HL7 version
ADT	ADT^A01	Admit/visit notification	2.3 or 2.5
	ADT^A02	Transfer a patient	2.3 or 2.5
	ADT^A03	Discharge/end visit	2.3 or 2.5
	ADT^A04	Register a patient	2.3 or 2.5
	ADT^A05	Pre-admit a patient	2.3 or 2.5
	ADT^A06	Change an outpatient to an inpatient	2.3 or 2.5
	ADT^A07	Change an inpatient to an outpatient	2.3 or 2.5
	ADT^A08	Update patient information	2.3 or 2.5
	ADT^A11	Cancel admit/visit notification	2.3 or 2.5
	ADT^A13	Cancel discharge/end visit	2.3 or 2.5
	ADT^A28	Add person information	2.3 or 2.5
	ADT^A31	Update person information	2.3 or 2.5
	ADT^A34	Merge patient information - patient I	2.3 or 2.5
	ADT^A39	Merge person - patient ID	2.3 or 2.5
	ADT^A40	Merge patient - patient identifier list	2.3 or 2.5
	ADT^A50	Change visit number	2.3 or 2.5
ORM	ORM^O01	Transmit order information	2.3
	ORR^O02	General order response message	2.3
OMG	OMG^O19	General clinical order message	2.5
	ORG^O20	Order acknowledge message	2.5
	OMI^O23	Procedure ordered/scheduled	2.5
ORU	ORU^R01	Transmit observations/results	2.3 or 2.5
MDM	MDM^T02	Original document notification and content	2.5
	MDM^T10	Document replacement notification and content	2.5
BAR	BAR^P01	Billing account record	2.3 or 2.5
DFT	DFT^P03	Detail financial transaction	2.3 or 2.5

Table 1: Supported HL7 message types

1.2 Audience

This document is written for healthcare and IT professionals who need to understand how the VEPRO Information System (VepRIS) can be integrated into their healthcare infrastructure. Basic knowledge concerning HL7 communication is recommended.

1.3 Abbreviations

The following table contains a list of abbreviations and terms used in this document:

Abbreviations	Description
ADT	Admission, Discharge, and Transfer message
DFT	Detail Financial Transaction message
DT	Field data type
EVN	Event Type segment
HL7	Health Level 7
LEN	Maximum length of a field
MSH	Message Header segment
OBR	Observation Request segment
OBX	Observation/Result segment
OPT	Usage (noted as OPT) - R = required; O = optional; C = conditional
ORC	Common Order segment
ORM	Order Request Message
ORU	Observation Results - Unsolicited message
PID	Patient ID segment
PV1	Patient Visit segment
RIS	Radiology Information System
SEQ	Position (sequence) of a field within a segment

Table 2: Abbreviations

1.4 Related documents

For detailed information regarding the HL7 standard, see www.hl7.org. For information regarding the overall communication scenario and workflow, please consult www.IHE.org and look for the SWF.b profile.

2 Patient Registration

When a patient enters a hospital or clinic, the patient's personal data is typically entered into a Hospital Information System (HIS) or Practice Management Software (PMS). It is commonly called the "leading system". When examinations are to be ordered, this is also done from within the leading system. The HIS / PMS provides VepRIS and all other radiological IT systems (PACS, other RIS) with this data via a set of HL7 messages, which are then processed by VepRIS. In IHE terms, the HIS / PMS then acts as the Order Placer (OP), while VepRIS acts as the Order Filler (OF).

Alternatively, VepRIS can be also used as the leading system. No HIS or PMS is then required, patient records and orders can be created in VepRIS directly. In this scenario, very few (if any) HL7 messages have to be sent by VepRIS to the other systems. In IHE terms, VepRIS then acts as both Order Placer (OP) and Order Filler (OF).

2.1 Admit / Discharge / Transfer Patient

2.1.1 ADT message

ADT messages are used for admitting, discharging and transferring patients. Following list shows the ADT message types supported by VepRIS (essential message types are printed in **bold**):

Functional area	Functional area plus event code	Event description	HL7 version
ADT	**ADT^A01**	**Admit/visit notification** *(Patient begins stationary visit in hospital)*	2.3 + 2.5
	ADT^A02	Transfer a patient	2.3 + 2.5
	ADT^A03	Discharge/end visit	2.3 + 2.5
	ADT^A04	**Register a patient** *(Patient is registered for ambulatory treatment)*	2.3 + 2.5
	ADT^A05	Pre-admit a patient	2.3 + 2.5
	ADT^A06	Change an outpatient to an inpatient	2.3 + 2.5
	ADT^A07	Change an inpatient to an outpatient	2.3 + 2.5
	ADT^A08	**Update patient information** *(Patient information was changed)*	2.3 + 2.5
	ADT^A11	Cancel admit/visit notification	2.3 + 2.5
	ADT^A13	Cancel discharge/end visit	2.3 + 2.5
	ADT^A28	Add person information	2.3 + 2.5
	ADT^A31	Update person information	2.3 + 2.5
	ADT^A34	**Merge patient information - patient ID** *(Merge two patient records into one)*	2.3 + 2.5
	ADT^A39	Merge person - patient ID	2.3 + 2.5
	ADT^A40	**Merge patient -patient identifier list**	2.3 + 2.5
	ADT^A50	Change visit number	2.3 + 2.5

Table 3: Supported ADT message types

2.1.1.1 ADT message segments

Supported segments for all inbound ADT messages are listed in the table below. Segments in brackets [ ] are optional, curly braces { } indicate repeatable segments. Segments not listed here are ignored.

ADT Message (HL7 2.3.1, HL7 2.5.1)		
Segment	**Description**	**Comment**
MSH	**Message Header**	
[EVN]	Event Type	
PID	**Patient Identification**	Patient data
PV1	**Patient Visit**	Visit data
[IN1]	Insurance	
[{ROL}]	Involved Physicians*	*HL7 2.5 only
[{OBX}]	Observation/Result	
[{AL1}]	Allergy Information	

Table 4: ADT message segments

2.1.1.1.1 MSH segment

The MSH segment, which is obligatory for all HL7 message types, contains unique message identifiers as well as information about the sender and the receiver of the message:

SEQ	LEN	DT	Usage	Element name
1	1	ST	R	Field Separator
2	4	ST	R	Encoding Characters
3	**180**	**HD**	**O**	**Sending Application**
4	180	HD	O	Sending Facility
5	**180**	**HD**	**O**	**Receiving Application**
6	180	HD	O	Receiving Facility
7	26	TS	O	Date/Time of Message
8	40	ST	O	Security
9	**13**	**CM**	**R**	**Message Type**
10	**20**	**ST**	**R**	**Message Control ID**
11	3	PT	R	Processing ID
12	60	VID	R	Version ID
13	15	NM	O	Sequence Number
14	180	ST	O	Continuation Pointer
15	2	ID	O	Accept Acknowledgement Type
16	2	ID	O	Application Acknowledgement Type
17	3	ID	O	Country Code
18	16	ID	O	Character Set
19	250	CE	O	Principal Language of Message
20	20	ID	O	Alternate Character Set Handling Scheme

Table 5: MSH Segment

The MSH segment must always be the first segment in a message. Relevant information for VepRIS is **Sending Application (MSH-3)** and **Message Type (MSH-9)** as well as a unique **Message Control ID (MSH-10).**

2.1.1.1.2 EVN segment

The EVN segment contains the date and time of the event. For incoming ADT messages into VepRIS, this segment is optional, having virtually no relevance.

SEQ	LEN	DT	Usage	Element name
1	3	ID	O	Event Type Code
2	26	TS	R	Recorded Date/Time
3	26	TS	O	Date/Time Planned Event
4	3	IS	O	Event Reason Code
5	60	XCN	O	Operator ID
6	26	TS	O	Event Occurred

Table 6: EVN Segment

2.1.1.1.3 PID segment

The PID segment contains all relevant patient information:

SEQ	LEN	DT	Usage	Element name
1	4	SI	O	Set ID
2	**20**	**CX**	**O**	**Patient ID**
3	**20**	**CX**	**R**	**Patient Identifier List**
4	20	CX	O	Alternate Patient ID
5	**48**	**XPN**	**R**	**Patient Name**
6	48	XPN	O	Mother's Maiden Name
7	**26**	**TS**	**O**	**Date/Time of Birth**
8	**1**	**IS**	**O**	**Sex**
9	48	XPN	O	Patient Alias
10	80	CE	O	Race
11	106	XAD	O	Patient Address
12	4	IS	O	Country Code
13	40	XTN	O	Phone Number - Home
14	40	XTN	O	Phone Number - Business
15	60	CE	O	Primary Language
16	1	IS	O	Marital Status
17	80	CE	O	Religion
18	**20**	**CX**	**O**	**Patient Account Number**
19	**16**	**ST**	**O**	**Social Security Number (SSN)**
20	25	DLN	O	Driver's License Number
21	20	CX	O	Mother's Identifier
22	80	CE	O	Ethnic Group
23	60	ST	O	Birth Place
24	1	ID	O	Multiple Birth Indicator
25	2	NM	O	Birth Order
26	80	CE	O	Citizenship
27	60	CE	O	Veterans Military Status
28	80	CE	O	Nationality
29	26	TS	O	Patient Death Date and Time
30	1	ID	O	Patient Death Indicator

Table 7: PID Segment

The **Patient Indentifier (PID)** should be provided in PID-3 (it might also be provided in PID-2). It consists of the actual PID and an optional domain identifier (issuer of that ID) and may look like this:

12345^^^Issuer_of_ID

or simply

12345

For the **Patient's Name (PID-5)**, the XPN data type is used. Therefore, PID-5 may look like this:

Lastname^Firstname^SecondGivenName^Suffix^Prefix

or simply

Lastname^Firstname

DateOfBirth (PID-7) is optional according to HL7 standard but should be provided to VepRIS, if the VepRIS GUI is used. The Date of birth shall be provided in ISO format.

For VepRIS, Dates in ISO format have to consist either of a date/time (YYYYMMDDHHMMSS, 14 digits) or a date only (YYYYMMDD, 8 digits). For PID-7, the shorter variant is sufficient. For example, the date April 15th, 1970 could be provided as

19700415

or

19700415000000

Patient's Sex (PID-8) is also optional according to HL7 standard but should be provided to VepRIS, if the VepRIS GUI is used. The code for the Patient's Sex shall be one of the following:

code	sex
M	Male
F	Female
U	Unknown

Table 8: Patient Sex values (PID-8)

The **Patient's Address (PID-11)** is of XAD data type and looks like this:

Street No.^^City^^ZIP^Country

Of **Patient Account Number (PID-18)** and **Patient's Social Security Number (PID-19)**, it is recommended (but not mandatory) to provide at least one value.

2.1.1.1.4 PV1 segment

The PV1 segment contains information concerning the patient's current visit to the clinic:

SEQ	LEN	DT	Usage	Element name
1	4	SI	O	Set ID
2	**1**	**IS**	**R**	**Patient Class** *(Inpatient, Outpatient)*
3	80	PL	O	Assigned Patient Location
4	2	IS	O	Admission Type
5	20	CX	O	Preadmit Number
6	80	PL	O	Prior Patient Location
7	60	XCN	O*	Attending Doctor (HL7 2.3)
8	**60**	**XCN**	**O***	**Referring Doctor** (HL7 2.3)
9	60	XCN	O*	Consulting Doctor (HL7 2.3)
10	3	IS	O	Hospital Service
11	80	PL	O	Temporary Location
12	2	IS	O	Preadmit Test Indicator
13	2	IS	O	Readmission Indicator
14	3	IS	O	Admit Source
15	**3**	**IS**	**O**	**Ambulatory Status** ***(pregnancy)***
16	2	IS	O	VIP Indicator
17	2	XCN	O*	Admitting Doctor (HL7 2.3)
18	60	IS	O	Patient Type
19	**2**	**CX**	**C**	**Visit Number**
20	20	FC	O	Financial Class
21	50	IS	O	Charge Price Indicator
22	2	IS	O	Courtesy Code
23	2	IS	O	Credit Rating
24	2	IS	O	Contract Code
25	2	DT	O	Contract Effective Date
26	8	NM	O	Contract Amount
27	12	NM	O	Contract Period
28	3	IS	O	Interest Code
29	2	IS	O	Transfer to Bad Debt Code
30	1	DT	O	Transfer to Bad Debt Date
31	8	IS	O	Bad Debt Agency Code
32	10	NM	O	Bad Debt Transfer Amount
33	12	NM	O	Bad Debt Recovery Amount
34	12	IS	O	Delete Account Indicator
35	1	DT	O	Delete Account Date
36	8	IS	O	Discharge Disposition
37	3	CM	O	Discharged to Location
38	25	CE	O	Diet Type
39	80	IS	O	Servicing Facility
40	2	IS	O	Bed Status

SEQ	LEN	DT	Usage	Element name
41	1	IS	O	Account Status
42	2	PL	O	Pending Location
43	80	PL	O	Prior Temporary Location
44	**80**	**TS**	**O**	**Admit Date/Time**
45	**26**	**TS**	**O**	**Discharge Date/Time**
46	26	NM	O	Current Patient Balance
47	12	NM	O	Total Charges
48	12	NM	O	Total Adjustments
49	12	NM	O	Total Payments
50	20	CX	O	Alternate Visit ID
51	1	IS	O	Visit Indicator
52	60	XCN	O	Other Healthcare Provider
*Note: Providing the physicians's records in PV1-7, PV1-8, PV1-9 and PV1-17 is recommended in HL7 2.3, while in HL7 2.5 these values are ignored. Instead, the involved physicians are encoded in the ROL segment (described forther below).				

Table 9: PV1 Segment

Of the possible values for **Patient Class (PV1-2)** (see HL7 table 0004), only the following are recognized by VepRIS. Other values are ignored.

Code	Meaning
I	Inpatient (stationary)
O	Outpatient (ambulatory)

Table 10: Code values for Patient Class (PV1-2)

Ambulatory Status (PV1-15) may contain a combination of codes (see HL7 table 0009), of which only code B6 (pregnant) is currently used by VepRIS.

Referring Doctor (PV1-8) specifies the physician initiating the visit to the clinic. It is not necessarily the same physician that orders examinations for that patient. Therefore, for VepRIS, providing the referring doctor is recommended. Other visit-related physicians (consulting physician, attending physician, ...) are currently ignored by VepRIS.

The provided physician data shall look like this:

ID^Lastname^Firstname^Middlename^Suffix^Prefix^Degree

or at least

ID^Lastname^Firstname

*(Note: The fields for the **Attending Doctor (PV1-7), Referring Doctor (PV1-8), ...** are used in HL7 2.3 only. In HL7 2.5, visit-related physicians information is provided in the ROL segment)*

Providing the **Visit number** in **PV1-19** is essential for VepRIS, although this field is described as conditional / optional in other literature. We assume that **Visit Indicator (PV1-51)** is valued "V", thus the visit number in PV1-19 becomes **mandatory**.

Admit-Date/Time, Discharge-Date/Time (PV1-44, PV1-45): The Admit-timestamp (ISO format) provides the start date & time of the patient's visit. The discharge timestamp should be left empty for most message types, only in messages of type ADT^A03 (Discharge/End visit) it would be set.

For VepRIS, Dates in ISO format have to consist either of a date/time (YYYYMMDDHHMMSS, 14 digits) or a date only (YYYYMMDD, 8 digits). For PV1-44 and PV1-45, the longer variant is recommended. For example, October 2nd 2020, 02:15 PM could be provided as

20201002141500

Notes:

(1) Hours have to be provided in 24 hours format, e.g. 02:15 PM becomes 14:15
(2) If seconds are unknown, the missing part should be filled with "00".

2.1.1.1.5 IN1 segment

The optional IN1 segment contains data concerning the patient's healthcare insurance. This data is purely informational and has no relevance for the VepRIS workflow.

SEQ	LEN	DT	Usage	Element name
1	4	SI	R	Set ID
2	250	CE	R	Insurance Plan ID
3	**250**	**CX**	**R**	**Insurance Company ID**
4	**250**	**XON**	**O**	**Insurance Company Name**
5	250	XAD	O	Insurance Company Address
6	250	XPN	O	Insurance Company Contact Person
7	250	XTN	O	Insurance Company Phone Number
…	...	…	…	...
49	**250**	**CX**	**O**	**Insured's ID Number**

Table 11: IN1 Segment

2.1.1.1.6 ROL segment (HL7 2.5 only)

In HL7 2.5.1, instead of providing the various visit-related physicians in the PV1 segment, a ROL segment is used for each physician:

SEQ	LEN	DT	Usage	Element name
1	60	EI	R	Role Instance ID
2	2	ID	R	Action Code
3	**250**	**CE**	**R**	**Role *(see table below)***
4	**250**	**XCN**	**R**	**Role Person**
5	26	TS	O	Role Begin Date/Time
6	26	TS	O	Role End Date/Time
7	250	CE	O	Role Duration
8	250	CE	O	Role Action Reason
9	250	CE	O	Provider Type
10	250	CE	O	Organization Unit Type
11	250	XAD	O	Office/Home Address/Birthplace
12	250	XAD	O	Phone

Table 12: ROL segment

The ROL segment is repeatable. Role Instance (ROL-1) is a counter starting with 1. Action Code (ROL-2) is ignored, all provided physicians are added / updated / linked to the visit.

The **Role identifier (ROL-3)** specifies the role of the physician:

Key	Role
AD	Admitting Physician
AT	Attending Physician
CP	Consulting Physician
FHCP	Family Health Care Professional
PP	Primary Care Provider
RP	Referring Physician
RT	Referred to Physician

Table 13: Role identifier values (ROL-3)

Of these physician roles, all are optional for VepRIS. It is therefore not essential to provide a ROL segment at all. Only the referring physician (type RP) is currently displayed in the GUI.

2.1.1.1.7 OBX segment

In the OBX segment, different observation values may be provided. In VepRIS, this information may be displayed in the GUI as additional information:

SEQ	LEN	DT	Usage	Element name
1	**4**	**SI**	**O**	**Set ID - OBX**
2	3	ID	C	Value Type
3	**80**	**CE**	**R**	**Observation Identifier**
4	20	ST	C	Observation Sub-ID
5	**65536***	*****	**C**	**Observation Value**
6	60	CE	O	Units
7	60	ST	O	References Range
8	5	ID	O	Abnormal Flags
9	5	NM	O	Probability
10	2	ID	O	Nature of Abnormal Test
11	1	ID	R	Observed Result Status
12	26	TS	O	Date Last Obs Normal Value
13	20	ST	O	User Defined Access Checks
14	26	TS	O	Date/Time of the Observation
15	60	CE	O	Producer's ID
16	80	XCN	O	Responsible Observer
17	60	CE	O	Observation Method
*The length of the observation value field is variable, depending on the value type selected.				

Table 14: OBX Segment

The OBX segment is repeatable. Starting with Set ID 1, each OBX segment contains an **Observation Value (OBX-5)** and an **Observation Identifier (OBX-3)**, uniquely identifying the value provided in OBX-5. If the identifier is defined in a well-known coding table, the proper code for that table should be provided in the identifier.

For example, if the LOINC coding table is used, OBX-3 could look like this:

8302-2^BODY HEIGHT^LN

This value in OBX-3 specifies that the value transferred in OBX-5 shall be interpreted as the patient's height.

2.1.1.1.8 AL1 segment

The AL1 segment can be used to provide a list of allergies:

SEQ	LEN	DT	Usage	Element name
1	**4**	**SI**	**R**	**Set ID - AL1**
2	2	IS	O	Allergy Type
3	**60**	**CE**	**R**	**Allergy Code/Mnemonic/Description**
4	2	IS	O	Allergy Severity
5	15	ST	O	Allergy Reaction
6	8	DT	O	Identification Date

Table 15: AL1 Segment

The AL1 segment is repeatable, starting with Set ID = 1. Each AL1 segment provides a value for a specified allergy. If the identifier is defined in a well-known coding table, the proper code for that table should be provided in the identifier. For example, if the ICD-10 coding table is used, AL1-3 could look like this:

J30.1^Allergic rhinitis due to pollen^I10

The information provided in AL1-3 is stored in the VIS database as Allergy Code 1, Allergy Code 2, and so on. It can be displayed in the VepRIS GUI but is not essential for processing the workflow.

2.1.1.2 Example ADT messages

2.1.1.2.1 Example ADT messages (HL7 2.3)

ADT^A01: Admit/visit notification (stationary visit)

```
MSH|^~\&|SendingApplication||VIS||202008141109||ADT^A01|MSG3026399|P|2.3|||||D|||
PID||341957|341957||Lastname^Firstname^^^^||19500326|F|||Street 32^^City^^12345^D||555-
56789|555-67890|||||01234567890|||
PV1||I||||||ABC123^Lastname^Firstname^^^Dr|||||||B6|VIP|||VisitNbr|||||||||||||||||||||||||
20200814110821|
IN1|||Company ID|Company Name|||||||||||||||||||||||||||||||||||||||||||||||||1234567890|
```

With this message, a Patient called Firstname Lastname is created. The female patient is pregnant. A stationary visit with referring physician Dr. Firstname Lastname is created.

ADT^A04: Register a patient (ambulatory visit)

```
MSH|^~\&|SendingApplication||VIS||202008141109||ADT^A04|MSG3026399|P|2.3|||||D|||
PID||341958|341958||Patient2^Firstname^^^^||19500401|M|||Street 40^^City^^12345^D||555-
56689|555-67790|||||00034567890|||
PV1||O||||||ABC123^Lastname^Firstname^^^Dr|||||||A0|VIP|||VisitNbr2|||||||||||||||||||||||
|20200814110821|
IN1|||Company ID|Company Name|||||||||||||||||||||||||||||||||||||||||||||||||1234567890|
```

With this message, a Patient called Firstname Patient2 is created. An ambulatory visit with referring physician Dr. Firstname Lastname is created.

ADT^A08: Update patient information

```
MSH|^~\&|SendingApplication||VIS||202008141109||ADT^A08|MSG3026399|P|2.3|||||D|||
PID||341957|341957||Patient1^Firstname^^^^||19500326|F|||Street 01^^City^^12345^D||555-
56789|555-67890|||||01234567890|||
PV1||I||||||ABC2345^Physician2^Firstname^^^Dr|||||||A0|VIP|||VisitNbr|||||||||||||||||||||
|||20200814110821|
IN1|||Company ID|Company Name2|||||||||||||||||||||||||||||||||||||||||||||1234567890|
```

With this message, the personal data of the Patient with the ID 341957 is updated. The last name is changed to Patient1, the referring physician was changed to Dr. Physician2, the patient is not pregnant, the insurance company has changed.

ADT^A34, ADT^A40: Merge patients

```
MSH|^~\&|SendingApplication||VIS||202008141109||ADT^A34|MSG3026399|P|2.3|||||D|||
PID||341958|341958||Patient2^Firstname^^^^||19500401|M|||Street 40^^City^^12345^D||555-
56689|555-67790|||||00034567890|||
MRG|341957|
```

With this message, two patients are merged into one. All cases of the patient with ID 341957 (Patient1) are changed to the patient with ID 341958 (Patient2), while Patient1 is being deleted.

2.1.1.2.2 Example ADT message (HL7 2.5)

ADT^A01: Admit/visit notification (stationary visit)

```
MSH|^~\&|SendingApplication||VIS||202008141109||ADT^A01^ADT_A01|MSG3026399|P|2.5|||||D|||
PID||400000|400000||Patient3^Firstname^^^^||19500101|M|||Street 2^^City^^12345^D||555-
56789|555-67890|||||01234567890|||
PV1||I|||||||||||||B6|VIP|||VisitNbr25|||||||||||||||||||||||||20200814110821|IN1|||Company
ID|Company Name|||||||||||||||||||||||||||||||||||||||||||||1234567890|
ROL|1|AD|RP|ABC251^Referring^Firstname^^^Dr
ROL|2|AD|CP|ABC252^Consulting^Firstname^^^Dr
ROL|3|AD|AT|ABC253^Attending^Firstname^^^Dr
```

With this message, a Patient called Firstname Patient3 as well as a Case with No. VisitNbr25 is created. Referring Physician, Consulting Physician and Attending Physician are provided, whereas only the Referring Physician is displayed in the VIS GUI.

3 Order Management

When a physician orders an examination for a patient, this order is typically electronically entered using the Hospital Information System (HIS) or Practice Management Software (PMS), which then sends an order message to the RIS.

Alternatively, for existing patient records, orders can also be created in VepRIS directly, with no necessity to send/receive the initial order message.

3.1 Order creation in HIS / PMS

When an order for an examination of a patient is created, modified or cancelled within the leading system, an order message of type ORM (HL7 2.3) or OMG (HL7 2.5) is sent to the other subsystems.

Functional area	Functional area plus event code	Event description	HL7 version
ORM	ORM^O01	General order message	2.3
OMG	OMG^O19	General clinical order message	2.5

Table 16: Order message types

3.1.1 ORM message

The message type for sending orders from the HIS/PMS to VepRIS in HL7 2.3 is ORM^O01.

3.1.1.1 ORM message segments

Required segments are listed in the table below. Segments in brackets [ ] are optional, curly braces { } indicate repeatable segments. Segments not listed here are ignored.

ORM message (HL7 2.3.1)		
Segment	**Description**	**Comment**
MSH	**Message Header**	
PID	**Patient Identification**	**Patient data**
[PV1]	Patient Visit	(optional)
[IN1]	Insurance	(optional)
ORC	**Common Order**	**Accession data**
{OBR}	**Order Detail**	**Procedure data**
[{AL1}]	Allergies	(optional)
[{OBX}]	Observation Values	(optional)

Table 17: ORM message segments

For the definition of the MSH, PID, PV1, IN1, AL1 and OBX segments see chapter 2 (Patient Registration).

Although not essential, the PV1 segment is recommended for the ORM message type. With the PV1 segment provided, an order message of type ORM^O01 can be processed by VepRIS without the need to previously provide an ADT message. Thus, by providing the PV1 segment in the order

message, ADT-less order communication becomes possible. For the same reason, providing the IN1, AL1 and OBX segments might also be of benefit.

3.1.1.1.1 ORC segment

The ORC segment (Order Control) contains common order information as follows:

SEQ	LEN	DT	Usage	Element name
1	**2**	**ID**	**R**	**Order Control**
2	**22**	**EI**	**C/R***	**Placer Order Number**
3	22	EI	O	Filler Order Number
4	22	EI	O	Placer Group Number
5	2	ID	O	Order Status
6	1	ID	O	Response Flag
7	200	TQ	O**	Quantity/Timing
8	200	CM	O	Parent
9	26	TS	O	Date/Time of Transaction
10	120	XCN	O	Entered By
11	120	XCN	O	Verified By
12	**120**	**XCN**	**O**	**Ordering Provider**
13	80	PL	O	Enterer's Location
14	40	XTN	O	Call Back Phone Number
15	26	TS	O	Order Effective Date/Time
16	200	CE	O	Order Control Code Reason
17	60	CE	O	Entering Organization
18	60	CE	O	Entering Device
19	120	XCN	O	Action By
*Note: ORC-2 (placer order number) is required for inbound order messages, in outbound order messages (order created by order filler), ORC-3 (filler order number) is filled instead.				
**Note: ORC-7 (quantity/timing) is optional in HL7 2.3.1, but ignored in HL7 2.5.1. The TQ1 segment is used instead.				

Table 18: ORC segment

For VepRIS, ORM messages have to contain exactly one ORC segment.

The **Order Control** field **(ORC-1)** determines the kind of action to be taken and should contain one of the following values:

Command	Meaning
NW	New Order
XO	Change Order
CA	Cancel Order Request
DC	Discontinue Order Request

Table 19: Order Control values (ORC-1)

Depending on the command in ORC-1, a new order will be created (NW), an existing order will be changed (XO), or an existing order will be cancelled (CA) or closed (DC).

The **Placer Order Number (ORC-2)** (also called Order No. or Accession No.) is essential for order management. Its formatting is

12345^Issuer_of_ID

or simply

12345

The other (optional) data fields in the ORC segment can be read and displayed in the VepRIS GUI, although they have no significant meaning for the VIS workflow.

3.1.1.1.2 OBR Segment

The OBR (Observation Request) segment contains detailed information concerning the ordered procedure. It is repeatable, meaning that an order may consist of multiple procedures.

For example, if a radiological examination of a patient's head, neck and shoulder is to be done, the order message would contain three OBR segments, one for each service. However, because only one ORC segment per message is supported by VepRIS, all procedures provided in one message must be part of the same order.

SEQ	LEN	DT	Usage	Element name
1	4	SI	O	Set ID - OBR
2	**75**	**EI**	**R**	**Placer Order Number**
3	75	EI	O	Filler Order Number
4	**200**	**CE**	**R**	**Universal Service ID**
5	2	ID	O**	Priority
6	**26**	**TS**	**O****	**Requested Date/Time**
7	26	TS	O	Observation Date/Time
8	26	TS	O	Observation End Date/Time
9	20	CQ	O	Collection Volume
10	60	XCN	O	Collector Identifier
11	1	ID	O	Specimen Action Code
12	60	CE	O	Danger Code
13	300	ST	O	Relevant Clinical Info.
14	26	TS	O	Specimen Received Date/Time
15	300	CM	O	Specimen Source
16	**80**	**XCN**	**O/R**	**Ordering Provider**
17	40	XTN	O	Order Callback Phone Number
18	60	ST	O	Placer Field 1
19	**60**	**ST**	**O**	**Placer Field 2**
20	60	ST	O	Filler Field 1
21	60	ST	O	Filler Field 2
22	26	TS	O	Results Rpt/Status Chng - Date/Time
23	40	CM	O	Charge to Practice
24	10	ID	O	Diagnostic Serv Sect ID
25	1	ID	O	Result Status
26	400	CM	O	Parent Result
27	**200**	**TQ**	**O/R****	**Quantity/Timing**
28	150	XCN	O	Result Copies To

SEQ	LEN	DT	Usage	Element name
29	150	CM	O	Parent
30	**20**	**ID**	**O/R2**	**Transportation Mode**
31	**300**	**CE**	**O/R2**	**Reason for Study**
32	200	CM	O	Principal Result Interpreter
33	200	CM	O	Assistant Result Interpreter
34	200	CM	O	Technician
35	200	CM	O	Transcriptionist
36	26	TS	O	Scheduled Date/Time
37	4	NM	O	Number of Sample Containers
38	60	CE	O	Transport Logistics of Collected Sample
39	200	CE	O	Collector's Comment
40	60	CE	O	Transport Arrangement Responsibility
41	30	ID	O	Transport Arranged
42	1	ID	O	Escort Required
43	200	CE	O	Planned Patient Transport Comment
44	80	CE	O	Procedure Code
45	80	CE	O	Procedure Code Modifier
*Note: OBR-2 (placer order number) is required for inbound order messages. In outbound order messages (order created by order filler), OBR-3 (filler order number) is filled instead.				
**Note: OBR-5 (priority), OBR-6 (requested date/time) and OBR-27 (quantity/timing) are optional in HL7 2.3 (OBR-27 required according to IHE) but ignored in 2.5.1. Instead, the TQ1 segment is used.				

Table 20: OBR segment

The **Placer Order Number (OBR-2)** uniquely specifies the order which the procedure is part of. Assuming that a separate message is sent for each order, this is always the same value as provided in ORC-2. See Placer Order Number (ORC-2) for further information.

Universal Service ID (OBR-4) contains a predefined unique identifier of the requested service as well as the service's textual description. It should look like this:

1234^Service text

Requested Date/Time (OBR-6) may provide the desired start time of the procedure. If left empty, the earliest possible start time shall be used.

According to HL7 standard, usage of this field is deprecated. Instead, OBR-27 (Quantity/Timing) should be used. For best compatibility, VepRIS reads both fields OBR-6 and OBR-27. If both fields are left empty, the next free slot on the requested resource will be allocated for the ordered procedure.

Ordering Provider (OBR-16) should contain the same value as **Ordering Provider (ORC-12)**. It is possible, but not recommended to mix different ordering physicians within a single order.

Placer Field 2 (OBR-19) may contain a **Procedure Number**. According to IHE, this is not necessary, for the procedure no. shall be generated by the order filler for each procedure. However, this mode of operation has some limitations:

- Order update on procedure level is not possible, because the ID of that procedure is unknown to the sender.
- Multiply received equal order messages for the same order lead to multiply created “ghost” procedures. This is not unusual. Each time the initial order message is re-sent, a new procedure is created, because there is no way to safely identify the procedure already created for this order (there may be many).

Therefore, it is recommended to let the leading system generate the new procedure no. and provide it in the otherwise unused Placer Field 2 (OBR-19). VepRIS uses this provided procedure no. to identify an eventually existing procedure. This way, updates on procedure level are possible, and under no circumstances duplicate procedures are created.

Usually, if the order no. is 12345, the corresponding procedure numbers are valued 12345_1, 12345_2, and so on. If no value is provided in OBR-19, VepRIS creates a procedure no. on its own, but the limitations stated above are applicable.

Quantity/Timing (OBR-27) is optional in HL7 but required according to IHE. It replaces the deprecated field Requested Date/Time (OBR-6). From this field, two values are extracted:

^^^Start-Date/Time^^Priority

Start date/time (OBR-27.4) is interpreted as the suggested start date/time (ISO format). According to HL7 standard, this field replaces OBR-6. For best compatibility, VepRIS reads both fields OBR-6 and OBR-27. If both fields are left empty, the next free slot on the requested resource will be allocated.

Priority (OBR-27.6) indicates an emergency patient:

value	meaning
(empty)	Routine
R	Routine
any other value	Emergency

Table 21: Priority values (OBR-27.6)

The optional field **Transportation Mode (OBR-30)** may contain one of the following values:

value	meaning
WALK	Patient walks to diagnostic service
CART	Patient travels on cart or gurney
WHLC	Wheelchair
PORT	The examining device goes to the patient’s location

Table 22: Transportation mode values (OBR-30)

The **Reason for Study** field **(OBR-31)** is defined as optional in HL7. In VIS, the value of this field is interpreted as the medical indication for the order, making it highly recommended to be provided to VIS. Its content may be provided in one of the following ways:

^Reason for Study
Reason for Study

Note that the values of OBR-31 should be identical for all OBR segments. In our understanding, there always has to be one medical indication for the order, therefore all procedures of an order should share the same medical indication.

3.1.1.2 Example ORM order message

```
MSH|^~\&|SendingApplication||VIS||202009101043||ORM^O01|MSG733600|P|2.3|
PID|||0100728685||Patient4^Firstname||19470503|F|||Street
44^^City^^2601^AT||0699/10030406||||||1238030545|||||||A|
PV1||O|Orthopedic
Ambulance^^^Orthopedy|||||P338^Referrer2^Firstname^^^^Dr|129914^Consulting^Firstname^^^Dr.|
|^|||||N|||2051015177||||||||||||||||||||||||20200602080801||
IN1|1||0000001120|Insurance Company|
ORC|NW|2466824|||||^^^^^3||20200910104316|NKKANZHE||M54183^Physician4^Jörg^^^OA
Dr.|OAM|||J|||
OBR|1|2466824||CR00008^Cor/Pulmo
ap|||||||||||||||2466824_01|||||||^^^20201010100000^^3|||^1|||||||||||||||
```

3.1.2 OMG message

The message type for sending orders from the leading HIS / PMS to VepRIS in HL7 2.5 is OMG^O19.

3.1.2.1 OMG message segments

Required segments are listed in the table below. Other segments are optional. Curly braces { } indicate repeatable segments.

OMG message (HL7 2.5.1)		
Segment	**Description**	**Comment**
MSH	**Message Header**	
PID	**Patient Identification**	**Patient data**
[PV1]	Patient Visit	(optional)
[IN1]	Insurance	(optional)
[{ROL}]	Role Segment	Physicians data
ORC	**Common Order**	**Accession data**
{TQ1}	**Timing/Quantity**	**Procedure data**
{OBR}	**Order Detail**	**Procedure data**
[{AL1}]	Allergies	(optional)
[{OBX}]	Observation Values	(optional)

Table 23: OMG message segments

For the definition of the MSH, PID, and PV1 segments see chapter 2 (Patient Registration).

For the definition of the ORC and OBR segment see chapter 3 (Order Management HL7 2.3).

The PV1 segment is optional for the OMG message type. However, with the PV1 segment provided, an order message of type OMG^O19 can be processed by VIS without the need to previously provide an ADT message. Thus, by providing the PV1 segment in the order message, ADT-less order communication becomes possible. For the same reason, providing the IN1, AL1 and OBX segments might also be recommended.

3.1.2.1.1 TQ1 segment

In HL7 2.5, the quantity/timing field in the ORC / OBR segment has been replaced by a dedicated segment with more detailed information.

SEQ	LEN	DT	Usage	Element name
1	4	SI	O	Set ID - TQ1
2	20	CQ	O	Quantity
3	540	RPT	O	Repeat Pattern
4	20	TM	O	Explicit Time
5	20	CQ	O	Relative Time and Units
6	20	CQ	O	Service Duration
7	26	TS	O	Start Date/Time
8	26	TS	O	End Date/Time
9	250	CWE	O	Priority
10	250	TX	O	Condition Test

11	250	TX	O	Test Instruction
12	10	ID	O	Conjunction
13	20	CQ	O	Occurrence Duration
14	10	NM	O	Total Occurrences

Table 24: TQ1 segment

3.1.2.2 Example OMG order message

```
MSH|^~\&|VIS|VEPRO|HIS|HIS|20220711120058462||OMG^O19^OMG_O19|O19_20220711120058462|P|2.5.1
|||||||||
PID||VP1001|VP1001^^^VEPRO^PI||Patient^Test^^^||19700415|M|||Street
123^^City^^12345^Country||01234 567890^^CP^testpatient@mailserver.com~02345
678901^^PH~^NET^NET^testpatient@mailserver.com||||||
PV1||O|^^^default_department|||||000002^Referring Physician^^^^^||Medical
Service|||||0001||||VC1003|||||||||||||||||||||||||20220711120058462|||||||V|
ORC|NW||VA1003^VEPRO||||||20220711115955|Main administrator||000003^Requesting
Physician^^^^^|||||HEALTH_INSTITUTE|||||||||||||
TQ1|||||||20220711|||||||
OBR|1|VA1003^VEPRO^^|VA1003^VEPRO|CTABD1^1
phase^VEPRO^^^|S|20220711120000|||||||||000003^Requesting
Physician^^^^^||VA1003|VPR1003|||||||1^once^^20220711^^||||test|||||||||U|||||||||
```

3.2 Order creation in VepRIS

For existing patient records, orders for examination can be created in VepRIS. The desired procedure (service) is chosen from a catalogue and an available time slot on the appropriate resource (modality) is scheduled. On the day of the scheduled examination, a worklist entry for that examination is created on the modality's worklist.

3.2.1 Processing of Orders without HL7 communication

In configurations where VepRIS acts as the leading system, patient records and orders are created in VepRIS without the need to communicate via HL7. Eventually, the patient record was previously created outside of VepRIS and introduced vie ADT message, but the order is now created within VepRIS. In this scenario, there is principally no need for order messages. Eventually, other subsystems shall be informed of the new order, thus VepRIS might send order status update messages, but for processing the order in VepRIS, this is not necessary.

3.2.2 ORM / ORR message (HL7 2.3)

If VepRIS is not the leading system, and the new order is created in VepRIS only exceptionally, the leading system must be informed of the new order (accession). For this purpose, VepRIS sends an ORM message to the leading system, which has to confirm the newly created accession number. It might even create an accession number on its own for that order according to its own coding scheme which has to be communicated back to VepRIS. For this feed-back, another message type (ORR) is supported.

For the definition of the ORM message type see chapter 3.1. The returned message is of type ORR (order response message) in HL7 2.3. It it can be sent as a separate message, or it can be part of the order message acknowledgement.

3.2.2.1 ORR message segments

Required segments are listed in the tables below. Other segments are optional.

ORR message (Success) (HL7 2.3.1)		
Segment	**Description**	**Comment**
MSH	Message Header	
MSA	Message Acknowledgement	AA, CA
ORC	Common Order	
OBR	Order Detail	

Table 25: ORR message (Success) overview

ORR message (Error) (HL7 2.3.1)		
Segment	**Description**	**Comment**
MSH	Message Header	
MSA	Message Acknowledgement	AR, AE, CR, CE
ERR	Error	

Table 26: ORR message (Error) overview

For the definition of the MSH segment see chapter 2 (Patient Registration).

For the definition of the ORC and OBR segment see chapter 3 (Order Management HL7 2.3).

3.2.2.1.1 MSA segment

The MSA segment is part of any acknowledgement sent by the receiver of an HL7 message.

SEQ	LEN	DT	Usage	Element name
1	2	ID	R	Acknowledgement Code
2	20	ST	R	Message Control ID
3	80	ST	O	Text Message
4	15	NM	O	Expected Sequence Number
5	1	ID	O	Delayed Acknowledgement Type
6	100	CE	O	Error Condition

Table 27: MSA segment

3.2.2.1.2 ERR segment

The ERR segment is part of any acknowledgement sent by the receiver of an HL7 message if that message was rejected. It shall contain an error description.

SEQ	LEN	DT	Usage	Element name
1	80	ID	R	Error code and location

Table 28: ERR segment

3.2.2.2 Example ORR message

--- ORR example message missing ---

3.2.3 OMG / ORG message (HL7 2.5)

If VepRIS is not the leading system, and the new order is created in VepRIS only exceptionally, the leading system must be informed of the new order (accession). For this purpose, VepRIS sends an OMG message to the leading system, which has to confirm the newly created accession number. It might even create an accession number on its own for that order according to its own coding scheme which has to be communicated back to VepRIS. For this feed-back, another message type (ORG) is supported.

For the definition of the OMG message type see chapter 3.1. The returned message is of type ORG (order response message) in HL7 2.5. It it can be sent as a separate message, or it can be part of the order message acknowledgement

3.2.3.1 ORG message segments

Required segments are listed in the table below. Other segments are optional.

ORG message (Success) (HL7 2.5.1)

Segment	Description	Comment
MSH	Message Header	
MSA	Message Acknowledgement	
ORC	Common Order	
TQ1	Timing/Quantity	
OBR	Order Detail	

Table 29: ORG message (Success) overview

ORG message (Error) (HL7 2.5.1)		
Segment	**Description**	**Comment**
MSH	Message Header	
MSA	Message Acknowledgement	
[{ERR}]	Error	

Table 30: ORG message (Error) overview

For the definition of the MSH segment see chapter 2 (Patient Registration).

For the definition of the ORC, OBR and TQ1 segment see chapter 3 (Order Management HL7 2.5).

The MSA and ERR segments are already described in 3.2.1

3.2.3.2 Example ORG message

--- ORG example message missing ---

3.3 Order status update to HIS / PMS

In the scenario with a HIS / PMS as the leading system, ORM or OMG messages are sent to VepRIS for each order. While the ongoing patient examination is processed in VepRIS, status update messages might keep the ordering HIS / PMS informed. For this purpose, order messages (ORM or OMG) with dedicated values in ORC-1 (Order Control) and ORC-5 (Order Status) are being sent back to the Order Provider.

3.3.1 ORM [status update HIS/PMS] (HL7 2.3)

The ORM message for status update is equal to the initially sent order message, except for fields ORC-1 and ORC-5:

ORC-1	ORC-5	Meaning
OC		Order cancelled by order filler
SC	IP	Order In Progress
SC	CM	Order Completed
SC	OD	Order Discontinued

Table 31: Order Control and Status values for status update ORM messages

If an order is cancelled before processing has been started, the Order Cancelled message is sent. If the order was processed to some point and then cancelled, Order Discontinued is sent.

3.3.1.1 Example ORM message [status update HIS/PMS]

```
MSH|^~\&|VIS|VEPRO|HIS|HIS|20220711120059023||ORM^O01|O01_20220711120059023|P|2.3.1||||||||
ORC|SC|VA1003^VEPRO^^|VA1003^VEPRO||IP|||||||||||||
```

3.3.2 OMG [status update HIS/PMS] (HL7 2.5)

The OMG message for status update is equal to the initially sent order message, except for fields ORC-1 and ORC-5. See chapter 3.3.1 for the list of possible values for these fields.

3.3.2.1 Example OMG message [status update HIS/PMS]

```
MSH|^~\&|VIS|VEPRO|HIS|HIS|20220711120058950||OMG^O19^OMG_O19|O19_20220711120058950|P|2.5.1
|||||||||
ORC|SC|VA1003^VEPRO^^|VA1003^VEPRO||IP|||||||||||||||||||||||||
TQ1|||||||20220711|||||||
OBR|1|VA1003^VEPRO^^|VA1003^VEPRO|CTABD1^1
phase^VEPRO^^^|S|20220711120000|||||||||000003^Requesting
Physician^^^^^||VA1003|VPR1003|||||||1^once^^20220711^^||||test|||||||||U|||||||||
```

3.4 Order status update to PACS

Orders are processed in VepRIS, after they were created in VepRIS or in another leading system. While the patient examination is processed in VepRIS, status update messages might keep the image manager (PACS) informed. For this purpose, order status update messages (ORM or OMI) with dedicated values in ORC-1 (Order Control) and ORC-5 (Order Status) are being sent to the image manager.

3.4.1 ORM [status update PACS] (HL7 2.3)

The ORM message semantics used for status update for the image manager differ from the ORM messages used for orders. While the ORC segment in the order message is at the accession (order) level, in this status update message it's the procedure level. It must not be mixed up with the status update ORM message sent to the Order Placer.

3.4.1.1 Example ORM message [status update PACS]

```
MSH|^~\&|VIS|VEPRO|EMR|VEPRO|20220711120058872||ORM^O01|O01_20220711120058872|P|2.3.1||||||
PID||VP1001|VP1001^^^VEPRO^PI||Patient^Test^^^||19700415|M|||Street
123^^City^^12345^Country||01234 567890^^CP^testpatient@mailserver.com~02345
678901^^PH~^NET^NET^testpatient@mailserver.com||||||
PV1||O|^^^default_department|||||000002^Referring Physician^^^^^||Medical
Service|||||0001||||VC1003|||||||||||||||||||||||||20220711120058872|||||||V|
ORC|NW|VA1003^VEPRO^^|||SC||1^once^^20220711|||Main administrator||000003^Requesting
Physician^^^^^|||||HEALTH_INSTITUTE||
OBR|1|VA1003^VEPRO^^|VA1003^VEPRO|CTABD1^1
phase^VEPRO^^^|S|20220711120000|||||||||000003^Requesting
Physician^^^^^||VA1003|VPR1003|||||||1^once^^20220711^^||||test|||||||||U|||||||||
ZDS|1.2.276.0.19.4.20220711120039.4^VIS^Application^DICOM
```

3.4.2 OMI message (HL7 2.5)

In HL7 2.5, a new message type (OMI) is defined for the purpose of informing the image manager (PACS) of the processing status.

3.4.2.1 OMI message segments

Required segments are listed in the table below. Other segments are optional. Curly braces { } indicate repeatable segments.

OMI message (HL7 2.5.1)		
Segments	**Patient Administration Message**	**Comment**
MSH	Message Header	
PID	Patient Identification	
PV1	Patient Visit	
{ROL}	Role	
ORC	Common Order	
TQ1	Timing/Quantity	

OBR	Order Detail	
{IPC}	Imaging Procedure Control	
Note: In OMI^O23 messages outbound to an image manager subsystem, one message is sent for each procedure, while the OBR segment corresponds to the contained procedure steps.		

Table 32: OMI message overview

3.4.2.1.1 IPC Segment

SEQ	LEN	DT	Usage	Element name
1	80	EI	R	Accession Identifier
2	22	EI	R	Requested Procedure ID
3	70	EI	R	Study Instance UID
4	22	EI	R	Scheduled Procedure Step ID
5	16	CE	O	Modality
6	250	CE	O	Protocol Code
7	22	EI	O	Schedules Station Name
8	250	CE	O	Scheduled Procedure Step Location
9	16	ST	O	Scheduled AE Title

Table 33: IPC segment

3.4.2.2 Example OMI message [status update PACS]

```
MSH|^~\&|VIS|VEPRO|EMR|VEPRO|20220711120058783||OMI^O23^OMI_O23|O23_20220711120058783|P|2.5
.1|||||||||
PID||VP1001|VP1001^^^VEPRO^PI||Patient^Test^^^||19700415|M|||Street
123^^City^^12345^Country||01234 567890^^CP^testpatient@mailserver.com~02345
678901^^PH~^NET^NET^testpatient@mailserver.com||||||
PV1||O|^^^default_department|||||000002^Referring Physician^^^^^||Medical
Service|||||0001||||VC1003|||||||||||||||||||||||||20220711120058783|||||||V|
ROL||UP|RP|000002^Referring Physician^^^^^|||||||||
ORC|NW|VA1003^VEPRO^^|||SC||||20220711120058783|Main administrator||000003^Requesting
Physician^^^^^|||||HEALTH_INSTITUTE||
TQ1|||||||20220711|||||||
OBR|1|VA1003^VEPRO^^|VA1003^VEPRO|CTABD1^1
phase^VEPRO^^^|S|20220711120000|||||||||000003^Requesting
Physician^^^^^||VA1003|VPR1003|||||||1^once^^20220711^^||||test|||||||||U|||||||||
IPC|VA1003^VEPRO^^|VPR1003|1.2.276.0.19.4.20220711120039.4^VIS^Application^DICOM|||^^
```

4 Clinical Reports

4.1 Transfer of Observation Results

In VIS, clinical reports can be written by the authorized medical staff. These reports can be transferred to other subsystems using the following message types:

Functional area	Functional area plus event code	Event description	HL7 version
ORU	ORU^R01	Transmit observations/results	2.3 or 2.5
MDM	MDM^T02	Original document notification and content	2.5
	MDM^T10	Document replacement notification and content	2.5

Table 34: Observation result message types

4.1.1 ORU message

The most commonly used message type for transferring clinical reports is ORU^R01. The report content is included in the message as plain text, rich text (RTF) or base64-encoded PDF.

The report text can be provided in a single OBX segment, or it can be splitted into different OBX segments with different meanings. Depending on the receiving application, multiple OBX segments may be provided using segment counting or predefined identifiers. Line feeds within plain text have to be escaped by a predefined character sequence, most commonly “\.br\”.

4.1.1.1 ORU message segments

Required segments are listed in the table below. Other segments are optional. Curly braces { } indicate repeatable segments.

ORU message (HL7 2.3.1)		
Segment	**Description**	**Comment**
MSH	Message Header	
PID	Patient Identification	
[PV1]	Patient Visit	Required if visit number is used.
OBR	Order Detail	
{OBX}	Observation/Result	different coding schemes possible

Table 35: ORU message overview

4.1.1.2 Example ORU message

```
MSH|^~\&|VEPRO|VIS|KIS_vendor|KIS_app|20201205031216||ORU^R01|ORUR0120201205031216|P|2.3
PID|||9101906999||Lastname^Firstname^^^^||19840510000000|F|||^^^^^A||||||||
PV1|||||||||||||||||||2051034407|0|||||||||||||||||||||20201205031216|
OBR||9485392_7|9485392_7^NKRAD^Befund||||20201205022100|20201205031216|||||||||1.2.276.0.19.4.20201205
021253.12345||Rad. CR: Abdomen: Abdomen leer stehend: Abdomen liegend ap + liegend: Abdomen Links
Seitenlage|||||P|
OBX||ST|PACS_FRAGETXT||Fragetext Line 1\.br\Fragetext Line 2|
OBX||ST|PACS_BEFTXT||Befundtext Line 1\.br\ Befundtext Line 2|
OBX||ST|PACS_ERGTXT||Ergebnistext Line 1\.br\Ergebnistext Line 2\.br\ Ergebnistext Line 3\.br\...|
OBX||ST|PACS_BEFDR||Befundender Arzt|
OBX||ST|PACS_VIDDR||Freigebender Arzt|
```

```
OBX||ST|PACS_SCHREIB||Schreibkraft|
OBX||ST|PACS_STATION||NK Interdisz.Aufnahme Ambulanz|
OBX||ST|PACS_ABTEILUNG||NK Interdisziplinär|
OBX||ST|PACS_UDATUM||15.12.2020|
OBX||ST|PACS_AUFNR||9485392|
OBX||ST|PACS_BTR||Rad. CR: Abdomen: Abdomen leer stehend: Abdomen liegend ap + liegend: Abdomen Links
Seitenlage|
```

4.1.2 MGM message

Another more universal message type (MDM) might also be used for transferring clinical reports. This type is required if clinical documents in the CDA document structure shall be transferred to a document repository.

4.1.2.1 MGM message segments

MGM Message (HL7 2.5)		
Segment	**Description**	**Comment**
MSH	**Message Header**	
[EVN]	Event Type	
PID	**Patient Identification**	Patient data
PV1	**Patient Visit**	Visit data
[ORC]	Common Order	Accession data
[TQ1]	Timing/Quantity	Procedure data
[OBR]	Order Detail	Procedure data
TXA	**Transcription Document Header**	
OBX	**Observation/Result**	

Table 36: MGM message overview

4.1.2.1.1 TXA segment

SEQ	**LEN**	**DT**	**Usage**	**Element name**
1	4	SI	R	Set ID
2	30	CWE	R	Document Type
3	2	ID	C	Document Content Presentation
4	24	DTM	O	Activity Date / Time
5	250	XCN	C	Primary Activity Provider Code / Name
6	24	DTM	O	Origination Date / Time
7	24	DTM	C	Transcription Date / Time
8	24	DTM	O	Edit Date / Time
9	250	XCN	O	Originator Code / Name
10	250	XCN	O	Assigned Document Authenticator
11	250	XCN	C	Transcriptionist Code / Name
12	30	EI	R	Unique Document Number
13	30	EI	C	Parent Document Number
14	22	EI	O	Placer Order Number
15	22	EI	O	Filler Order Number

16	30	ST	O	Unique Document File Name
17	2	ID	R	Document Completion Status
18	2	ID	O	Document Confidentiality Status
19	2	ID	O	Document Availability Status
20	2	ID	O	Document Storage Status
21	30	ST	C	Document Change Reason
22	250	PPN	C	Authentication Person, Time Stamp (set)
23	250	XCN	O	Distributed Copies (Code and Name of Recipients)
24		CWE	O	Folder Assignment
25	250	ST	O	Document Title
26	24	DTM	O	Agreed Due Date / Time
27		HD		Creating Facility
28		CWE		Creating Specialy

Table 37: TXA segment

4.1.2.2 Example MGM messages

MDM^T02: Original document notification and content

```
MSH|^~\&|^of_application_oid^ISO|^of_facility_oid^ISO|^op_application_oid^ISO|^op_facility_
oid^ISO|20220701154154||MDM^T02^MDM_T02|T02_20220701154154|P|2.5|
EVN|T02|20220701154153||02|12345^Physician^Requesting^^^^^^&operator_domain_oid&ISO^^^^EI
PID|1||0100123456^^^&assigningauthority_oid&ISO^PI~4567890^^^&1.2.40.0.10.1.4.3.1&ISO^SS||L
astname^Firstname^^^^^L||19420706000000|F|||Street^^City^^Zip^Country^H||^^^|||||||||||||AT
^^HL70171|||||||20181205014310
PV1||I|pointofcare^room^bed^facility^^C^^^location_type^C1^&assigning_authority_oid&ISO||||
|23456^Physician^Referring^^^^|24567^Physician^Consulting^^^^Dr.||||||||||2251021678^^^&cas
e_issuer_oid&ISO^VN|||||||||||||||||||||||||20220701153111|||||2251021678^^^&case_issuer_o
id&ISO^MR|V|
TXA|1|18782-
3||20220701152758|||||45678^Physician^Requesting^^^^^^&domain_oid&ISO^L|||98765^^1.2.40.0.1
0.1.6.1.1.1.338.1.102.3.2^ISO||||555444^^domain_oid^ISO|LA|U||||456456^Physician^Authentica
ting^^^^^^&domain_oid&ISO^L^^^^^20220701154153
OBX|1|ST|^SUBJECT|0|document_title||||||F
OBX|2|ST|^MIME||text/xml||||||F
OBX|3|CE|^FORMATCODE||urn:elga:radio:2015-v2.06:EIS_FullSupport^ELGA Befund bildgebende
Diagnostik, EIS Full Support v2.06^1.2.40.0.34.5.37||||||F
OBX|4|CE|^LANGUAGECODE||de^Deutsch^ISO639-1||||||F
OBX|5|NM|^NUMBLOCKS||1||||||F
OBX|6|ED|^DOCBLOCK|0|^AD^Octet-stream^Base64^PD94bWwgdmVyc2lvbj0iMlbnQ+||||||F
OBX|7|EI|^SETID||5768768^^1.2.40.0.10.1.6.1.1.1.338.1.102.3.2^ISO||||||F
OBX|8|EI|^ServiceEvent||1.4.0.3^Röntgen.unpaariges Organ.Prozedur nicht näher
bestimmt.Thorax^1.2.40.0.34.5.38^ISO||||||F|||20220701153023
```

With this message, a base-64 encoded CDA document is transferred to be initially created on the receiving end.

MDM^T10: Document replacement notification and content

```
MSH|^~\&|^of_application_oid^ISO|^of_facility_oid^ISO|^op_application_oid^ISO|^op_facility_
oid^ISO|20220701154154||MDM^T10^MDM_T02|T10_20220701154154|P|2.5|
EVN|T02|20220701154153||02|12345^Physician^Requesting^^^^^^&operator_domain_oid&ISO^^^^EI
PID|1||0100123456^^^&assigningauthority_oid&ISO^PI~4567890^^^&1.2.40.0.10.1.4.3.1&ISO^SS||L
astname^Firstname^^^^^L||19420706000000|F|||Street^^City^^Zip^Country^H||^^^|||||||||||||AT
^^HL70171|||||||20181205014310
```

```
PV1||I|pointofcare^room^bed^facility^^C^^^location_type^C1^&assigning_authority_oid&ISO||||
|23456^Physician^Referring^^^^|24567^Physician^Consulting^^^^Dr.||||||||||2251021678^^^&cas
e_issuer_oid&ISO^VN|||||||||||||||||||||||||20220701153111|||||2251021678^^^&case_issuer_o
id&ISO^MR|V|
TXA|1|18782-
3||20220701152758|||||45678^Physician^Requesting^^^^^^&domain_oid&ISO^L|||98765^^1.2.40.0.1
0.1.6.1.1.1.338.1.102.3.2^ISO||||555444^^domain_oid^ISO|LA|U||||456456^Physician^Authentica
ting^^^^^^&domain_oid&ISO^L^^^^^20220701154153
OBX|1|ST|^SUBJECT|0|document_title||||||F
OBX|2|ST|^MIME||text/xml||||||F
OBX|3|CE|^FORMATCODE||urn:elga:radio:2015-v2.06:EIS_FullSupport^ELGA Befund bildgebende
Diagnostik, EIS Full Support v2.06^1.2.40.0.34.5.37||||||F
OBX|4|CE|^LANGUAGECODE||de^Deutsch^ISO639-1||||||F
OBX|5|NM|^NUMBLOCKS||1||||||F
OBX|6|ED|^DOCBLOCK|0|^AD^Octet-stream^Base64^PD94bWwgdmVyc2lvbj0iMlbnQ+||||||F
OBX|7|EI|^SETID||5768768^^1.2.40.0.10.1.6.1.1.1.338.1.102.3.2^ISO||||||F
OBX|8|EI|^ServiceEvent||1.4.0.3^Röntgen.unpaariges Organ.Prozedur nicht näher
bestimmt.Thorax^1.2.40.0.34.5.38^ISO||||||F|||20220701153023
```

With this message, a base-64 encoded CDA document is transferred to be updated on the receiving end.

5 Financial Transactions

5.1 Transfer of Billing and Financial data

One step within the VIS workflow is the documentation of provided services for billing purposes. After the performed steps and additional expenses of a procedure have been documented, one or both of the following message types are created:

Functional area	Functional area plus event code	Event description	HL7 version
BAR	BAR^P01	Billing account record	2.3 or 2.5
DFT	DFT^P03	Detail financial transaction	2.3 or 2.5

Table 38: Message types for financial transactions

5.1.1 BAR message

BAR (“Billing Account Record”) messages are used for sending tariff codes to the HIS subsystem. Further processing of the billing procedure is done by the recipient of the BAR message.

BAR messages are used for generalized tariffs (e.g. from the OPS catalogue) covering a range of procedures assigned to a specific treatment.

5.1.1.1 BAR message segments

Supported segments are listed in the table below. Curly braces { } indicate repeatable segments.

BAR message		
Segment	**Description**	**Comment**
MSH	Message Header	
EVN	Event Type	
PID	Patient Identification	
PV1	Patient Visit	
{PR1}	Procedure information	

Table 39: BAR message overview

5.1.1.1.1 PR1 segment

SEQ	LEN	DT	Usage	Element name
1	4	SI	R	Set ID - PR1
2	2	IS	R	Procedure Coding Method
3	80	CE	R	Procedure Code
4	40	ST	O	Procedure Description
5	26	TS	R	Procedure Date/Time
6	2	IS	R	Procedure Functional Type
7	4	NM	O	Procedure Minutes
8	120	XCN	O	Anesthesiologist
9	2	IS	O	Anesthesia Code

10	4	NM	O	Anesthesia Minutes
11	120	XCN	O	Surgeon
12	230	XCN	O	Procedure Practioner
13	60	CE	O	Consent Code
14	2	NM	O	Procedure Priority
15	80	CE	O	Associated Diagnosis Code

Table 40: PR1 segment

5.1.1.2 Example BAR message

```
MSH|^~\&|VEPRO|VEPRO|KIS|KIS|20210508065821||BAR^P01|BARP0120210508065821|P|2.3|||||D
EVN|P01|20210508065821|
PID|1|988276|988276||Lastname^Firstname^^^^||19290704000000|F|
PV1||||||||||||||||||7210110407|||||||||||||||||||||||20210508065821|
PR1|1|ops2021|3-203^^ops2021||20210508065804|D|||||||N|
PR1|2|ops2021|3-205^^ops2021||20210508065804|D|||||||N|
```

5.1.2 DFT message

DFT (“Detail Financial Transaction”) messages are used for sending tariff codes to the HIS subsystem. Further processing of the billing procedure is done by the recipient of the DFT message.

DFT messages are used for detailed service tariffs (e.g. from the EBM or GOÄ catalogue), one code for each particular service

5.1.2.1 DFT message segments

Supported segments are listed in the table below. Curly braces { } indicate repeatable segments.

DFT message		
Segment	**Description**	**Comment**
MSH	Message Header	
EVN	Event Type	
PID	Patient Identification	
PV1	Patient Visit	
{FT1}	Financial transaction	

Table 41: DFT message overview

5.1.2.1.1 FT1 segment

SEQ	LEN	DT	Usage	Element name
1	4	SI	O	Set ID - FT1
2	12	ST	O	Transaction ID
3	10	ST	O	Transaction Batch ID
4	26	TS	R	Transaction Date

5	26	TS	O	Transaction Posting Date
6	8	IS	R	Transaction Type
7	80	CE	R	Transaction Code
8	40	ST	O	Transaction Description
9	40	ST	O	Transaction Description - Alternative
10	6	NM	O	Transaction Quantity
11	12	CP	O	Transaction Amount Extended
12	12	CP	O	Transaction Amount Unit
13	60	CE	O	Department Code
14	8	IS	O	Insurance Plan
15	12	CP	O	Insurance Amount
16	80	PL	O	Assigned Patient Location
17	1	IS	O	Fee Schedule
18	2	IS	O	Patient Type
19	60	CE	O	Diagnosis Code
20	120	XCN	O	Performed by Code
21	120	XCN	O	Ordered by Code
22	12	CP	O	Unit Cost
23	22	EI	O	Filler Order Number
24	120	XCN	O	Entered By Code
25	80	CE	O	Procedure Code

Table 42: FT1 segment

5.1.2.2 Example DFT message

```
MSH|^~\&|VIS|VEPRO|KIS|KIS|20220711102403617||DFT^P03|P03_20220711102403617|P|2.3|||||D
EVN|P03|20220711102403617|
PID||VP1001|VP1001^^^VEPRO^PI||Patient^Test^^^||19700415|M|||Street
123^^City^^12345^Country||01234 567890^^CP^testpatient@mailserver.com~02345
678901^^PH~^NET^NET^testpatient@mailserver.com||||||
PV1||O|^^^default_department|||||000002^Referring Physician^^^^^||Medical
Service|||||0001||||VC1002|||||||||||||||||||||||||20220711102403617|||||||V|
IN1|1|||||||||||||||||||||||||||||||||||||||||||||||||||
FT1|1||||||ROTHOPA|||1||||||||||
FT1|2||||||ROTHOINT|||1||||||||||
```