



## HL7 CDA CASE STUDY

### **Hip joint replacement**

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## **Summary**

*During complex clinical treatment the patient may need to visit multiple healthcare organizations. Documents with medical content are exchanged in order to support the coordination process between those organizations. Today, these documents are mainly exchanged in the form of letters on paper, fax or e-mail. In many cases, the patient is used as a courier of the documents (typical examples include discharge letters, X-ray images, and prescriptions). The patient has the responsibility to bring the document (created by e.g. a hospital or X-ray Institute) to the next appointment in another organization (such as a medical practice or pharmacy). The need to exchange medical documents is therefore obvious. Both the media used (paper) as well as the transmission method (couriered by the patient) are surprising in the light of today's technical capabilities.*

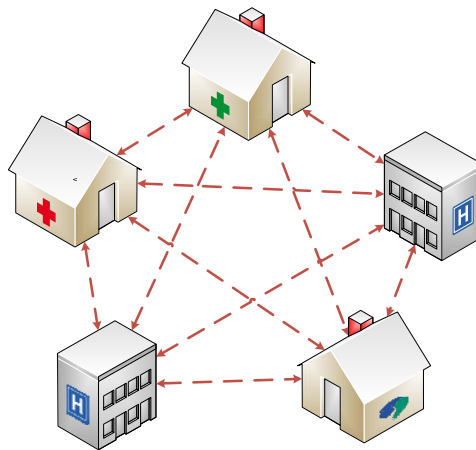
*HL7 Switzerland, an affiliate organization of HL7, has developed a specification for a number of electronic medical documents in the context of the national Swiss eHealth Strategy. This specification is based on HL7 V3, CDA and a German CDA implementation guide (the VHitG Arztbrief) which covers similar use-cases. This specification allows for the exchange of electronic medical documents between participants in the Swiss health care system without losing information caused by media transitions such as the one between paper and electronic documents. It will act as a successor standard for medical information in free text documents (such as PDF, TIF, Word or e-mail).*

*Using the case study "hip joint replacement" ten possible examples of medical documents exchanged between the involved health professionals were identified. Paper based examples of these documents can be found in an appendix of the specification. These sample documents were used as the basis for the specification of their CDA equivalents. The examples illustrate how the content of CDA documents based on the CDA-CH specification could be rendered.*

## I. Introduction – Business Case

HL7 Switzerland actively participates in the national efforts related to the Swiss eHealth strategy. According to this strategy (goal “A1”) standards should be created (before the end of 2008) for the exchange of relevant information from the personal medical record. A HL7 working group worked on the CDA-CH specification which presents a first step towards achieving this objective. The specification was written in German and translated in French and Italian and it is published free of charge to the public [1], [2]. HL7 Switzerland does not have the power to mandate its usage. The content of this specification therefore has the status of a ‘recommendation to the legislator’.

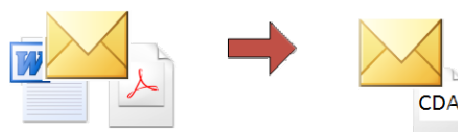
The fact that information systems often operate in isolation leads to unnecessary human efforts. To achieve a uniform and economically reasonable use of electronic exchange of medical documents the use of standards is a must. This ensures that several autonomous systems and organizations can communicate properly with each other. The CDA-CH specification focuses exactly on this subject and has the aim to increase the interoperability between service providers in the Swiss health care system.



**Picture 1: Document exchange among health care service providers (e.g. hospitals, doctors, pharmacies and home care organizations)**

The CDA-CH specification - based on the German VHitG Arztbrief – will allow health care service providers to exchange medical documents between with each other. First and foremost, we see the scenery of this specification where the need to increase interoperability levels within existing processes and procedures exists. We therefore locally suggest treating the specification as a successor standard for medical information currently available only as free text documents (e.g. PDF, TIF, Word and e-mail).

The CDA-CH specification will allow health care service providers to exchange electronic medical documents between each other. There is a need to increase interoperability levels within existing processes. We therefore recommend that health care providers use the specification as a successor standard for medical information (which is currently available as unstructured free text documents; e.g. PDF, TIF, Word and e-mail).



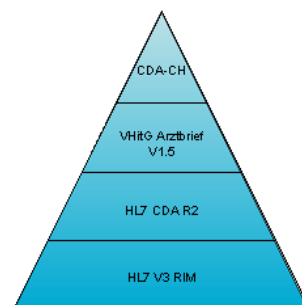
**Picture 2: Suggestion for the use of CDA-CH**

## II. Implementation, Methodology and Tools

The standard is currently being implemented in a first project, called ANOS Medical Cockpit. The functionality there will be a Clinical Documentation and Communication for an Emergency Station which is driven by General Practitioners. The implementation will take care about Level 1 CDA Documents according to the CDA-CH Architecture which is described below.

### Architecture:

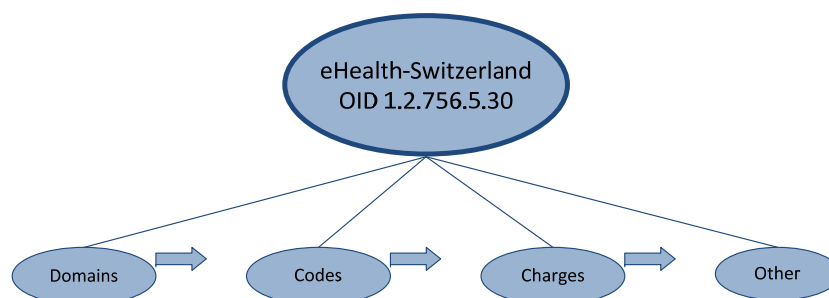
CDA-CH does only specify the necessary Swiss specific elements because it is based on the German implementation Guide "VHitG Arztbrief". In a first version of the specification we entirely standardize the CDA-Header but do only mention a few normative definitions for the CDA-Body. The main reason for this iterative movement of the standardization is to not generate too much prevention arguments. We will provide a pragmatic way and "a just today implementable" solution.



Picture 3: CDA-CH Dependencies

The specification further contains a lot of additional and not yet normative information around concepts for security, privacy, transmission and so on.

Because the introduction of CDA is the first national wide approach of using HL7 V3 in Switzerland we simultaneously set up a OID registration authority which takes care of a controlled registration of Swiss eHealth object domains. This authority makes in addition to the ISO 9834-1 requirements sure that we do not register more than one OID node for one domain.



Picture 4: OID root "eHealth-Switzerland"

We didn't covered subjects like tools or conformance testing. This will be one of the next tasks to do.

### III. CDA in Use

The standard is currently being implemented in a first project, called ANOS Medical Cockpit of the regional Hospital in Solothurn, Switzerland. Within the ANOS Project there haven't been any CDA Documents, yet. The Project is currently in the startup phase.

Let us therefore explain the case study we included in the CDA-CH Specification:

The case study serves the sole purpose of illustration for a possible implementation of this specification and is not normative.

#### **Case study:**

A 70-year-old patient visits his physician because of burden pain in the right hip joint, which already exists a long time, but has increased significantly in recent months.

Because of the history of illness and the clinical status of the patient, the family physician suspected the diagnosis of osteoarthritis of the right hip joint as the source of complaints. The family doctor decides to confirm the suspicion through an X-ray examination of the hip joint.

Since he does not carry out X-ray investigations himself, he transfers the patient in an external X-ray institute through a contract form and negotiates an appointment. The images of the inquiry and an X-ray report with radiological assessment by the specialist are delivered to be the family doctor shortly after the study.

At the next consultation the doctor discusses the situation with the patient. They decide that the patient goes to a specialist for orthopedics to discuss the treatment options. The family doctor submits a transfer report, which contains the existing disease process and the results of the investigations and transmits these outlines, together with the X-ray images to the practice of the orthopedist.

Once he has informed himself on the basis of radiological findings of the X-ray images, the orthopedist recommends the patient's operational restoration of the right hip joint through implantation of a hip-endoprosthesis. The patient agrees with the proposal. The orthopedist informs the family doctor about the decision and invites him to organize the transfer to the hospital and to do the preoperative laboratory tests in the GP practice.

Shortly before the hospital admission, the patient has an appointment with his physician to determine the necessary laboratory values for the surgery. The laboratory values are sent from the GP practice to the hospital where they are transferred into the electronic patient dossier.

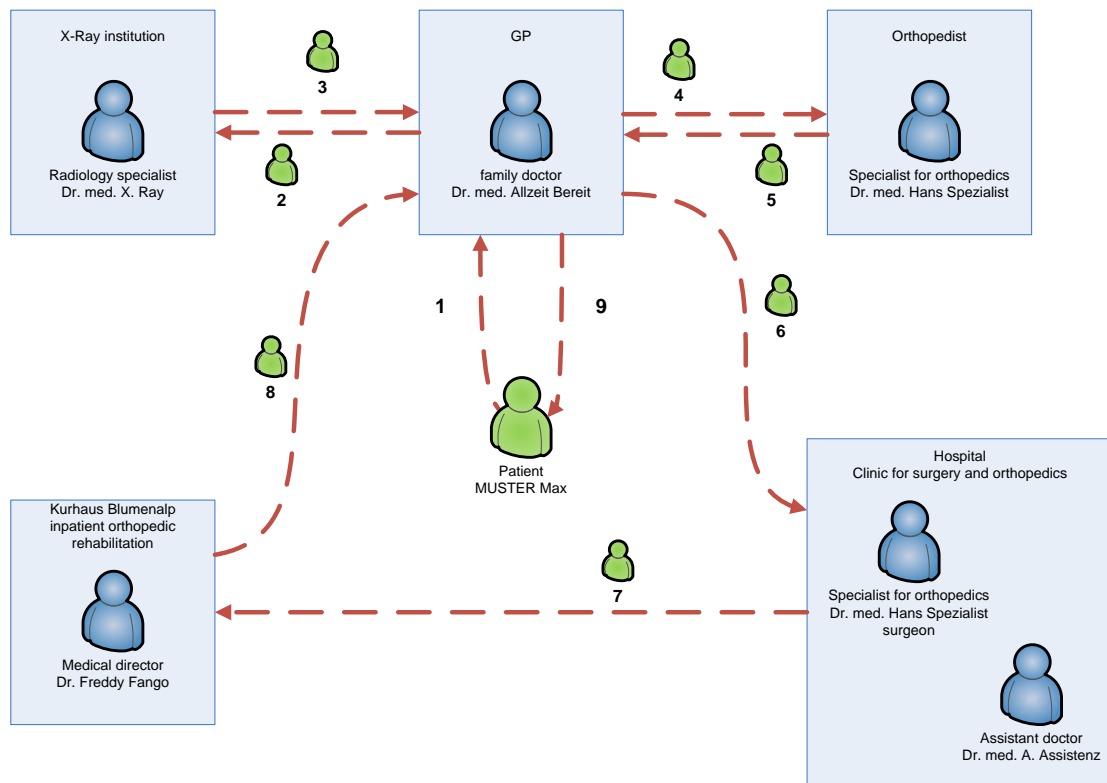
During the operation, the X-ray images of hip are available to the surgeons. The situation of the endoprosthesis is checked using C-arm (translation?). Postoperative there are taken again X-ray images of the hip in the hospital. The orthopedist documents the operation history and gives instructions for the further treatment of the patient after surgery in a report. The family doctor gets a copy of this operation report.

The patient can after a week hospital stay be dismissed in an inpatient rehabilitation.

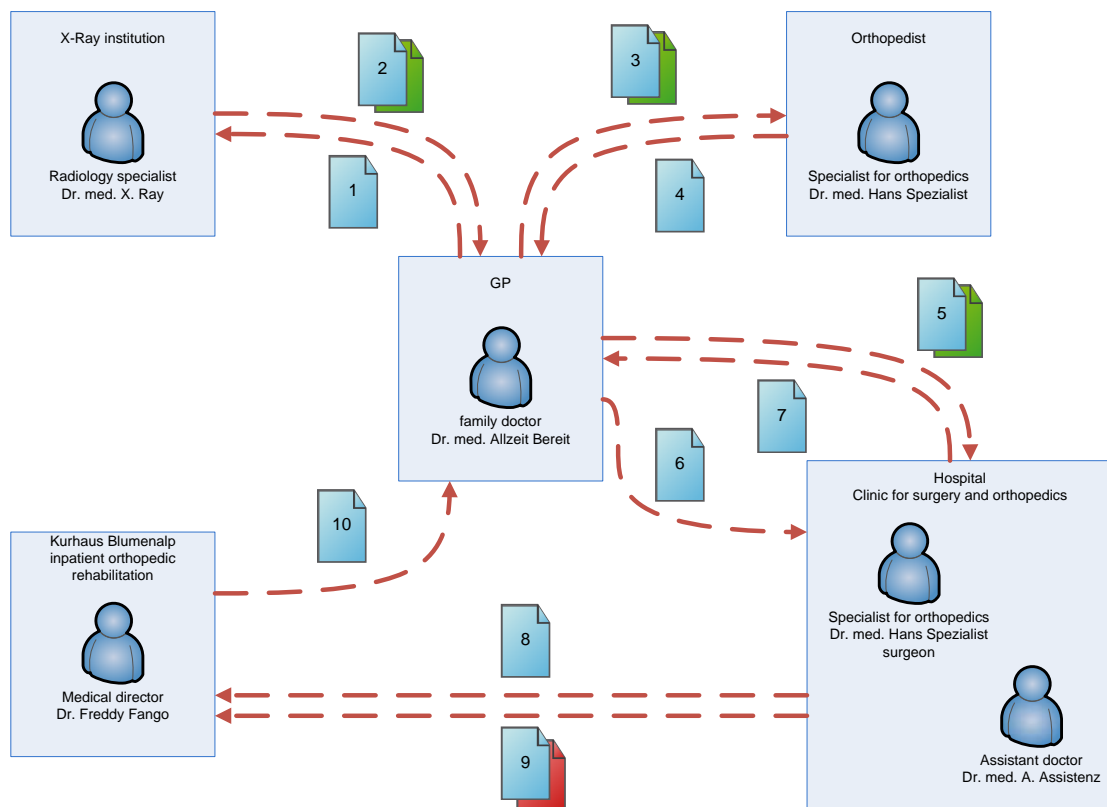
The medical director of the rehabilitation house is informed using a summarized discharge report on the morbidity and surgical history of the patient. A summary of laboratory results, a copy of the X-ray images and a copy of the operation report are attached to the report. The family doctor also gets a copy of the summarized discharge report.

After completion of rehabilitation of the patient the rehabilitation clinic in turn creates a summary report for the general practitioner with a copy to the orthopedist. The treatment will finally end with a consultation at the family doctor.

The patient is undergoing the following stations throughout the treatment:



Picture 5: Walkthrough of the patient in the case study “hip joint replacement”



Picture 6: Document workflow in the case study “hip joint replacement”

**Legend:**

1. Allocation to radiological diagnostics:  
Order for radiological investigation by the family doctor to the radiology institute.
2. Feedback radiology findings:  
Returning the resulting images and findings to the family doctor
3. Transfer for assessment by the specialized physician:  
Referral letter from the physician to the orthopedist, together with the X-ray images and a summary of the history and the findings collected
4. Referral report:  
Medical report of the orthopedist to the family doctor with a specialized assessment and a description of the next steps (operation)
5. Regular hospital admission:  
The doctor asks the hospital to invite the patient for surgery operation
6. Preoperative investigation of lab results:  
Recent findings from the physical examination and reporting of laboratory analysis results from the general practitioner to hospital.
7. Surgery operation report:  
Operation report of the surgeons to the family doctor
8. Short report on hospital discharge:  
Roughly information from the hospital to the rehabilitation institute
9. Hospital discharge report:  
Referral letter to the rehabilitation clinic (including postoperative X-ray images of the total endoprosthesis and summary of the lab results) with a copy to the family doctor
10. Rehabilitation discharge report:  
Discharge report of the rehabilitation clinic to the family doctor with a copy to the orthopedist

**IV. Evaluation/Assessment**

Not applicable for the implementation.

Let us therefore explain the current market acceptance and legislator situation in Switzerland:  
The specification recently finished a public consultation to become a national standard. The acceptance is very good.

Hospitals are thinking about only to provide CDA as discharge reports because CDA is human readable and can easily being rendered in any web browser using style sheets. Another reason for doing this is that there is IT infrastructure (at least computer and internet access) at each health care service provider and therefore there are no financial investments necessary on receiver site.

Because we currently only make use of the CDA header and the CDA body (level 1) CDA R2 fulfills all our current needs. There are some projects planned which intend to create CDA body templates and clinical statements (e.g. medical certificate for accident insurances). Very often medical information in Switzerland is enriched with insurance information and therefore we can imagine that we will have some feedback for CDA Release 3 in the future.

## V. Future Plans

The working group has currently the following subjects on the agenda:

- Standardization CDA Body: discharge reports, medical certificates, OP reports, referrals...
- CDA-CH Addenda "transfer report for longterm care"
- Spreading information and promote acceptance around OIDs in Switzerland

Out of scope of CDA but as well very important:

- Communication of "care provision" orders so that any form of health services can be electronically requested and answered using a single standard
- Spreading information and promote acceptance around IHE in Switzerland

## VI. Conclusions and Lessons Learned

CDA is a good match with our current requirements. It is used as an enabler to spread HL7 implementations in Switzerland and we promote HL7 as a national standard to our legislator. We see some problems related to the coherence of the HL7 V3 standard. CDA is a stable model whereas this is less true for some of the messaging models we are likely to use in future projects.

## References

- [1]: CDA-CH Specification V1.1 (ge/fr/it):  
[http://www.hl7.ch/downloads/CDA-CH\\_V1.1.zip](http://www.hl7.ch/downloads/CDA-CH_V1.1.zip)
- [2]: CDA-CH Supporting Documents V1.1 (ge/fr/it):  
[http://www.hl7.ch/downloads/CDA-CH\\_SupportingDocuments.zip](http://www.hl7.ch/downloads/CDA-CH_SupportingDocuments.zip)
- [3]: Presentation of the HL7 working group (May 20<sup>th</sup> 2008; ge):  
[http://www.hl7.ch/downloads/Präsentation\\_ts\\_20080520.pdf](http://www.hl7.ch/downloads/Präsentation_ts_20080520.pdf)
- [4]: Presentation at the annual member conference of the Swiss Society for Medical Informatics (June 6<sup>th</sup> 2008; ge):  
[http://www.sgmi-ssim.ch/uploads/media/schaller\\_presentation.ppt](http://www.sgmi-ssim.ch/uploads/media/schaller_presentation.ppt)
- [5]: Presentation at the first eHealth Summit (August 27<sup>th</sup> 2008; ge):  
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