

# CDA for Pathology Reports: Korean Perspective

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**Abstract- Pathology reports constitute an important part of patient medical records that need to be exchanged for improving quality of care. In this paper, we report our experience from an early effort to implement CDA for pathology reports used at hospitals in Korea. Our approach is to create an abstract model that only defines the body structure and all necessary entries for checklist items as optional. Each individual CDA for a specific pathology report can then be created through specialization of the abstract model.**

## I. INTRODUCTION

To improve the quality of patient care, it is very important and imperative to share clinical information of patients between healthcare providers in an interoperable manner. HL7 CDA [1] is an XML-based standard for the exchange and sharing of clinical documents. In Korea, CDAs for referrals and care summary reports have been implemented and efforts to implement CDA for other types of clinical documents including pathology reports are currently under way.

Pathology reports constitute an important part of clinical information and are used in the study and diagnosis of disease through examination of organs, tissues, bodily fluids, and whole bodies (autopsies). As such, CDA implementation for pathology reports is necessary with high priority.

In this paper, we report our experiences from an early phase of designing and implementing pathology report CDA from Korean perspectives. More specifically, our approach is to create a single abstract CDA model to accommodate diverse pathology reports that are currently being used at hospitals in Korea. The abstract model is much like an abstract class in the object oriented paradigm. It defines a basic sectional structure in the body and entries for all checklist items as optional. CDA for each individual pathology report is then created through specialization. To achieve a high degree of interoperability, our design is based on Surgical Pathology Cancer Case Summary (Checklist) by College of American Pathologists [2] and Implementation Guide for CDA Release 2 CDA for Anatomical Pathology Reports (draft) by HL7 [3].

There was at least one effort to implement CDA for Pathology reports, reported in IHC 2008 [4], in which they implemented an information system in Anatomy Pathology and described how to generate, validate, and transfer Pathology Report CDA. In the work, however, only the diagnosis was implemented in entry level, yet all other sections were presented in narrative text. Therefore, the approach is limited in classifying and retrieving CDAs within the information

system. They also focused more on the information system than on the details about the CDA itself. In contrast, we try to implement as much in entry level as possible with emphasis on the specifics of CDA, since the information system aspect regarding CDA has been reported elsewhere [5][6][7].

## II. METHOD

We design the abstract CDA via the following steps:

- (a) Derive a comprehensive checklist, some of which are included in a specific pathology report.
- (b) Assign a structural constraint to the abstract CDA.
- (c) Assign appropriate LOINC or SNOMED CT codes to the names and values of entries.

In what follows, we elaborate each of the above steps.

We first analyzed 27 Pathology reports that are being used in Kyungpook National University Hospital, including ‘Thyroid Cancer’ and ‘Breast Cancer’. In addition, a total of 59 checklist items such as ‘procedure’ and ‘specimen size’ were identified. We observed, however, they used different expressions for the same item in different reports, probably for the sake of their conveniences. It is hence natural to assume that such inconsistencies also exist in Pathology reports in other hospitals in Korea too.

To avoid the inconsistencies and to derive a comprehensive checklist, we then took and analyzed the Surgical Pathology Cancer Case Summary (Checklist) by College of American Pathologists. Our choice of it as a reference is based on the following observations: it is a de facto standard in U.S. and includes quite a large set of checklist items that we believe encompass all those checklist items that are included in pathology reports used in Korea. We identified all checklist items from the list and analyzed them in terms of which section(s) they must be assigned to, in the next step.

Next, we followed the HL7 Implementation Guide for CDA Release 2 CDA for Anatomical Pathology Reports US realm (draft) to define the body structure. According to the draft, the body is divided into six sections, to which each checklist item is assigned based on the analysis from the previous step. Note that the draft is specifically designed for the use in U.S. and some disparities with pathology reports used in Korea. Therefore, we take only the structure and names of the sections, but choose a different way to assign each entry to sections, based on local requirements.

A further adjustment is made to the section structure. Assigning a large list of entries to a section with no additional

structure may result in poor readability. Therefore, we add an additional layer of structure to each section so that an upper-level entry groups similar or closely related entries together.

Finally, to implement CDA in the entry level, we need to assign a code system and a specific code to the name and value of entries. We use LOINC (Logical Observation Identifiers Names and Codes) [8] for the sections and upper-level entries. But for the names and values of specific checklist items, we use SNOMED CT (Systematized Nomenclature of Medicine Clinical Terms) [9] instead, because LOINC is not for such specific names and values.

CDA body	<ul style="list-style-type: none"> <li>- Clinical Information</li> <li>- Intraoperative Examination</li> <li>- Macroscopic Examination</li> <li>- Microscopic Examination</li> <li>- Additional Pathological findings</li> <li>- Comments</li> </ul>
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**Figure 1. CDA body structure**

Macroscopic Examination	<ul style="list-style-type: none"> <li>- Procedure</li> <li>- Tumor</li> <li>- Other Macroscopic Findings</li> </ul>
Microscopic Examination	<ul style="list-style-type: none"> <li>- Histologic</li> <li>- Tumor</li> <li>- pTNM</li> <li>- Tumor Involvement</li> <li>- Other Microscopic Findings</li> </ul>

**Figure 2. Upper-level entries**

### III. RESULT

Following the HL7 Implementation Guide, we divided the CDA body into six sections as Fig. 1. Each section name is self-explanatory. For the detailed description of each section, readers are referred to [4]. We observed that most of the checklist items belong to either Macroscopic Examination or Microscopic Examination sections, and we implemented them as Entry.

Macroscopic Examination section includes *Procedure, Tumor, and Other Macroscopic Findings* as upper-level entries. Likewise, Microscopic Examination section includes five upper-level entries as shown in Fig. 2. Procedure entry represents information about surgical procedures and specimen including Specimen Site, Specimen Size, and Laterality. Tumor entry includes information about tumor such as Tumor Site and Tumor Size. Other Macroscopic Findings includes items such as Fetal Tissue, Satellite Nodule.

Microscopic Examination section includes Histologic, Tumor, pTNM, Tumor Involvement, Other Microscopic Findings. Histologic entry represents information including Histologic Grade and Histologic Type. Tumor entry include characteristic of microscopic observation of tumor such as Tumor

Configuration and Tumor Quantitation. pTNM represents information about tumor staging, including Primary Tumor, Regional Lymph nodes and Distant Metastasis. Tumor Involvement entry represents information of extent of tumor include Tumor Invasion and Tumor Extension. Other Microscopic Findings includes items such as Intratumoral/Peritumoral Lymphatic Response, Mitotic Index.

For the Entry level implementation, we need to assign codes to the names and values of checklist items. LOINC codes were assigned to Section names and upper-level entry names. For the names and values of specific checklist items, however, we found LOINC inadequate and used SNOMED CT instead. An example of code assignment for the checklist items is given in Fig. 3.

Identical checklist items expressed differently were merged to a single checklist item with unified descriptions and assigned a single SNOMED CT code.

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<entry>
  <observation classCode="OBS" moodCode="EVN">
    <code code="384727002"
      codeSystem="2.16.840.1.113883.6.96"
      codeSystemName="SNOMED CT"
      displayName="Specimen Laterality"/>
    <value xsi:type="CD" code="7771000"
      codeSystem="2.16.840.1.113883.6.96"
      codeSystemName="SNOMED CT" displayName="right"/>
  </observation>
</entry>

```

**Figure 3. Code assignment example**

### IV. CONCLUSION

As an important part of patient clinical information, pathology reports need to be exchanged between healthcare providers in an interoperable manner, to improve the quality of patient care. In this paper, we reported our experience from an early stage of implementing CDA for pathology reports that are being used at Korean hospitals.

Our approach is to create an abstract CDA model that encompasses various pathology reports, from which CDA for each individual report can be derived through specialization. We chose a comprehensive checklist from Surgical Pathology Cancer Case Summary. The body structure follows HL7 Implementation Guide for CDA Release 2 CDA for Pathology Reports US Realm, with additional upper-level entries to enhance readability by grouping similar or closely related checklist items.

For future work, we plan to implement CDAs for individual pathology report based on the abstract model we described in this paper.

As many Pathology reports are associated with images, we also plan to include DICOM-compliant image IDs [10] within a CDA to refer to associated images.

## REFERENCES

- [1] HL7 Clinical Document Architecture (CDA), <http://www.hl7.org>
- [2] Surgical Pathology Cancer Case Summary (Checklist), College of American Pathologists. <http://www.cap.org>
- [3] Implementation Guide for CDA Release 2 CDA for Anatomical Pathology Reports. US Realm <http://www.hl7.org>
- [4] Nikos Kyriakoulakos, Implementation of electronic Anatomic Pathology Report as using a representation form the HL7 CDA document standard, IHIC 2008, 2008.
- [5] H. Kim, B.-K. Yi, I. Kim, K. Ha, Y.-S. Kwak, Interoperable Clinical Information Sharing System based on CDA and Document Registry Framework, IHIC 2008, 2008.
- [6] I. Kim, National Projects Requiring HL7 Standards in Korea, IHIC 2009, 2009.
- [7] S.-H. Lee, H. J. Lee, B.-K. Yi, I. K. Kim, Y. S. Kwak, H. S. Lee , Y. Lee , W.-K. Lee, M.-J. Cho, Information System for National Human Pathogen Bank of Korea, APAMI 2009, 2009. pp.68-72.
- [8] Logical Observation Identifiers Names and Codes (LOINC). <http://www.loinc.org>
- [9] Systematized Nomenclature of Medicine (SNOMED CT). <http://www.ihtsdo.org>
- [10] ISO 17432, Health Informatics – Messages and communication – Web access to DICOM persistent objects