# HISO 10047 CDA Templates for Comprehensive Clinical Assessments

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## Document information

## Contributors

The following organisations contributed to the development of this standard through representation on HISO or one of its working groups:

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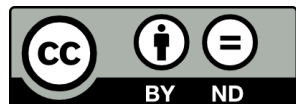
Māori interests

National Health IT Board Consumer Panel

Accident Compensation Corporation

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See the HISO website for information about our standards development processes.

# Contents

# 1    Introduction

This standard provides an electronic format for sharing comprehensive clinical assessment reports created using the interRAI methodology.

## 1.1    Background

The New Zealand health and disability sector has implemented comprehensive clinical assessments for older people, using a set of interRAI instruments[1]. Home care, residential care and community health assessments have been rolled out. Assessors around the country use centrally hosted interRAI-certified software to complete questionnaires and produce assessment reports.

Each interRAI instrument comprises a questionnaire and data collection form, a set of clinical assessment protocols (CAPs) and triggers, and a set of outcome measures. Questionnaire responses, CAPs and outcome measures are collected in structured assessment reports for use in care planning. Completed reports are shared via clinical data repositories as entries in the patient's electronic health record. Clinicians in all settings retrieve and view assessment data using their own point-of-care software.

Assessment reports are copied from the assessment system to care planning applications, clinical data repositories and clinical workstations.

## 1.2    Purpose

This standard provides the electronic format of interRAI assessment reports copied between systems. It is a standard for interoperability. We present HL7 Clinical Document Architecture (CDA) templates defining the necessary XML format.

Commercial software with assessment, care planning or repository functions will need to be able to produce and/or consume CDA documents conforming to our templates. Products will be certified against this standard.

## 1.3    Scope

This standard provides CDA templates for interRAI home care, contact assessment, residential care and community health assessment types.

The standard is necessarily constrained to data elements and code sets defined or used by interRAI.

Our key use case scenario is serving a request from an external point-of-care system (eg care planning application or clinical workstation) to retrieve a completed assessment report from the central system.

The process is as follows:

1. An assessment is completed online using the central system and stored there.

2. A clinician logged into an external point-of-care system queries the central system and

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[1] The name interRAI derives from 'international resident assessment instrument'

requests that particular assessment report (which will be identified by patient, assessment type and assessment date).

3. The central system constructs the assessment report as a CDA document and returns it to the requesting system.

4. The requesting system receives the CDA document and either displays the document directly (using a stylesheet) or imports the content of the document as a unit into its own database.

Note the following rules for safe use of interRAI assessment data:

▪ When any assessment data is retrieved from the database and displayed to the end user, the full assessment must be presented so that its context and provenance are clear. This avoids the clinical risk of displaying individual data elements out of context.

▪ Care planning can then occur based on the basis of the full assessment, CAPS, outcome measures etc. Fragments of assessment data should not be imported for care planning and care plans should not be auto-generated from assessment data.

▪ The interRAI copyright notice should be clearly displayed with the assessment.

With regards to architecture, note that:

▪ The central system does not store assessment reports readymade as CDA documents; rather, they are constructed on demand from their component data elements. Each report retains its own data integrity whether stored in the database or copied as a document.

▪ In future we plan to expose assessment reports via an Integrating the Healthcare Enterprise (IHE) Cross Enterprise Document Sharing (XDS) interface. Under this model, records in the assessment system will be indexed by an external registry system, making this content uniformly findable and accessible alongside clinical records stored in other repositories.

## 1.4    Related specifications

Our interoperability architecture is described by the following specifications:

▪ Reference Architecture for Interoperability
http://www.ithealthboard.health.nz/content/health-sector-architects-group/

▪ HISO 10040 Health Information Exchange Architecture
http://www.ithealthboard.health.nz/content/health-information-exchange-architecture-building-blocks/

▪ HISO 10043 CDA Common Templates http://www.ithealthboard.health.nz/hiso/

The key underlying international standards are:

▪ HL7 Clinical Document Architecture (CDA) Release 2 Normative Edition 2005
http://www.hl7.org/

▪ HL7/LOINC user guide for CDA document type vocabulary domain
http://loinc.org/downloads/files/LOINCManual.pdf

▪ ASTM/HL7 Continuity of Care Document (CCD) http://www.hl7.org/

Standards related to web services transport, repository, security and privacy mechanisms are described elsewhere.

# 2    CDA templates

This section presents the definitive set of CDA templates for interRAI assessment reports. Our templates conform to HL7 CDA Release 2.

HISO 10043 CDA Common Templates describes the compact style in which templates are defined here.

## 2.1    Assessment reports

The CDA document template for long-term care facility (LTCF) assessments is our example here.

```
{ltcf assessment report} →
ClinicalDocument
    realmCode
        code
            @code = NZ
    typeId
        @root = 2.16.840.1.113883.1.3
        @extension = POCD_HD000040
    templateId
        @root = 2.16.840.1.113883.2.18.7.20.3
    id
        @root (assessment number) : UUID
    code
        @code (assessment type) : LOINC code = "74195-9"
        @displayName = "interRAI Long Term Care Facility (LTCF) Document"
        …
    title = "interRAI Long-Term Care Facility (LTCF) Assessment Form Version 9.1"
    effectiveTime
        @value (assessment date/time) : datetime
    confidentialityCode
        @code = N (normal)
    languageCode
        @code = en-NZ
    recordTarget
        patientRole
            {patient}²
    {author}²+
    {custodian}²
    component
        structuredBody
            {assessment section}+ (ie multiple assessment sections)
            {medications section}
            {assessment section}+
```

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² Refer to [10043 CDA Common Templates](#) for these definitions

{assessment summary section}
{outcome scales section}

LOINC codes (to be assigned) and CDA template OIDs distinguish the different document types. CDA templates for the other three assessments differ from the example in just these details, besides the title.

| Title | LOINC code | CDA template OID |
|---|---|---|
| interRAI Home Care (HC) Assessment Form Version *<version number>* | 74196-7 | 2.16.840.1.113883.2.18.7.20.2 |
| interRAI Long-Term Care Facility (LTCF) Assessment Form Version *<version number>* | 74195-9 | 2.16.840.1.113883.2.18.7.20.3 |
| interRAI Community Health Assessment (CHA) Form Version *<version number>* | 74194-2 | 2.16.840.1.113883.2.18.7.20.4 |
| interRAI Contact Assessment (CA) Form Version *<version number>* | 74197-5 | 2.16.840.1.113883.2.18.7.20.5 |

The overall LOINC classification for interRAI assessment reports is yet to be assigned.

Assessments can be interim or final. Interim reports have the word DRAFT appended to the title.

## 2.2 Assessment sections

The body of the CDA document breaks into a number of sections corresponding to the structure of the assessment.

The four document types use many of the same section headings, as the table shows.

| i-code | Section title | HC | LTCF | CHA | CA |
|---|---|---|---|---|---|
| iA | Identification information | ✓ | ✓ | ✓ | ✓ |
| iB | Intake and initial history | ✓ | ✓ | ✓ | ✓ |
| iC | Cognition | ✓ | ✓ | ✓ | ✓ |
| iD | Communication and vision | ✓ | ✓ | ✓ | ✓ |
| iE | Mood and behaviour | ✓ | ✓ | ✓ | ✓ |
| iF | Psychosocial wellbeing | ✓ | ✓ | ✓ | ✓ |
| iG | Functional status | ✓ | ✓ | ✓ | ✓ |
| iH | Continence | ✓ | ✓ | ✓ | |
| iI | Disease diagnoses | ✓ | ✓ | ✓ | ✓ |

| i-code | Section title | HC | LTCF | CHA | CA |
|---|---|:---:|:---:|:---:|:---:|
| iJ | Health conditions | ✓ | ✓ | ✓ | ✓ |
| iK | Oral nutritional status | ✓ | ✓ | ✓ | ✓ |
| iL | Skin condition | ✓ | ✓ | | ✓ |
| iM | Medications | ✓ | ✓ | ✓ | |
| iN | Treatments and procedures | ✓ | ✓ | ✓ | ✓ |
| iO | Responsibility and directives | ✓ | ✓ | | |
| iP | Social supports | ✓ | | ✓ | ✓ |
| iQ | Environmental assessment | ✓ | | ✓ | |
| iR | Discharge potential and overall status | ✓ | ✓ | | |
| iS | Activity pursuit | | ✓ | | |
| iT | Discharge | ✓ | ✓ | ✓ | |
| iU | Assessment details (assessor name and date) | ✓ | ✓ | ✓ | ✓ |
| iNN | Contact assessment summary | | | | ✓ |
| – | Assessment summary | ✓ | ✓ | ✓ | |
| – | Quality indicators (future edition) | | | | |
| – | Outcome scales | ✓ | ✓ | ✓ | |

All sections indicated should be present in final assessments. Sections can be missing from draft assessments.

The section identifiers listed are from the interRAI-specific i-code code set. Because the last few sections are not present in the questionnaire form they don't have these codes.

Each assessment item is represented by a machine-readable coded entry in its particular section. A written equivalent is placed in this section's narrative block, enabling web browsers to render a close approximation of the original assessment form.

All sections except medications, assessment summary and outcome scales sections conform to the same template.

{assessment section} →
component
    section
        templateId
            @root = 2.16.840.1.113883.2.18.7.80
        code

```
            @code : interRAI i-code
            @displayName (section title) : text
            …
        title : text (eg Cognition)
        text
            table
                tbody
                    {assessment item display row}*
    {assessment item row}*
```

The i-code concept descriptor in the above matches a production rule that we define in order to avoid repeating boilerplate text.

```
{icode concept} →
@code : interRAI i-code
@displayName : text
@codeSystem = 2.16.840.1.113883.2.18.63
```

## 2.3  Assessment items

Assessment items are all represented in essentially the same way, whichever section they appear in. We use the observation class from the CDA clinical statement model to associate each question with the assessor's chosen response.

In most sections, references to assessment items are based on the i-code code set. (The exception is the outcomes scales section with its own code set – see later).

```
{assessment item row} →                          {assessment item display row} →
entry                                            tr
    @typeCode = DRIV
    templateId
        @root = 2.16.840.1.113883.2.18.7.80.1
    observation
        @classCode = OBS
        @moodCode = EVN
        code
            @code : interRAI i-code                        th
            @displayName : text                           td
            …
        statusCode
            @code = complete | draft
        effectiveTime
            low
                @value (assessment date/time) : datetime
                                                          td (list of possible responses)
        value
            {assessment item value}                       td
    {assessment item comment}?               {assessment item display comment}?
```

For the sake of context, all possible responses to the particular assessment item have to be displayed, not only the one selected. However, such boilerplate appears in the text block only and not in the coded entry.

The data type used to record responses varies from item to item in the report. Multi-choice items tend to have integer values. Boolean, plain text, date and NHI/HPI identifier data types are also used.

The various representations and display formats are as follows.

| | |
|---|---|
| {assessment item value} (integer) → | |
| xsi:type = INT | |
| @value  : integer | td (eg "1. Yes") |
| | |
| {assessment item value} (text) → | |
| @xsi:type = ST | |
| @value : text | td |
| | |
| {assessment item value} (boolean) → | |
| @xsi:type = BL | |
| @value = true \| false | td = Yes \| No |
| | |
| {assessment item value} (date) → | |
| @xsi:type = TS | |
| @value : date | td : DD/MM/YYYY |

NHI and HPI numbers are coded as CDA native identifiers.

| | |
|---|---|
| {assessment item value} (NHI number) → | |
| @xsi:type = II | |
| @extension : NHI Number (format AAANNNN) | td |
| @root = 2.1.840.1.113883.2.18.2 | |
| | |
| {assessment item value} (HPI number) → | |
| @xsi:type = II | |
| @extension : HPI Person Number (format XXNNN) | td |
| @root = 2.1.840.1.113883.2.18.3.1 | |

Every assessment item can have a free text comment against it. For space reasons, the comment has to be displayed in a new row.

| | |
|---|---|
| {assessment item comment} → | {assessment item display comment} → |
| entryRelationship | tr |
|    @typeCode = SUBJ | |
|    inversionInd = true | |
|    observation | |
|       @classCode = OBS | |
|       @moodCode = EVN | |
|       code | |
|          @code = 48767-8 | |
|          @displayName = "Annotation comment" | |

```
        …
    value
        @xsi:type = ST
        . : text                                              td
```

As a complete worked example, consider how we represent a certain assessment item:

- Assessment type – Home Care (HC)

- Section C – Cognition

- Question 4 – Acute change in mental status from person's usual functioning

- Response – 0 (No)

The respective iCodes are iC for the section and iC4 for the question.

The item in the data entry form looks like this:

| 4 | Acute change in mental status from person's usual functioning | Eg restlessness, lethargy, difficulty to arouse, altered environmental perception<br>0. No    1. Yes | 0 |
|---|---|---|---|

Which translates to the following in a CDA document.

```
component
    section
        templateId
            @root = 2.16.840.1.113883.2.18.7.80
        code
            @code : interRAI i-code = iC
            @displayName = "Cognition"
            …
        title = Cognition
        text
            table
                tbody
                    (see opposite)
    (other coded entries)                          (other display rows)
    entry                                          tr
        observation
        @classCode = OBS
        @moodCode = EVN
        code
            @code : interRAI i-code = iC4              th = 4
            @displayName = "Acute change in …"        th = "Acute change in …"
            …
        statusCode
            @code = completed
        effectiveTime
            low
                @value = 20120803

                                                   td (list of possible responses)
```

```
              value
                  @xsi:type = INT
                  @value = 0                          td = "0. No"
              (other coded entries)                   (other display rows)
```

Once stylesheets have been applied, the version rendered on screen will look something like the following (depending on the actual stylesheets used).

**Cognition**

| 4 | **Acute change in mental status from person's usual functioning** | Eg restlessness, lethargy, difficulty to arouse, altered environmental perception<br>0. No<br>1. Yes | 0. No |
|---|---|---|---|

## 2.4     Patient demographics

Patient identity and demographic information appears in both the CDA document header and a particular body section for that part of the interRAI assessment. While this information is effectively duplicated, the formats are not the same and different purposes are served.

The body section provides a portrayal of the completed assessment form, while for most general purposes the proper source of patient demographics is the CDA document header.

## 2.5     Medications

The medications section has a different layout to most others. Coded entries in this section are ordered so that each sequence of six entries relates to a particular medication.

|   | a. Medication Name | b. Dose | c. Units | d. Route | e. Freq. | f. PRN |
|---|---|---|---|---|---|---|
| 1 | Bisacodyl Enema 10 mg per 5 ml | 10 | mg | PO | Q3D | 0 |
| 2 | Metoprolol 47.5 mg | 47.5 | mg | PO | BID | 1 |

The medication name is coded using the New Zealand Medicines Terminology (NZMT) and is selected from the New Zealand Universal List of Medicines (NZULM). The two examples involve medicinal products with unit of use, but products of any NZMT classification can be represented, including trade products and packaged products. Product identifiers are in all cases SNOMED codes.

Other entries use the interRAI-specific code sets tied to the respective assessment items. (Although we expect to adopt more widely based code sets in future.)

```
{medications section} →
component
    section
        templateId
            @root = 2.16.840.1.113883.2.18.7.82
        code
            @code : interRAI i-code = "8677-7"
            @displayName = "Medications"
```

```
        …
        title = "Medications"
        text
            table
                thead
                    tr
                        th (blank)
                        th = "a. Medication Name"
                        th = "b. Dose"
                        th = "c. Units"
                        th = "d. Route"
                        th = "e. Freq."
                        th = "f. PRN"
                tbody
                    {medications display row}*
        {medications row}*
```

Item number appears in the text block but not as a coded entry, simply as a counter.

| {medications row} → | {medications display row} → |
|---|---|
| | tr |
| |    th (item number) |
| {medications assessment item} (medication name) |    td |
| {medications assessment item} (dose numeric value) |    td |
| {medications assessment item} (dose units) |    td |
| {medications assessment item} (route) |    td |
| {medications assessment item} (frequency) |    td |
| {medications assessment item} (as-needed) |    td |

The coded form of assessment items is the same as in other sections, although with a different template identifier.

```
{medications assessment item} →
entry
    @typeCode = DRIV
    templateId
        @root = 2.16.840.1.113883.2.18.7.82.1
    observation (etc)
```

The medication name is an NZMT value, while the other values are all character strings.

```
{assessment item value} (nzmt) →
@xsi:type = CV
@code : NZMT code (eg 10055721000116103)
@displayName : text (eg "Frusemide 40 mg tablet")
@codeSystem = 2.16.840.1.11383.2.18.21
```

Note that we intend to use the native medication classes of the CDA clinical statement model in place of the above structures in a future edition of this standard.

## 2.6    Assessment summary

The assessment summary section, like the medications section, is organised differently to others. The text block is structured to display assessment items across the page.

**Clinical Assessment Protocols**

| CAP | Triggered | Addressed in Care Plan | Assessment Summary |
|---|---|---|---|
| 1. Physical activities promotion | Triggered (L1) | X | Participant isn't as physically active as his peers |
| 2. Activities of daily living | Facilitate improvement (L2) | | |
| 3. Physical restraints | … | | |

Coded entries in this section are precisely ordered, each sequence of four entries relating to a particular clinical assessment protocol (CAP). These entries include the name of the CAP, whether the CAP was triggered and at what level (0, 1 or 2), and whether the CAP is addressed in a care plan. The last entry in the sequence is an explanatory comment.

```
{assessment summary section} →
component
    section
        templateId
            @root = 2.16.840.1.113883.2.18.7.81
        code
            @code : LOINC code = "46079-0"
            @displayName = "Assessment Summary"
            …
        title = "Assessment Summary"
        text
            table
                thead
                    tr
                        th = CAP
                        th = Triggered
                        th = "Addressed in Care Plan"
                        th = "Assessment Summary"
                tbody
                    {assessment summary display row}*
        {assessment summary row}*
```

The care plan question has a boolean-valued response, while the other values are all free text.

```
{assessment summary row} →                      {assessment summary display row} →
                                                tr
{assessment summary item} (CAP)                     td
{assessment summary item} (triggered)               td ("X" if true, otherwise blank)
{assessment summary item} (care plan)               td
{assessment summary item} (comment)                 td
```

The coded form of assessment items is the same as in other sections, except with a different template identifier.

```
{assessment summary item} →
entry
    @typeCode = DRIV
    templateId
        @root = 2.16.840.1.113883.2.18.7.81.1
    observation (etc)
```

Note that we propose to modify the structure of the above coded entries in a future edition of this standard: the four coded entries in each row will be wrapped by a new organizer element.

## 2.7    Outcome scales

The outcome scales section is another (like the medications and assessment summary sections) that has a structure of its own.

Resource utilisation groupings (RUGs) as a distinct subclass are displayed in a separate table from other outcome scales.

**Outcome Scales**

| ADL Hierarchy Scale (0 - 6) | 2 |
|---|---|
| Cognitive Performance Scale (0 – 6) | 3 |

**Resource Utilisation Grouping (RUG)**

| RUG Description | CA2 / ADL 4 - 11 |
|---|---|
| RUG III Group | Clinically complex with depression |

RUGs entries follow other outcome scales entries in the same block of clinical statements.

Because outcome scales don't have iCodes, we adopt the item's full description as a surrogate identifier, replacing space characters with underscores – for example: 'ADL_Hierarchy_Scale_(0_-_6)'.

The section as a whole does not carry a code – neither an i-code nor a suitable LOINC code is presently available.

```
{outcome scales section} →
component
    section
        templateId
            @root = 2.16.840.1.113883.2.18.7.83
        title = "Outcome Scales"
        text
            table
                @caption = "Outcome Scales"
                tbody
                    {outcome scales display row}*
```

```
                table
                    @caption = "Resource Utilisation Grouping (RUG)"
                    tbody
                        {outcome scales display row}*
            {outcome scales row}*
```

Every entry pairs an outcome scale with an observed value.

```
{outcome scales row} →                                  {outcome scales display row} →
entry                                                   tr
    templateId
        @root = 2.16.840.1.113883.2.18.7.83.1
    observation
        @classCode = OBS
        @moodCode = EVN
        code
            @code : interRAI Outcome Scale
            @displayName : text                         th (eg "ADL Hierarchy Scale …")
            @codeSystem = 2.16.840.1.113883.2.18.65
        statusCode
            @code = completed
        effectiveTime
            low
                @value (assessment date) : date
        value
            @xsi:type = ST
            . : text                                    td (eg 2)
```