HL7 FINLAND

# FINNISH HEALTH DATA HACKATHON

## Care Plan & Clinical Reasoning Track

December 18, 2025

# HL7 FINLAND

HL7 Affiliate | Denmark

HL7 Affiliate | Norway

HL7 SWEDEN

Helsinki

IHE CATALYST

sensotrend

# AGENDA

- Overview of the scope
- Example topics
- Your ideas for topics
- Q&A

fhir.fi/hackathon

# NORDIC HEALTH DATA
# HACKATHONS

fhir.fi/hackathon

# HL7 Finland 30 Years Symposium

- Monday, 19 January 2026
- Same premises as the hackathon
- Requires different registration!

- Draft agenda:

9.30-10.00 Coffee
10.00-12.00 Finnish sessions
12.00-13.00 Lunch
13.00-16.00 International sessions
16.00- Networking and drinks

www.hl7.fi/kokoukset-ja-tapahtumat/hl7-finland-30th-anniversary-symposium/


Radical in Actions

# Europe's Premier Festival For Health & Care

19-21 January 2026 | Helsinki, Finland

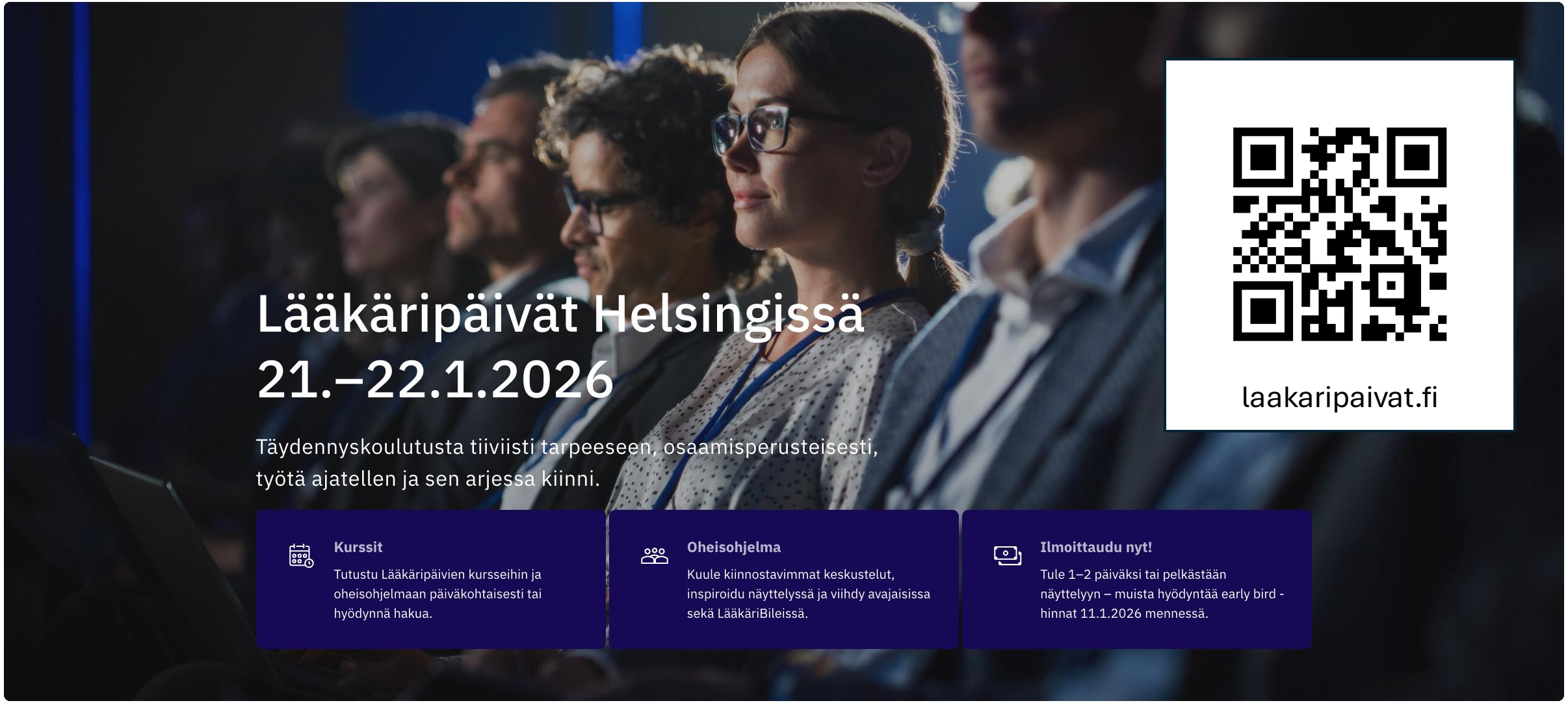
Festival tickets

Become a partner

radicalhealthfest.com

## Operationalising Precision Health

**Radical Health Festival Helsinki is where bold ideas meet real action — and where new alliances for health are born.**
**We are a festival, not a conference. A movement for those ready to challenge the old ways, rethink prevention and care, and drive health transformation across Europe and beyond. In 2026, we focus on Operationalising Precision Health — making it real, together.**



# Lääkäripäivät Helsingissä 21.–22.1.2026

laakaripaivat.fi

Täydennyskoulutusta tiiviisti tarpeeseen, osaamisperusteisesti, työtä ajatellen ja sen arjessa kiinni.

**Kurssit**

Tutustu Lääkäripäivien kursseihin ja oheisohjelmaan päiväkohtaisesti tai hyödynnä hakua.

**Oheisohjelma**

Kuule kiinnostavimmat keskustelut, inspiroidu näyttelyssä ja viihdy avajaisissa sekä LääkäriBileissä.

**Ilmoittaudu nyt!**

Tule 1–2 päiväksi tai pelkästään näyttelyyn – muista hyödyntää early bird -hinnat 11.1.2026 mennessä.

# When & Where

- Monday, January 19, 2026, starting at 9:00 EEST
- Some tracks continue on Tuesday, January 20, 2026
- Results presented on Wednesday, January 21, 2026

# Participation

- Register in advance
- **No costs involved!**

# Participate

**To take part in the hackathon, please fill in and submit the registration form!**

We will have implementations available at least from

- Apotti
- City of Helsinki
- Duodecim
- Epic
- Findynet
- Forsante
- Gnomon Informatics
- HippocrAItes
- IHE Catalyst
- Kela
- MyHealth@MyHands
- Otos Health
- Sensotrend
- Scytáles

The list of available implementations is updated up to the start of the event.

If you want to get listed on this page, or if you want to propose an additional track, please contact Heidi Hakala, the FHIR Ambassador of HL7 Finland, at heidi.hakala@productivityleap.com!

HL7 FINLAND

# Finnish Health Data Hackathon Registration Form

Register to the Health Data Hackathon on January 19-21 2026

Family Name*

Enter text

Given Name*

Enter text

Organization*

# Care Plans and Clinical Reasoning

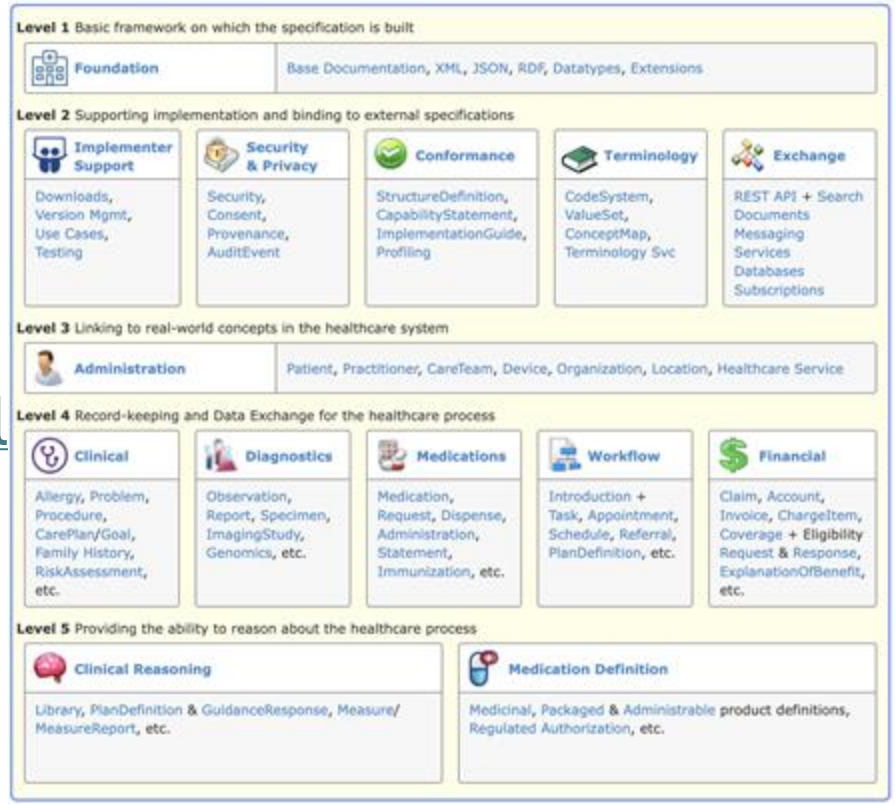
Finnish Health Data Hackathon

2026-01 Helsinki

# FHIR Clinical Reasoning

**Level 5 of the FHIR specification:**

The Clinical Reasoning Module
https://hl7.org/fhir/R4/clinicalreasoning-modul




**Level 5** Providing the ability to reason about the healthcare process

**Clinical Reasoning** | Library, PlanDefinition & GuidanceResponse, Measure/MeasureReport, etc.

# Knowledge Artifacts – Use Case: **Sharing**

**Representation of patient-independent clinical knowledge**
**Sharing knowledge artifacts across systems and organizations**

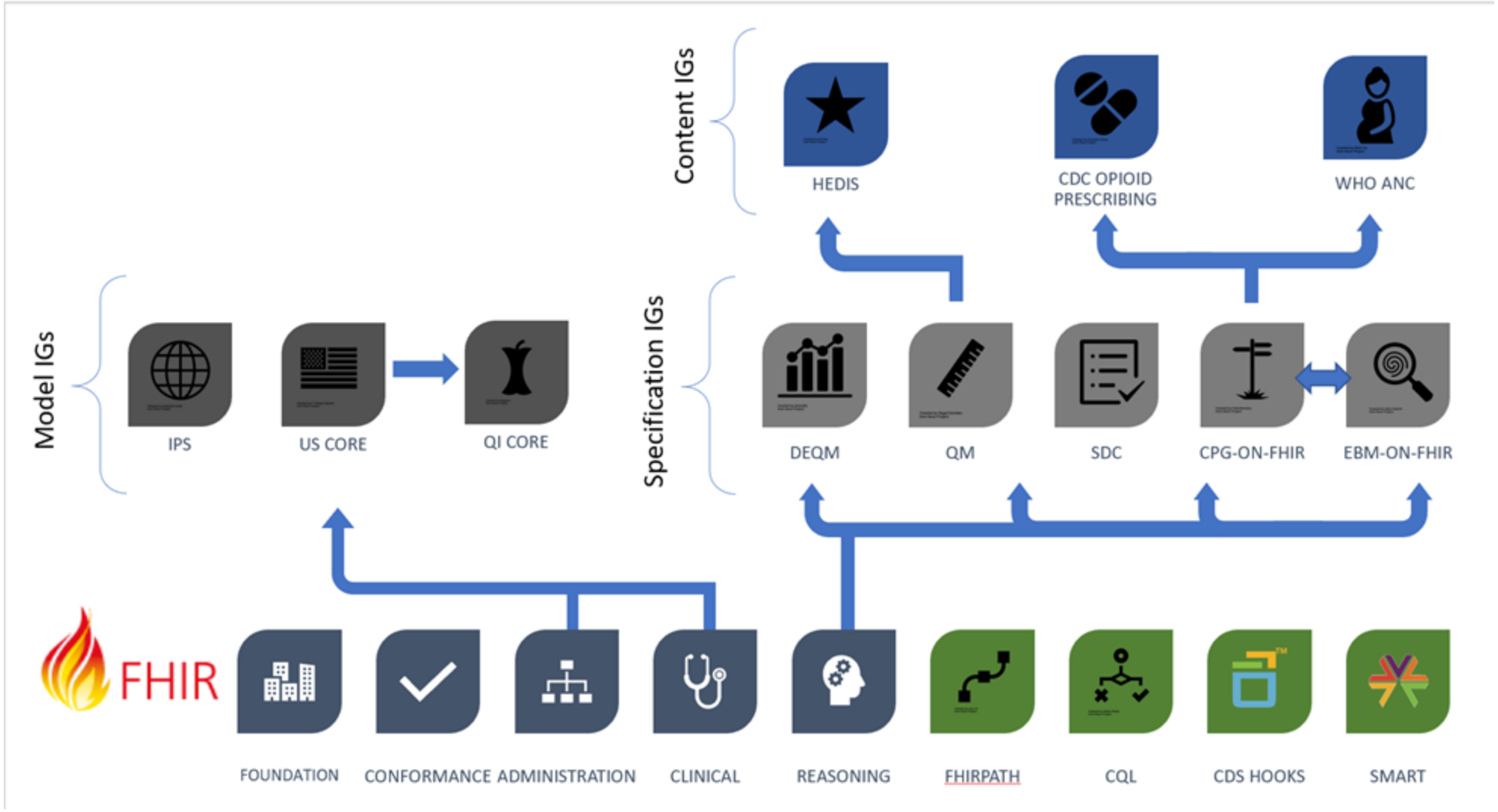
- Decision support rules
- Quality measures
- Order sets
- Clinical protocols
- Care plans

# Knowledge Artifacts – Use Case: **Evaluation**

**Evaluate Knowledge Artifacts in the context of a patient or population**
**Dynamic capabilities through expression languages**

- Example: Using dynamic values in Plan- and ActionDefinitions
  - Set field values
  - Encode applicability criteria

# Publishing Knowledge Artifacts – IG Types




https://build.fhir.org/ig/HL7/cqf-recommendations/types-of-igs.png

# CRMI – Canonical Resource Management Infrastructure

Defines profiles for (canonical) knowledge artifacts
https://hl7.org/fhir/uv/crmi/STU1/

- **Shareable:** requirements for sharing an artifact between systems (authoring, publishing, clinical implementation)
- **Computable:** computable at authoring/design: how much the definition is computable, e.g. an intentional value set definition
- **Publishable:** use context, publisher, copyright
- **Executable:** implementation and runtime considerations (as opposed to authoring)

# CRMI IG – Computable

Supports the authoring process
Computable definition of the content
**“Computable”** has different meaning for each resource type

- ValueSet:
  - Intentional definition (compose)
  - Allows computable creation of the expansion
- Library
  - CQL compiler options
  - Declaration of codes used by the Library

# CRMI IG – Executable

Supports execution of the content
The meaning of **“Executable”** for some resource type

- ValueSet:
  - The expansion is present
  - Supports execution in environments that do not have a terminology service
- Library
  - Dependencies
  - Parameters
  - Data requirements

# CPG – Clinical Practice Guidelines

https://hl7.org/fhir/uv/cpg/STU2/

- Methodology and profiles for the creation of computable representation of narrative clinical guidelines
- Support creating computable representations that are faithful to the intent of the original narrative guidelines

# Knowledge representation levels

| Knowledge Level | Description | Example |
|---|---|---|
| L1 | Narrative | Guideline for a specific disease that may be written in the format of a peer-reviewed journal article |
| L2 | Semi-structured | Flow diagram, decision tree, or other similar format that EXPLICITLY describes or expresses logic constructs that are interpretable by non-SME 'computable logic developer' for constructing L3, BUT are also expressed in a manner sufficient for domain SME to review and validate |
| L3 | Structured | Standards-compliant Specification for CDS that explicitly encodes computer interpretable logic including data model(s), terminologies (concepts, value sets), logic expressions in a computable language sufficient for implementation- often across a broader set of local implementations |
| L4 | Executable | Manifestation of the logic (typically in a user interface) that is used in a local execution environment (e.g. CDS interventions running live in a local production EHR environment) or available via web services |

https://hl7.org/fhir/uv/cpg/STU2/knowledge-levels.png

# Clinical Guideline Example – The WADA List

## **Level 1** knowledge representation: **Narrative**

# S2. Peptidhormoner, vekstfaktorer, relaterte stoffer og mimetika

**Forbudt til enhver tid (i og utenfor konkurranse).**

*Alle forbudte stoffer i denne gruppen er ikke-spesifiserte stoffer.*

Følgende stoffer, og andre stoffer med lignende kjemisk struktur eller lignende biologisk(e) effekt(er), er forbudt:

### S2.1. Erytropoietin (EPO) og stoffer som påvirker erytropoiesen

Inkludert, men ikke begrenset til:

#### S2.1.1. Erytropoietin-reseptoragonister, for eksempel

- darbepoietin (dEPO)
- erytropoietin (EPO)
- EPO-baserte molekyler (for eksempel EPO-Fc, metoksypolyetylenglykol-epoetin beta (Continous erythropoietin receptor activator, CERA))
- EPO-lignende stoffer og molekyler bygget på disse (for eksempel CNTO-530 og peginesatid)

#### S2.1.2 Hypoksi-induserbar faktor (HIF)-aktivatorer, for eksempel

- daprodustat (GSK1278863)
- IOX2
- kobolt
- molidustat (BAY 85-3934)
- roksadustat (FG-4592)
- vadadustat (AKB-6548)
- xenon

NB. Vitamin B12, som inneholder kobolt, er ikke forbudt

#### S2.1.3. GATA-hemmere, for eksempel

- K-11706

#### S2.1.4. Transformerende vekstfaktor-beta (transforming growth factor-beta (TGF-β) )-signalhemmere, for eksempel

- luspatercept
- sotatercept

#### S2.1.5. Medfødte reparasjonsreseptoragonister (Innate

# Clinical Guideline Example – The WADA List

## POC L3 (Structured) representation using FHIR and CQL Published as a Content Implementation Guide

```
"description" : "FEST codes for substances included in section S2 of the List.",
"expansion" : {
  "timestamp" : "2024-07-18",
  "contains" : [
    {
      "system" : "http://legemiddelverket.no/FEST/VirkestoffID",
      "code" : "ID_0CF89765-A38A-4D76-89DC-A9D9630B9BFF",
      "display" : "Darbepoetin alfa"
    },
    {
      "system" : "http://legemiddelverket.no/FEST/VirkestoffID",
      "code" : "ID_705D4593-9905-4003-B32C-A326BB677D48",
      "display" : "Erytropoietin, konsentrert oppløsning"
    },
    {
      "system" : "http://legemiddelverket.no/FEST/VirkestoffID",
      "code" : "ID_EC370228-1959-4B73-87C0-78F6FC94C84C",
      "display" : "Epoetin zeta"
    },
    {
      "system" : "http://legemiddelverket.no/FEST/VirkestoffID",
      "code" : "ID_0FD5AA9A-14A5-4819-A04D-1F56C2A26B78",
      "display" : "Metoksypolyetylenglykol-epoetin beta"
    },
    {
      "system" : "http://legemiddelverket.no/FEST/VirkestoffID",
      "code" : "ID_CB877A48-6C82-4B44-81A9-3CF405A614CC",
      "display" : "Peginesatid"
```

```
define function GetIssues(
    Medications List<FHIR.Medication>, MedicationKnowledges List<FHIR.MedicationKnowledge>, VS System.ValueSet,
    GroupCode String, Severity String, Comment String,
    URL String):
  MedicationKnowledges MK
    let
      matchingCodes: MK.code.coding intersect GetMedicationCodings(Medications)
    where MK.ingredient.item.coding in VS and Count(matchingCodes) > 0
    return DetectedIssue {
      status: DetectedIssueStatus  { value: 'final' },
      severity: DetectedIssueSeverity { value: (case
        when Severity = 'red' then 'high'
        when Severity = 'yellow' then 'moderate'
        else 'low'
      end)},
      implicated: GetMedicationRefs(GetMatchingMedication(MK, Medications)),
      detail: string { value: GetMatchingIngredientDetails(MK, VS, GroupCode, Severity, Comment) },
      reference: uri { value: URL }
    }
```

https://build.fhir.org/ig/adamzkover/wada-list-fhir/index.html

# Clinical Guideline Example – The WADA List

L4 (Executable) representation:

- Load the IG's artifacts into a compatible FHIR server (e.g. HAPI FHIR starter)
- Load medication data e.g. from FEST (terminology must match the IG)
- Send a request to the Library $evaluate operation

# Clinical Guideline Example – The WADA List

```
<Parameters xmlns="http://hl7.org/fhir">
   <parameter>
      <name value="issues"/>
      <resource>
         <DetectedIssue xmlns="http://hl7.org/fhir">
            <status value="final"/>
            <implicated>
               <reference value="Medication/2dcb5f4b-7f62-46d6-84ca-5e6c78d2e599"/>
            </implicated>
            <detail value="Retacrit inj, oppl 30 000 IE/sprøyte: Epoetin zeta: forbudt iht. WADAs dopingliste (S2)"/>
            <reference value="https://www.antidoping.no/medisinsk/dopinglisten/dopinggruppe-s2"/>
         </DetectedIssue>
      </resource>
   </parameter>
   <parameter>
      <name value="medications"/>
      <resource>
         <Medication xmlns="http://hl7.org/fhir">
            <id value="2dcb5f4b-7f62-46d6-84ca-5e6c78d2e599"/>
            <code>
               <coding>
                  <system value="http://legemiddelverket.no/FEST/LegemiddelMerkevareID"/>
                  <code value="ID_1127913B-48A9-4E32-994D-173BC4DF752C"/>
                  <display value="Retacrit inj, oppl 30 000 IE/sprøyte"/>
               </coding>
               <text value="Retacrit inj, oppl 30 000 IE/sprøyte"/>
            </code>
         </Medication>
      </resource>
   </parameter>
</Parameters>
```

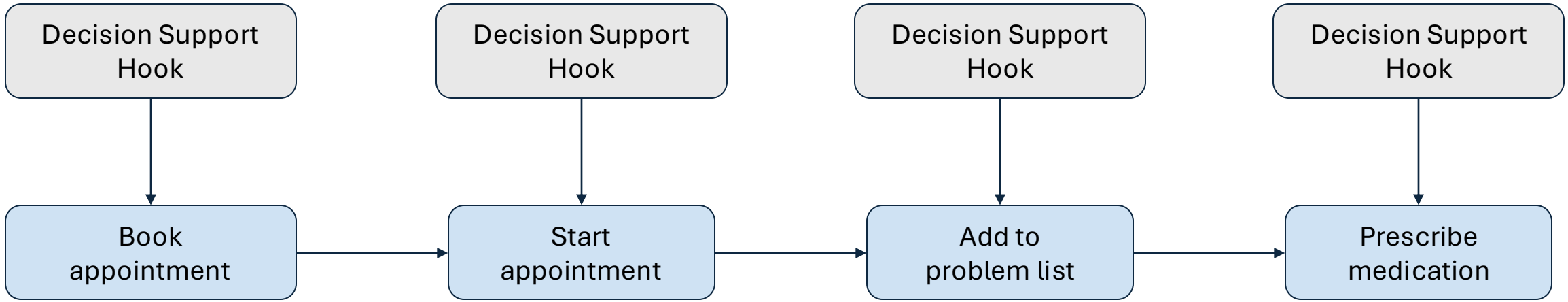
# Evidence Based Medicine (EBM) on FHIR

- Profiles and terminology for the representation of scientific knowledge and research, articles and studies
- Share information about research in FHIR format
- Evaluate eligibility criteria for research studies
- Find research relevant to a specific patient context

# CDS Hooks

An HL7 standard for workflow-based decision support
https://cds-hooks.hl7.org/

- Shared understanding of workflow steps between client and server
- Different relevant data (context) at each step



# CDS Hooks – API Definition – Discovery

- Standard API endpoint for listing the services (functions) provided by a decision support service
- Each service declares
  - Identity
  - Appropriate workflow step (hook)
  - Description of the service and the use context
  - Data requirements


```
{
  "services": [
    {
      "hook": "patient-view",
      "title": "Static CDS Service Example",
      "description": "An example of a CDS Service that returns a static set of cards",
      "id": "static-patient-greeter",
      "prefetch": {
        "patientToGreet": "Patient/{{context.patientId}}"
      }
    },
```

# CDS Hooks – API Definition – Requests

- JSON structure for the invocation of a CDS Hooks service, including:
- Service, hook, and invocation ID
- FHIR server access
  - Server URL
  - Authorization token
- Required input data
  - Hook-specific context (e.g. medication for order-select)
  - Prefetch (service-specific)

# CDS Hooks – API Definition – Response

- Central concepts: Card, Action, Suggestion
- Card
  - Summary
  - Detail
  - Indicator (severity)
  - Source (reference)
  - Suggestions (actions)
    - Actions (CRUD request type, resource, description)
  - Links (to launch SMART on FHIR apps, not the same as Source)
- Feedback

# CDS Hooks – Hook Library

- Attached to the CDS Hooks specification
- Hooks may be proposed by the community,
  and are matured according to the standard HL7 process
- Mature hook examples:
  - patient-view
  - order-select
  - order-sign

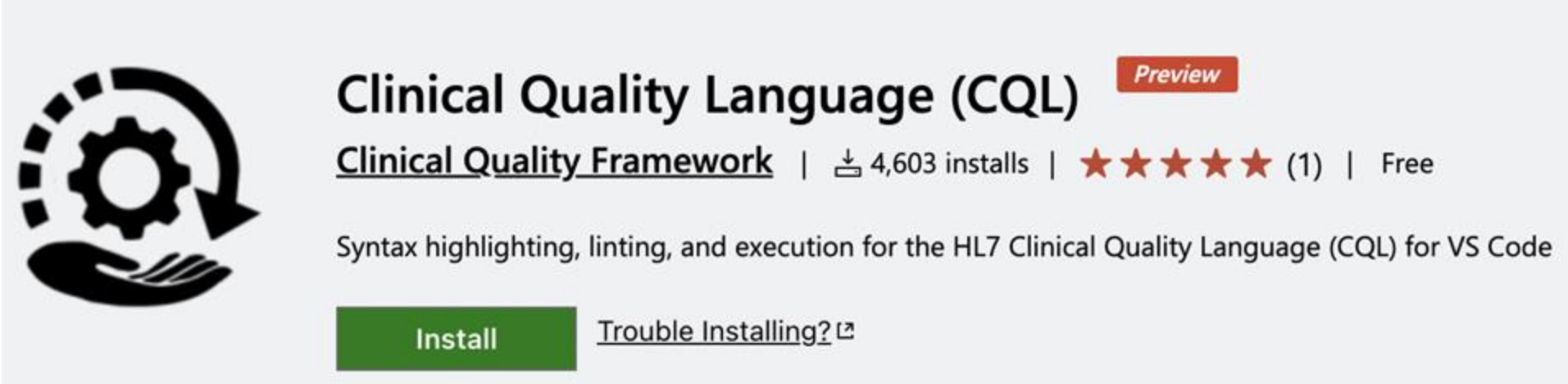
# CQL – Clinical ~~Query~~ Quality Language

https://cql.hl7.org/

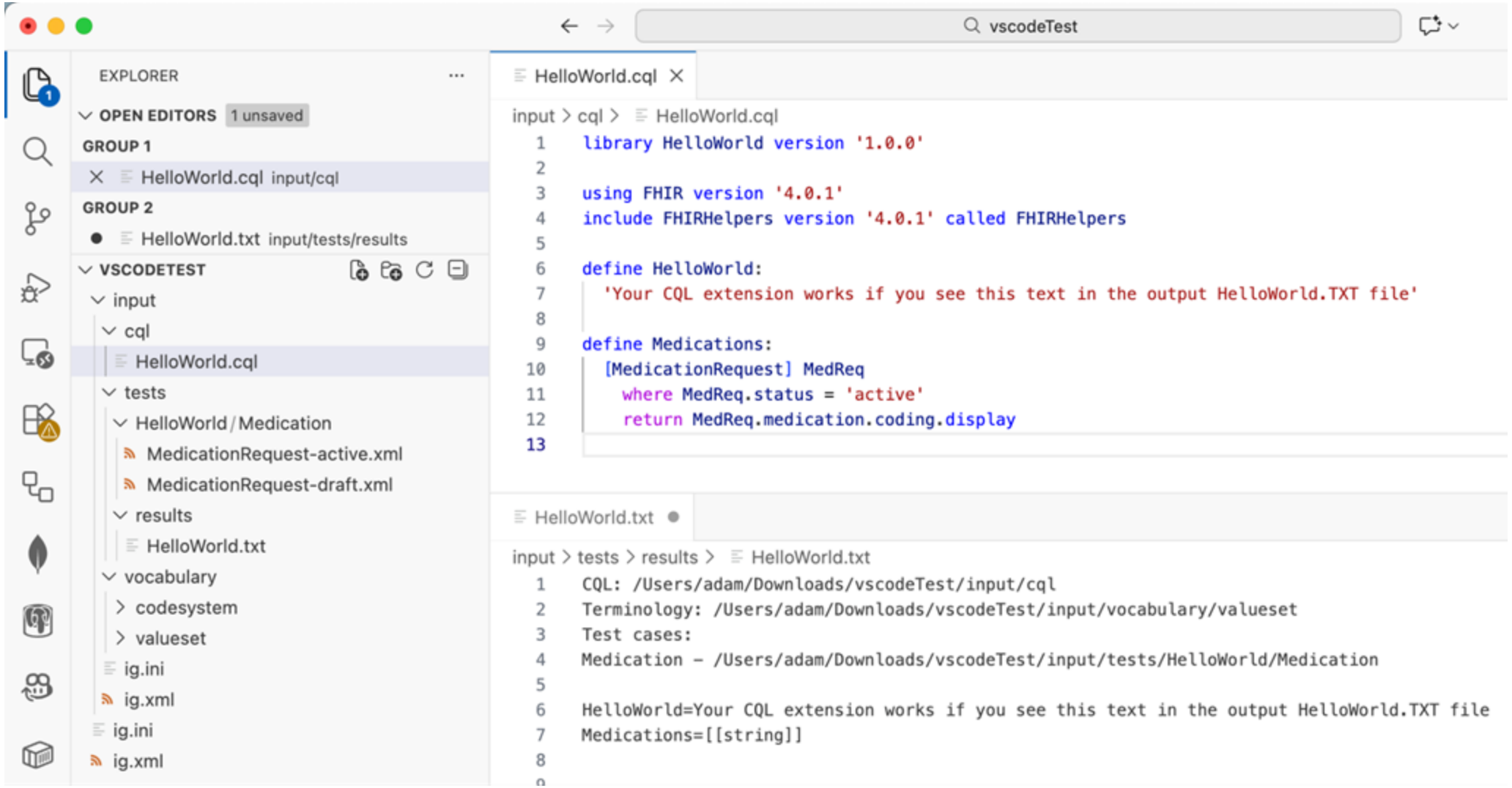
- A domain-specific language for quality measure and decision support
- Independent of the data model
- Can be used with any data model, including FHIR
- Reference implementations (execution engines) available HAPI, Firely…
- Embedded in Library resources in FHIR implementations

# CQL – Development and Testing

- VS Code plugin
- User Guide: https://github.com/cqframework/vscode-cql/wiki/User-Guide
  - Directory structure
  - Naming conventions



# CQL Execution – Demo



*Example Topics for:*

# Care Plans and Clinical Reasoning

Finnish Health Data Hackathon
2026-01 Helsinki

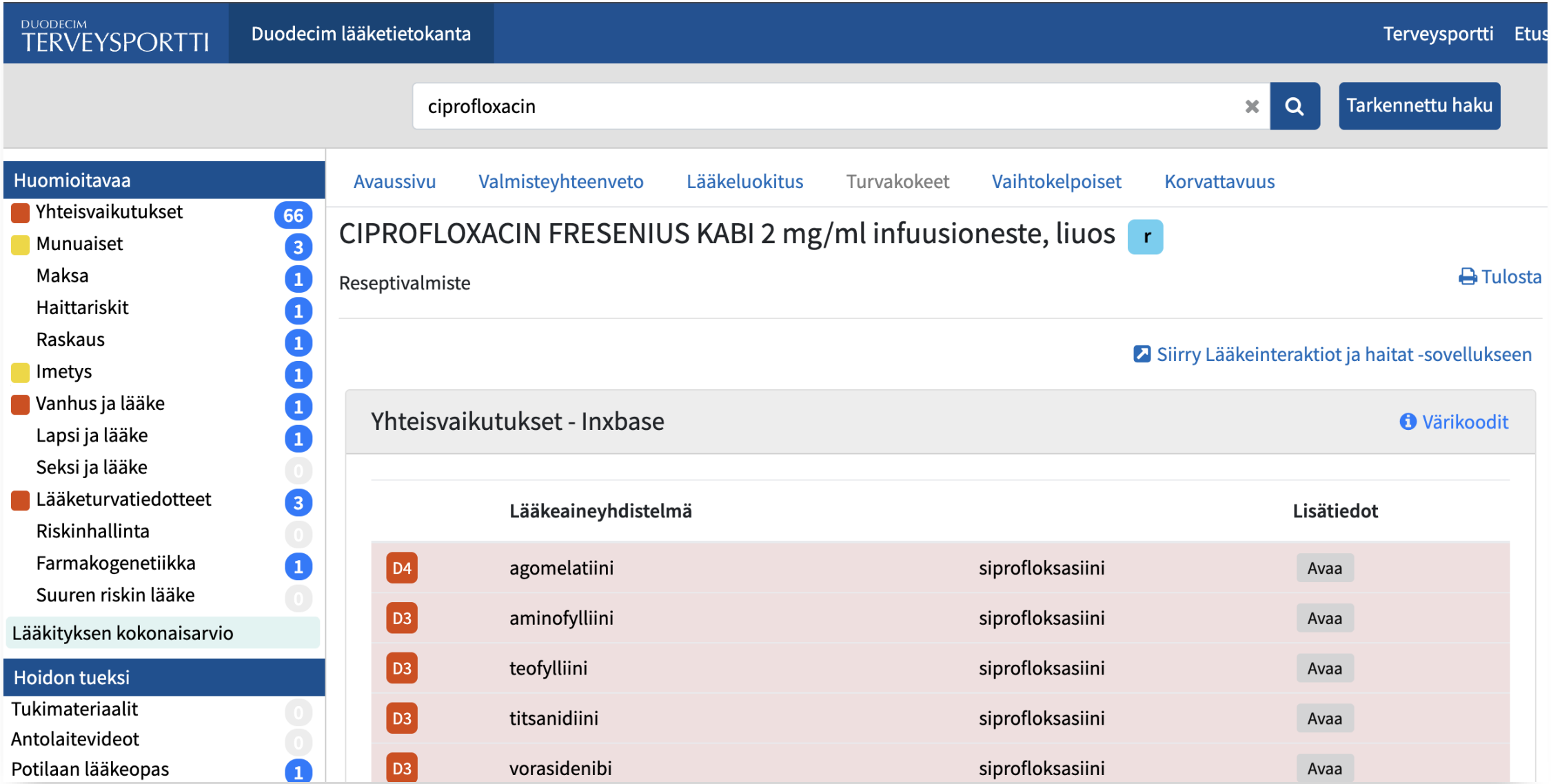
*Example Topic:*

# Authoring, Publishing, and Sharing Clinical Knowledge

# ICD-10

- I63 - Aivoinfarkti
- I63.0 - Aivoihin verta tuovien valtimoiden tukosten aiheuttama aivoinfarkti
- I63.1 - Aivoihin verta tuovien valtimoiden embolian aiheuttama aivoinfarkti
- I63.2 - Aivoihin verta tuovien valtimoiden määrittämättömän tukkeuman tai ahtauman aiheuttama aivoinfarkti
- I63.3 - Aivovaltimoiden tukosten aiheuttama aivoinfarkti
- I63.4 - Aivovaltimoiden embolian aiheuttama aivoinfarkti
- I63.5 - Aivovaltimoiden määrittämättömän tukkeuman tai ahtauman aiheuttama aivoinfarkti
- I63.6 - Aivolaskimoiden tukosten aiheuttama (ei-märkäinen) aivoinfarkti
- I63.8 - Muu aivoinfarkti
- I63.9 - Määrittämätön aivoinfarkti

```
Instance: aho00890
InstanceOf: CRMIPublishableGroup
* insert CommonArticleTargetGroupMetadata(aho00890, "0.1.0", "2025-01-22")
* insert AHOArticleTargetGroupMetadata(aho00890, [[Aivoinfarktin ensihoito ja diagnostiikka]])
* characteristic
  * exclude = false
  * code = $LOINC#75323-6 "Condition"
  * valueCodeableConcept
    * coding[0] = $ICD10#I63 "Aivoinfarkti"
    * coding[+] = $ICD10#I63.0 "Aivoihin verta tuovien valtimoiden tukosten aiheuttama aivoinfarkti"
    * coding[+] = $ICD10#I63.1 "Aivoihin verta tuovien valtimoiden embolian aiheuttama aivoinfarkti"
    * coding[+] = $ICD10#I63.2 "Aivoihin verta tuovien valtimoiden määrittämättömän tukkeuman tai ahtauman aiheuttama aivoinfarkti"
    * coding[+] = $ICD10#I63.3 "Aivovaltimoiden tukosten aiheuttama aivoinfarkti"
    * coding[+] = $ICD10#I63.4 "Aivovaltimoiden embolian aiheuttama aivoinfarkti"
    * coding[+] = $ICD10#I63.5 "Aivovaltimoiden määrittämättömän tukkeuman tai ahtauman aiheuttama aivoinfarkti"
    * coding[+] = $ICD10#I63.6 "Aivolaskimoiden tukosten aiheuttama (ei-märkäinen) aivoinfarkti"
    * coding[+] = $ICD10#I63.8 "Muu aivoinfarkti"
    * coding[+] = $ICD10#I63.9 "Määrittämätön aivoinfarkti"
```


DUODECIM TERVEYSPORTTI
Duodecim lääketietokanta
Terveysportti
Etus
ciprofloxacin
Tarkennettu haku
Huomioitavaa
Yhteisvaikutukset 66
Munuaiset 3
Maksa 1
Haittariskit 1
Raskaus 1
Imetys 1
Vanhus ja lääke 1
Lapsi ja lääke 1
Seksi ja lääke 0
Lääketurvatiedotteet 3
Riskinhallinta 0
Farmakogenetiikka 1
Suuren riskin lääke 0
Lääkityksen kokonaisarvio
Hoidon tueksi
Tukimateriaalit 0
Antolaitevideot 0
Potilaan lääkeopas 1
Avaussivu
Valmisteyhteenveto
Lääkeluokitus
Turvakokeet
Vaihtokelpoiset
Korvattavuus
CIPROFLOXACIN FRESENIUS KABI 2 mg/ml infuusioneste, liuos r
Reseptivalmiste
Tulosta
Siirry Lääkeinteraktiot ja haitat -sovellukseen
Yhteisvaikutukset - Inxbase
Värikoodit
Lääkeaineyhdistelmä
Lisätiedot
D4 agomelatiini siprofloksasiini Avaa
D3 aminofylliini siprofloksasiini Avaa
D3 teofylliini siprofloksasiini Avaa
D3 titsanidiini siprofloksasiini Avaa
D3 vorasidenibi siprofloksasiini Avaa

```
"interaction": {
  "interactant": [{
    "extension": [{
      "url": "https://fhir.duodecim.fi/medication/core/StructureDefinition/administration-route",
      "valueCodeableConcept": {
        "coding": [⋯
        ],
        "text": "Enteral Per Oral"
      }
    }],
    "itemCodeableConcept": {
      "coding": [⋯
      ],
      "text": "ciprofloxacin"
    }
  }],
  "effect": {
    "concept": {
      "coding": [⋯
      ],
      "text": "The bioavailability of ciprofloxacin is reduced, with lowered plasma concentrations and possibility for therapeutic failure as a result."
    }
  },
  "management": [{
    "coding": [⋯
    ],
    "text": "Concurrent administration of ciprofloxacin and antacids or magnesium should be avoided. Fluoroquinolones should be taken at least 2 hours before and not less than 4 to 6 hours after the antacid. H2-antagonist treatment can be used as an alternative treatment in ciprofloxacin treated patients requiring gastroprotection."
  }]
}
```

# Tooling is still mostly for IGs, here's SUSHI with ~20K instances:

55498 ttys003 **438:32.93** node /Users/joonatan/.nvm/versions/node/v20.13.1/bin/sushi

*Example Topic:*

# Defining Clinical Concepts

# ValueSet Compose Language (VCL)

- ***B-Hb*** http://fhir.org/VCL?v1=(http://loinc.org)ancestor=LP392452-1
- ***Aspirin*** http://fhir.org/VCL?v1=(http://www.nlm.nih.gov/research/umls/rxnorm)has_ingredient=1191
- ***Nitrates*** http://fhir.org/VCL?v1=(http://www.whocc.no/atc)concept<<C01D
- ***Asthma*** http://fhir.org/VCL?v1=(http://snomed.info/sct)concept<<195967001

aspirin_output.txt

```
1017    Mapped from: SNOMED#778378003
1018    Mapped from: SNOMED#785412001
1019    Mapped from: SNOMED#785413006
1020    Mapped from: SNOMED#786109002
1021    Mapped from: SNOMED#786110007
1022    Mapped from: SNOMED#7947003
1023
1024    Maps to: RxNorm#1191
1025
1026    RxNorm - ATC pr lat: ATC#A01AD05
1027    RxNorm - ATC pr lat: ATC#B01AC06
1028    RxNorm - ATC pr lat: ATC#B01AC56
1029    RxNorm - ATC pr lat: ATC#M01BA03
1030    RxNorm - ATC pr lat: ATC#N02BA01
1031    RxNorm - ATC pr lat: ATC#N02BA51
1032    RxNorm - ATC pr lat: ATC#N02BA71
1033
1034    RxNorm - ATC pr up: ATC#B01AC30
1035    RxNorm - ATC pr up: ATC#S02DA30
1036
1037    RxNorm - ATC sec lat: ATC#C07FX02
1038    RxNorm - ATC sec lat: ATC#C07FX03
1039    RxNorm - ATC sec lat: ATC#C07FX04
1040    RxNorm - ATC sec lat: ATC#C10BX01
1041    RxNorm - ATC sec lat: ATC#C10BX02
1042    RxNorm - ATC sec lat: ATC#C10BX04
1043    RxNorm - ATC sec lat: ATC#C10BX05
1044    RxNorm - ATC sec lat: ATC#C10BX06
1045    RxNorm - ATC sec lat: ATC#C10BX08
1046    RxNorm - ATC sec lat: ATC#C10BX12
1047    RxNorm - ATC sec lat: ATC#N02AJ02
```

ATHENA

aspirin

## DETAILS

| | |
|---|---|
| **Domain ID** | Drug |
| **Concept Class ID** | Ingredient |
| **Vocabulary ID** | RxNorm |
| **Concept ID** | 1112807 |
| **Concept code** | 1191 |
| **Validity** | Valid |
| **Concept** | Standard |
| **Valid start** | 01-Jan-1970 |

# *FEvIR CohortDefinition Examples*

## Associated Resources

Resources referenced by **List:** Eligibility Criteria Examples (FOI 396954) include:

**Group:** NCT03127267 Eligibility Criteria (287192) (FOI 287192)
**Group:** Recommendation Eligibility Criteria for Bariatric Surgery (ADA Recommendation 8.17) (179511) (FOI 179511)
**Group:** RecommendationEligibilityCriteria: Eligibility Criteria for Bariatric Surgery (ADA Recommendation 8.16) (32139) (FOI 32139)
**Group:** RecommendationEligibilityCriteria: NIH 1991 Consensus Eligibility Criteria for Bariatric Surgery (172235) (FOI 172235)
**Group:** StudyEligibilityCriteria: Adolescents with non-syndromic obesity (200487) (FOI 200487)
**Group:** StudyEligibilityCriteria: Eligibility Criteria for Bariatric Surgery Randomized Trial (Diabetes Surgery Study) (170443) (FOI 170443)
**Group:** StudyEligibilityCriteria: Eligibility Criteria for DIBASY Trial (172461) (FOI 172461)
**Group:** StudyEligibilityCriteria: Obese patients ≥ 18 years old (171819) (FOI 171819)
**Group:** StudyEligibilityCriteria: STAMPEDE trial Eligibility Criteria (172968) (FOI 172968)
**Group:** StudyEligibilityCriteria: Type 2 diabetes and elevated BMI in 2016 meta-analysis (33398) (FOI 33398)

https://fevir.net/resources/List/396954

See the following comments on the CRMI IG repository for our initial suggestions on using CohortDefinition as a shared model:

https://github.com/HL7/crmi-ig/pull/95#issuecomment-3442231452

*Example Topic:*

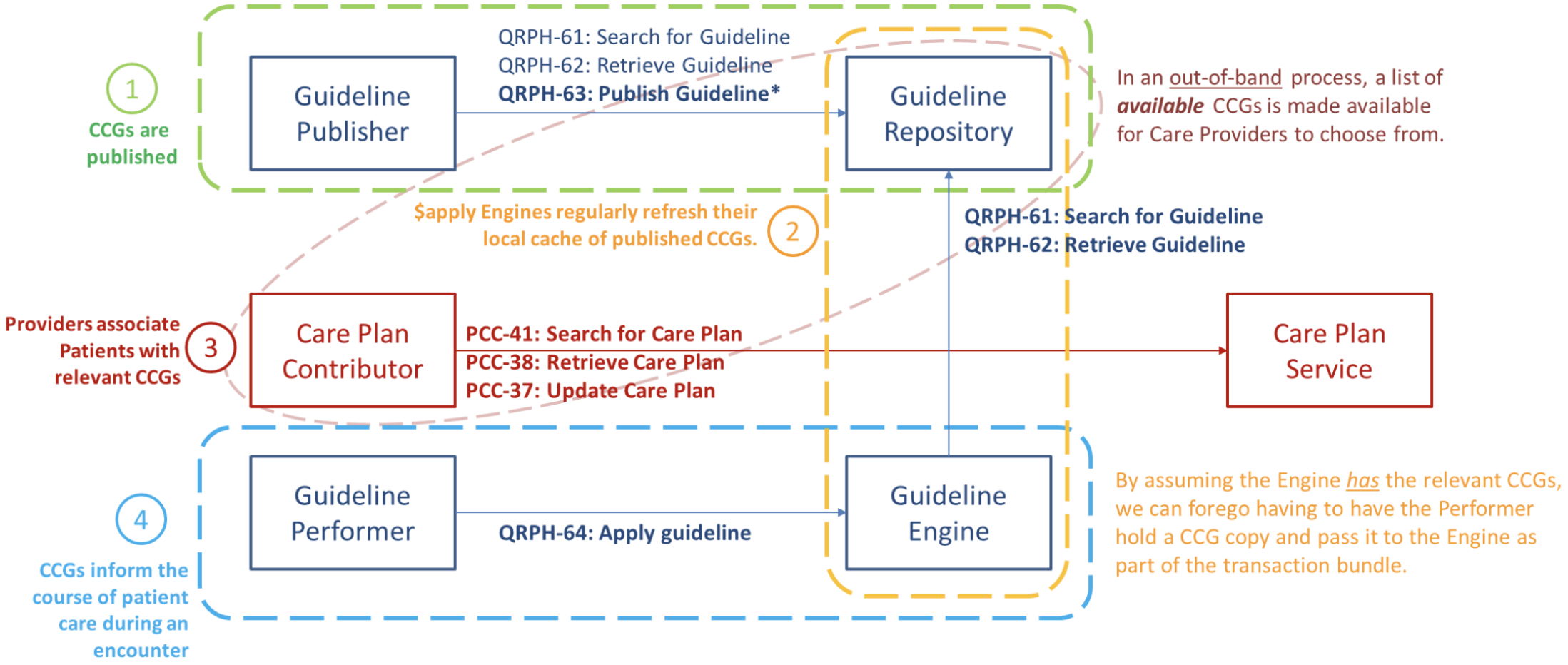
# Modelling Care Plans and Computable Guidelines

**Table 1.** Monitoring tests for antirheumatic drug therapy. Tests should also be performed 2–3 weeks after any increase in drug dose. ESR and CRP should be checked on visits to the doctor and otherwise as needed.

| Lääke | Safety monitoring tests |
|---|---|
| **Methotrexate** | |
| At 3 weeks, 6 weeks, 12 weeks after beginning of treatment, then every 3–12 months, | Basic blood count with platelets (+ differential count), ALT, creatinine |
| **Hydroxychloroquine** | |
| No laboratory monitoring needed<br>Checkup by an ophthalmologist after 15 years of use | |
| **Sulfasalazine** | |
| At 3 weeks, 6 weeks, 12 weeks after beginning of treatment, then every 3–12 months | Basic blood count with platelets (+ differential count), ALT |
| **Biological antirheumatic drugs** | |
| • Often used concomitantly with methotrexate, in which case monitoring protocol as for methotrexate.<br>• In addition, after 3 months of tosilizumab or sarilumab, blood lipids should be tested. | |

Example L4 slice from Duodecim EBMG RA guideline is available:

https://github.com/reason-healthcare/interactive-cds-content




*A Guideline Publisher ***may*** digitally sign the top-level bundle (the *folder*) and/or ***may*** digitally sign every resource (each CARD, all libraries, etc.).

**Figure 13 - Pictorial illustration of CCG actors**

*Example Topic:*

# Testing Clinical Knowledge Against European Synthetic Data

HL7 Europe

Home | The Story | Principles | Progress | Personas | Examples | Policy | Credits+

# Synthetic Data Examples – Realistic – using AI

SYNDERAI provides realistic, privacy-preserving synthetic European healthcare data, including the first EU-Lab FHIR synthetic datasets. Explore reusable examples supported by AI for interoperability and secondary use in healthcare systems. And meet our Personas with their health story.

## Lab Reports were the first SYNDERAI examples

First batch of synthetic examples were generated in October 2024 for the HL7 Europe FHIR Laboratory Report for the EHDS.

READ MORE

## Clinically realistic Examples supported by AI

We use AI to support realistic clinical data scenarios such as like Discharge Reports and Patient Summaries with proper interdependencies.

OUR STORY

## Privacy & Anonymity

No real patient data; ensures privacy while enabling secondary use and testing.

PRINCIPLES

# *European Patient Summary*

| Patient | | Author | Patient summary Document | |
|---|---|---|---|---|
| Name: | **Staňková**, Miroslava | Dr. **Ping**, Hel | European Patient Summary | |
| DOB: | 29-SEP-1987 (Age: 38) | | Report Date: | **10-APR-2024** |
| Gender: | female | | | |
| ID: | 7981-969754-5 (ECI) | | | |

## Problem list

Condition

| Condition | Onset Date | Status |
|---|---|---|
| Transformed migraine | 31-Jan-2014 | active |

## Medication list

MedicationStatement

No known medications

## Immunizations list

Immunization

| Vaccine | Date |
|---|---|
| Hepatitis A virus antigen only vaccine product | 16-Apr-2025 |
| Influenza virus antigen only vaccine product | 16-Apr-2025 |
| COVID-19 non-replicating viral vector vaccine | 14-Apr-2021 |
| Clostridium tetani toxoid antigen adsorbed only vaccine product | 24-Feb-2016 |

## Procedure History list

Procedure

| Procedure | Date | Reason |
|---|---|---|
| Postoperative care | 08-Sep-2019 | History of tubal ligation (situation) |
| Ligation of bilateral fallopian tubes | 08-Sep-2019 | Sterilization requested (situation) |

## Allergies and Intolerances

AllergyIntolerance

| Allergy/Intolerance | Onset Date | Status | Type | Reaction |
|---|---|---|---|---|
| | ? | active | ? | |

## Vital Signs

Observation

| Vital Signs | 2025-04-16 | 2024-04-10 |
|---|---|---|
| Body Height | 151.1 cm | 151.1 cm |
| Pain severity - 0-10 verbal numeric rating [Score] - Reported | 2 {score} | 1 {score} |
| Body Weight | 65.5 kg | 65.8 kg |
| Body mass index (BMI) [Ratio] | 28.7 kg/m2 | 28.8 kg/m2 |
| Diastolic Blood Pressure | 64 mm[Hg] | 64 mm[Hg] |
| Systolic Blood Pressure | 96 mm[Hg] | 93 mm[Hg] |
| Heart rate | 69 /min | 69 /min |
| Respiratory rate | 15 /min | 14 /min |

## Relevant diagnostic tests/laboratory data

Observation

| Recent Lab Observations | 10-APR-2024 | Reference Range | Unit |
|---|---|---|---|
| Cholesterol [Mass/volume] in Serum or Plasma | 168.2 | 125 - 200 | mg/dL |
| Triglyceride [Mass/volume] in Serum or Plasma | 125.4 | 35 - 150 | mg/dL |
| Cholesterol in LDL [Mass/volume] in Serum or Plasma by Direct assay | 110.3 | 0 - 130 | mg/dL |
| Cholesterol in HDL [Mass/volume] in Serum or Plasma | **32.8 L** | 40 - 100 | mg/dL |

# *European Laboratory Report*

**Patient**

Name: **Smith**, , Timothy,
DOB: 10-SEP-1941 (Age: 84)
Gender: male
Address: 9 Jeffrey orchard
NW1 North Joshuaville (United Kingdom)
ID: 8029-862360-6 (ECI)

**Report**

**Date: 19-MAY-2025**

**Laboratory**

dr **Ample**, Ex
Laboratoire Central Européenne
Boulevard du Jardin Botanique 32
1000 Brussels (Belgium)

**Requested by**

Evelina Children's Hospital
SE1 7 London (United Kingdom)

**Specimen**

Collected: 19-MAY-2025

## Chemistry

Observation

| Test | 19-MAY-2025 | Reference Range | Unit |
|---|---|---|---|
| Hemoglobin A1c/Hemoglobin.total in Blood | 5.5 | 4.5 - 6.4 | % |
| Glucose [Mass/volume] in Blood | 131.1 | 70 - 140 | mg/dL |
| Urea nitrogen [Mass/volume] in Blood | 19.6 | 7 - 25 | mg/dL |
| Creatinine [Mass/volume] in Blood | 0.7 | 0.6 - 1.3 | mg/dL |
| Calcium [Mass/volume] in Blood | 9.1 | 8.5 - 10.5 | mg/dL |
| Sodium [Moles/volume] in Blood | 143.9 | 135 - 145 | mmol/L |
| Potassium [Moles/volume] in Blood | 4.7 | 3.5 - 5.1 | mmol/L |
| Chloride [Moles/volume] in Blood | 102.9 | 98 - 107 | mmol/L |
| Carbon dioxide, total [Moles/volume] in Blood | 26.5 | 22 - 29 | mmol/L |
| Cholesterol [Mass/volume] in Serum or Plasma | **244.9 H** | 0 - 200 | mg/dL |
| Triglyceride [Mass/volume] in Serum or Plasma | **490.0 H** | 0 - 199 | mg/dL |
| Cholesterol in LDL [Mass/volume] in Serum or Plasma by Direct assay | 119.1 | 0 - 130 | mg/dL |
| Cholesterol in HDL [Mass/volume] in Serum or Plasma | **27.8 L** | 40 - 100 | mg/dL |
| Microalbumin/Creatinine [Mass Ratio] in Urine | 14.7 | 0 - 30 | mg/g |

## Annotation

**Conclusion and Recommendations based on this report and previous findings known to us**

Laboratory results show good glycemic control and normal renal function. However, there is significant dyslipidemia with elevated total cholesterol, markedly high triglycerides, and low HDL cholesterol, increasing cardiovascular risk. Electrolytes and other parameters are within normal limits. Lipid management and cardiovascular risk reduction should be considered.

```
POST /fhir/$import
Accept: text/yaml
Content-Type: text/yaml

id: synderai
contentEncoding: plain
inputs:
- resourceType: Patient
  url: https://raw.githubusercontent.com/bearror/synderai-to-ndjson/refs/heads/main/output/Patient.ndjson

...
```

*Example extractor: https://github.com/bearror/synderai-to-ndjson*

Aidbox / **Resources**

Search resource type

Search | + Create

All (230) | Populated (10) | FHIR (153) | Custom (0) | System (76) | Favorites (9)

| Resource type | Table Size | History Size | Index Size | Default profile |
|---|---|---|---|---|
| AllergyIntolerance | 136 kB | 16 kB | 16 kB | http://hl7.org/fhir/StructureDefinition/AllergyIntolerance |
| Condition | 704 kB | 16 kB | 48 kB | http://hl7.org/fhir/StructureDefinition/Condition |
| Medication | 80 kB | 16 kB | 16 kB | http://hl7.org/fhir/StructureDefinition/Medication |
| MedicationStatement | 408 kB | 16 kB | 32 kB | http://hl7.org/fhir/StructureDefinition/MedicationStatement |
| Observation | 67 MB | 16 kB | 2384 kB | http://hl7.org/fhir/StructureDefinition/Observation |
| Organization | 80 kB | 16 kB | 16 kB | http://hl7.org/fhir/StructureDefinition/Organization |
| Patient | 152 kB | 16 kB | 16 kB | http://hl7.org/fhir/StructureDefinition/Patient |
| Procedure | 504 kB | 16 kB | 48 kB | http://hl7.org/fhir/StructureDefinition/Procedure |
| Specimen | 1688 kB | 16 kB | 136 kB | http://hl7.org/fhir/StructureDefinition/Specimen |

Resources | Profiles | Search Parameters

GET /fhir/MedicationStatement? _count=30&_page=1&_ilike= Search + Create

| id | lastUpdated | dosage | reasonCode | medicationCodeableConce | status | medicationReference |
|---|---|---|---|---|---|---|
| 0010322b-02e0-4892... | 01/12/2025, 21:39:46.253 | 1 tablet (100 mg) once d... | - | - | active | Metoprolol tartrate (as m... |
| 0125c32c-0b65-43bd... | 01/12/2025, 21:39:46.253 | 1 tablet (10 mg) once daily | Osteoporosis (disorder) | - | active | Alendronic acid (as alend... |
| 01a45b72-41e6-4c8f-a... | 01/12/2025, 21:39:46.253 | 1 tablet (325 mg) by mou... | - | - | active | Acetaminophen 325 mg ... |
| 01e10ef0-4295-47e9... | 01/12/2025, 21:39:46.253 | 1 tablet (50 mg) once daily | - | - | active | Metoprolol tartrate (as m... |
| 0351003d-f178-43cc-8... | 01/12/2025, 21:39:46.253 | 1 tablet (2.5 mg) by mout... | Essential hypertension (di... | - | active | Amlodipine (as amlodipin... |
| 0394c7cd-654f-44b4-b... | 01/12/2025, 21:39:46.253 | 1 tablet (325 mg acetami... | - | - | active | Acetaminophen 325 MG /... |
| 0678985e-ab14-4c42-8... | 01/12/2025, 21:39:46.253 | 1 tablet (10 mg) by mout... | Essential hypertension (di... | - | active | Lisinopril 10 mg oral tablet |
| 0730414e-66d6-4327-a... | 01/12/2025, 21:39:46.253 | 1 tablet (2.5 mg) by mout... | Essential hypertension (di... | - | active | Amlodipine (as amlodipin... |
| 07aa459e-9b4c-44df-8... | 01/12/2025, 21:39:46.253 | - | - | No known medications (si... | active | - |
| 083fed8e-0479-4f97-a... | 01/12/2025, 21:39:46.253 | 1 tablet (2.5 mg) by mout... | Essential hypertension (di... | - | active | Amlodipine (as amlodipin... |
| 0b5c2519-fee8-4789... | 01/12/2025, 21:39:46.253 | 1 tablet (20 mg) once daily | - | - | active | Simvastatin 20 mg oral ta... |
| 0c5160e7-967f-4790-8... | 01/12/2025, 21:39:46.253 | 1 mL (5 mg) injected intra... | - | - | active | Vitamin B12 5 MG/ML Inj... |
| 0c84d388-5824-4935... | 01/12/2025, 21:39:46.253 | 1 tablet (25 mg) by mout... | Essential hypertension (di... | - | active | Hydrochlorothiazide 25 ... |
| 0d012ad9-f593-4072-9... | 01/12/2025, 21:39:46.253 | 1 tablet (300 mg/5 mg) b... | - | - | active | Acetaminophen 300 mg ... |
| 0d9f4da2-03a5-47dc... | 01/12/2025, 21:39:46.253 | 1 tablet (2.5 mg) by mout... | Essential hypertension (di... | - | active | Amlodipine (as amlodipin... |
| 0dfff676-8d82-4bdb... | 01/12/2025, 21:39:46.253 | Inject 10 units subcutane... | Prediabetes | - | active | insulin isophane human 7... |
| 0ea368bb-4eab-4003... | 01/12/2025, 21:39:46.253 | 1 tablet (10 mg) once daily | Osteoporosis (disorder) | - | active | Alendronic acid (as alend... |

0 selected

1 2 3 4 5 ... 8 > 30 / page

Overview Edit Versions

JSON YAML Format Copy Profile

```
{
  "dosage": [
    {
      "text": "1 tablet (100 mg) once daily",
      "timing": {
        "repeat": {
          "period": 1,
          "frequency": 1,
          "periodUnit": "d"
        }
      },
      "asNeededBoolean": false,
      "doseAndRate": [
        {
          "doseQuantity": {
            "code": "{tbl}",
            "unit": "{tbl}",
            "value": 1
          }
        }
      ]
    }
  ],
  "effectivePeriod": {
    "start": "2016-10-19"
```

Validation errors: 1 VALIDATE

Constraint error: dosage[0].doseAndRate[0].doseQuantity

Dosage: Invalid constraint result for ID 'qty-3'. Expression: 'code.empty() or system.exists()'. Human-readable message: 'If a code for the unit is present, the system SHALL also be present'.

*Example Topic:*

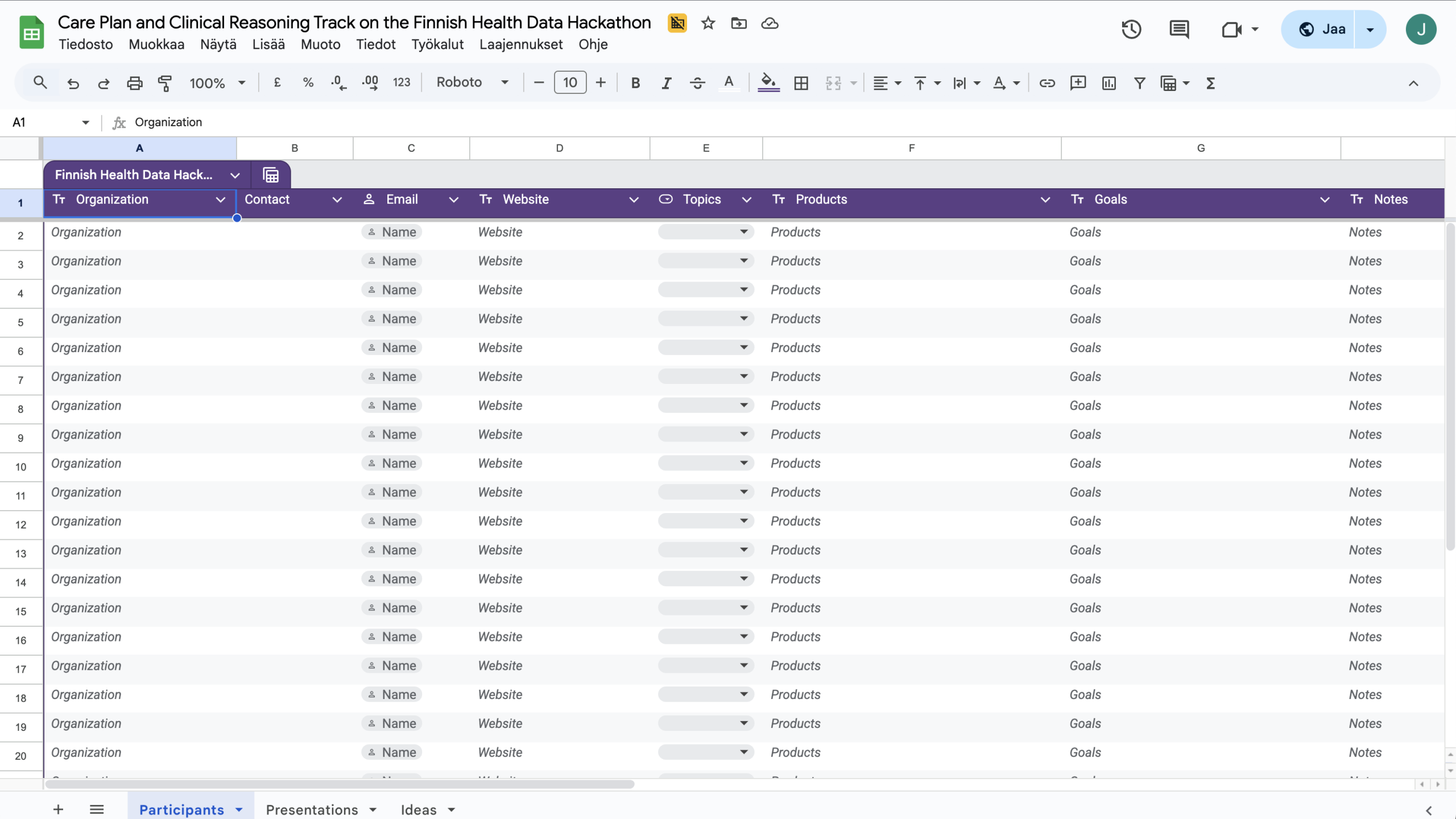
# Integrating Clinical Knowledge

# Example integrations Duodecim has ready…

- ***Direct:*** Duodecim can provide an example CRMI medication knowledge base with ClinicalUseDefinition resources
- ***Reasoning-as-a-Service:*** Duodecim can provide the same medication knowledge base as a CDS Hooks service on order-select
  - In addition, Duodecim could start moving the questionnaire-completed hook towards standardisation, if there’s interest

# Participating on the Care Plan & Clinical Reasoning Track

- Fill in the Google Sheet at https://docs.google.com/spreadsheets/d/1X6WD6GPxNvwwpRAb0gsIti_5LBTuGT5nnwUk535piCQ/edit?usp=sharing
- Share your ideas and interests!


Care Plan and Clinical Reasoning Track on the Finnish Health Data Hackathon
Tiedosto Muokkaa Näytä Lisää Muoto Tiedot Työkalut Laajennukset Ohje
Jaa
A1
Organization
Finnish Health Data Hack...
Organization
Contact
Email
Website
Topics
Products
Goals
Notes
Name
Participants
Presentations
Ideas

# Q&A

Care Plan & Clinical Reasoning Track of the Finnish Health Data Hackathon

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# Next Webinars

- Wallets, national contact points (NCP)
  - Friday, December 19, 11:00 CET

# Thank you for participating!