

ICD REST API

and other Tools for Software Developers

C. Çelik

World Health Organization

7 December 2020

Tools for Software Integration	Tools	
	Tools for End Users	Tools for Development and Maintenance
ICD-API (REST API)	ICD-11 Browser	iCat - Authoring Tool
Other software components Embedded Coding Tool	ICD-11 Coding Tool	Maintenance Platform <ul style="list-style-type: none"> - Proposal System - Translation Platform - ICD-FIT (Field Implementation Tool)
https://icd.who.int		

ICD-11 Browser

Foundation URI : <http://id.who.int/icd/entity/257068234>

1A00 الكوليرا

عنصر أصلي
غداوى مغوية جرثومية [بكتيرية]

المُشتَمَلات
• متلازمة الكوليرا

الربط اللاحق

أضف تفاصيل الكوليرا

إظهار جميع العناصر الأصلية الأعلى

التصنيف 11- إحصائيات الوفيات والمراضة

01 بعض الأمراض المُعدية (العدوانية) أو الطُفيلية

التهابات المعدة والأمعاء أو القولون من منشأ غداوي

غداوى مغوية جرثومية [بكتيرية]

1A00 الكوليرا

1A01 عدوى الأمعاء الناجمة عن ضُمَات أخرى.

1A02 حالات عدوى الأمعاء ناجمة عن الشبغيلات

1A03 عدوى الأمعاء الناجمة عن الإشريكيَّات القولونية

1A04 حالات التهاب الأمعاء ناجمة عن المِطْطِيات الغسيرة (الكلوستريديوم ديفيسيل)

1A05 عدوى الأمعاء الناجمة عن البرسيانية المُلهَنة للأمعاء والقولون (برسيانية إنتيروكوليتيكا)

1A06 التهاب المعدة والأمعاء الناجم عن الغطائف

1A07 الخُصى التيفيَّة

1A08 الخُصى نظيرة التيفويد

1A09 غداوى ناجمة عن السَلْمُونيلات الأخرى

1C10.1 داء الشَّيْثَات البطنِيّ

1A0Y غداوى أخرى جرثومية (بكتيرية) مُعَيَّنة تصيب الأمعاء

1A0Z غداوى جرثومية (بكتيرية) تصيب الأمعاء، لم يتم تعيينها

التسُمُّ الجرثومي المنقول بالغذاء

عداوى الأمعاء الفيروسية المنشأ

عداوى الأمعاء الناجمة عن الأولي (البروتوزوا)

1A40 التهابات المعدة والأمعاء أو التهاب القولون، بدون تحديد

用于死因与疾病统计的ICD-11 (版本 : 09/2020)

查找 [高级查找]

Foundation URI : <http://id.who.int/icd/entity/257068234>

ICD-11 - 死因与疾病统计

01 某些感染性疾病或寄生虫病

感染性胃肠炎或结肠炎

细菌性肠道感染

1A00 霍乱

1A01 其他弧菌的肠道感染

1A02 志贺菌肠道感染

1A03 大肠埃希菌肠道感染

1A04 难辨梭状芽孢杆菌引起的肠道感染

1A05 小肠结肠耶尔森菌肠道感染

1A06 弯曲菌性胃肠炎

1A07 伤寒

1A08 副伤寒

1A09 其他沙门菌感染

1C10.1 腹部放线菌病

1A0Y 其他特指的细菌性肠道感染

1A0Z 未特指的细菌性肠道感染

细菌性食物中毒

病毒性肠道感染

肠道原虫感染

1A40 未特指感染性病原体的胃肠炎或结肠炎

真菌性肠感染

以性传播为主要途径的感染性疾病

分枝杆菌病

Foundation URI : <http://id.who.int/icd/entity/257068234>

1A00 霍乱

父节点

细菌性肠道感染

显示所有上位词

包括术语

- 霍乱综合征

后组配

增加细节 霍乱

感染性病原体 (需要时, 使用附加编码)

XN7N1	霍乱弧菌
XN8P1	O1群霍乱弧菌, 霍乱生物型
XN62R	O1群霍乱弧菌, 埃尔托生物型

关联情况 (需要时, 使用附加编码)

查找

[高级查找]

版本说明

Foundation URI : <http://id.who.int/icd/entity>

1A00 Cholera

Parent

Bacterial intestinal infections

Inclusions

- cholera syndrome

Postcoordination

Add detail to **Cholera**

Infectious agent (use additional code)

XN7N1	Vibrio cholerae
XN8P1	Vibrio cholerae
XN62R	Vibrio cholerae

Associated with (use additional code)

Search

[高级查找]

CIE-11 para estadísticas de mortalidad y morbilidad (Versión : 09/2020)

Buscar [Búsqueda avanzada]

Navegación

CIE-11 - Estadísticas de morbilidad y mortalidad

01 Algunas enfermedades infecciosas o parasitarias

02 Neoplasias

03 Enfermedades de la sangre o de los órganos hematopoyéticos

04 Enfermedades del sistema inmunitario

05 Enfermedades endocrinas, nutricionales o metabólicas

06 Trastornos mentales, del comportamiento y del neurodesarrollo

07 Trastornos del ciclo de sueño y vigilia

08 Enfermedades del sistema nervioso

09 Enfermedades del aparato visual

10 Enfermedades del oído o de la apófisis mastoides

CIE-11 para las estadísticas de mortalidad y morbilidad

Versión para preparar la puesta en funcionamiento

Notas de la versión

- La estructura de códigos de la CIE-11.
- El mecanismo de actualización está en [mantenimiento](#).

ICD-11 Coding Tool

ICD-11 Coding Tool

Mortality and Morbidity Statistics (MMS)
2020-09

Help

cholera

Herramienta de codificación de la CIE-11

Estadísticas de mortalidad y morbilidad (EMM)
2020-09

Ay

Guessing the word being typed...

colera



أداة الترميز في التصنيف-11

إحصائيات الوفاة
2020-09

الكوليرا

كلمات في لغة المقصد

فرز: درجة التوافق

1A00 الكوليرا*

اسم تم تعيينه بالكامل
Intestinal infection due to Vibrio cholerae [No translation available]

المُشْتَمَلات
متلازمة الكوليرا

مصطلحات متوافقة
الكوليرا الأسيوية
الكوليرا الوبائية
متلازمة الكوليرا
كوليرا غير O1
التهاب أمعاء ناجم عن الكوليرا الناجمة عن ضمات الكوليرا، من ذرات غير O1

الربط اللاحق
الربط اللاحق متوفر: انقر هنا لفتح المتصفح

1A00&XN8P1 كوليرا ناجمة عن ضمات الكوليرا O1 ، الضرب البيولوجي كوليرا

1A00&XN62R كوليرا ناجمة عن ضمات الكوليرا O1 ، الضرب البيولوجي الطور

Entidades destinatarias

Ordenar: Por coincidencia en la búsqueda

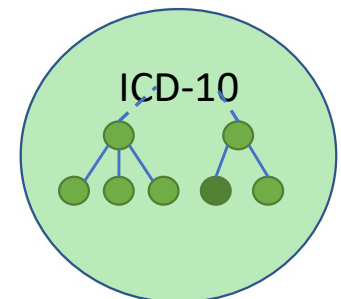
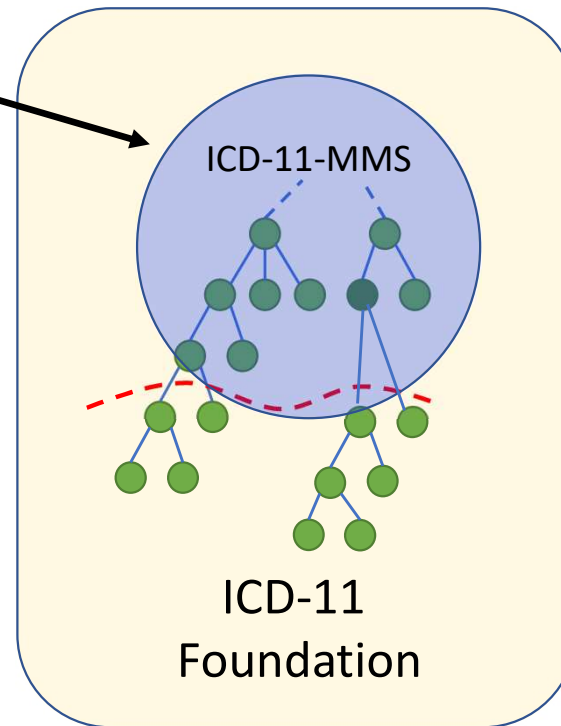
- 1A00** **Cólera**
- MB24.1** Ira
- 1A00&XN8P1** **Cólera** debido a Vibrio cholerae O1, cholerae biovar
- 1A00&XN62R** **Cólera** por Vibrio cholerae O1, biovar eltor
- MB24.C** Irritabilidad
- QA08.0** Examen especial de detección de enfermedades infecciosas intestinales

[+ Details]

efly nonmedicinal as to [Details]

ICD-11 – more relevant detail

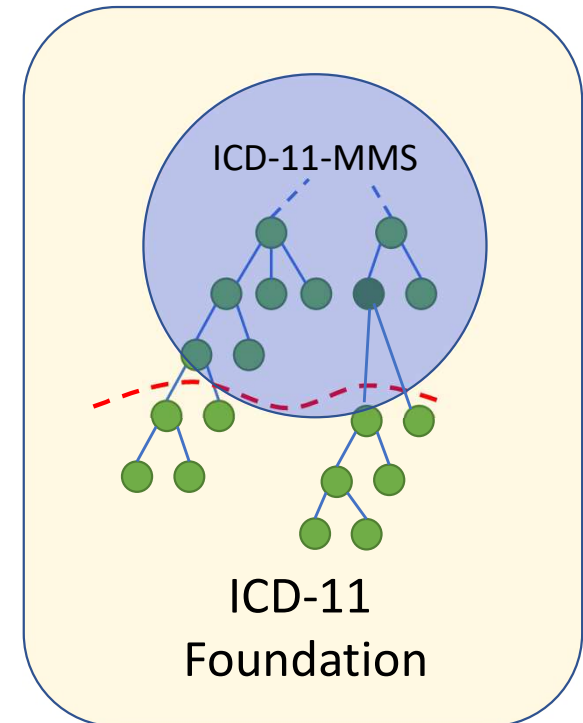
- 17.000 statistical categories
 - ICD-11 for Mortality and Morbidity Statistics (MMS)
- 80.000 entities
- 120.000 terms
- >1.600.000 terms recognized



14000 categories
Separate text index
Separate rule base
Need terminology link
Outdated content

Coding Tool Features

- Searches all terms in the Foundation
 - The Coding Tool searches all of these terms
 - But guides the user to the correct code in the statistical classification



Word completion/suggestion

- Supports word completion and word suggestion during search

ICD-11 Coding Tool Mortality and Morbidity Statistics (MMS)
December 2018

dial ✕

Guessing the word being typed...

Word list
sort: Relatedness/repetition ▾

- dialysis
- dialysis-associated
- dialysis-related

Destination Entities

- QB94.Z** Care involving **dialysis**, unspecified ⓘ
- dialysis** NOS ⓘ
- 5D00.3** **Dialysis-associated** amyloidosis ⓘ
- 6D85.X** Dementia due to other specified disease classified

ICD-11 Coding Tool Mortality and Morbidity Statistics (MMS)
December 2018

malignant

Related words...

Word list
sort: Relatedness/repetition ▾

- neoplasm
- site
- carcinoma
- cell
- lymphoma
- melanoma

Dynamic results

- Search results dynamically available as user types
- Organized by matching score and classification hierarchy

ICD-11 Coding Tool Mortality and Morbidity Statistics (MMS)
December 2018

asthma

Related words...

Word list
sort: Relatedness/repetition

Destination Entities
sort: Matching score

CA23 Asthma

- CA23.00 Allergic asthma with exacerbation
- CA23.01 Allergic asthma with status asthmaticus
- CA23.02 Allergic asthma, uncomplicated
- CA23.0Z Allergic asthma, unspecified
- CA23.1 Non-allergic asthma
- CA23.10 Non-allergic asthma with exacerbation
- CA23.11 Non-allergic asthma with status asthmaticus
- CA23.12 Non-allergic asthma, uncomplicated
- CA23.2 Other specified forms of asthma or bronchospasm
- CA23.20 Aspirin-induced asthma
- CA23.22 Cough variant asthma
- CA23.3 Unspecified asthma
- CA23.30 Unspecified asthma with exacerbation
- CA23.31 Unspecified asthma with status asthmaticus
- CA23.32 Unspecified asthma, uncomplicated

Better Search


ICD-11 search engine is customized for better search results

- Similar words (tuberculosis – tuberculous)
- Aware of Spelling variants (edema, oedema)
- Substitutions (renal - kidney) (cancer – malignant neoplasm)
 - In addition to thousands of synonyms, we have global substitutions so that our system finds terms that are not even in ICD-11 index
- Diacritic normalization (behcet, behçet)
- Possessive normalization (behcet's, behcet)
- Handling compound words
 - Searching **myelitis** will get you “**Neuromyelitis**” “**polymyelitis**” as well.
 - Searching **art** will not match **part** (i.e. not simplistic search that would cause unwanted matches)

Handling Postcoordination




- In cases when the Coding Tool finds a result in the foundation that is more detailed than an ICD-11 category.
 - It could return a post-coordination combination when the required meta data is available in the foundation


ICD-11 Coding Tool Mortality and Morbidity Statistics (MMS)
December 2018




Guessing the word being typed...

Word list
sort: Relatedness/repetition ▾
eltor

Destination Entities
sort: Matching score ▾
1A00&XN62R Cholera due to Vibrio **cholerae** 01, biovar **eltor**  
cholera due to **Cholera eltor**  *


Postcoordination 

IA00 Cholera
└ Infectious agent

Code: 1A00&XN62R
XN62R Vibrio cholera 01, biovar eltor 

Coding maternal cases










ICD-11 Coding Tool Mortality and Morbidity Statistics (MMS)
2020-09

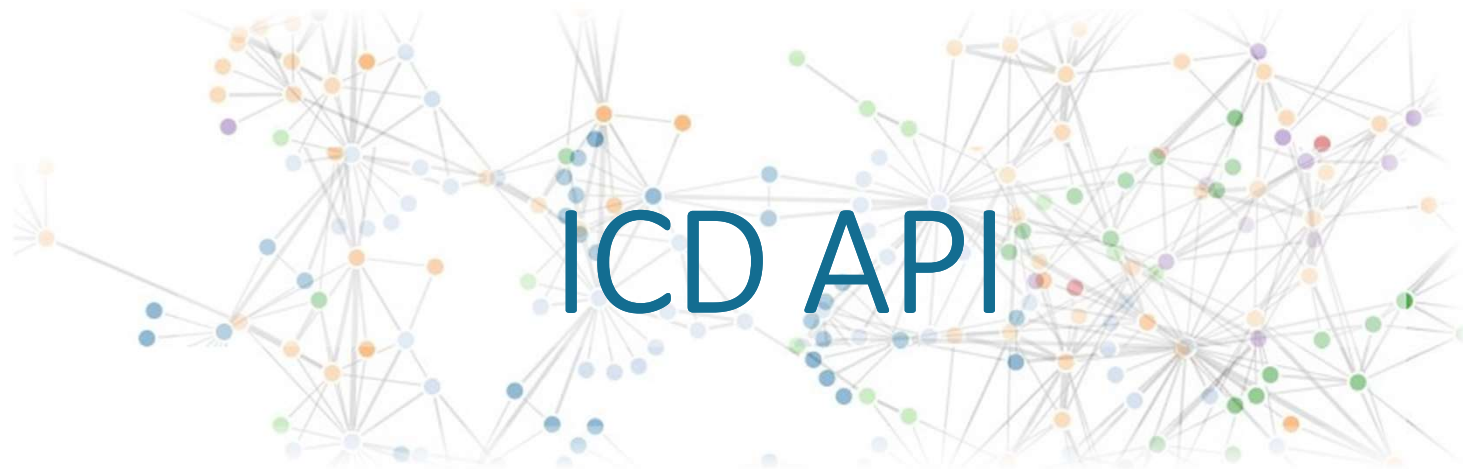
Infected cystitis 

Related words...

Word list
sort : Relatedness/repetition ▾
noninfectious
acute
cholecystitis

Destination Entities
sort: Matching score ▾

GC00.1 Infectious cystitis *   
Description
Inflammation of the urinary bladder caused by microbes
Exclusions
tuberculous cystitis (NHEA) (1B12.5)
bladder disorder in schistosomiasis [bilharziasis] (NHEB) (1F86.0)
Matching Terms
infective cystitis
Related categories in maternal chapter 
Infections of bladder in pregnancy / Infectious cystitis (JA62.1/GC00.1)
Postcoordination 
Postcoordination is available: [click here to open the browser](#) ☐
GC00.Y Other specified **cystitis**   [Details]
Noninfectious **cystitis**
DC12.OZ Acute cholecystitis, unspecified   [Details]
acute cholecystitis **infection**



ICD API allows programmatic access to the International Classification of Diseases (ICD).

It is an HTTP based REST API

ICD API

- ICD API (web services) allow other software to access the ICD content
- HTTP based REST API
 - Uses solid, proven underlying technology designed for the web
 - Benefit from the infrastructure and tools of the web.
- Easy to consume, technology independent
 - Can be consumed from any programming language or platform

ICD API – Content Negotiation

- **Multiple Formats** using accept headers.
 - JSON LD
(JSON for Linked Data), is a syntax defined by W3C for encoding Linked Data using JSON. JSON-LD documents could be consumed as simple JSON files.
 - RDF/XML
A syntax defined by the W3C to express (serialize) an RDF graph as an XML document
- **Multiple languages**
 - Supports language headers to provide different language versions.

ICD API

- **Multiple Versions**

- ICD-11 Foundation / Linearizations such as MMS
- Different Releases can be accessed. ([2020-09](#), 2019-04)
- Different Language versions ([Arabic](#), English, [Spanish](#))

Searching

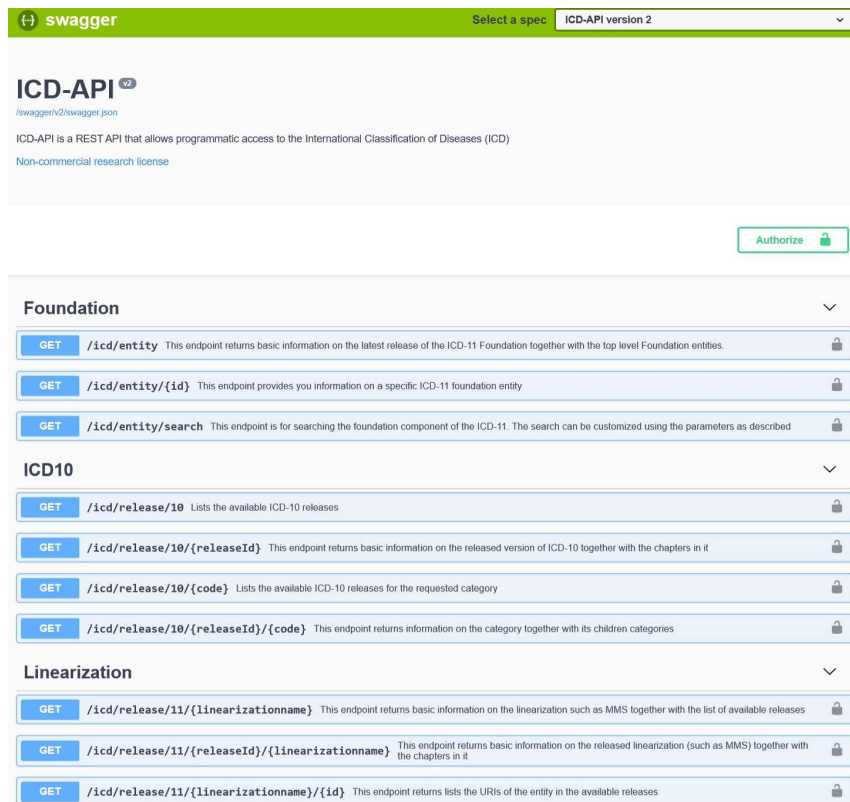
Searching with the ICD-API

- Advanced search functionality (*similar to the searching used in the WHO tools (ICD-11 Coding Tool, ICD-11 Browser)*
 - Weighted results
 - Subset searching
 - Post-coordination combination results
 - Multilingual

Postcoordination Support

- Full access to post-coordination information
 - Which entity can be post-coordinated with which axes
 - Allowed value sets
 - Searching allowed value sets when postcoordinating

Open API (Swagger) Support

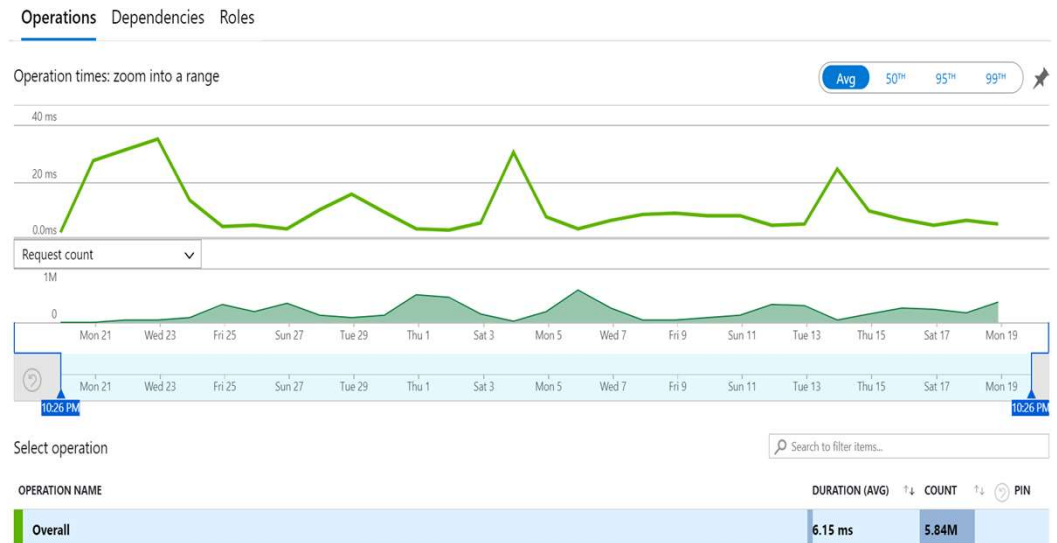
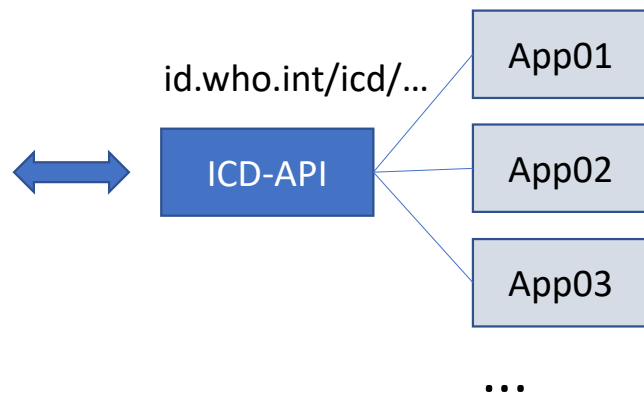


- Detailed API documentation in Open API (Swagger) format
- Many examples included
- Allows trying out the API
- Supports Client code generation

<https://id.who.int/swagger>

Cloud Infrastructure

- Deployed in the Microsoft Cloud (Azure)
 - Scalable vertically and horizontally
 - Increased availability with redundant deployments

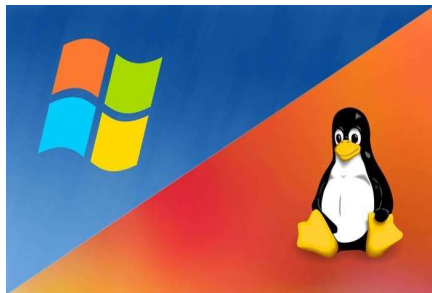


Local Deployments



Docker based deployment

- Very light weight docker images
- Supports multilingual versions
- Linux / Windows / Cloud



Other local deployment options coming

- Windows service
- Linux process (daemon)

<https://icd.who.int/icdapi>

[Home](#) [About](#)

[Register](#) [Log in](#)



ICD API allows programmatic access to the International Classification of Diseases (ICD). It is an HTTP based REST API. You may use this site to access up to date documentation on using the API as well as managing the keys needed for using the API.

[The list of available classification versions](#)

How to Use the API

Version 2 new

[What's new in version 2](#)
[API Documentation](#)
[API-Reference \(swagger\)](#)

[ICD API Samples GitHub repository](#)

ICD-API in container new beta

You may deploy the ICD-API locally using Docker

[Learn more](#)

API Access

View API access key(s) (*please login first*)

If you haven't registered already please [Register](#) to get access to the API

Embedded Coding Tool new

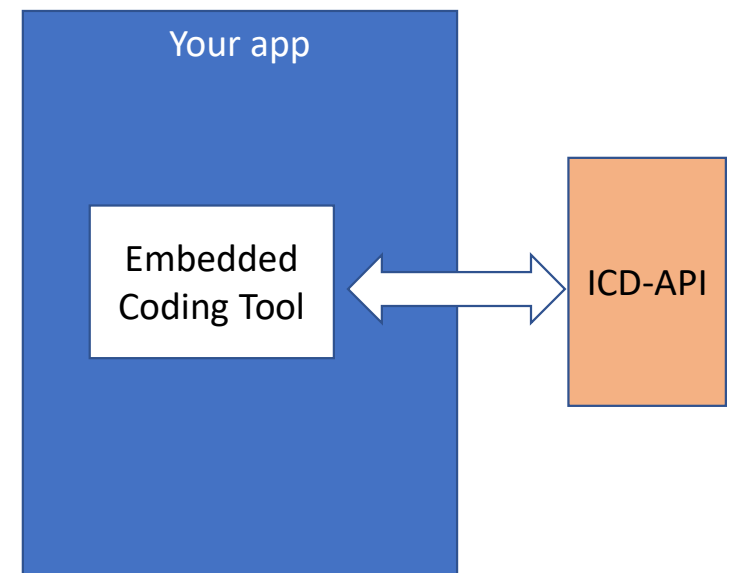
You can easily integrate ICD-11 Coding Tool into your applications.

[Learn more](#)

Embedded Coding Tool is powered by the ICD-API

Embedded Coding Tool

- javascript / HTML component that could be integrated into any web-based application
- Powered by ICD-API
- Any input field within your application could become a complete Coding Tool by simply decorating it with additional attributes
- Could use cloud deployed or container deployed ICD-API
- Multilingual



DEMO

Other Deployments of Embedded Coding Tool

- Uganda Death Certification - DHIS2 ICD 11 Integration
- UNRWA e-health System
- ICD-FIT (WHO)
- Jamaica (within EMR)
- Tanzania (In EMR & Cause of Death)
- Kuwait (EMR)
- Rwanda (EMR – OpenMRS)

Integration with your Software

Method	Pros / Cons
Traditional Integration <i>Loading Content using a file or API (or by other means) and synchronize as needed</i>	<ul style="list-style-type: none">- Does not benefit from existing software components in the API such as searching, post-coordination related features.
Integration using ICD-API <i>ICD-11 is accessed and searched using ICD-API. WHO Cloud instance of the ICD-API or local container deployments could be used</i>	<ul style="list-style-type: none">- The search engine that WHO has developed will be accessible to your applications.- Additional features for postcoordination
Embedded Coding Tool Integration <i>This method internally uses the ICD-API and provides ready to consume UI components for web applications which replicate the function of the ICD11 Coding Tool within your software</i>	<ul style="list-style-type: none">- Speeds up the software development for web applications that need to perform ICD-11 coding functionality.
Hybrid Integration <i>Any combination of the above.</i>	

Future work

- International Classification of Functioning (ICF) and International Classification of Health Interventions (ICHI) integration in to the foundation and API
- HL7-FHIR support for the ICD-API
- Alternative local deployments.
- Embedded ICD-11 Browser
- More languages