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SNOMED CT Expo 2017

Data Normalization, Groupers and Other Transformations as Actionable Solutions for the Healthcare Ecosystem

Regis Charlot and Eric Rose, M.D.
Intelligent Medical Objects, Inc.

October 19, 2017

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Discussion Outline

- Clinical Interface Terminology (CIT)
- CIT and HIE Solutions
- CIT and data “re-colorization”
- CIT and “grouper” content
- CIT groupers for analytics

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Clinical Interface Terminology

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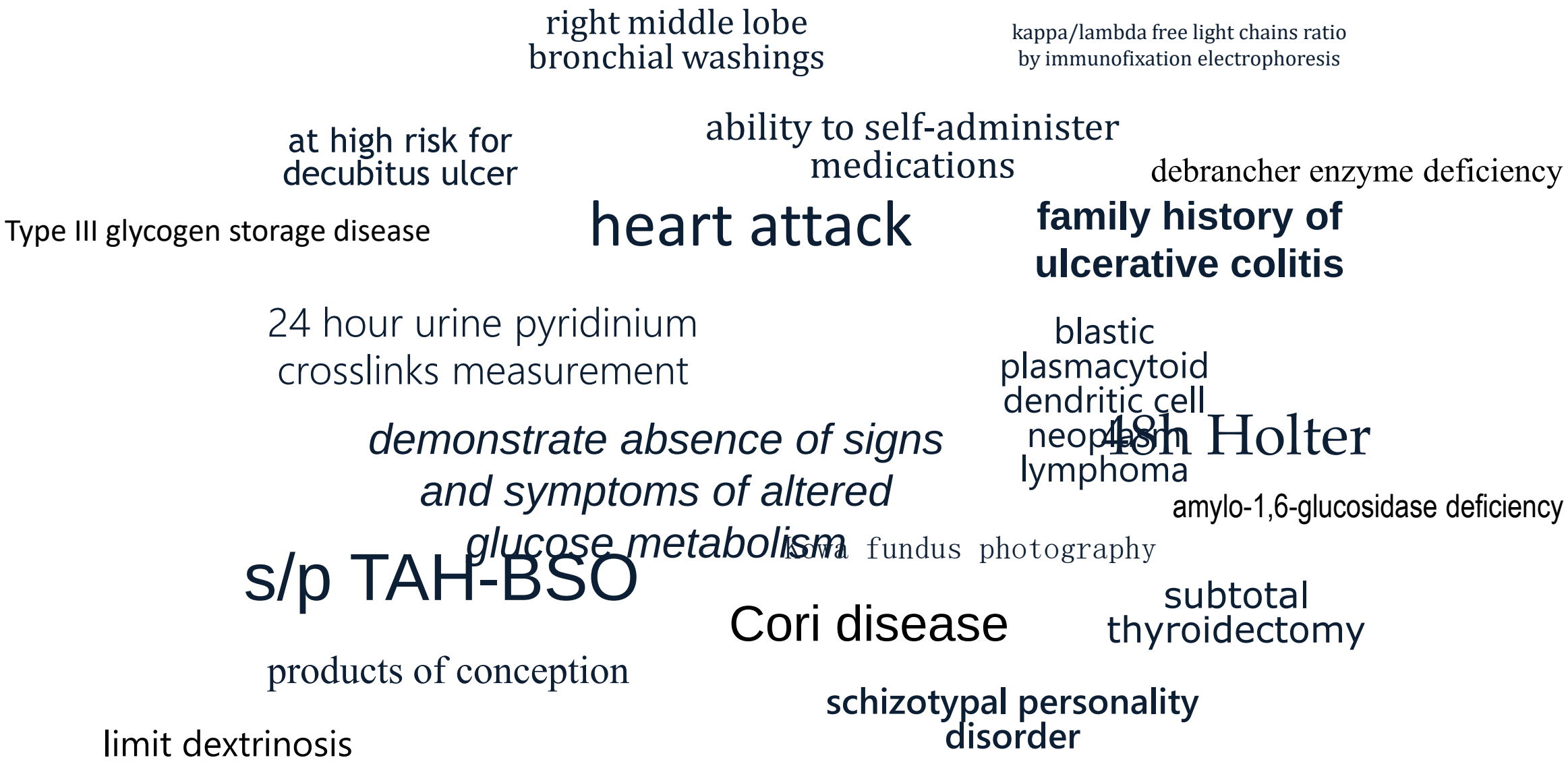
Clinical Interface Terminology-Why?



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Clinical Interface Terminology-Why?

“The terms in our system are not clinically meaningful.”

“It’s impossible to express ourselves using [administrative terminology].”

“It’s so frustrating trying to find terms to document medical histories and patient problem lists….”

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Clinical Interface Terminology-Why?

"The terms in our system are not clinically meaningful."

"It's impossible to express ourselves using [administrative terminology]."

"It's so frustrating trying to find terms to document medical histories and patient problem lists…."

- Terms are hard to find
- Even when found, they are often poorly suited to clinical use
  e.g. "strtctc impltj nstim eltrd w/record 1st array"

All this leads to…

- Incomplete and/or incorrect documentation
- Potential clinical risk
- Lost time and money due to under-coding or rejected claims
- Lost potential for secondary use of data (CDS, reporting, research)

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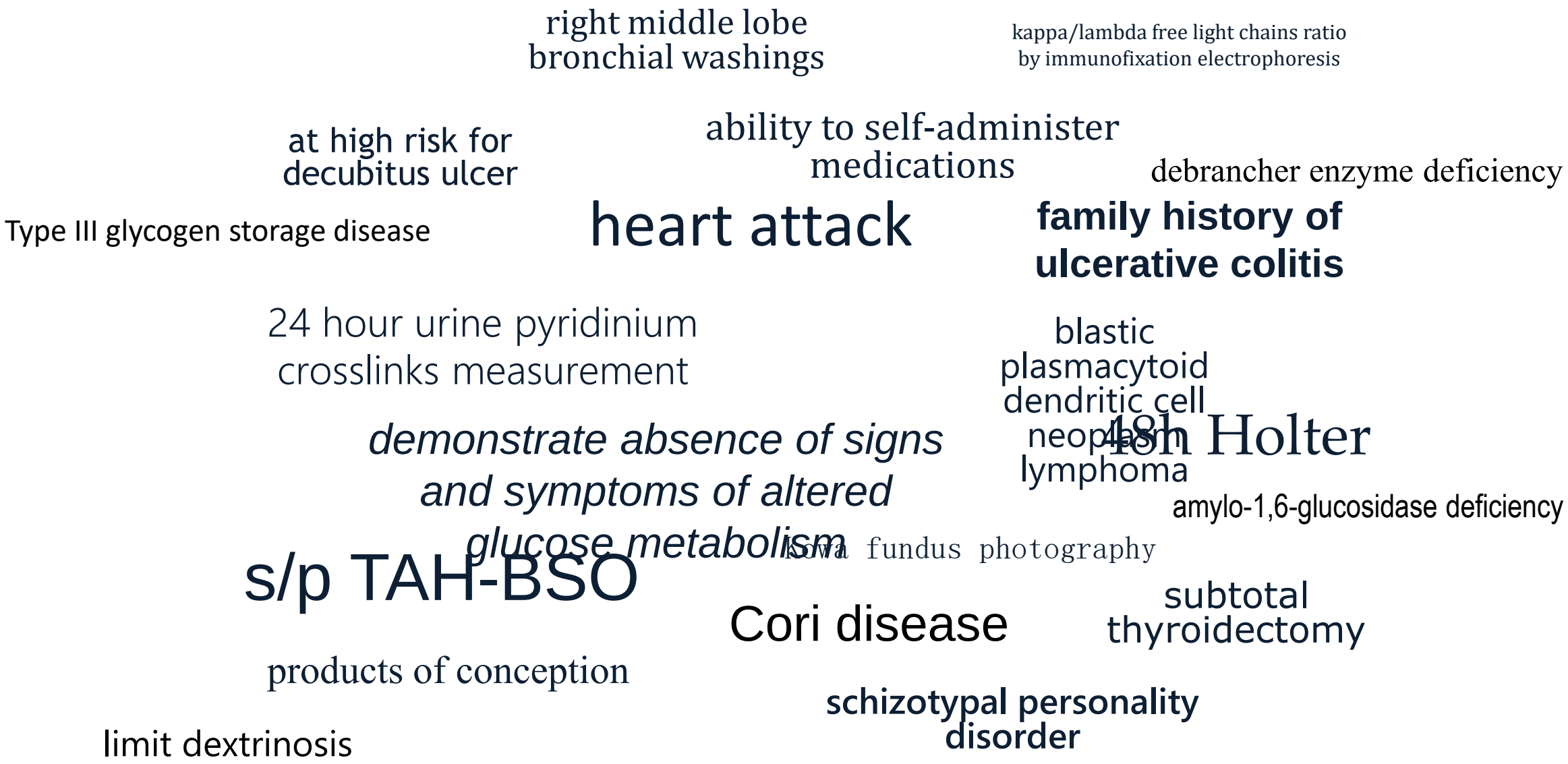
Clinical Interface Terminology-Why?



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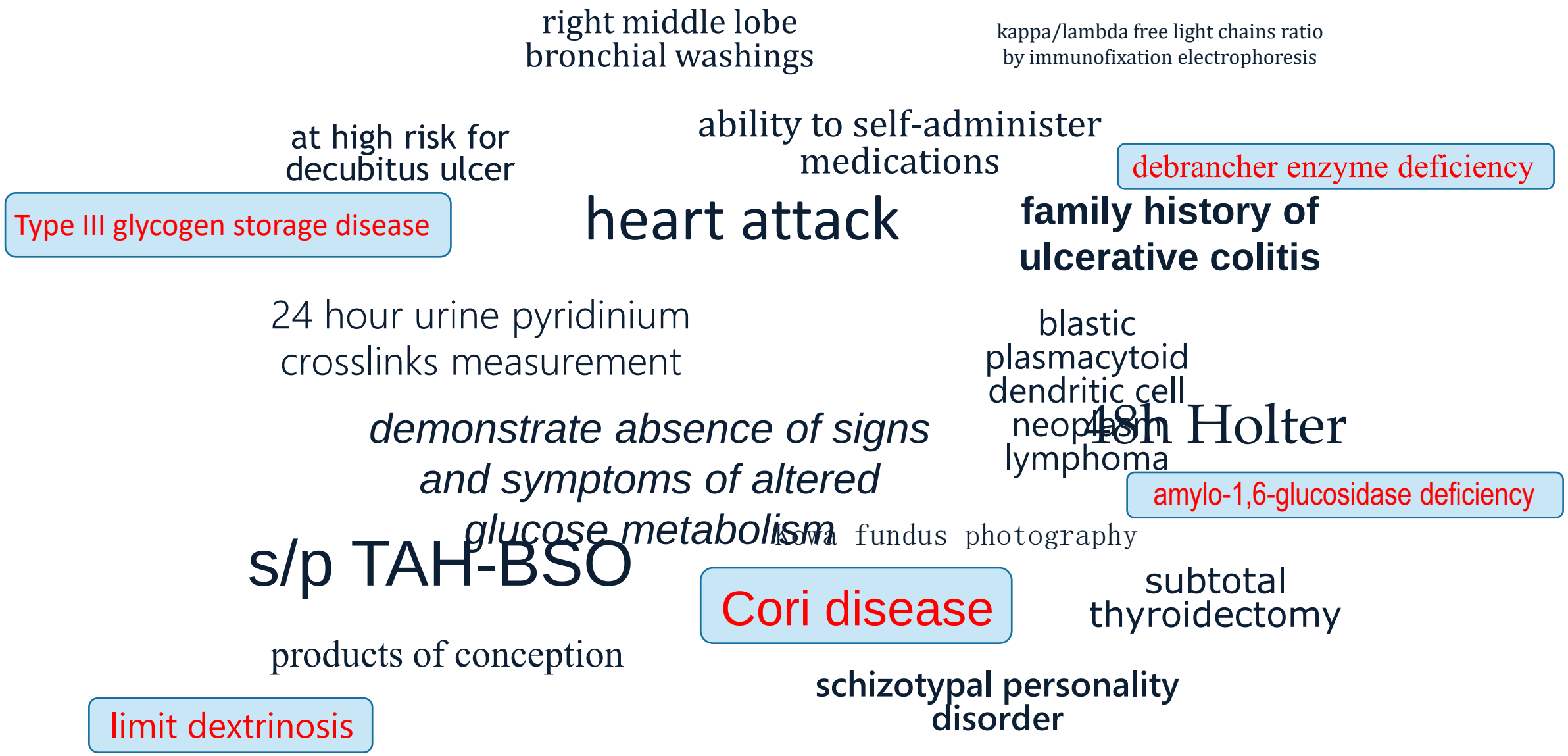
Clinical Interface Terminology-Why?



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Clinical Interface Terminology-How?

Clinician-Friendly Terms

- myocardial infarction with ST segment elevation
- ST elevation myocardial infarction
- ST elevation MI
- STEMI
- MI w/ST elevation

Standardized Health Vocabularies

SNOMED CT 401303003
Acute ST segment elevation myocardial infarction (disorder)

ICD-10-CM I21.3
ST elevation (STEMI) myocardial infarction of unspecified site

ICD-9-CM 410.90
Acute myocardial infarction, episode of care unspecified

ICD-10 (WHO) I23.3
Acute transmural myocardial infarction of unspecified site

Read CTV3 XaIwM
Acute ST segment elevation myocardial infarction

Human Phenotype Ontology (HPO) 0001658
Myocardial infarction

MedDRA 10064346
STEMI

ICD-11 BA41.0
Acute ST elevation myocardial infarction

...and *MORE*

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Clinical Interface Terminology-How?

- Precoordination sufficient to capture clinical understanding and intent

Clinician Selects

"carcinoma of breast, stage 1, estrogen receptor positive"
IMO Lexical ID: 3539276

SNOMED CT 254838004 Carcinoma of breast (disorder)- primary
SNOMED CT 13104003 Clinical stage I (finding)- secondary
SNOMED CT 416053008 Estrogen receptor positive tumor (disorder)- secondary

- Alternative-Using SNOMED CT as an interface terminology
  - Clinician needs to select the three SNOMED terms *and*
  - It is more difficult to maintain association of all codes to single clinical entity

SNOMED CT 254838004 Carcinoma of breast (disorder)

AND SNOMED CT 13104003 Clinical stage I (finding)

AND SNOMED CT 416053008 Estrogen receptor positive tumor (disorder)

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Term-specific unique identifiers

- What is the IMO Lexical ID?
  - The IMO Lexical ID is a unique identifier associated with an IMO term.
  - The IMO Lexical ID never changes for any given term.
- The value of the IMO Descriptions with unique Lexical IDs
  - Captures precisely what the clinician sees and does (Clinical Intent)
  - Retains all relevant code maps, *which are updated over time* as appropriate
  - Supports secondary use cases outside of clinical care

The IMO Lexical ID is the key to extracting the value created by clinician-led documentation

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Benefits of Clinical Interface Terminology: Interoperability

- Facilitates compliance with varying coding requirements
- Allows clinical intent to be maintained
  - Original clinical text preserved
  - No granularity lost as a result of code mapping
- Benefits amplified if both sender and receive use the same CIT
  - IMO currently used by over 550,000 clinicians in 8 countries
  - Data integrity maintained across multiple EMR and other health information platforms

Exchange data with no loss of fidelity

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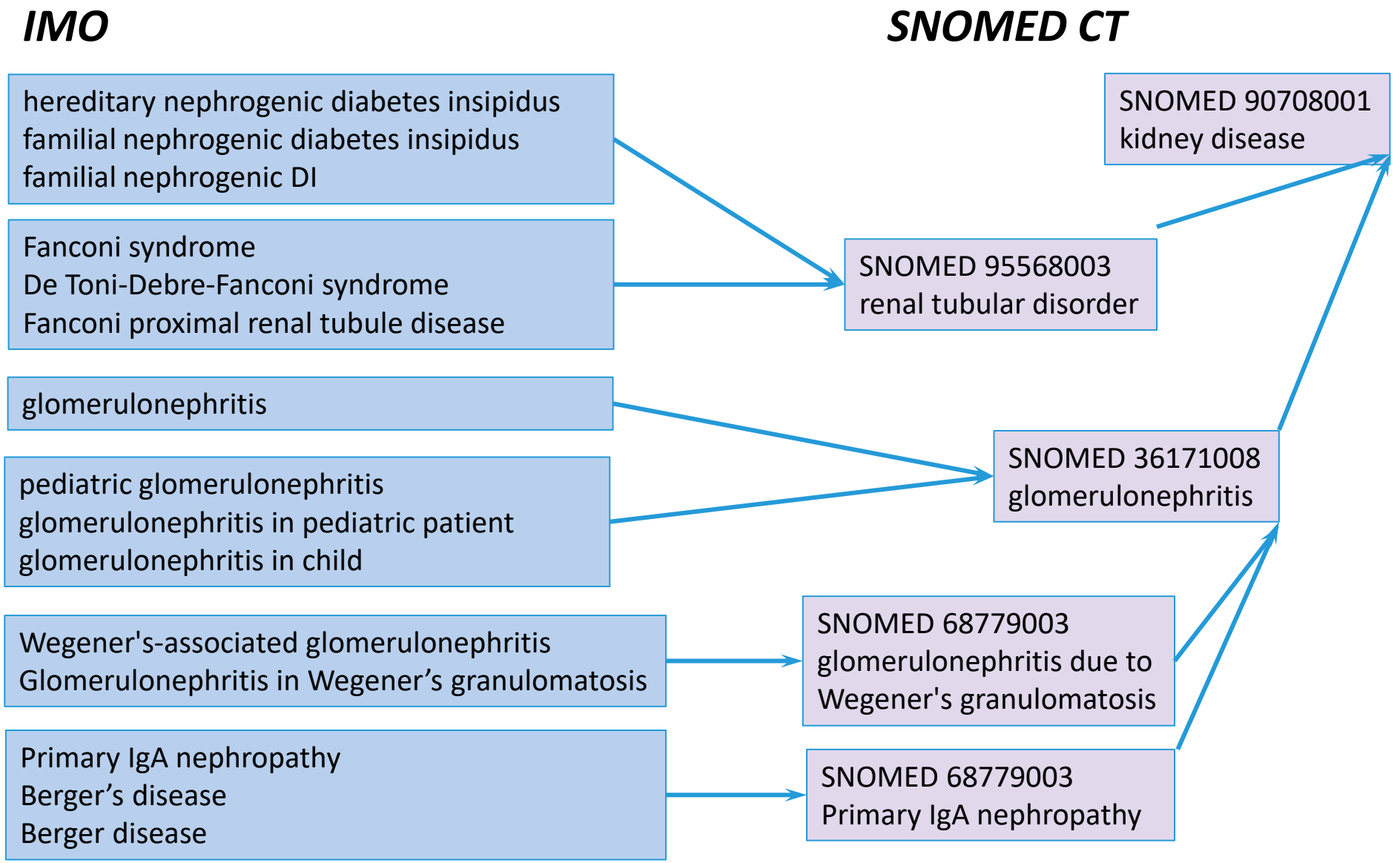
Benefits of Clinical Interface Terminology: Analytics



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Benefits of Clinical Interface Terminology: Analytics

- More accurate capture of clinical data→more detailed and precise reports
- Practice Profile Reporting
- Clinical Quality Measurement
- Risk based payment environments
- Clinical decision support systems (CDSS)

Accurate and complete code maps with well maintained clinical data allows for precise and custom analytics

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Code mapping by domain

IMO Domain	Standardized Vocabulary Maps
Problems	SNOMED CT, ICD-10, ICD-10-CM, ICD-10-AM, ICD-10-CA
Procedures	SNOMED CT, LOINC, CPT4, ICD-P, ICD-10-PCS, HCPCS, CVX
Allergens (non-drug)/Medication	SNOMED CT, UNII, RxNorm, NDF-RT
Anatomical Site	SNOMED CT, HL7 Body Parts
Blood Product	SNOMED CT
Care Outcome	SNOMED CT
Document	SNOMED CT, LOINC, HL7 Document
Environment	SNOMED CT, HL7 Service Location
Observable	SNOMED CT, LOINC
Organism	SNOMED CT
Result Values	SNOMED CT
Specimen Type	SNOMED CT, HL7 Specimen Source
Topographical Modifiers	SNOMED CT

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IMO HIE Solutions and Data Re-colorization

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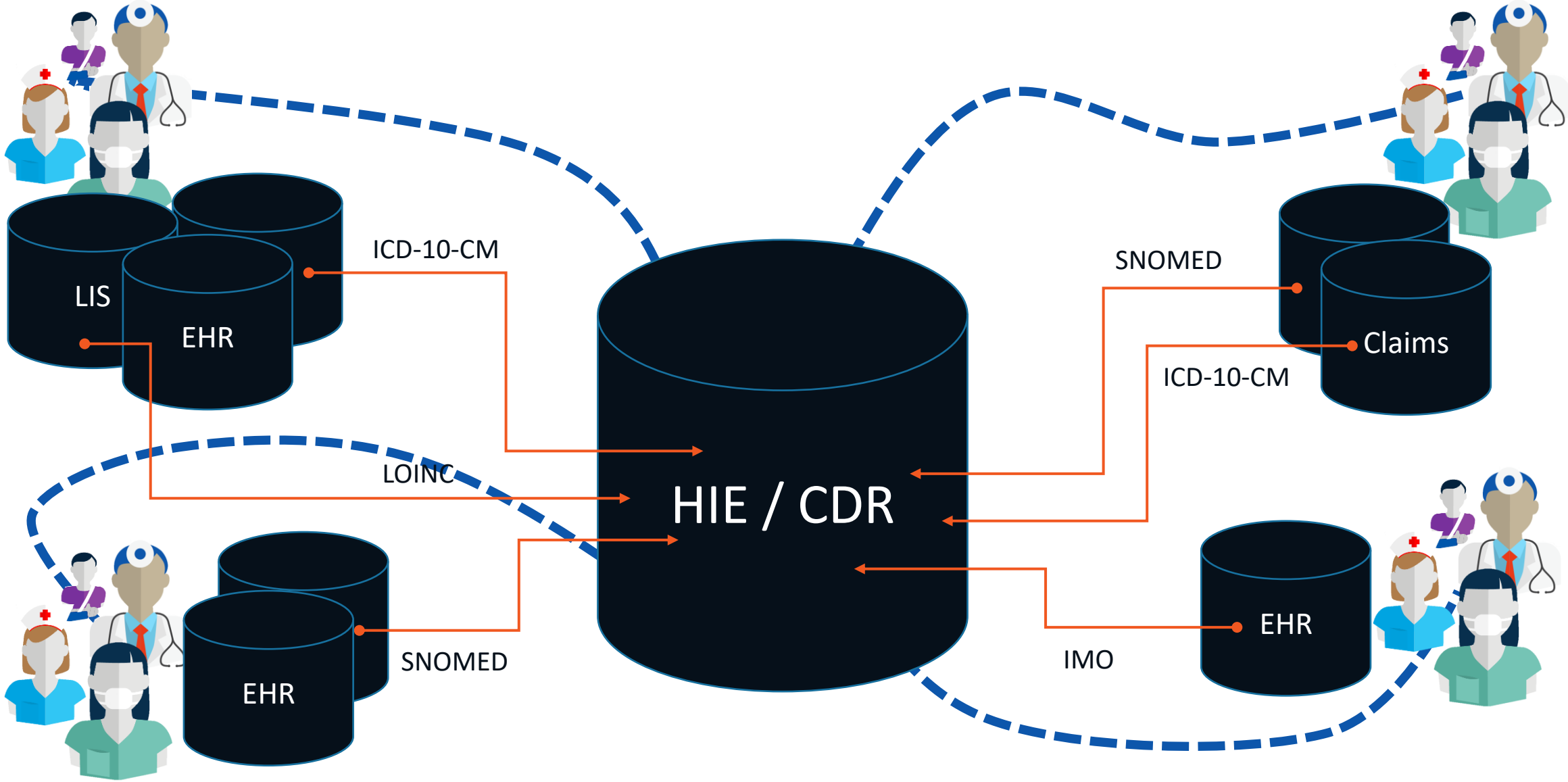
IMO Solutions for HIE / CDR



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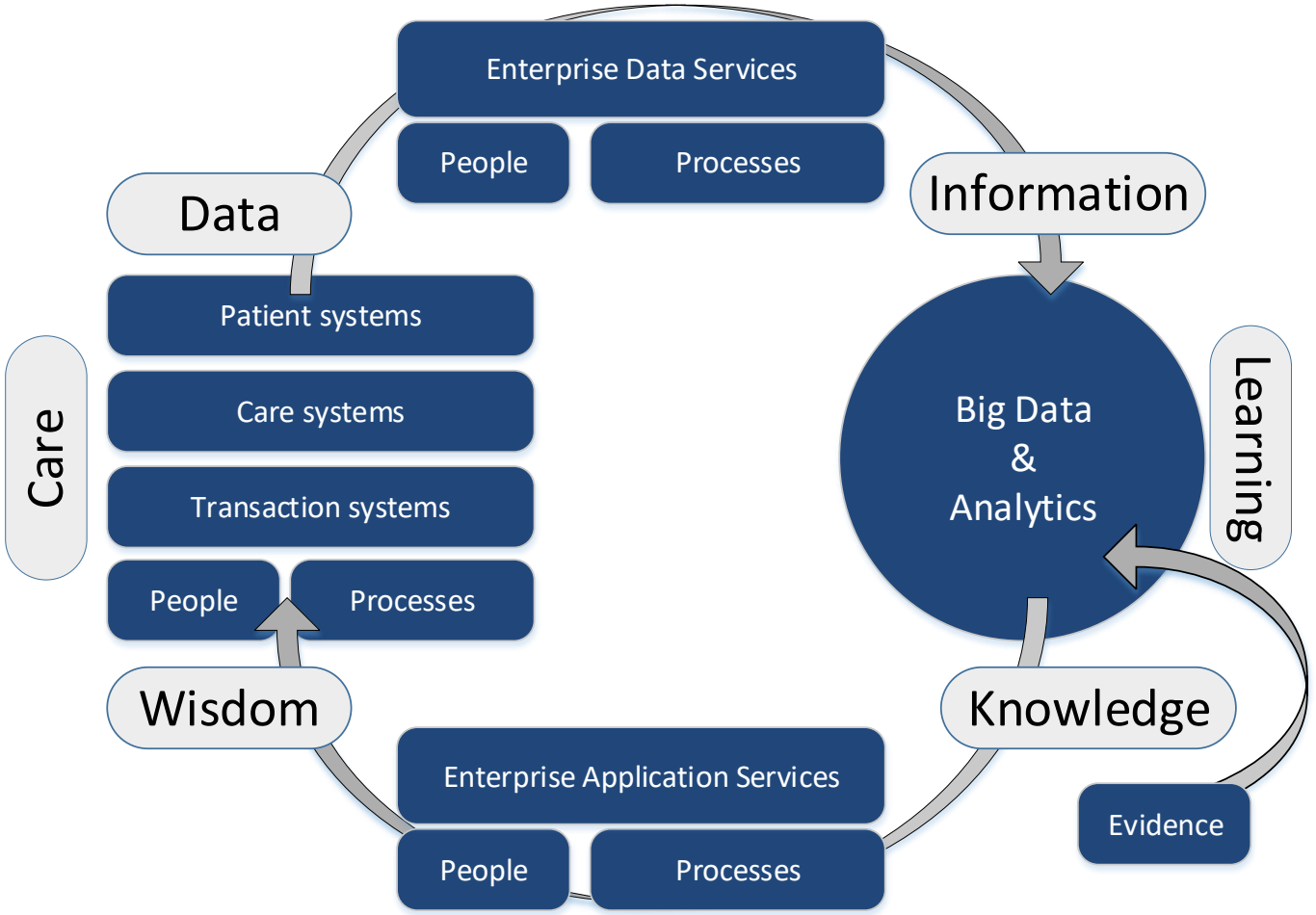
Healthcare Ecosystem



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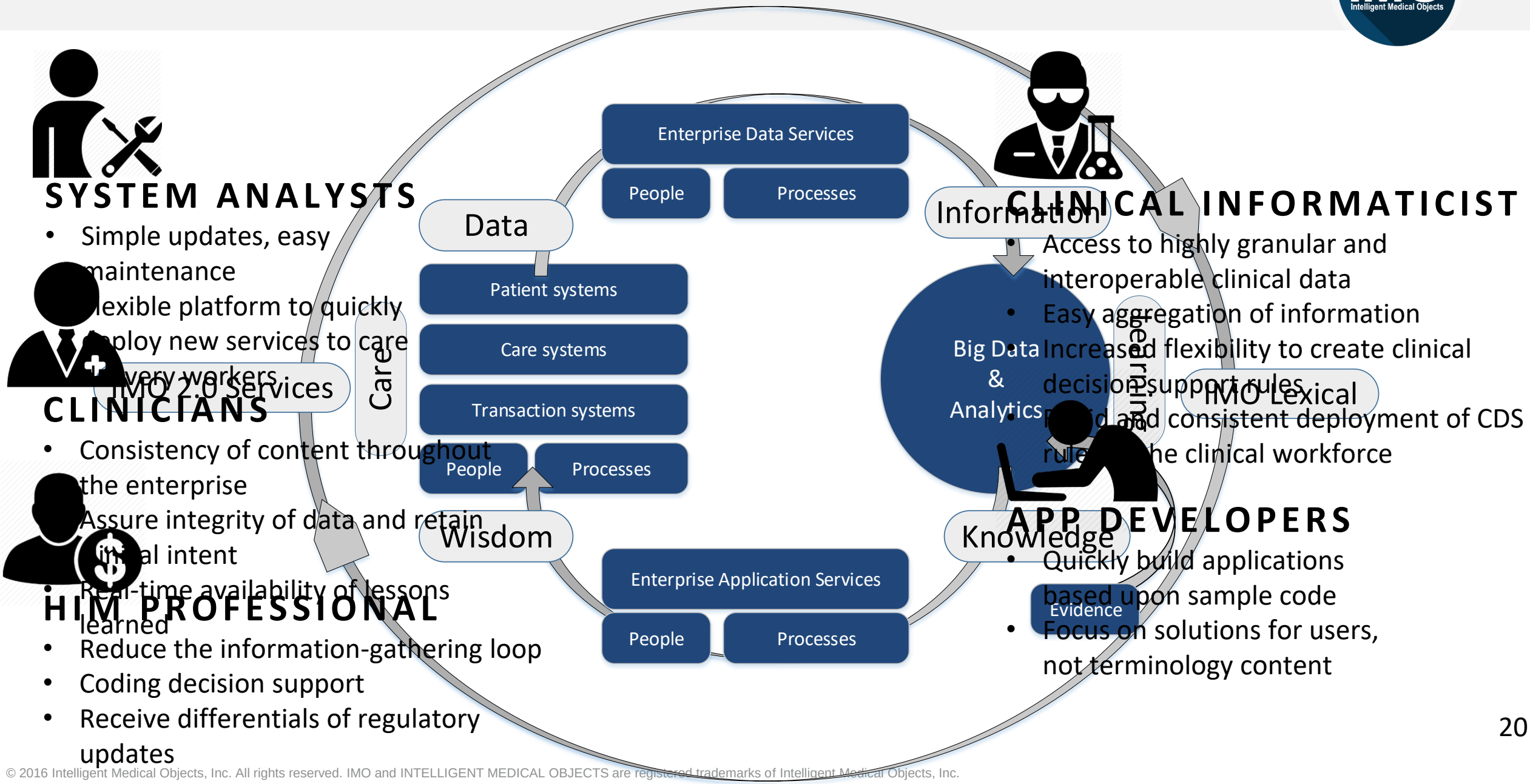

SYSTEM ANALYSTS

- Simple updates, easy maintenance
- Flexible platform to quickly deploy new services to care delivery workers

IMO 2.0 Services

CLINICIANS

- Consistency of content throughout the enterprise
- Assure integrity of data and retain initial intent
- Real-time availability of lessons learned

HIM PROFESSIONAL

- Reduce the information-gathering loop
- Coding decision support
- Receive differentials of regulatory updates

CLINICAL INFORMATICIST

- Access to highly granular and interoperable clinical data
- Easy aggregation of information
- Increased flexibility to create clinical decision support rules

IMO Lexical

- Rapid and consistent deployment of CDS rules to the clinical workforce

APP DEVELOPERS

- Quickly build applications based upon sample code
- Focus on solutions for users, not terminology content

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IMO Solutions for HIE / CDR

Structured Data Challenges

- Inbound systems report data in myriad coding systems
- Lost resolution from inbound system
- Downstream applications have separate inbound data requirements
- Crossmaps for each use-case are difficult to create and maintain

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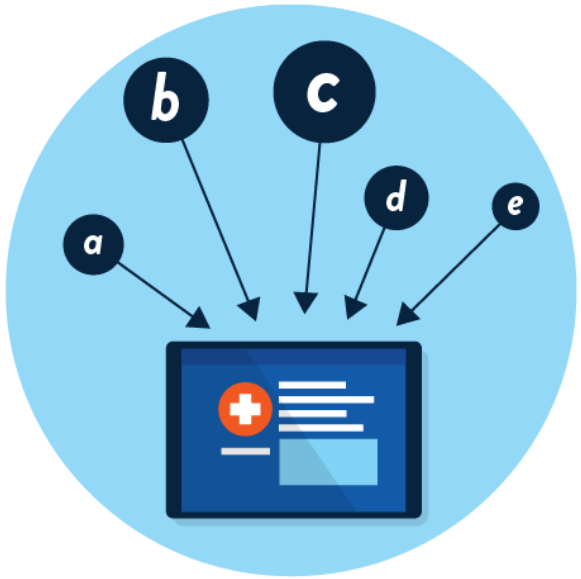
IMO Solutions for HIE / CDR



Structured Data Solutions

- Sync inbound documents and messages to IMO Clinical Interface Terminologies for downstream reporting, analytics, and clinical workflows
- Deterministically map coding systems to most appropriate IMO terms
- Solve “cross-mapping problem” between terminologies using IMO’s industry-leading terminology products
- IMO Terminology Solutions updated 10x / year and aligned to coding system regulatory updates

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The importance of preserving clinical intent for analytics

Original Problem (IT)
Term captured in EHR

Type 2 diabetes mellitus with stage 4 chronic kidney disease, with long-term current use of insulin

SNOMED CT
- **44054006** Diabetes mellitus type 2
- **710815001** Long-term current use of insulin

Typical C-CDA Interface

ICD-10-CM
- **E11.22 - Type 2 diabetes mellitus with diabetic chronic kidney disease**
- **N18.4** - Chronic kidney disease, stage 4 (severe)
- **Z79.4** - Long term (current) use of insulin

Standard Data Translation

Type 2 diabetes mellitus

SNOMED CT
44054006 Type 2 diabetes mellitus

ICD-10-CM
E11.9 Type 2 diabetes mellitus without complications

Chronic kidney disease and insulin usage lost in transaction – 500% reduction in risk profile for this patient based upon CMS HCC

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Data Colorization with IMO

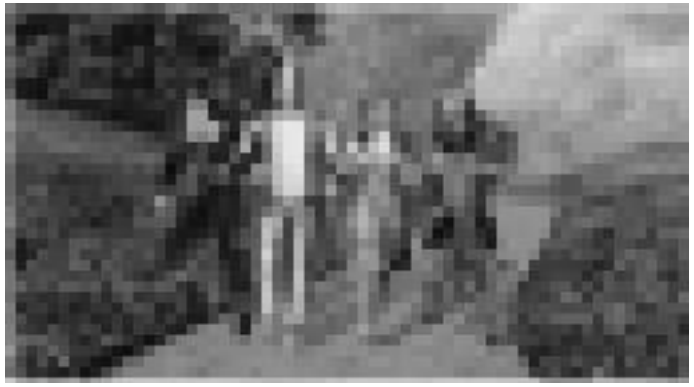
Bring back the Clinical Intent/Context to Existing Data Sets

Clinical Events/Story/Notes

Standard code based interfaces
(e.g. SNOMED / ICD)

Typical Encoding found in HIE

ICD or SNOMED-encoded Data



IMO

IMO
Terminology/Vocabulary/Tools
with Clinical Information + Codes

IMO can “color-ize” data with
Clinical Intent/Context

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The importance of preserving clinical intent for analytics

Original Problem (IT) Term captured in EHR

Type 2 diabetes mellitus with stage 4 chronic kidney disease, with long-term current use of insulin

SNOMED CT
- **44054006** Diabetes mellitus type 2

C-CDA document w/ original IMO Term or lexical ID included

ICD-10-CM
- **E11.22 - Type 2 diabetes mellitus with diabetic chronic kidney disease**
- **N18.4** - Chronic kidney disease, stage 4 (severe)
- **Z79.4** - Long term (current) use of insulin

IMO Data Colorization Process

Problem (IT) Term w/ Colorization

Type 2 diabetes mellitus with stage 4 chronic kidney disease, with long-term current use of insulin

SNOMED CT
- **44054006** Diabetes mellitus type 2
- **237599002** Insulin treated type 2 diabetes mellitus
- **431857002** Chronic kidney disease stage 4
- **710815001** Long-term current use of insulin

ICD-10-CM
- **E11.22 - Type 2 diabetes mellitus with diabetic chronic kidney disease**
- **N18.4** - Chronic kidney disease, stage 4 (severe)
- **Z79.4** - Long term (current) use of insulin

Full clinical meaning retained in transaction.

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IMO Grouper Solution

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The Challenge

- Modern EMR's allow for the capture of copious amounts of structured clinical data
- This data is often highly granular and disparate making analytics extremely difficult
- Government and private organizations are rapidly increasing the amount of reporting required
- The published value sets are routinely updated
- Creating custom reports is difficult and require significant maintenance overhead
- We need to be able to leverage Healthcare data to its fullest
- The many use cases often necessitate unique rules for group inclusion

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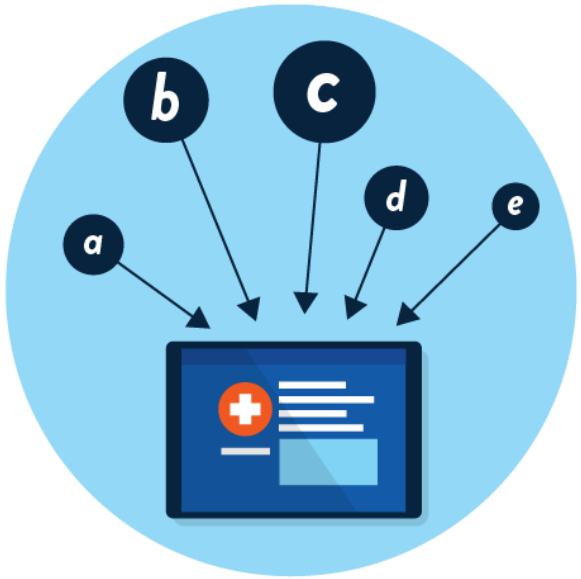
The Solution



Features and Benefits

- IMO can efficiently create quality groupers leveraging our content and our Clinical, Technical, and Coding terminology experts
- Provide Regulatory Value Sets
- Custom value sets for a wide range of use cases
- Management and maintenance – Need for continuous vetting
- Leverages existing IMO lexicals already in use in most EMRs
- Eventual creation of Value Set Library

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Groupers- Definitions

Grouper or Value Set

- A collection of like terms and associated codes with a specific scope or purpose
- These may have a computable definition and associated meta data that align with or identify the group

Extensional Groupers- Externally defined value sets

- Administrative code groups
- Fixed set of codes and/or concepts
- Regularly augmented or modified

Intentional Groupers- Internally defined value sets

- Customer or IMO created
- Unlimited use cases
- Maximum flexibility
- May leverage one or more conceptual hierarchies
- Allow for precise and custom analytics

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Grouper Use Cases

Best Practice Alerts	• Craft a best practice alert, such as "Identify whether this patient has diabetes, and if so, have they had a hemoglobin A1c in last 6 months".
Federal Initiatives	• Manage and maintain federally mandated value sets. IMO provides updates and annual differentials.
Quality Improvement/Document Retrieval	• Use IMO to build filters to automatically aggregate multiple IMO concepts within a single identifier. For example, all Chest CT scan results which include any form of pulmonary nodule in the text
Content Delivery	• Identify content (e.g. discharge instructions or patient education) relevant to a customer dictionary entry even though there is no direct match between dictionary entry and content master item.
Find Patients for Research	• Define precise queries to find specific patient types for clinical trials, therapies, etc.

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Grouper Use Cases

In-Patient Only Surgeries	• Management and updates provided
Sensitive Data	• Identify and manage patients with data requiring special handling within institutions and for Transition of Care Documents
Predictive Analytics	• Risk Management: Identify and manage patients with CHF at high risk for re-admission due to co-morbidities
Public Health Reporting	• Cohort analytics and case reporting
User Interface Display	• Related problems, medications and lab results to ease viewing of patient data

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Groupers for Analytics

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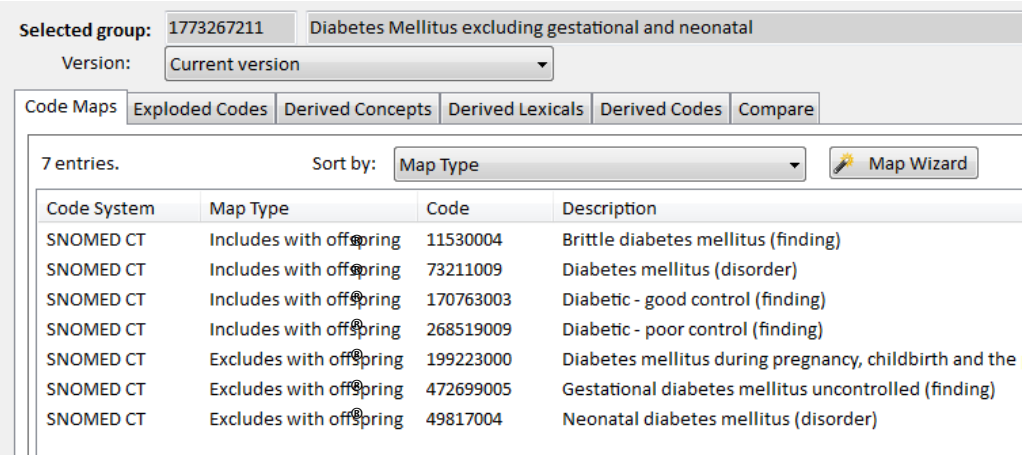
Analytics

Diabetes Mellitus:
- 7 Definitional Group Members (Disorders + Findings)



Selected group: 1773267211 Diabetes Mellitus excluding gestational and neonatal

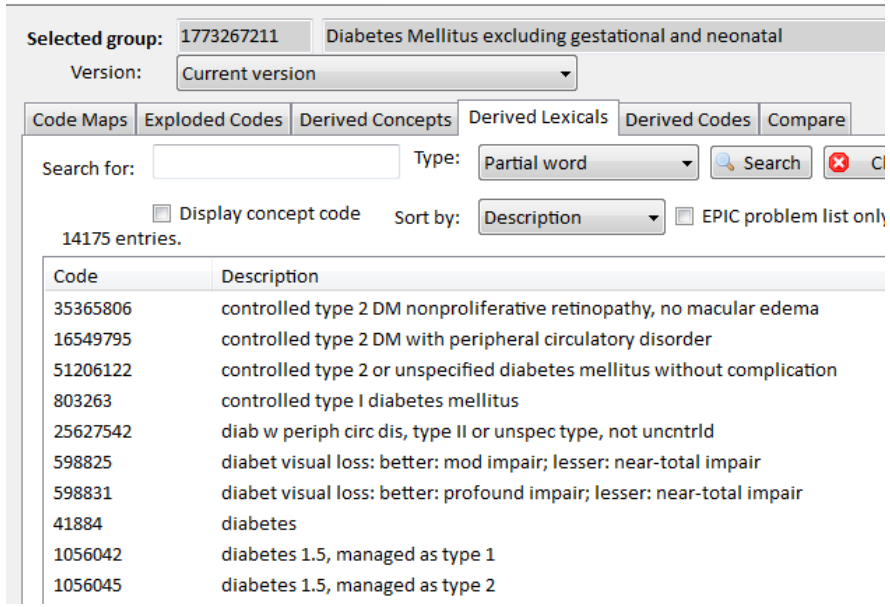
Version: Current version

Code Maps | Exploded Codes | Derived Concepts | Derived Lexicals | Derived Codes | Compare

7 entries. Sort by: Map Type Map Wizard

Code System	Map Type	Code	Description
SNOMED CT	Includes with offspring	11530004	Brittle diabetes mellitus (finding)
SNOMED CT	Includes with offspring	73211009	Diabetes mellitus (disorder)
SNOMED CT	Includes with offspring	170763003	Diabetic - good control (finding)
SNOMED CT	Includes with offspring	268519009	Diabetic - poor control (finding)
SNOMED CT	Excludes with offspring	199223000	Diabetes mellitus during pregnancy, childbirth and the
SNOMED CT	Excludes with offspring	472699005	Gestational diabetes mellitus uncontrolled (finding)
SNOMED CT	Excludes with offspring	49817004	Neonatal diabetes mellitus (disorder)

Diabetes Mellitus:
- 14175 IMO Lexicals
- Capturing greater specificity (granularity)
- Capturing clinical intent



Selected group: 1773267211 Diabetes Mellitus excluding gestational and neonatal

Version: Current version

Code Maps | Exploded Codes | Derived Concepts | Derived Lexicals | Derived Codes | Compare

Search for: Type: Partial word Search Cl

Display concept code Sort by: Description EPIC problem list only

14175 entries.

Code	Description
35365806	controlled type 2 DM nonproliferative retinopathy, no macular edema
16549795	controlled type 2 DM with peripheral circulatory disorder
51206122	controlled type 2 or unspecified diabetes mellitus without complication
803263	controlled type I diabetes mellitus
25627542	diab w periph circ dis, type II or unspec type, not uncntrld
598825	diabet visual loss: better: mod impair; lesser: near-total impair
598831	diabet visual loss: better: profound impair; lesser: near-total impair
41884	diabetes
1056042	diabetes 1.5, managed as type 1
1056045	diabetes 1.5, managed as type 2

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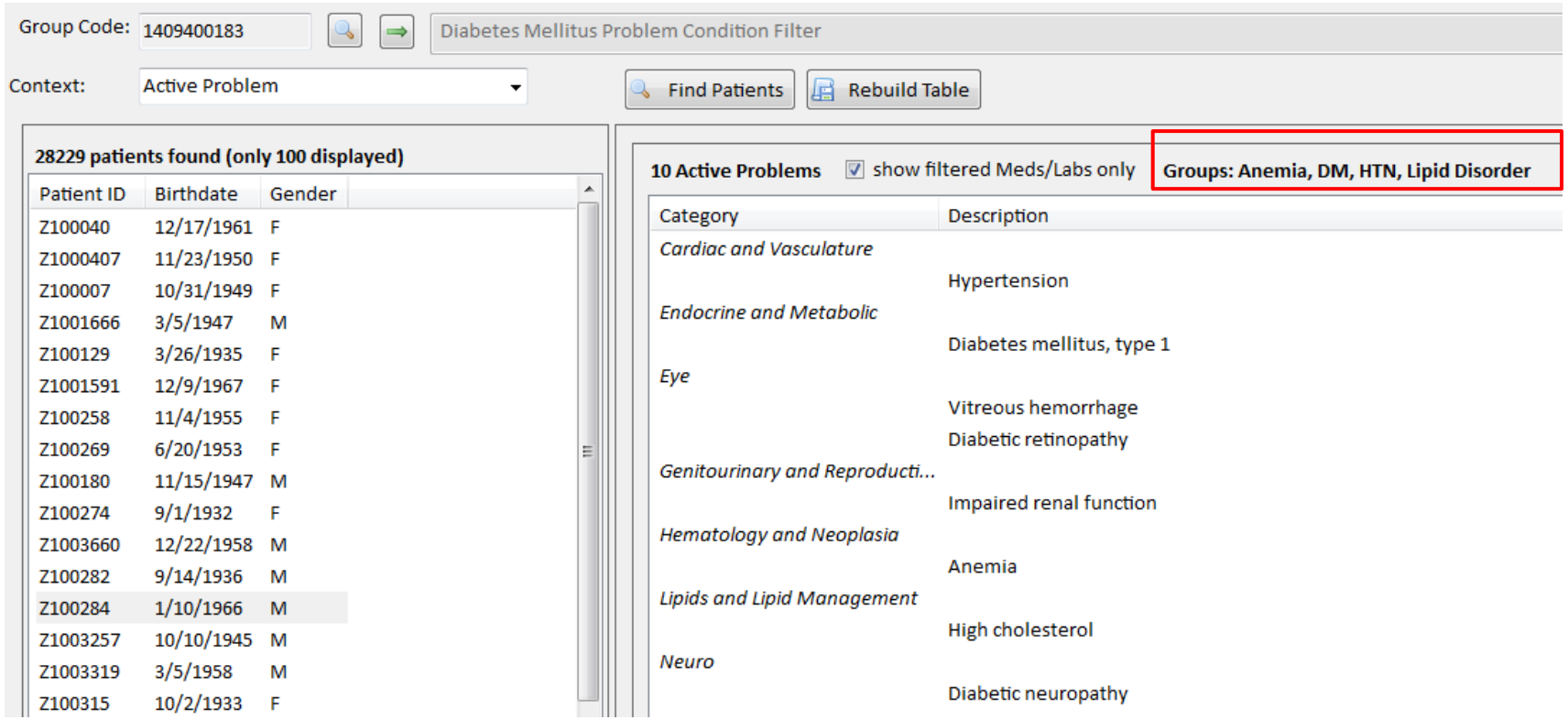
Analytics

50 year old male patient on query for Diabetes Mellitus found to also qualify for Anemia, Hypertension and Lipid Disorder Reporting Groupers based on group members



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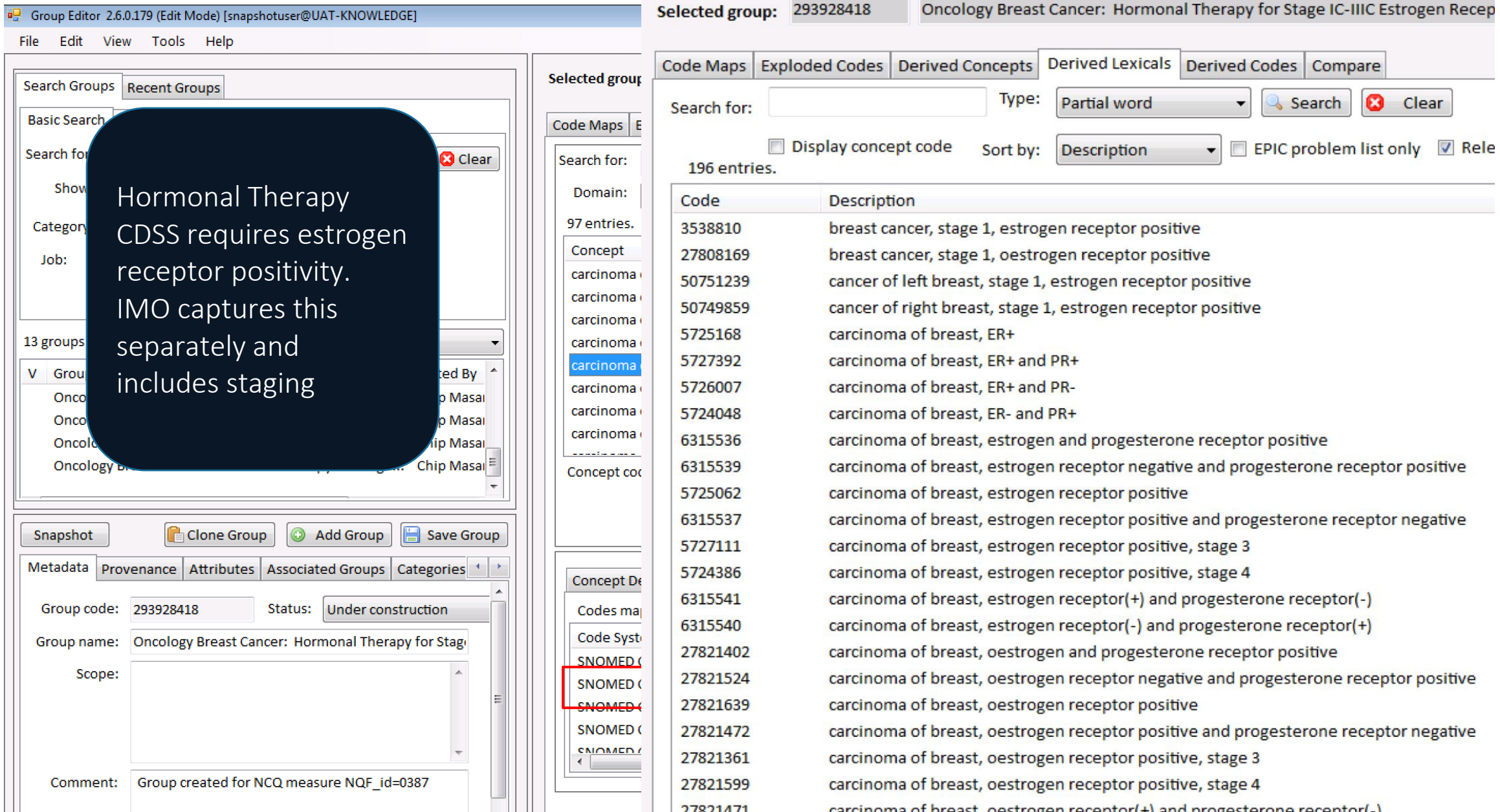
Analytics


Group Editor 2.6.0.179 (Edit Mode) [snapshotuser@UAT-KNOWLEDGE]
File Edit View Tools Help
Search Groups Recent Groups
Basic Search
Clear
13 groups
Snapshot Clone Group Add Group Save Group
Metadata Provenance Attributes Associated Groups Categories
Group code: 293928418 Status: Under construction
Group name: Oncology Breast Cancer: Hormonal Therapy for Stag
Scope:
Comment: Group created for NCQ measure NQF_id=0387
Hormonal Therapy CDSS requires estrogen receptor positivity. IMO captures this separately and includes staging
Selected group: 293928418 Oncology Breast Cancer: Hormonal Therapy for Stage IC-IIIC Estrogen Recep
Code Maps Exploded Codes Derived Concepts Derived Lexicals Derived Codes Compare
Search for:
Type: Partial word
Search
Clear
Display concept code
Sort by: Description
EPIC problem list only
196 entries.
Code Description
3538810 breast cancer, stage 1, estrogen receptor positive
27808169 breast cancer, stage 1, oestrogen receptor positive
50751239 cancer of left breast, stage 1, estrogen receptor positive
50749859 cancer of right breast, stage 1, estrogen receptor positive
5725168 carcinoma of breast, ER+
5727392 carcinoma of breast, ER+ and PR+
5726007 carcinoma of breast, ER+ and PR-
5724048 carcinoma of breast, ER- and PR+
6315536 carcinoma of breast, estrogen and progesterone receptor positive
6315539 carcinoma of breast, estrogen receptor negative and progesterone receptor positive
5725062 carcinoma of breast, estrogen receptor positive
6315537 carcinoma of breast, estrogen receptor positive and progesterone receptor negative
5727111 carcinoma of breast, estrogen receptor positive, stage 3
5724386 carcinoma of breast, estrogen receptor positive, stage 4
6315541 carcinoma of breast, estrogen receptor(+) and progesterone receptor(-)
6315540 carcinoma of breast, estrogen receptor(-) and progesterone receptor(+)
27821402 carcinoma of breast, oestrogen and progesterone receptor positive
27821524 carcinoma of breast, oestrogen receptor negative and progesterone receptor positive
27821639 carcinoma of breast, oestrogen receptor positive
27821472 carcinoma of breast, oestrogen receptor positive and progesterone receptor negative
27821361 carcinoma of breast, oestrogen receptor positive, stage 3
27821599 carcinoma of breast, oestrogen receptor positive, stage 4

Q & A

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