**Synthetic instances for use cases**

1. Abby has a diagnosis of essential hypertension.

2. Jane has no diagnosis of hypertension and only one elevated systolic BP measure.

3. Tom has no diagnosis of hypertension, but has two elevated systolic BP measures in the range of grade 1 hypertension.

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| --- | --- | --- | --- |
| **Competency question** | **Query** | **Query result** | **Status** |
| What are all of the elevated BP measures in the data set? | 'elevated blood pressure measurement datum' | Basil’s elevated systolic BP measurement datum  Clara first elevated systolic BP measurement datum  Clara second elevated systolic BP measurement datum  Desmond’s first elevated systolic BP measurement datum  Desmond’s second elevated systolic BP measurement datum  Ernest’s diastolic BP measurement datum  Ernest’s systolic BP measurement datum | Validated for adult systolic BPs  Next step: model for children |
| Which data items in the data set are about elevated BP phenotypes? | 'is about' some 'elevated blood pressure phenotype' | Amy’s diagnosis  Basil’s elevated systolic BP measurement datum  Clara’s first elevated systolic BP measurement datum  Clara’s second elevated systolic BP measurement datum  Desmond’s first diastolic BP measurement datum  Desmond’s second diastolic BP measurement datum  Ernest’s diastolic BP measurement datum  Ernest’s elevated systolic BP | Validated for adult systolic BPs and diagnoses of hypertension |
| What are all of BP values in the data set >= 126.0 mm Hg? | 'blood pressure measurement datum' and 'has measurement value' some xsd:double[>= "126.0"^^xsd:double] | Basil’s elevated systolic BP measurement datum  Clara’s first elevated systolic BP measurement datum  Ernest’s systolic BP measurement datum | Validated |
| What are all of the health care encounters with elevated BP values? | 'health care encounter' and has\_specified\_output some 'elevated systolic blood pressure measurement datum' | Basil’s first health care encounter  Clara’s first health care encounter  Clara’s second health care encounter  Ernest’s only health care encounter | Validated for adults, systolic BP |
| Who are the patients with elevated BP values at 2 more health care encounters? | 'Homo sapiens' and 'bearer of' some ('blood pressure' and inverse('is about') min 2 ('elevated blood pressure measurement datum' and is\_specified\_output\_of some 'health care encounter')) | Clara  Desmond | Validated for adults, systolic BP |
| Who has a hypertensive phenotype? | ‘has phenotype’ some Hypertension | Clara  Desmond |  |
| Who has a phenotype that gives rise to hypertension?  (Note: for hypertension, this is equivalent to the same query above, but for cases where multiple phenotypes may give rise to a common disease, this distinction is more useful.) | 'has phenotype' some ('feature gives rise to disease' some hypertension) |  |  |
| Which patients have been diagnosed with hypertension? | organism and inverse('is about') some 'diagnosis of hypertension' |  | Validated for adults, systolic |
| Who has either a diagnosis of hypertension or a hypertensive phenotype? | (organism and inverse('is about') some 'diagnosis of hypertension') or ('has phenotype' some Hypertension) |  | Validated for adults, systolic |

Who has hypertension? Can now be asked in a variety of ways:

7a. Who has a diagnosis of hypertension?

7b. Who has a hypertensive phenotype?

7c. Who has either a diagnosis of hypertension or a hypertensive phenotype?

In addition to modeling for diastolic BP and for non-adults, we would like to answer the following CQs?

1. Who is has uncontrolled hypertension?

“Uncontrolled hypertension was defined as an average SBP ≥140 mmHg or an average DBP ≥90 mmHg, among those with hypertension.” Most recent measurement

https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6135a3.htm

2. Who has hypertension and has achieved blood pressure control?

That is, who has hypertension and normal BP measures at the most recent visit?

3. Distinguish between thresholds and ranges of hypertension: Who has grade 1 hypertension? Who has hypertension according to the most recent guidelines? Who has a BP measure that is a contraindication for the administration of rtPA?

Hypertension Ontology Competency Questions

Goal 1: Model HTN in a manner that supports ETL from the ontology to both OMOP and PCORnet CDM

Goal 2: Support inference of patients with various types of hypertension and hypertension according to various definitions

Goal 3: Support NLP extraction of hypertension-related variables

**Triples for modeling BP measures of patients connected with health care encounters**

P1 rdf:type adult

p1’s systolic BP rdf:type systolic blood pressure

pr1 rdf:type ‘patient role’

sbpm1 rdf:type ‘systolic BP measurement datum’

hce1 rdf:type ‘health care encounter’

pr1 ‘inheres in’ ‘p1’

hce1 realizes pr1

sbpm1 ‘is about’ p1’s systolic BP

sbpm1 ‘has measurement value’ “xxx”^^xsd:double

hce1 has\_specified\_output’ sbpm1

p1’s systolic BP ‘inheres in’ p1