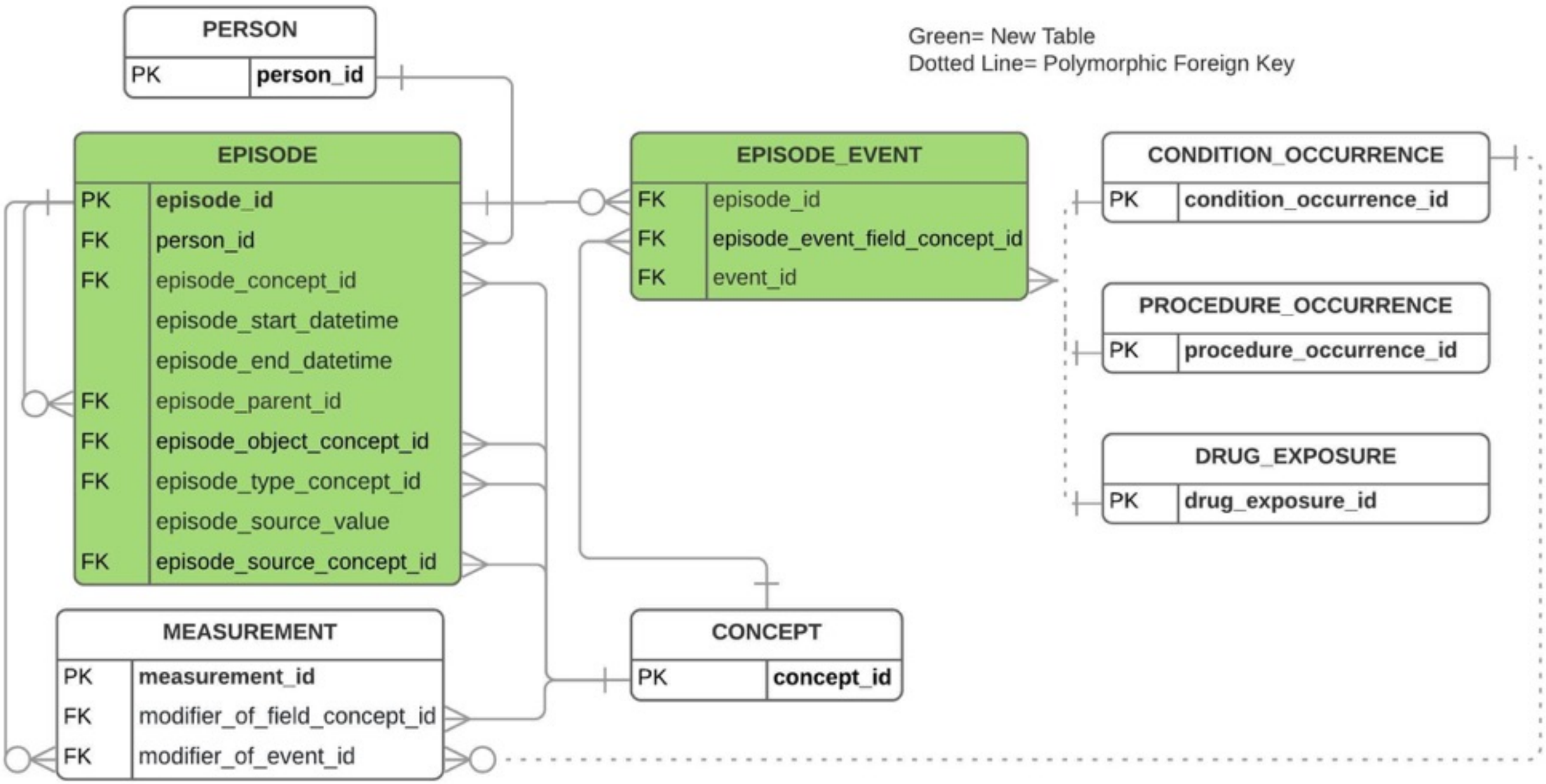
PERSON
PK
person_id
Green= New Table
Dotted Line= Polymorphic Foreign Key
EPISODE
PK
episode_id
FK
person_id
FK
episode_concept_id
episode_start_datetime
episode_end_datetime
FK
episode_parent_id
FK
episode_object_concept_id
FK
episode_type_concept_id
episode_source_value
FK
episode_source_concept_id
EPISODE_EVENT
FK
episode_id
FK
episode_event_field_concept_id
FK
event_id
CONDITION_OCCURRENCE
PK
condition_occurrence_id
PROCEDURE_OCCURRENCE
PK
procedure_occurrence_id
DRUG_EXPOSURE
PK
drug_exposure_id
MEASUREMENT
PK
measurement_id
FK
modifier_of_field_concept_id
FK
modifier_of_event_id
CONCEPT
PK
concept_id

Oncology Diagnosis Modifiers

- Refine oncology diagnoses with oncology diagnosis modifiers (like staging, grading, biomarkers etc.).
- No standardized vocabulary of oncology diagnosis modifiers.
- OMOP currently contains vocabularies with duplicative, overlapping options for representing many oncology diagnosis modifiers.
- ETL developer is forced to choose whatever "seems" right.
- Healthcare analytics informatics becomes “Choose your own Adventure”.

Today:
Too Many Options

- ETL developer wants to record an oncology diagnosis of ICDO histology '8140/3 Adenocarcinoma, NOS' and ICDO site 'C18.2 Ascending colon'/'.

- Oncology extension recommends to map this ICDO site/ histology combination of 8140/3-C18.2 to 'Adenocarcinoma of ascending colon' OMOP Concept ID 44502439.

- ETL developer wants to further modify this oncology diagnosis with pathological TNM Staging for AJCC Version 6 T=pT3

- ETL developer is faced with multiple options:

Options

- Option 1: Map T=pT3 to SNOMED code 395707006 'pT3: Tumor invades through the muscularis propria into the subserosa or into non-peritonealized prevocalic or perirectal tissues' OMOP Concept ID 4193681 in the Condition domain.
    - http://athena.ohdsi.org/search-terms/terms/4193681
    - How to relate this entry in CONDITION_OCCURRENCE to the entry in CONDITION_OCCURRENCE for the base oncology diagnosis? FACT_RELATIONSHIP?
- Option 2: Map T=pT3 to LOINC code 21899-0 'Primary tumor.pathology Cancer' OMOP Concept Id 3016308 in the Measurement domain and LOINC Answer ID LA3624-9 'T3' OMOP Concept Id 45876313 in the Meas Value domain.
    - http://athena.ohdsi.org/search-terms/terms/3016308
    - http://athena.ohdsi.org/search-terms/terms/45876313
    - How to relate this entry in the MEASURMENT table to the entry in CONDITION_OCCURRENCE for the base oncology diagnosis? FACT_RELATIONSHIP?

Standardize an Option

- The oncology extension recommends placing oncology diagnosis modifiers within the MEASUREMENT table.
- Point to a parent CONDITION_OCCURRENCE or EPISODE entry by populating the new polymorphic foreign key: MEASUREMENT.modifier_of_field_concept_id and MEASUREMENT.modifier_of_event_id.
- Option 1 one pre-coordinates one oncology diagnosis modifier with an oncology diagnosis into a single Condition concept. But what if we want to add a second oncology diagnosis modifier? Pathological TNM Staging for AJCC Version 6 N=pN1? Do we need try find another pre-coordinated Condition concept that coordinates both oncology diagnosis modifiers? Or do we try to find a pre-coordinated Condition concept that coordinates only the second oncology diagnosis modifier? What happens with a 3rd, 4th and beyond oncology diagnosis modifiers?
- Seem to point to choosing 'Option 2'

Necessary Evil: NAACCR

- In the U.S,, the most widely available source system containing "discrete" oncology diagnosis modifiers is NAACCR formatted tumor registry data.
- NAACCR is a data dictionary format for the tracking of oncology diagnoses, oncology diagnosis modifiers and oncology treatments. All US facilities diagnosing and treating cancer patients are mandated to report their data in the NAACCR format to federal and state agencies. Most NAACCR data is manually abstracted from patient charts by certified tumor registrars.
- The oncology extension wants to be able to support the ingestion of oncology diagnosis modifiers from NAACCR tumor registry data. To enable this use case, the oncology extension recommends adopting the NAACCR tumor registry vocabulary as the standard OMOP oncology diagnosis modifier vocabulary.
- The ingestion of the NAACCR data format is currently under construction by the OMOP vocabulary team.
- The hope is that NAACCR vocabulary could be transitioned from the standard OMOP oncology diagnosis modifier vocabulary to a source vocabulary.
- The future vision is that the Nebraska Lexicon will be adopted as OMOP's standard oncology diagnosis modifier vocabulary
    - https://www.unmc.edu/pathology/informatics/tdc
- The Nebraska lexicon is an effort to map the CAP Cancer Protocols to standardized vocabularies like SNOMED and/or LOINC.
    - https://www.cap.org/protocols-and-guidelines/cancer-reporting-tools/cancer-protocol-templates
- The CAP Cancer Protocols is a comprehensive, frequently updated vocabulary of oncology diagnosis modifiers that is tightly bound to actual clinical pathology practice.

Option 3: NAACCR

- NAACCR Item 1060
    - TNM EDITION NUMBER
    - http://datadictionary.naaccr.org/default.aspx?c=10#1060
- NAACCR Item 880
    - TNM PATH T
    - http://datadictionary.naaccr.org/default.aspx?c=10#880
- NAACCR item 1013
    - AJCC TNM PATH:
    - http://datadictionary.naaccr.org/default.aspx?c=10#1013
- NAACCR #1060 TNM Edition Number controls which set of staging variables should be populated for a NAACCR case. For example, NAACCR #880 TNM PATH T versus NAACCR #1011 AJCC TNM PATH T. So If TNM Edition Number = 'Eighth Edition (published 2016), recommended for use with cases diagnosed 2018+' then NAACCR #1011 should be used. Otherwise, other AJCC editions should use NAACCR #880.

Cancer Staging Ingestion Decisions: Possible values across anatomic sites?

- Should NAACCR Item 880 'TNM PATH T'/ NAACCR Item 1013 'AJCC TNM PATH T' be mapped to option 2? To a combination of option 1 and 2? To neither?
- The list of staging possible values is not uniform across anatomic sites. Also, some anatomic sites are not staged at all. For example:
    - Colon cancer T staging includes a pT1 possible value.
        - https://staging.seer.cancer.gov/tnm/input/1.9/colon/path_t/?breadcrumbs=(~schema_list~),(~view_schema~,~colon~)
    - Prostate cancer T staging does not include a pT1 possible value
        - https://staging.seer.cancer.gov/tnm/input/1.9/prostate/path_t/?breadcrumbs=(~schema_list~),(~view_schema~,~prostate~)
    - Brain and Cerebral Meninges no staging
        - https://staging.seer.cancer.gov/tnm/schema/1.9/brain/?breadcrumbs=(~schema_list~)
- Should representation of cancer staging within the OMOP vocabulary preserve the differences in possible values for cancer staging across anatomic site? Or should the list of possible values be collapsed across anatomic sites?

Cancer Staging Ingestion Decisions: Staging Versions

- AJCC Edition history

Edition	Effective year
1	1978
2	1984
3	1989
4	1993
5	1998
6	2003
7	2010
8	2018

Cancer Staging Ingestion Decisions: Staging Versions

- UICC Edition History

Edition	Effective year
1	1968
2	1974
3	1982
4	1987
5	1997
6	2003
7	2010
8	2017

Can we ignore staging systems and versions?

- It is crucial to be aware that the criteria used in the TNM system have varied over time, sometimes fairly substantially, according to the different editions that AJCC and UICC have released.

- A given stage may have quite a different prognosis depending on which staging edition is used, independent of any changes in diagnostic methods or treatments, an effect that has been termed "stage migration." The technologies used to assign patients to particular categories have also changed, and increasingly sensitive methods tend to cause individual cancers to be reassigned to higher stages, making it improper to compare that cancer's prognosis to the historical expectations for that stage.

- A further important consideration is the effect of improving treatments over time

- Should representation of cancer staging within the OMOP vocabulary include system (AJCC vs. UICC vs others) and version? Or should the list of possible values be collapsed across systems and versions?

Choose Your Own Adventure