**AAA eMERGE**

**Phenotype goal**

The goal is to carry out a genome-wide association study on patients with abdominal aortic aneurism (AAA). Cases are defined as meeting at least one of three criteria: had a AAA repair procedure (Case Type 1), had at least one vascular clinic encounter with a diagnosis of ruptured AAA (Case Type 2), or had at least two vascular clinic encounters with a diagnosis of unruptured AAA (Case Type 3).

**Phenotype narrative**

Exclude anyone younger than 40 or older than 89 (Exclude Type 2). Exclude anyone with the following related conditions (by ICD9CM code): 759.82 (Marfan Syndrome), 756.83 (Ehlers‐Danlos Syndrome), 441.1 (Thoracic Aneurysm, ruptured), 441.2 (Thoracic Aneurysm without mention of rupture), 441.7 (Thoracoabdominal aneurysm without mention of rupture), 443.2 (Other arterial dissection), 437.5 (Moyamoya Disease), and 447.8 (Fibromuscular Dysplasia) (Exclude Type 1).

Then include anyone with an AAA repair code (see CPT codes), AAA rupture diagnosis by vascular department (441.3), or 2 or more unruptured AAA diagnoses (441.4) by the vascular department and last encounter is within the past 5 years.

CPT codes:

34800 (Endovascular repair of infrarenal abdominal aortic aneurysm or dissection; using aorto‐ aortic tube prosthesis)

34802 (Endovascular repair of infrarenal abdominal aortic aneurysm or dissection; using modular bifurcated prosthesis (1 docking limb))

34803 (Endovascular repair of infrarenal abdominal aortic aneurysm or dissection; using modular bifurcated prosthesis (2 docking limbs))

34804 (Endovascular repair of infrarenal abdominal aortic aneurysm or dissection; using unibody bifurcated prosthesis)

34805 (Endovascular repair of infrarenal abdominal aortic aneurysm or dissection; using aorto‐ uniiliac or aorto‐unifemoral prosthesis)

34830 (Open repair of infrarenal aortic aneurysm or dissection, plus repair of associated arterial trauma, following unsuccessful endovascular repair; tube prosthesis)

34831 (Open repair of infrarenal aortic aneurysm or dissection, plus repair of associated arterial trauma, following unsuccessful endovascular repair; aorto‐bi‐iliac prosthesis)

34832 (Open repair of infrarenal aortic aneurysm or dissection, plus repair of associated arterial trauma, following unsuccessful endovascular repair; aorto‐bifemoral prosthesis)

35081 (Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, abdominal aorta)

35082 (Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, abdominal aorta)

35091 (Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, abdominal aorta involving visceral vessels (mesenteric, celiac, renal))

35092 (Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, abdominal aorta involving visceral vessels (mesenteric, celiac, renal))

35102 (Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, abdominal aorta involving iliac vessels (common, hypogastric, external))

35103 (Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, abdominal aorta involving iliac vessels (common, hypogastric, external))

35131 (Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, iliac artery (common, hypogastric, external))

35132 (Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, iliac artery (common, hypogastric, external))

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**Text view**

Initial Event Cohort

People having any of the following:

* ko foreach: expression().PrimaryCriteria().CriteriaList
* ko with: Criteria a condition occurrence of AAA eMERGE Ruptured abdominal aortic aneurysm5
* ko if: ko.utils.unwrapObservable(First) != null /ko ko if: ko.utils.unwrapObservable(OccurrenceStartDate) != null /ko ko if: ko.utils.unwrapObservable(OccurrenceEndDate) != null /ko ko if: ko.utils.unwrapObservable(ConditionType) != null /ko ko if: ko.utils.unwrapObservable(StopReason) != null /ko ko if: ko.utils.unwrapObservable(ConditionSourceConcept) != null /ko ko if: ko.utils.unwrapObservable(Age) != null /ko ko if: ko.utils.unwrapObservable(Gender) != null /ko ko if: ko.utils.unwrapObservable(ProviderSpecialty) != null /ko ko if: ko.utils.unwrapObservable(VisitType) != null /ko ko if: ko.utils.unwrapObservable(CorrelatedCriteria) != null /ko
* /ko
* ko with: Criteria a condition occurrence of AAA eMERGE Abdominal aortic aneurysm without rupture3
* ko if: ko.utils.unwrapObservable(First) != null /ko ko if: ko.utils.unwrapObservable(OccurrenceStartDate) != null /ko ko if: ko.utils.unwrapObservable(OccurrenceEndDate) != null /ko ko if: ko.utils.unwrapObservable(ConditionType) != null /ko ko if: ko.utils.unwrapObservable(StopReason) != null /ko ko if: ko.utils.unwrapObservable(ConditionSourceConcept) != null /ko ko if: ko.utils.unwrapObservable(Age) != null /ko ko if: ko.utils.unwrapObservable(Gender) != null /ko ko if: ko.utils.unwrapObservable(ProviderSpecialty) != null /ko ko if: ko.utils.unwrapObservable(VisitType) != null /ko ko if: ko.utils.unwrapObservable(CorrelatedCriteria) != null Having all ko if: group().Type().startsWith('AT\_') /ko of the following criteria:
  + ko foreach: group().DemographicCriteriaList /ko ko foreach: group().CriteriaList
    - at least 1 occurrences of ko with: Criteria a visit occurrence of Any Visit
    - ko if: ko.utils.unwrapObservable(First) != null /ko ko if: ko.utils.unwrapObservable(OccurrenceStartDate) != null
      * occurrence start is after 2012-03-17
    - /ko ko if: ko.utils.unwrapObservable(OccurrenceEndDate) != null /ko ko if: ko.utils.unwrapObservable(VisitType) != null /ko ko if: ko.utils.unwrapObservable(VisitSourceConcept) != null /ko ko if: ko.utils.unwrapObservable(VisitLength) != null /ko ko if: ko.utils.unwrapObservable(Age) != null /ko ko if: ko.utils.unwrapObservable(Gender) != null /ko ko if: ko.utils.unwrapObservable(ProviderSpecialty) != null /ko ko if: ko.utils.unwrapObservable(CorrelatedCriteria) != null /ko
    - /ko starting between all days Before and all days After event index date ko if: EndWindow /ko
  + /ko
    - ko foreach: group().Groups /ko
* /ko
* /ko
* ko with: Criteria a procedure of AAA eMERGE AAA repair procedures1
* ko if: ko.utils.unwrapObservable(First) != null /ko ko if: ko.utils.unwrapObservable(OccurrenceStartDate) != null /ko ko if: ko.utils.unwrapObservable(ProcedureType) != null /ko ko if: ko.utils.unwrapObservable(Modifier) != null /ko ko if: ko.utils.unwrapObservable(Quantity) != null /ko ko if: ko.utils.unwrapObservable(ProcedureSourceConcept) != null /ko ko if: ko.utils.unwrapObservable(Age) != null /ko ko if: ko.utils.unwrapObservable(Gender) != null /ko ko if: ko.utils.unwrapObservable(ProviderSpecialty) != null /ko ko if: ko.utils.unwrapObservable(VisitType) != null /ko ko if: ko.utils.unwrapObservable(CorrelatedCriteria) != null /ko
* /ko
* /ko

with continuous observation of at least 0 days prior and 0 days after event index date, and limit initial events to: **earliest event per person.**

For people matching the Primary Events, include:

Having all ko if: group().Type().startsWith('AT\_') /ko of the following criteria:

ko foreach: group().DemographicCriteriaList

* with the following event criteria: ko with: Criteria
* ko if: Age() != null
  + with age between 40 and 89 (inclusive)
* /ko ko if: Gender() != null /ko ko if: Race() != null /ko ko if: Ethnicity() != null /ko ko if: OccurrenceStartDate() != null /ko ko if: OccurrenceEndDate() != null /ko
* /ko

/ko ko foreach: group().CriteriaList

* and exactly 0 occurrences of ko with: Criteria a condition occurrence of AAA eMERGE exclusion conditions4
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* /ko starting between all days Before and all days After event index date ko if: EndWindow /ko

/ko

* ko foreach: group().Groups /ko

Limit cohort of initial events to: **earliest event per person.**

Limit qualifying cohort to: **earliest event per person.**

No end date strategy selected. By default, the cohort end date will be the end of the observation period that contains the index event.

ko if: expression().CensoringCriteria().length > 0 /ko

Appendix 1: Concept Set Definitions

ko foreach: sortedConceptSets

1. AAA eMERGE AAA repair procedures

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Concept Id** | **Concept Name** | **Domain** | **Vocabulary** | **Excluded** | **Descendants** | **Mapped** |
| 2107631 | Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, abdominal aorta | Procedure | CPT4 | NO | YES | NO |
| 2107645 | Repair of aortoiliac pseudoaneurysm using graft, with anastomosis of common iliac, renal, and mesenteric arteries to graft | Procedure | CPT4 | NO | YES | NO |
| 2107643 | Repair of abdominal aortic pseudoaneurysm using graft, with anastomosis of mesenteric and renal arteries to graft | Procedure | CPT4 | NO | YES | NO |
| 2107664 | Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for aneurysm, pseudoaneurysm, and associated occlusive disease, iliac artery (common, hypogastric, external) | Procedure | CPT4 | NO | YES | NO |
| 2107642 | Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, abdominal aorta | Procedure | CPT4 | NO | YES | NO |
| 2107646 | Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, abdominal aorta involving iliac vessels (common, hypogastric, external) | Procedure | CPT4 | NO | YES | NO |
| 2107644 | Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, abdominal aorta involving visceral vessels (mesenteric, celiac, renal) | Procedure | CPT4 | NO | YES | NO |
| 2107665 | Direct repair of aneurysm, pseudoaneurysm, or excision (partial or total) and graft insertion, with or without patch graft; for ruptured aneurysm, iliac artery (common, hypogastric, external) | Procedure | CPT4 | NO | YES | NO |
| 2107573 | Endovascular repair of infrarenal abdominal aortic aneurysm or dissection; using aorto-aortic tube prosthesis | Procedure | CPT4 | NO | YES | NO |
| 2107577 | Endovascular repair of infrarenal abdominal aortic aneurysm or dissection; using aorto-uniiliac or aorto-unifemoral prosthesis | Procedure | CPT4 | NO | YES | NO |
| 2107574 | Endovascular repair of infrarenal abdominal aortic aneurysm or dissection; using modular bifurcated prosthesis (1 docking limb) | Procedure | CPT4 | NO | YES | NO |
| 2107575 | Endovascular repair of infrarenal abdominal aortic aneurysm or dissection; using modular bifurcated prosthesis (2 docking limbs) | Procedure | CPT4 | NO | YES | NO |
| 2107576 | Endovascular repair of infrarenal abdominal aortic aneurysm or dissection; using unibody bifurcated prosthesis | Procedure | CPT4 | NO | YES | NO |
| 2107596 | Open repair of infrarenal aortic aneurysm or dissection, plus repair of associated arterial trauma, following unsuccessful endovascular repair; aorto-bi-iliac prosthesis | Procedure | CPT4 | NO | YES | NO |
| 2107597 | Open repair of infrarenal aortic aneurysm or dissection, plus repair of associated arterial trauma, following unsuccessful endovascular repair; aorto-bifemoral prosthesis | Procedure | CPT4 | NO | YES | NO |
| 2107595 | Open repair of infrarenal aortic aneurysm or dissection, plus repair of associated arterial trauma, following unsuccessful endovascular repair; tube prosthesis | Procedure | CPT4 | NO | YES | NO |

2. AAA eMERGE Abdominal aortic aneurysm without rupture

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Concept Id** | **Concept Name** | **Domain** | **Vocabulary** | **Excluded** | **Descendants** | **Mapped** |
| 321314 | Abdominal aortic aneurysm without rupture | Condition | SNOMED | NO | NO | NO |

3. AAA eMERGE Abdominal aortic aneurysm without rupture

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Concept Id** | **Concept Name** | **Domain** | **Vocabulary** | **Excluded** | **Descendants** | **Mapped** |
| 321314 | Abdominal aortic aneurysm without rupture | Condition | SNOMED | NO | NO | NO |

4. AAA eMERGE exclusion conditions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Concept Id** | **Concept Name** | **Domain** | **Vocabulary** | **Excluded** | **Descendants** | **Mapped** |
| 443622 | Aneurysm of thoracic aorta | Condition | SNOMED | NO | YES | NO |
| 315288 | Dissecting aneurysm of artery | Condition | SNOMED | NO | YES | NO |
| 79145 | Ehlers-Danlos syndrome | Condition | SNOMED | NO | YES | NO |
| 4135811 | Fibromuscular dysplasia | Observation | SNOMED | NO | YES | NO |
| 258540 | Marfan's syndrome | Condition | SNOMED | NO | YES | NO |
| 378774 | Moyamoya disease | Condition | SNOMED | NO | YES | NO |
| 441875 | Thoracic aortic aneurysm which has ruptured | Condition | SNOMED | NO | YES | NO |

5. AAA eMERGE Ruptured abdominal aortic aneurysm

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Concept Id** | **Concept Name** | **Domain** | **Vocabulary** | **Excluded** | **Descendants** | **Mapped** |
| 195559 | Ruptured abdominal aortic aneurysm | Condition | SNOMED | NO | NO | NO |

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