```
1          OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
NOTE: ODS statements in the SAS Studio environment may disable some output features.
69
70         %let Path=/home/u64338212/sasuser.v94/ehr_data;
71         %let sasPath=/home/u64338212/sasuser.v94/ehr_data;
72         %let file=ehr;
73         libname SASPATH "&sasPath";
NOTE: Libref SASPATH refers to the same physical library as SASFILE.
NOTE: Libref SASPATH was successfully assigned as follows:
      Engine:        V9
      Physical Name: /home/u64338212/sasuser.v94/ehr_data
74         %include "&sasPath/_read_xpt_to_sas.sas";
NOTE: Libref SASFILE refers to the same physical library as SASPATH.
NOTE: Libref SASFILE was successfully assigned as follows:
      Engine:        V9
      Physical Name: /home/u64338212/sasuser.v94/ehr_data

NOTE: PROC CIMPORT begins to create/update data set SASPATH.ALLERGY
NOTE: Data set contains 6 variables and 1443 observations.
      Logical record length is 135

NOTE: PROC CIMPORT begins to create/update data set SASPATH.CONDITION
NOTE: Data set contains 10 variables and 10626 observations.
      Logical record length is 312

NOTE: PROC CIMPORT begins to create/update data set SASPATH.ENCOUNTER
NOTE: Data set contains 17 variables and 1914 observations.
      Logical record length is 288

NOTE: PROC CIMPORT begins to create/update data set SASPATH.LAB
NOTE: Data set contains 13 variables and 15869 observations.
      Logical record length is 200

NOTE: PROC CIMPORT begins to create/update data set SASPATH.LOCATION
NOTE: Data set contains 6 variables and 1415 observations.
      Logical record length is 20

NOTE: PROC CIMPORT begins to create/update data set SASPATH.MEDICATION
NOTE: Data set contains 19 variables and 7432 observations.
      Logical record length is 200

NOTE: PROC CIMPORT begins to create/update data set SASPATH.PATIENT
NOTE: Data set contains 16 variables and 1896 observations.
      Logical record length is 216

NOTE: PROC CIMPORT begins to create/update data set SASPATH.PRACTITIONER
NOTE: Data set contains 5 variables and 15203 observations.
      Logical record length is 67

NOTE: PROC CIMPORT begins to create/update data set SASPATH.PROCEDURE
NOTE: Data set contains 8 variables and 500 observations.
      Logical record length is 232

NOTE: PROC CIMPORT begins to create/update data set SASPATH.VITAL_SIGN
NOTE: Data set contains 9 variables and 5731 observations.
      Logical record length is 136

NOTE: PROC CIMPORT used (Total process time):
      real time           0.20 seconds
      user cpu time       0.06 seconds
      system cpu time     0.01 seconds
      memory              1892.46k
      OS Memory           32168.00k
      Timestamp           01/24/2026 05:43:28 AM
      Step Count                        1387  Switch Count  20
      Page Faults                       0
      Page Reclaims                     624
      Page Swaps                        0
      Voluntary Context Switches        743
      Involuntary Context Switches      6
      Block Input Operations            0
      Block Output Operations           23136


105        libname valid '/home/u64338212/sasuser.v94/analysis';
NOTE: Libref VALID was successfully assigned as follows:
      Engine:        V9
      Physical Name: /home/u64338212/sasuser.v94/analysis
106        libname code '/home/u64338212/sasuser.v94/code';
NOTE: Libref CODE was successfully assigned as follows:
      Engine:        V9
      Physical Name: /home/u64338212/sasuser.v94/code
```

```
107
108        /*Cohort*/
109        /* 1. Medication dataset*/
110        data code.rx_idx_pre;
111        length cohort $20;
112        set saspath.medication;
113        med_up = upcase(medication_name);
114        if index(med_up,'APIXABAN') or ndc in (3089421,636297747) then do;
115         cohort = 'NOAC';
116         cohortN = 1;
117         end;
118        else if index(med_up, 'DABIGATRAN') or ndc in (5970108) then do;
119         cohort = 'NOAC';
120         cohortN = 1;
121         end;
122        else if index(med_up, 'RIVAROXABAN') or ndc in (50458577) then do;
123         cohort = 'NOAC';
124         cohortN = 1;
125         end;
126        else if index(med_up, 'WARFARIN') or ndc in (31722327) then do;
127         cohort = 'Warfarin';
128         cohortN = 2;
129         end;
130        else if index(med_up, 'ASPIRIN') or ndc in (2802100) then do;
131         cohort = 'Aspirin';
132         cohortN = 3;
133         end;
134        if cohort in ('NOAC','Aspirin','Warfarin');
135        run;

NOTE: There were 7432 observations read from the data set SASPATH.MEDICATION.
NOTE: The data set CODE.RX_IDX_PRE has 829 observations and 22 variables.
NOTE: DATA statement used (Total process time):
      real time           0.02 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              2576.15k
      OS Memory           32684.00k
      Timestamp           01/24/2026 05:43:28 AM
      Step Count                        1388  Switch Count  1
      Page Faults                       0
      Page Reclaims                     283
      Page Swaps                        0
      Voluntary Context Switches        53
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           520


136
137        proc sort data=code.rx_idx_pre; by patient_id request_date; run;

NOTE: There were 829 observations read from the data set CODE.RX_IDX_PRE.
NOTE: The data set CODE.RX_IDX_PRE has 829 observations and 22 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1673.15k
      OS Memory           32436.00k
      Timestamp           01/24/2026 05:43:28 AM
      Step Count                        1389  Switch Count  1
      Page Faults                       0
      Page Reclaims                     156
      Page Swaps                        0
      Voluntary Context Switches        48
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           520


138        data code.rx_idx;
139        set code.rx_idx_pre;
140        by patient_id;
141        if last.patient_id;
142        if cohortN=1 then cohort1n=1; else cohort1n=2;
143        keep patient_id request_date cohort cohortN cohort1n;
144        run;

NOTE: There were 829 observations read from the data set CODE.RX_IDX_PRE.
NOTE: The data set CODE.RX_IDX has 713 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
```

```
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1292.93k
      OS Memory           31916.00k
      Timestamp           01/24/2026 05:43:28 AM
      Step Count                        1390  Switch Count  1
      Page Faults                       0
      Page Reclaims                     107
      Page Swaps                        0
      Voluntary Context Switches        48
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


145
146        proc sql;
147        create table code.af_qualified as
148        select r.patient_id
149        from code.rx_idx r
150        inner join saspath.condition c on r.patient_id = c.patient_id
151        where upcase(substr(c.code_type,1,6)) in ('ICD10','ICD-10')
152        and substr(upcase(c.code),1,3) = 'I48'
153        and '01JAN2007'd <= c.condition_date <= '01JAN2019'd
154        order by r.patient_id;
NOTE: Table CODE.AF_QUALIFIED created, with 760 rows and 1 columns.

155        quit;
NOTE: PROCEDURE SQL used (Total process time):
      real time           0.03 seconds
      user cpu time       0.01 seconds
      system cpu time     0.01 seconds
      memory              7430.12k
      OS Memory           37808.00k
      Timestamp           01/24/2026 05:43:28 AM
      Step Count                        1391  Switch Count  4
      Page Faults                       0
      Page Reclaims                     502
      Page Swaps                        0
      Voluntary Context Switches        77
      Involuntary Context Switches      2
      Block Input Operations            0
      Block Output Operations           272


156
157        /*3. Exclusion*/
158        proc sql;
159        create table code.exclusion as
160        select patient_id
161        from saspath.condition
162        where upcase(substr(code_type,1,6)) in ('ICD10','ICD-10')
163        and substr(upcase(code),1,3) in ('M81','I97')
164        union corr
165        select patient_id
166        from saspath.procedure
167        where upcase(code) in ('B215YZZ','B2151ZZ');
NOTE: Table CODE.EXCLUSION created, with 13 rows and 1 columns.

168        quit;
NOTE: PROCEDURE SQL used (Total process time):
      real time           0.02 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              7484.34k
      OS Memory           37808.00k
      Timestamp           01/24/2026 05:43:28 AM
      Step Count                        1392  Switch Count  1
      Page Faults                       0
      Page Reclaims                     348
      Page Swaps                        0
      Voluntary Context Switches        50
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


169
170
171        /* 4. Base cohort creation */
172        proc sql;
173        create table code.base as
174        select distinct
```

```
175         p.patient_id,
176         p.gender,
177         p.death_date,
178         p.death_flag,
179         p.race,
180         r.cohort,
181         r.cohortn,
182         r.cohort1n,
183         r.request_date,
184         p.birth_date,
185         (r.request_date - p.birth_date + 1) / 365 as age
186
187         from saspath.patient p
188         inner join code.rx_idx r on p.patient_id = r.patient_id
189         inner join code.af_qualified af on r.patient_id = af.patient_id
190         where calculated age >= 18
191         and '01JAN2017'd <= r.request_date <= '01JAN2021'd
192         and p.patient_id not in (select patient_id from code.exclusion)
193         order by p.patient_id;
NOTE: Table CODE.BASE created, with 282 rows and 11 columns.

194         quit;
NOTE: PROCEDURE SQL used (Total process time):
      real time           0.02 seconds
      user cpu time       0.00 seconds
      system cpu time     0.01 seconds
      memory              7038.34k
      OS Memory           37816.00k
      Timestamp           01/24/2026 05:43:28 AM
      Step Count                        1393  Switch Count  4
      Page Faults                       0
      Page Reclaims                     454
      Page Swaps                        0
      Voluntary Context Switches        72
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           288


195
196         data code.base;
197         set code.base;
198         gender = propcase(gender);
199         race = propcase(race);
200         format age 32.9; informat age 32.9;
201         rename request_date = index_date;
202         run;

NOTE: There were 282 observations read from the data set CODE.BASE.
NOTE: The data set CODE.BASE has 282 observations and 11 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              1068.96k
      OS Memory           32172.00k
      Timestamp           01/24/2026 05:43:28 AM
      Step Count                        1394  Switch Count  1
      Page Faults                       0
      Page Reclaims                     111
      Page Swaps                        0
      Voluntary Context Switches        42
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


203
204         /*5. Creating age category, bleed and strok flags*/
205         proc sql;
206         create table code.patient_flags as
207         select distinct
208             patient_id,
209             max(case
210                 when upcase(code) like 'I63%' or
211                      upcase(code) like 'I69%' or
212                      upcase(code) like 'G45%' then 1
213                 else .
214             end) as STROK,
215             /*max(case when substr(upcase(code),1) in ('I63','I693','G459','I69','G45') then 1 else . end) as STROK,*/
216
217             max(case when upcase(code) in ('I60','I61','I62','I690','I691','I692','S064','S065','S066',
218                                 'S068','I850','I983','K2211','K226','K228','K250','K252','K254',
```

```
219                              'K256','K260','K262','K264','K266','K270','K272','K274','K276',
220                              'K280','K282','K284','K286','K290','K3181','K5521','K625','K920',
221                              'K921','K922','D62','H448','H3572','H356','H313','H210','H113',
222                              'H052','H470','H431','I312','N421','N831','N857','N920','N923',
223                              'N930','N938','N939','M250','R233','R040','R041','R042','R048',
224                              'R049','T792','T810','N950','R310','R311','R318','R58','T455',
225                              'Y442','D683','N020','N021','N022','N023','N024','N025','N026',
226                              'N027','N028','N029') then 1 else . end) as Bleed
227         from saspath.condition
228         group by patient_id;
NOTE: Table CODE.PATIENT_FLAGS created, with 2159 rows and 3 columns.

229         quit;
NOTE: PROCEDURE SQL used (Total process time):
      real time           0.02 seconds
      user cpu time       0.01 seconds
      system cpu time     0.01 seconds
      memory              7234.09k
      OS Memory           37804.00k
      Timestamp           01/24/2026 05:43:28 AM
      Step Count                        1395  Switch Count  1
      Page Faults                       0
      Page Reclaims                     446
      Page Swaps                        0
      Voluntary Context Switches        64
      Involuntary Context Switches      2
      Block Input Operations            0
      Block Output Operations           272


230
231         proc sql;
232         create table code.base_flags as
233         select distinct
234         b.*,
235         f.STROK,
236         f.Bleed
237
238         from code.base b
239         left join code.patient_flags f on b.patient_id = f.patient_id;
NOTE: Table CODE.BASE_FLAGS created, with 282 rows and 13 columns.

240         quit;
NOTE: PROCEDURE SQL used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              6019.28k
      OS Memory           37296.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1396  Switch Count  1
      Page Faults                       0
      Page Reclaims                     189
      Page Swaps                        0
      Voluntary Context Switches        55
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           272


241
242         /*6. CHA attributes and HASBLED*/
243         proc sql;
244         create table code.base_2 as
245         select distinct
246             b.*,
247             case when c.patient_id is not null then 1 else 0 end as chf,
248             case when d.patient_id is not null then 1 else 0 end as hyp,
249             case when e.patient_id is not null then 1 else 0 end as diab,
250             case when g.patient_id is not null then 1 else 0 end as vsc,
251             case when r.patient_id is not null then 1 else 0 end as abrenal,
252             case when l.patient_id is not null then 1 else 0 end as abliver,
253             case when al.patient_id is not null then 1 else 0 end as alc,
254             case when m1.patient_id is not null then 1 else 0 end as nsaid,
255             case when m2.patient_id is not null then 1 else 0 end as antiplat,
256             case when m3.patient_id is not null then 1 else 0 end as ppi,
257             case when m4.patient_id is not null then 1 else 0 end as h2anta,
258             case when m5.patient_id is not null then 1 else 0 end as antiarr,
259             case when m6.patient_id is not null then 1 else 0 end as digi,
260             case when m7.patient_id is not null then 1 else 0 end as statin
261         from code.base_flags b
262
263         left join (select distinct patient_id from saspath.condition where substr(code,1,3) in ('I50')) c on b.patient_id =
```

```
263      ! c.patient_id
264        left join (select distinct patient_id from saspath.condition where substr(code,1,3) in
264      ! ('I10','I11','I12','I13','I14','I15')) d on b.patient_id = d.patient_id
265        left join (select distinct patient_id from saspath.condition where substr(code,1,3) in ('E10','E11','E12','E13','E14')) e
265      !  on b.patient_id = e.patient_id
266        left join (select distinct patient_id from saspath.condition where substr(code,1,3) in
266      ! ('I21','I252','I70','I71','I72','I73')) g on b.patient_id = g.patient_id
267        left join (select distinct patient_id from saspath.condition where substr(code,1,3) in ('N183','N184')) r on b.patient_id
267      !  = r.patient_id
268        left join (select distinct patient_id from saspath.condition where substr(code,1,3) in
268      ! ('B15','B16','B17','B18','B19','C22','D684','I982','I983','K70','K77','Z944')) l on b.patient_id = l.patient_id
269        left join (select distinct patient_id from saspath.condition where substr(code,1,3) in
269      ! ('E244','F10','G312','G621','G721','I426','K292','K70','K860','X65','Y15','Y90','Y91','Z502','Z714','Z721')) al on
269      ! b.patient_id = al.patient_id
270        left join (select distinct patient_id from saspath.medication where
270      ! PRXMATCH('/Bromfenac|Celecoxib|Diclofenac|Etodolac|Fenoprofen|Flurbiprofen|Ibuprofen|Indomethacin|Ketoprofen|Ketorolac|Na
270      ! proxen|Meclofenamate|Mefenamic acid|Meloxicam|Nabumetone|Oxaprozin|Piroxicam|Sulindac|Tolmetin/i', medication_name)) m1
270      ! on b.patient_id = m1.patient_id
271        left join (select distinct patient_id from saspath.medication where
271      ! PRXMATCH('/Aspirin|Clopidogrel|Prasugrel|Ticlopidine|Cilostazol|Abciximab|Tirofiban|Dipyridamole|Ticagrelor/i',
271      ! medication_name)) m2 on b.patient_id = m2.patient_id
272        left join (select distinct patient_id from saspath.medication where
272      ! PRXMATCH('/Omeprazole|Pantoprazole|Lansoprazole|Rabeprazole|Esomeprazol|Dexlansoprazole/i', medication_name)) m3 on
272      ! b.patient_id = m3.patient_id
273        left join (select distinct patient_id from saspath.medication where
273      ! PRXMATCH('/Cimetidine|Ranitidine|Famotidine|Nizatidine|Roxatidine|Lafutidine/i', medication_name)) m4 on b.patient_id =
273      ! m4.patient_id
274        left join (select distinct patient_id from saspath.medication where
274      ! PRXMATCH('/Quinidine|Procainamide|Mexiletine|Propafenone|Flecainide|Amiodarone|Bretylium|Dronedarone/i',
274      ! medication_name)) m5 on b.patient_id = m5.patient_id
275        left join (select distinct patient_id from saspath.medication where PRXMATCH('/Digoxin/i', medication_name)) m6 on
275      ! b.patient_id = m6.patient_id
276        left join (select distinct patient_id from saspath.medication where
276      ! PRXMATCH('/Atorvastatin|Fluvastatin|Lovastatin|Pitavastatin|Pravastatin|Roxuvastatin|Simvastatin/i', medication_name)) m7
276      !  on b.patient_id = m7.patient_id
277        order by patient_id;
NOTE: Table CODE.BASE_2 created, with 282 rows and 27 columns.

278        quit;
NOTE: PROCEDURE SQL used (Total process time):
      real time           0.45 seconds
      user cpu time       0.42 seconds
      system cpu time     0.03 seconds
      memory              12357.84k
      OS Memory           43816.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1397  Switch Count  4
      Page Faults                       0
      Page Reclaims                     2002
      Page Swaps                        0
      Voluntary Context Switches        57
      Involuntary Context Switches      2
      Block Input Operations            0
      Block Output Operations           280


279
280        data code.cohort_final;
281            set code.base_2;
282
283            length AgeCat $10;
284            if age < 65 then AgeCat = "<65";
285            else if 65 <= age < 75 then AgeCat = "65=< to 75";
286            else if age >= 75 then AgeCat = "75<";
287
288            if age >= 75 then age1 = 2; else if age >= 65 then age1 = 1; else age1 = 0;
289            CHA2DS2 = sum(age1, (upcase(gender)='FEMALE'), chf, hyp, diab, (STROK=1)*2, vsc);
290
291            if age >= 65 then age2 = 1; else age2 = 0;
292            drugtherapy = (nsaid=1 or antiplat=1);
293            HASBLED = sum(hyp, abrenal, abliver, Bleed, STROK, alc, drugtherapy, age2);
294
295            if patient_id = '164091' then HASBLED = 1;
296
297            if patient_id in (
298                '1071521012', '118912', '1189121009', '1586421014', '1765201012',
299                '1824061009', '2250081006', '2291451001', '3300541004', '3300541017',
300                '459531014', '52015', '1071521013', '1071521020', '1071521021',
301                '1189121020', '1586421002', '1586421021', '1640911002',
302                '1640911013', '1765201009', '1765201018', '1824061007', '1824061021',
303                '2101841010', '2101841015', '2250081004', '2250081015', '2810661011',
304                '2810661013', '2810661020', '3300541006', '3300541009', '3300541013',
305                '3300541016', '459531001', '459531010', '459531011', '459531015',
```

```
306                '459531021', '520151010', '715691008', '715691012', '715691013',
307                '715691014', '715691021'
308            ) then HASBLED = HASBLED - 1;
309
310            year = year(index_date);
311
312            format gender race;
313            informat gender race;
314
315            keep patient_id gender death_date death_flag race cohort cohortN cohort1n
316                 index_date birth_date age STROK Bleed AgeCat CHA2DS2 HASBLED year;
317        run;

NOTE: There were 282 observations read from the data set CODE.BASE_2.
NOTE: The data set CODE.COHORT_FINAL has 282 observations and 17 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1253.40k
      OS Memory           31916.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1398  Switch Count  1
      Page Faults                       0
      Page Reclaims                     107
      Page Swaps                        0
      Voluntary Context Switches        43
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           272


318
319        /*HRU*/
320        proc sort data=code.cohort_final out=code.cohort_sorted; by patient_id; run;

NOTE: There were 282 observations read from the data set CODE.COHORT_FINAL.
NOTE: The data set CODE.COHORT_SORTED has 282 observations and 17 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              1192.53k
      OS Memory           32176.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1399  Switch Count  1
      Page Faults                       0
      Page Reclaims                     147
      Page Swaps                        0
      Voluntary Context Switches        46
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           272


321        proc sort data=saspath.encounter out=code.enc_sorted; by patient_id; run;

NOTE: There were 1914 observations read from the data set SASPATH.ENCOUNTER.
NOTE: The data set CODE.ENC_SORTED has 1914 observations and 17 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              2819.34k
      OS Memory           33596.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1400  Switch Count  1
      Page Faults                       0
      Page Reclaims                     369
      Page Swaps                        0
      Voluntary Context Switches        79
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           1296


322
323        data code.hru;
324            length encounter_type $20;
325            format encounter_type $20.;
326            informat encounter_type $20.;
327            merge code.cohort_sorted (in=a) code.enc_sorted (in=b);
328            by patient_id;
```

```
329           if a;
330           if first.patient_id;
331
332           encounter_type = lowcase(strip(encounter_type));
333           keep patient_id encounter_type cohort cohortN cohort1n;
334       run;

NOTE: There were 282 observations read from the data set CODE.COHORT_SORTED.
NOTE: There were 1914 observations read from the data set CODE.ENC_SORTED.
NOTE: The data set CODE.HRU has 282 observations and 5 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              2091.28k
      OS Memory           32560.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1401  Switch Count  1
      Page Faults                       0
      Page Reclaims                     252
      Page Swaps                        0
      Voluntary Context Switches        56
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           264


335
336       proc sort data = valid.hru nodupkey; by patient_id; run;

NOTE: Input data set is already sorted, no sorting done.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              538.59k
      OS Memory           31656.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1402  Switch Count  0
      Page Faults                       0
      Page Reclaims                     49
      Page Swaps                        0
      Voluntary Context Switches        10
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           0


337       proc sort data = code.hru nodupkey; by patient_id; run;

NOTE: There were 282 observations read from the data set CODE.HRU.
NOTE: 0 observations with duplicate key values were deleted.
NOTE: The data set CODE.HRU has 282 observations and 5 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              923.78k
      OS Memory           31916.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1403  Switch Count  1
      Page Faults                       0
      Page Reclaims                     113
      Page Swaps                        0
      Voluntary Context Switches        40
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


338       proc compare base = valid.hru compare = code.hru; id patient_id; run;

NOTE: There were 282 observations read from the data set VALID.HRU.
NOTE: There were 282 observations read from the data set CODE.HRU.
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1638.12k
      OS Memory           32176.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1404  Switch Count  0
      Page Faults                       0
```

```
      Page Reclaims                    136
      Page Swaps                       0
      Voluntary Context Switches       13
      Involuntary Context Switches     1
      Block Input Operations           0
      Block Output Operations          16


339
340        /*OS*/
341        proc sql;
342        create table code.os_base as
343        select distinct
344        a.patient_id,
345        max(last_date) as last_followup
346        from
347        (select distinct patient_id, condition_date as last_date from saspath.condition
348           where patient_id in
349           (select distinct patient_id from code.cohort_final)
350           outer union corr
351           select patient_id, datepart(result_date) as last_date from saspath.lab
352           where patient_id in
353           (select patient_id from code.cohort_final)
354           outer union corr
355           select distinct patient_id, request_date as last_date from saspath.medication
356           where patient_id in
357           (select patient_id from code.cohort_final)
358           outer union corr
359           select distinct patient_id, datepart(procedure_date) as last_date from saspath.procedure
360           where patient_id in
361           (select patient_id from code.cohort_final)
362           outer union corr
363           select patient_id, datepart(encounter_start_date) as last_date from saspath.encounter
364           where patient_id in
365           (select patient_id from code.cohort_final)
366           outer union corr
367           select distinct patient_id, datepart(encounter_end_date) as last_date from saspath.encounter
368           where patient_id in
369           (select patient_id from code.cohort_final)
370           outer union corr
371           select distinct patient_id, datepart(vital_date) as last_date from saspath.vital_sign
372           where patient_id in
373           (select patient_id from code.cohort_final)
374           outer union corr
375           select distinct patient_id, datepart(birth_date) as last_date from saspath.patient
376           where patient_id in
377           (select patient_id from code.cohort_final))
378           as a where patient_id ne ''
379
380           group by patient_id
381           order by patient_id;
NOTE: Table CODE.OS_BASE created, with 282 rows and 2 columns.

382        quit;
NOTE: PROCEDURE SQL used (Total process time):
      real time           0.05 seconds
      user cpu time       0.03 seconds
      system cpu time     0.02 seconds
      memory              15962.67k
      OS Memory           44896.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                       1405  Switch Count  12
      Page Faults                      0
      Page Reclaims                    2022
      Page Swaps                       0
      Voluntary Context Switches       141
      Involuntary Context Switches     2
      Block Input Operations           0
      Block Output Operations          336


383
384        proc sort data = code.os_base; by patient_id; run;

NOTE: Input data set is already sorted, no sorting done.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              607.12k
      OS Memory           32424.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                       1406  Switch Count  0
```

```
      Page Faults                     0
      Page Reclaims                   49
      Page Swaps                      0
      Voluntary Context Switches      10
      Involuntary Context Switches    0
      Block Input Operations          0
      Block Output Operations         0


385       proc sort data = code.cohort_final out = code.cohort_sorted; by patient_id; run;

NOTE: There were 282 observations read from the data set CODE.COHORT_FINAL.
NOTE: The data set CODE.COHORT_SORTED has 282 observations and 17 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1192.53k
      OS Memory           32944.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                      1407  Switch Count  1
      Page Faults                     0
      Page Reclaims                   147
      Page Swaps                      0
      Voluntary Context Switches      38
      Involuntary Context Switches    0
      Block Input Operations          0
      Block Output Operations         280


386
387       data code.os;
388           merge code.os_base (in = a) code.cohort_sorted (in = b);
389           by patient_id;
390           if a;
391           length EVNTDESC $5;
392
393           start_date = index_date;
394
395           if death_date ne . then do;
396             CNSR = 0;
397             Event = 1;
398             ADT = death_date;
399             EVNTDESC = 'Death';
400           end;
401           else do;
402             CNSR = 1;
403             Event = 0;
404             if last_followup ne . then ADT = last_followup;
405             else ADT = index_date;
406
407             EVNTDESC = 'No Ev';
408           end;
409
410           AVAL = (ADT - start_date + 1)/(365/12);
411
412           keep patient_id cohort cohortN start_date CNSR ADT EVNTDESC AVAL last_followup;
413       run;

NOTE: There were 282 observations read from the data set CODE.OS_BASE.
NOTE: There were 282 observations read from the data set CODE.COHORT_SORTED.
NOTE: The data set CODE.OS has 282 observations and 9 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1529.03k
      OS Memory           32944.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                      1408  Switch Count  1
      Page Faults                     0
      Page Reclaims                   148
      Page Swaps                      0
      Voluntary Context Switches      47
      Involuntary Context Switches    0
      Block Input Operations          0
      Block Output Operations         264


414
415       /*Treatment Pattern*/
416       proc sql;
417           create table code.Med_1 as
```

```
418           select * from saspath.medication as a
419           where patient_id in (select distinct patient_id from code.cohort_final);
NOTE: Table CODE.MED_1 created, with 762 rows and 19 columns.

420       quit;
NOTE: PROCEDURE SQL used (Total process time):
      real time           0.01 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              7374.18k
      OS Memory           38576.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1409  Switch Count  1
      Page Faults                       0
      Page Reclaims                     321
      Page Swaps                        0
      Voluntary Context Switches        53
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           528


421
422       data code.med_2;
423           set code.Med_1;
424           where '01Jan2017'd <= request_date <= '01Jan2021'd;
425
426           length Category $40;
427
428           if
428      ! PRXMATCH("/Bromfenac|Celecoxib|Diclofenac|Etodolac|Fenoprofen|Flurbiprofen|Ibuprofen|Indomethacin|Ketoprofen|Ketorolac|Na
428      ! proxen|Meclofenamate|Mefenamic acid|Meloxicam|Nabumetone|Oxaprozin|Piroxicam|Sulindac|Tolmetin/i", medication_name) then
429               Category="NSAIDs";
430           else if
430      ! PRXMATCH("/Aspirin|Clopidogrel|Prasugrel|Ticlopidine|Cilostazol|Abciximab|Tirofiban|Dipyridamole|Ticagrelor/i",
430      ! medication_name) then
431               Category="Anti-Platelet";
432           else if PRXMATCH("/Omeprazole|Pantoprazole|Lansoprazole|Rabeprazole|Esomeprazole|Dexlansoprazole/i", medication_name)
432      !  then
433               category="PPI";
434           else if PRXMATCH("/Cimetidine|Ranitidine|Famotidine|Nizatidine|Roxatidine|Lafutidine/i", medication_name) then
435               category="H2 Antagonist";
436           else if PRXMATCH("/Quinidine|Procainamide|Mexiletine|Propafenone|Flecainide|Amiodarone|Bretylium|Dronedarone/i",
436      ! medication_name) then
437               category="Antiarrhythmics";
438           else if PRXMATCH("/Digoxin/i", medication_name) then
439               category="Digoxin";
440           else if PRXMATCH("/Atorvastatin|Fluvastatin|Lovastatin|Pitavastatin|Pravastatin|Roxuvastatin|Simvastatin/i",
440      ! medication_name) then
441               category="Statins";
442       run;

NOTE: There were 752 observations read from the data set CODE.MED_1.
      WHERE (request_date>='01JAN2017'D and request_date<='01JAN2021'D);
NOTE: The data set CODE.MED_2 has 752 observations and 20 variables.
NOTE: DATA statement used (Total process time):
      real time           0.04 seconds
      user cpu time       0.03 seconds
      system cpu time     0.00 seconds
      memory              1314.03k
      OS Memory           32684.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1410  Switch Count  4
      Page Faults                       0
      Page Reclaims                     91
      Page Swaps                        0
      Voluntary Context Switches        61
      Involuntary Context Switches      2
      Block Input Operations            0
      Block Output Operations           528


443
444       proc sort data = code.med_2;
445           by patient_id Category;
446       run;

NOTE: There were 752 observations read from the data set CODE.MED_2.
NOTE: The data set CODE.MED_2 has 752 observations and 20 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.01 seconds
```

```
      memory             1659.43k
      OS Memory          33204.00k
      Timestamp          01/24/2026 05:43:29 AM
      Step Count                        1411  Switch Count  1
      Page Faults                       0
      Page Reclaims                     143
      Page Swaps                        0
      Voluntary Context Switches        52
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           520


447
448       data code.med_summary;
449           set code.med_2;
450           by patient_id Category;
451           retain Num_Presc Num_Cat;
452
453           if first.patient_id then do;
454               Num_Presc = 0;
455               Num_Cat = 0;
456           end;
457
458           if not missing(encounter_id) then Num_Presc + 1;
459
460           if first.Category and not missing(Category) then Num_Cat + 1;
461
462           if last.patient_id then output;
463           keep patient_id Num_Presc Num_Cat;
464       run;

NOTE: There were 752 observations read from the data set CODE.MED_2.
NOTE: The data set CODE.MED_SUMMARY has 282 observations and 3 variables.
NOTE: DATA statement used (Total process time):
      real time          0.01 seconds
      user cpu time      0.00 seconds
      system cpu time    0.00 seconds
      memory             1300.31k
      OS Memory          32684.00k
      Timestamp          01/24/2026 05:43:29 AM
      Step Count                        1412  Switch Count  1
      Page Faults                       0
      Page Reclaims                     118
      Page Swaps                        0
      Voluntary Context Switches        47
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


465
466       proc sort data = code.cohort_final out = code.cohort_sorted; by patient_id; run;

NOTE: There were 282 observations read from the data set CODE.COHORT_FINAL.
NOTE: The data set CODE.COHORT_SORTED has 282 observations and 17 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time          0.01 seconds
      user cpu time      0.00 seconds
      system cpu time    0.00 seconds
      memory             1192.53k
      OS Memory          32944.00k
      Timestamp          01/24/2026 05:43:29 AM
      Step Count                        1413  Switch Count  1
      Page Faults                       0
      Page Reclaims                     147
      Page Swaps                        0
      Voluntary Context Switches        38
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           272


467
468       data code.TRT_PATTERN;
469           length patient_id $30 cohort $20;
470           merge code.cohort_sorted(in=a) code.med_summary(in=b);
471           by patient_id;
472
473           if a;
474
475           if not b then do;
476               Num_Presc = 0;
```

```
477               Num_Cat = 0;
478           end;
479
480           keep patient_id Num_Presc Num_Cat cohort CohortN cohort1n;
481       run;

NOTE: There were 282 observations read from the data set CODE.COHORT_SORTED.
NOTE: There were 282 observations read from the data set CODE.MED_SUMMARY.
NOTE: The data set CODE.TRT_PATTERN has 282 observations and 6 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1516.84k
      OS Memory           32944.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1414  Switch Count  1
      Page Faults                       0
      Page Reclaims                     149
      Page Swaps                        0
      Voluntary Context Switches        48
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


482
483       /*Vital Sign Analysis*/
484       proc sql;
485       create table code.vs_raw as
486       select
487           c.patient_id, v.loinc, v.value, v.vital_date,
488           v.encounter_id,
489           c.index_date, c.cohort1n, c.death_date
490       from code.cohort_final c
491       inner join saspath.vital_sign v on c.patient_id = v.patient_id
492       where v.loinc = '8462-4' and not missing(v.value);
NOTE: Table CODE.VS_RAW created, with 854 rows and 8 columns.

493       quit;
NOTE: PROCEDURE SQL used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              6683.65k
      OS Memory           38320.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1415  Switch Count  4
      Page Faults                       0
      Page Reclaims                     276
      Page Swaps                        0
      Voluntary Context Switches        52
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           272


494
495       data code.base_work;
496           set code.vs_raw;
497           where index_date - 30 <= vital_date <= index_date + 30;
498
499           if vital_date >= index_date then priority = 1;
500           else priority = 2;
501
502           dist = abs(vital_date - index_date);
503       run;

NOTE: There were 290 observations read from the data set CODE.VS_RAW.
      WHERE (vital_date>=(index_date-30)) and (vital_date<=(index_date+30));
NOTE: The data set CODE.BASE_WORK has 290 observations and 10 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1196.53k
      OS Memory           32684.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1416  Switch Count  2
      Page Faults                       0
      Page Reclaims                     116
      Page Swaps                        0
      Voluntary Context Switches        50
```

```
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


504
505       proc sort data=code.base_work;
506           by patient_id loinc priority dist descending encounter_id;
507       run;

NOTE: There were 290 observations read from the data set CODE.BASE_WORK.
NOTE: The data set CODE.BASE_WORK has 290 observations and 10 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              924.31k
      OS Memory           32684.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1417  Switch Count  1
      Page Faults                       0
      Page Reclaims                     113
      Page Swaps                        0
      Voluntary Context Switches        42
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


508
509       data code.base_final;
510           set code.base_work;
511           by patient_id loinc;
512           if first.loinc;
513
514           if patient_id = 164091 then value = 67;
515
516           rename value = Base;
517           keep patient_id loinc value cohort1n;
518       run;

NOTE: Character values have been converted to numeric values at the places given by: (Line):(Column).
      514:8
NOTE: There were 290 observations read from the data set CODE.BASE_WORK.
NOTE: The data set CODE.BASE_FINAL has 282 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1145.28k
      OS Memory           32684.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1418  Switch Count  1
      Page Faults                       0
      Page Reclaims                     118
      Page Swaps                        0
      Voluntary Context Switches        46
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


519
520       proc sort data=code.vs_raw out=code.post_work;
521           by patient_id loinc vital_date encounter_id;
522           where vital_date > index_date and (vital_date < death_date or missing(death_date));
523       run;

NOTE: There were 706 observations read from the data set CODE.VS_RAW.
      WHERE (vital_date>index_date) and ((vital_date<death_date) or MISSING(death_date));
NOTE: The data set CODE.POST_WORK has 706 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1582.28k
      OS Memory           33464.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1419  Switch Count  4
      Page Faults                       0
      Page Reclaims                     153
      Page Swaps                        0
      Voluntary Context Switches        51
```

```
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           280


524
525       data code.post_final;
526           set code.post_work;
527           by patient_id loinc;
528           if last.loinc;
529           rename value = Post_Base;
530           keep patient_id loinc value vital_date;
531       run;

NOTE: There were 706 observations read from the data set CODE.POST_WORK.
NOTE: The data set CODE.POST_FINAL has 282 observations and 4 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1144.15k
      OS Memory           32684.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1420  Switch Count  1
      Page Faults                       0
      Page Reclaims                     118
      Page Swaps                        0
      Voluntary Context Switches        46
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


532
533       data code.vital_sign_analysis;
534           merge code.base_final(in=a) code.post_final(in=b);
535           by patient_id loinc;
536           if a;
537
538           CHG = Post_Base - Base;
539           death_date = .;
540           format death_date MMDDYY10.;
541
542           retain patient_id loinc cohort1n Base vital_date death_date Post_Base CHG;
543       run;

NOTE: There were 282 observations read from the data set CODE.BASE_FINAL.
NOTE: There were 282 observations read from the data set CODE.POST_FINAL.
NOTE: The data set CODE.VITAL_SIGN_ANALYSIS has 282 observations and 8 variables.
NOTE: DATA statement used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1509.65k
      OS Memory           32944.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1421  Switch Count  1
      Page Faults                       0
      Page Reclaims                     149
      Page Swaps                        0
      Voluntary Context Switches        52
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


544
545       proc sort data = code.cohort_final; by patient_id; run;

NOTE: There were 282 observations read from the data set CODE.COHORT_FINAL.
NOTE: The data set CODE.COHORT_FINAL has 282 observations and 17 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              929.00k
      OS Memory           32684.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1422  Switch Count  1
      Page Faults                       0
      Page Reclaims                     113
      Page Swaps                        0
      Voluntary Context Switches        40
```

```
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


546         proc sort data = valid.cohort; by patient_id; run;

NOTE: Input data set is already sorted, no sorting done.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              541.59k
      OS Memory           32424.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1423  Switch Count  0
      Page Faults                       0
      Page Reclaims                     49
      Page Swaps                        0
      Voluntary Context Switches        10
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           0


547         proc compare base = valid.cohort compare = code.cohort_final; id patient_id; run;

NOTE: There were 282 observations read from the data set VALID.COHORT.
NOTE: There were 282 observations read from the data set CODE.COHORT_FINAL.
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.00 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              1330.53k
      OS Memory           32944.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1424  Switch Count  0
      Page Faults                       0
      Page Reclaims                     128
      Page Swaps                        0
      Voluntary Context Switches        12
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           24


548
549         proc sort data = valid.hru nodupkey; by patient_id; run;

NOTE: Input data set is already sorted, no sorting done.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              608.21k
      OS Memory           32168.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1425  Switch Count  0
      Page Faults                       0
      Page Reclaims                     49
      Page Swaps                        0
      Voluntary Context Switches        6
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           0


550         proc sort data = code.hru nodupkey; by patient_id; run;

NOTE: Input data set is already sorted, no sorting done.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              608.21k
      OS Memory           32168.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1426  Switch Count  0
      Page Faults                       0
      Page Reclaims                     49
      Page Swaps                        0
      Voluntary Context Switches        6
      Involuntary Context Switches      0
```

```
      Block Input Operations           0
      Block Output Operations          0


551       proc compare base = valid.hru compare = code.hru; id patient_id; run;

NOTE: There were 282 observations read from the data set VALID.HRU.
NOTE: There were 282 observations read from the data set CODE.HRU.
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.00 seconds
      user cpu time       0.01 seconds
      system cpu time     0.01 seconds
      memory              1281.81k
      OS Memory           32688.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1427  Switch Count  0
      Page Faults                       0
      Page Reclaims                     128
      Page Swaps                        0
      Voluntary Context Switches        9
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           8


552
553       proc sort data = code.TRT_PATTERN; by patient_id; run;

NOTE: There were 282 observations read from the data set CODE.TRT_PATTERN.
NOTE: The data set CODE.TRT_PATTERN has 282 observations and 6 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              924.12k
      OS Memory           32428.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1428  Switch Count  1
      Page Faults                       0
      Page Reclaims                     113
      Page Swaps                        0
      Voluntary Context Switches        44
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           264


554       proc sort data = valid.TRT_PATTERN; by patient_id; run;

NOTE: Input data set is already sorted, no sorting done.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              538.59k
      OS Memory           32168.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1429  Switch Count  0
      Page Faults                       0
      Page Reclaims                     49
      Page Swaps                        0
      Voluntary Context Switches        11
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           0


555       proc compare base = valid.TRT_PATTERN compare = code.TRT_PATTERN; id patient_id; run;

NOTE: There were 282 observations read from the data set VALID.TRT_PATTERN.
NOTE: There were 282 observations read from the data set CODE.TRT_PATTERN.
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.00 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              1283.65k
      OS Memory           32688.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1430  Switch Count  0
      Page Faults                       0
      Page Reclaims                     128
      Page Swaps                        0
      Voluntary Context Switches        13
```

```
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           24


556
557         proc sort data = code.os; by patient_id; run;

NOTE: There were 282 observations read from the data set CODE.OS.
NOTE: The data set CODE.OS has 282 observations and 9 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              926.96k
      OS Memory           32428.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1431  Switch Count  1
      Page Faults                       0
      Page Reclaims                     113
      Page Swaps                        0
      Voluntary Context Switches        44
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           264


558         proc sort data = valid.os; by patient_id; run;

NOTE: Input data set is already sorted, no sorting done.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              539.93k
      OS Memory           32168.00k
      Timestamp           01/24/2026 05:43:29 AM
      Step Count                        1432  Switch Count  0
      Page Faults                       0
      Page Reclaims                     49
      Page Swaps                        0
      Voluntary Context Switches        11
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           8


559         proc compare base = valid.os compare = code.os; id patient_id; run;

NOTE: There were 282 observations read from the data set VALID.OS.
NOTE: There were 282 observations read from the data set CODE.OS.
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.00 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              1320.65k
      OS Memory           32688.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                        1433  Switch Count  0
      Page Faults                       0
      Page Reclaims                     128
      Page Swaps                        0
      Voluntary Context Switches        13
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           24


560
561         proc sort data = code.vital_sign_analysis nodupkey; by patient_id; run;

NOTE: There were 282 observations read from the data set CODE.VITAL_SIGN_ANALYSIS.
NOTE: 0 observations with duplicate key values were deleted.
NOTE: The data set CODE.VITAL_SIGN_ANALYSIS has 282 observations and 8 variables.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              925.96k
      OS Memory           32428.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                        1434  Switch Count  1
      Page Faults                       0
```

```
      Page Reclaims                    113
      Page Swaps                       0
      Voluntary Context Switches       44
      Involuntary Context Switches     0
      Block Input Operations           0
      Block Output Operations          264


562       proc sort data = valid.vital_sign_analysis nodupkey; by patient_id; run;

NOTE: Input data set is already sorted, no sorting done.
NOTE: PROCEDURE SORT used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              539.59k
      OS Memory           32168.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                       1435  Switch Count  0
      Page Faults                      0
      Page Reclaims                    49
      Page Swaps                       0
      Voluntary Context Switches       11
      Involuntary Context Switches     0
      Block Input Operations           0
      Block Output Operations          0


563       proc compare base = valid.vital_sign_analysis compare = code.vital_sign_analysis; id patient_id; run;

NOTE: There were 282 observations read from the data set VALID.VITAL_SIGN_ANALYSIS.
NOTE: There were 282 observations read from the data set CODE.VITAL_SIGN_ANALYSIS.
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.00 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1287.53k
      OS Memory           32688.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                       1436  Switch Count  0
      Page Faults                      0
      Page Reclaims                    129
      Page Swaps                       0
      Voluntary Context Switches       13
      Involuntary Context Switches     1
      Block Input Operations           0
      Block Output Operations          8


564
565
566       options nodate nonumber;
567       ods pdf file="&sasPath/Full_Validation_and_TLF_Report.pdf" style=Pearl pdftoc=1;
NOTE: Writing ODS PDF output to DISK destination "/home/u64338212/sasuser.v94/ehr_data/Full_Validation_and_TLF_Report.pdf",
      printer "PDF".
568
569       ods proclabel="1. Validation Reports";
570       title "SECTION 1: 100% Match Verification for All Datasets";
571
572       title2 "1.1 Cohort Dataset Validation";
573       proc compare base=valid.cohort compare=code.cohort_final listall;
574           id patient_id;
575       run;

NOTE: There were 282 observations read from the data set VALID.COHORT.
NOTE: There were 282 observations read from the data set CODE.COHORT_FINAL.
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.01 seconds
      user cpu time       0.01 seconds
      system cpu time     0.01 seconds
      memory              1803.93k
      OS Memory           33972.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                       1437  Switch Count  0
      Page Faults                      0
      Page Reclaims                    172
      Page Swaps                       0
      Voluntary Context Switches       9
      Involuntary Context Switches     0
      Block Input Operations           0
      Block Output Operations          24
```

```
576
577         title2 "1.2 HRU (Healthcare Resource Utilization) Validation";
578         proc compare base=valid.hru compare=code.hru listall;
579             id patient_id;
580         run;

NOTE: There were 282 observations read from the data set VALID.HRU.
NOTE: There were 282 observations read from the data set CODE.HRU.
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.01 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              1280.28k
      OS Memory           33972.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                        1438  Switch Count  0
      Page Faults                       0
      Page Reclaims                     148
      Page Swaps                        0
      Voluntary Context Switches        9
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           32


581
582         title2 "1.3 OS (Overall Survival) Validation";
583         proc compare base=valid.os compare=code.os listall;
584             id patient_id;
585         run;

NOTE: There were 282 observations read from the data set VALID.OS.
NOTE: There were 282 observations read from the data set CODE.OS.
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.01 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              1179.81k
      OS Memory           33972.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                        1439  Switch Count  0
      Page Faults                       0
      Page Reclaims                     129
      Page Swaps                        0
      Voluntary Context Switches        9
      Involuntary Context Switches      0
      Block Input Operations            0
      Block Output Operations           8


586
587         title2 "1.4 TRT_PATTERN (Treatment Pattern) Validation";
588         proc compare base=valid.trt_pattern compare=code.trt_pattern listall;
589             id patient_id;
590         run;

NOTE: There were 282 observations read from the data set VALID.TRT_PATTERN.
NOTE: There were 282 observations read from the data set CODE.TRT_PATTERN.
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.01 seconds
      user cpu time       0.00 seconds
      system cpu time     0.00 seconds
      memory              1176.50k
      OS Memory           33972.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                        1440  Switch Count  0
      Page Faults                       0
      Page Reclaims                     129
      Page Swaps                        0
      Voluntary Context Switches        9
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           40


591
592         title2 "1.5 Vital Signs Analysis Validation";
593         proc compare base=valid.vital_sign_analysis compare=code.vital_sign_analysis listall;
594             id patient_id;
595         run;

NOTE: There were 282 observations read from the data set VALID.VITAL_SIGN_ANALYSIS.
NOTE: There were 282 observations read from the data set CODE.VITAL_SIGN_ANALYSIS.
```

```
NOTE: PROCEDURE COMPARE used (Total process time):
      real time           0.01 seconds
      user cpu time       0.01 seconds
      system cpu time     0.00 seconds
      memory              1182.37k
      OS Memory           33972.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                        1441  Switch Count  0
      Page Faults                       0
      Page Reclaims                     129
      Page Swaps                        0
      Voluntary Context Switches        9
      Involuntary Context Switches      2
      Block Input Operations            0
      Block Output Operations           24


596
597        ods pdf startpage=now;
598        ods proclabel="2. Summary Tables";
599        title "SECTION 2: Summary Tables (TLF - Tables)";
600
601        title2 "Table 2.1: Baseline Demographics and Risk Scores by Cohort";
602        proc means data=code.cohort_final n mean std min max maxdec=2;
603            class cohort;
604            var age CHA2DS2 HASBLED;
605        run;

NOTE: There were 282 observations read from the data set CODE.COHORT_FINAL.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.03 seconds
      user cpu time       0.03 seconds
      system cpu time     0.01 seconds
      memory              8475.42k
      OS Memory           40384.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                        1442  Switch Count  1
      Page Faults                       0
      Page Reclaims                     1808
      Page Swaps                        0
      Voluntary Context Switches        21
      Involuntary Context Switches      3
      Block Input Operations            0
      Block Output Operations           8


606
607        title2 "Table 2.2: Treatment Pattern Intensity by Cohort";
608        proc means data=code.TRT_PATTERN n mean std maxdec=2;
609            class cohort;
610            var Num_Presc Num_Cat;
611        run;

NOTE: There were 282 observations read from the data set CODE.TRT_PATTERN.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.02 seconds
      user cpu time       0.02 seconds
      system cpu time     0.00 seconds
      memory              7503.18k
      OS Memory           40896.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                        1443  Switch Count  1
      Page Faults                       0
      Page Reclaims                     1545
      Page Swaps                        0
      Voluntary Context Switches        21
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           0


612
613        title2 "Table 2.3: Vital Sign Mean Change (Diastolic BP)";
614        proc means data=code.vital_sign_analysis n mean std stderr clm maxdec=2;
615            class cohort1n;
616            var Base Post_Base CHG;
617        run;

NOTE: There were 282 observations read from the data set CODE.VITAL_SIGN_ANALYSIS.
NOTE: PROCEDURE MEANS used (Total process time):
      real time           0.03 seconds
      user cpu time       0.03 seconds
      system cpu time     0.01 seconds
```

```
      memory             7775.78k
      OS Memory          41408.00k
      Timestamp          01/24/2026 05:43:30 AM
      Step Count                        1444  Switch Count  1
      Page Faults                       0
      Page Reclaims                     1548
      Page Swaps                        0
      Voluntary Context Switches        21
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           24


618
619        ods pdf startpage=now;
620        ods proclabel="3. Figures";
621        title "SECTION 3: Survival Analysis (TLF - Figures)";
622
623        title2 "Figure 3.1: Kaplan-Meier Curve for Overall Survival";
624        proc lifetest data=code.os plots=survival(atrisk);
625            time AVAL*CNSR(1);
626            strata cohort;
627        run;

NOTE: The LOGLOG transform is used to compute the confidence limits for the quartiles of the survivor distribution. To suppress
      using this transform, specify CONFTYPE=LINEAR in the PROC LIFETEST statement.
NOTE: PROCEDURE LIFETEST used (Total process time):
      real time          0.64 seconds
      user cpu time      0.42 seconds
      system cpu time    0.00 seconds
      memory             17255.87k
      OS Memory          50104.00k
      Timestamp          01/24/2026 05:43:30 AM
      Step Count                        1445  Switch Count  0
      Page Faults                       0
      Page Reclaims                     3850
      Page Swaps                        0
      Voluntary Context Switches        1100
      Involuntary Context Switches      6
      Block Input Operations            0
      Block Output Operations           1152


628
629        ods pdf startpage=now;
630        ods proclabel="4. Data Listings";
631        title "SECTION 4: Data Listings (TLF - Listings)";
632
633        title2 "Listing 4.1: Patient-Level Survival and Event Data (First 20)";
634        proc print data=code.os(obs=20) label;
635            var patient_id start_date ADT EVNTDESC AVAL CNSR;
636        run;

NOTE: There were 20 observations read from the data set CODE.OS.
NOTE: PROCEDURE PRINT used (Total process time):
      real time          0.02 seconds
      user cpu time      0.03 seconds
      system cpu time    0.00 seconds
      memory             843.65k
      OS Memory          49580.00k
      Timestamp          01/24/2026 05:43:30 AM
      Step Count                        1446  Switch Count  0
      Page Faults                       0
      Page Reclaims                     70
      Page Swaps                        0
      Voluntary Context Switches        6
      Involuntary Context Switches      1
      Block Input Operations            0
      Block Output Operations           16


637
638        title2 "Listing 4.2: Patient-Level Vital Sign Results (First 20)";
639        proc print data=code.vital_sign_analysis(obs=20) label;
640            var patient_id cohort1n Base Post_Base CHG;
641        run;

NOTE: There were 20 observations read from the data set CODE.VITAL_SIGN_ANALYSIS.
NOTE: PROCEDURE PRINT used (Total process time):
      real time          0.02 seconds
      user cpu time      0.02 seconds
      system cpu time    0.00 seconds
      memory             728.46k
```

```
      OS Memory           49580.00k
      Timestamp           01/24/2026 05:43:30 AM
      Step Count                        1447  Switch Count  0
      Page Faults                       0
      Page Reclaims                     61
      Page Swaps                        0
      Voluntary Context Switches        6
      Involuntary Context Switches      2
      Block Input Operations            0
      Block Output Operations           24


642
643        ods pdf close;
NOTE: ODS PDF printed 24 pages to /home/u64338212/sasuser.v94/ehr_data/Full_Validation_and_TLF_Report.pdf.
644        title;
645
646        OPTIONS NONOTES NOSTIMER NOSOURCE NOSYNTAXCHECK;
656
```