**Supplementary Appendix**. Analytical codes.

\*out0: MACE; out1: myocardial infarction; out2: stroke; out3: CV death; out4: heart failure; out5: all-cause death

\*<1> CLONING AND CENSORING;

**%macro** CC(out=);

\*Procedure 1: Cloning;

data strategy1 strategy2 strategy3 strategy4 ;

retain indi\_dscm\_no duration date\_stt date\_end disc\_dt date\_out dth\_dt out time\_fu std\_end\_dt;

set y.cht\_out&out.;

output strategy1; output strategy2; output strategy3; output strategy4; run;

\*Procedure 2: Censoring;

\*\*\*\*\*We have two types of artificial censoring: early discontinuation of SGLT2i (*stopearly*) and continuation beyond the assigned treatment duration (*nostop)*;

\*\*Strategy 1: Continue for 0-1 year;

data step1\_strategy1;

set strategy1;

if time\_fu <=**360** then do;

cens\_fu=time\_fu; cens\_out=out; cens\_nostop=**0**; end;

ELSE if duration >**360** then do; cens\_fu=**360**; cens\_out=**0**; cens\_nostop=**1**; end;

ELSE if duration <=**360** then do; cens\_fu=time\_fu; cens\_out=out; cens\_nostop=**0**;

end;

run;

\*\*Strategy 2: Continue for 1-2 year;

DATA step1\_strategy2;

SET strategy2;

IF duration < **360** THEN DO;

IF time\_fu >= duration THEN DO; cens\_fu = duration; cens\_out = **0**; cens\_stopearly = **1**; cens\_nostop = **0**; END;

ELSE IF time\_fu < duration THEN DO; cens\_fu = time\_fu; cens\_out = out; cens\_stopearly = **0**; cens\_nostop = **0**; END;

END;

ELSE IF time\_fu <= **720** THEN DO; cens\_fu = time\_fu; cens\_out = out; cens\_stopearly = **0**; cens\_nostop = **0**; END;

ELSE IF duration > **720** THEN DO; cens\_fu = **720**; cens\_out = **0**; cens\_stopearly = **0**; cens\_nostop = **1**; END;

ELSE DO; cens\_fu = time\_fu; cens\_out = out; cens\_stopearly = **0**; cens\_nostop = **0**; END;

RUN;

\*\*Strategy 3: Continue for 2-3 year;

DATA step1\_strategy3;

SET strategy3;

IF duration < **720** THEN DO;

IF time\_fu >= duration THEN DO; cens\_fu = duration; cens\_out = **0**; cens\_stopearly = **1**; cens\_nostop = **0**; END;

ELSE IF time\_fu < duration THEN DO; cens\_fu = time\_fu; cens\_out = out; cens\_stopearly = **0**; cens\_nostop = **0**; END;

END;

ELSE IF time\_fu <= **1080** THEN DO; cens\_fu = time\_fu; cens\_out = out; cens\_stopearly = **0**; cens\_nostop = **0**; END;

ELSE IF duration > **1080** THEN DO; cens\_fu = **1080**; cens\_out = **0**; cens\_stopearly = **0**; cens\_nostop = **1**; END;

ELSE DO; cens\_fu = time\_fu; cens\_out = out; cens\_stopearly = **0**; cens\_nostop = **0**; END;

RUN;

\*\*Strategy 4: Continue for 3-5 year;

DATA step1\_strategy4;

SET strategy4;

IF duration < **1080** THEN DO;

IF time\_fu >= duration THEN DO; cens\_fu = duration; cens\_out = **0**; cens\_stopearly = **1**; END;

ELSE IF time\_fu < duration THEN DO; cens\_fu = time\_fu; cens\_out = out; cens\_stopearly = **0**; END;

END;

ELSE DO;

cens\_fu = time\_fu; cens\_out = out; cens\_stopearly = **0**;

END;

RUN;

\*\*\*Create time-split data;

\*\*Strategy 1: Continue for 0-1 year;

data b1;

set step1\_strategy1;

do start\_interval=**0**; output;end;

do start\_interval=**360**; output;end;

drop date\_end -- dth\_dt;

run;

data b2;

set b1;

by indi\_dscm\_no;

if start\_interval>cens\_fu then delete;

if start\_interval=**0** then interval\_no=**1**;

else if start\_interval=**360** then interval\_no=**2**;

run;

DATA m.step2\_strategy1\_out&out.;

SET b2;

IF start\_interval = **0** THEN DO;

IF cens\_fu > **360** THEN DO;

interval\_out = **0**;

interval\_nostop = **0**;

interval\_fu = **360**;

interval\_end = **360**; END;

ELSE IF cens\_fu <= **360** THEN DO;

interval\_out = cens\_out;

interval\_nostop = **0**;

interval\_fu = cens\_fu-**0**;

interval\_end = cens\_fu; END;

END;

IF start\_interval = **360** THEN DO;

IF cens\_nostop = **1** THEN DO;

interval\_out = **0**;

interval\_nostop = **1**;

interval\_fu = **0**;

interval\_end = **360**;

END;

ELSE IF cens\_nostop = **0** THEN DO;

IF cens\_fu > **1800** THEN DO;

interval\_out = **0**;

interval\_nostop = **0**;

interval\_fu = **1800** - **360**;

interval\_end = **1800**;

END;

ELSE IF cens\_fu <= **1800** THEN DO;

interval\_out = cens\_out;

interval\_nostop = **0**;

interval\_fu = cens\_fu - **360**;

interval\_end = cens\_fu;

END;

END;

END;

if start\_interval = **0** then date\_ipw=date\_stt+**0**;

else if start\_interval = **360** then date\_ipw=date\_stt+**360**;

format date\_ipw yymmdd10.;

interval\_line+**1**;

run;

\*\*Strategy 2: Continue for 1-2 year;

data tt1;

set step1\_strategy2;

do start\_interval=**0**; output;end;

do start\_interval=**360**; output;end;

do start\_interval=**720**; output;end;

drop date\_end -- dth\_dt;

run;

data tt2;

set tt1;

by indi\_dscm\_no;

if start\_interval>cens\_fu then delete;

if start\_interval=**0** then interval\_no=**1**;

else if start\_interval=**360** then interval\_no=**2**;

else if start\_interval=**720** then interval\_no=**3**;

run;

DATA m.step2\_strategy2\_out&out.;

SET tt2;

IF start\_interval = **0** THEN DO;

IF cens\_fu > **360** THEN DO;

interval\_out = **0**;

interval\_stopearly = **0**;

interval\_nostop = **0**;

interval\_fu = **360**;

interval\_end = **360**;

END;

ELSE IF cens\_fu <= **360** and cens\_stopearly=**0** THEN DO;

interval\_out = cens\_out;

interval\_stopearly = **0**;

interval\_nostop = **0**;

interval\_fu = cens\_fu - **0**;

interval\_end = cens\_fu;

END;

ELSE IF cens\_fu <= **360** and cens\_stopearly=**1** THEN DO;

interval\_out = **0**;

interval\_stopearly = **1**;

interval\_nostop = **0**;

interval\_fu = cens\_fu - **0**;

interval\_end = cens\_fu;

END;

END;

IF start\_interval = **360** THEN DO;

IF cens\_fu > **720** THEN DO;

interval\_out = **0**;

interval\_stopearly = **0**;

interval\_nostop = **0**;

interval\_fu = **720** - **360**;

interval\_end = **720**;

END;

ELSE IF cens\_fu <= **720** THEN DO;

interval\_out = cens\_out;

interval\_stopearly = **0**;

interval\_nostop = **0**;

interval\_fu = cens\_fu - **360**;

interval\_end = cens\_fu;

END;

END;

IF start\_interval = **720** THEN DO;

IF cens\_nostop = **1** THEN DO;

interval\_out = **0**;

interval\_nostop = **1**;

interval\_stopearly=**0**;

interval\_fu = **0**;

interval\_end = **720**;

END;

ELSE IF cens\_nostop = **0** THEN DO;

IF cens\_fu > **1800** THEN DO;

interval\_out = **0**;

interval\_nostop = **0**;

interval\_stopearly=**0**;

interval\_fu = **1800** - **720**;

interval\_end = **1800**;

END;

ELSE IF cens\_fu <= **1800** THEN DO;

interval\_out = cens\_out;

interval\_nostop = **0**;

interval\_stopearly=**0**;

interval\_fu = cens\_fu - **720**;

interval\_end = cens\_fu;

END;

END;

END;

if start\_interval = **0** then date\_ipw=date\_stt+interval\_end;

else if start\_interval = **360** then date\_ipw=date\_stt+**360**;

else if start\_interval = **720** then date\_ipw=date\_stt+**720**;

format date\_ipw yymmdd10.;

interval\_line+**1**;

run;

\*\*Strategy 3: Continue for 2-3 year;

data tt1;

set step1\_strategy3;

do start\_interval=**0**; output;end;

do start\_interval=**720**; output;end;

do start\_interval=**1080**; output;end;

drop date\_end -- dth\_dt;

run;

data tt2;

set tt1;

by indi\_dscm\_no;

if start\_interval>cens\_fu then delete;

if start\_interval=**0** then interval\_no=**1**;

else if start\_interval=**720** then interval\_no=**2**;

else if start\_interval=**1080** then interval\_no=**3**;

run;

DATA m.step2\_strategy3\_out&out.;

SET tt2;

IF start\_interval = **0** THEN DO;

IF cens\_fu > **720** THEN DO;

interval\_out = **0**;

interval\_stopearly = **0**;

interval\_nostop = **0**;

interval\_fu = **720**;

interval\_end = **720**;

END;

ELSE IF cens\_fu <= **720** and cens\_stopearly=**0** THEN DO;

interval\_out = cens\_out;

interval\_stopearly = **0**;

interval\_nostop = **0**;

interval\_fu = cens\_fu - **0**;

interval\_end = cens\_fu;

END;

ELSE IF cens\_fu <= **720** and cens\_stopearly=**1** THEN DO;

interval\_out = **0**;

interval\_stopearly = **1**;

interval\_nostop = **0**;

interval\_fu = cens\_fu - **0**;

interval\_end = cens\_fu;

END;

END;

IF start\_interval = **720** THEN DO;

IF cens\_fu > **1080** THEN DO;

interval\_out = **0**;

interval\_stopearly = **0**;

interval\_nostop = **0**;

interval\_fu = **1080** - **720**;

interval\_end = **1080**;

END;

ELSE IF cens\_fu <= **1080** THEN DO;

interval\_out = cens\_out;

interval\_stopearly = **0**;

interval\_nostop = **0**;

interval\_fu = cens\_fu - **720**;

interval\_end = cens\_fu;

END;

END;

IF start\_interval = **1080** THEN DO;

IF cens\_nostop = **1** THEN DO;

interval\_out = **0**;

interval\_nostop = **1**;

interval\_stopearly=**0**;

interval\_fu = **0**;

interval\_end = **1080**;

END;

ELSE IF cens\_nostop = **0** THEN DO;

IF cens\_fu > **1800** THEN DO;

interval\_out = **0**;

interval\_nostop = **0**;

interval\_stopearly=**0**;

interval\_fu = **1800** - **1080**;

interval\_end = **1800**;

END;

ELSE IF cens\_fu <= **1800** THEN DO;

interval\_out = cens\_out;

interval\_nostop = **0**;

interval\_stopearly=**0**;

interval\_fu = cens\_fu - **1080**;

interval\_end = cens\_fu;

END;

END;

END;

if start\_interval = **0** then date\_ipw=date\_stt+interval\_end;

else if start\_interval = **720** then date\_ipw=date\_stt+**720**;

else if start\_interval = **1080** then date\_ipw=date\_stt+**1080**;

format date\_ipw yymmdd10.;

interval\_line+**1**;

run;

\*\*Strategy 4: Continue for 3-5 year;

data a1;

set step1\_strategy4;

do start\_interval=**0**; output;end;

do start\_interval=**1080**; output;end;

drop date\_end -- dth\_dt;

run;

data a2;

set a1;

if start\_interval>cens\_fu then delete;

if start\_interval=**0** then interval\_no=**1**;

else if start\_interval=**1080** then interval\_no=**2**;

run;

DATA m.step2\_strategy4\_out&out.;

SET a2;

IF start\_interval = **0** THEN DO;

IF cens\_fu > **1080** THEN DO;

interval\_out = **0**;

interval\_stopearly = **0**;

interval\_fu = **1080**;

interval\_end = **1080**;

END;

ELSE IF cens\_fu <= **1080** and cens\_stopearly=**0** THEN DO;

interval\_out = cens\_out;

interval\_stopearly = **0**;

interval\_fu = cens\_fu - **0**;

interval\_end = cens\_fu;

END;

ELSE IF cens\_fu <= **1080** and cens\_stopearly=**1** THEN DO;

interval\_out = **0**;

interval\_stopearly = **1**;

interval\_fu = cens\_fu - **0**;

interval\_end = cens\_fu;

END;

END;

IF start\_interval = **1080** THEN DO;

IF cens\_fu > **1800** THEN DO;

interval\_out = **0**;

interval\_stopearly = **0**;

interval\_fu = **1800**;

interval\_end = **1800**;

END;

ELSE IF cens\_fu <= **1800** THEN DO;

interval\_out = cens\_out;

interval\_stopearly = **0**;

interval\_fu = cens\_fu - **1080**;

interval\_end = cens\_fu;

END;

END;

if start\_interval =**0** then date\_ipw=date\_stt+interval\_end;

else if start\_interval = **1080** then date\_ipw=date\_stt+**1080**;

format date\_ipw yymmdd10.;

interval\_line+**1**;

run;

**%mend**;

%***cc***(out=**0**);

%***cc***(out=**1**);

%***cc***(out=**2**);

%***cc***(out=**3**);

%***cc***(out=**4**);

%***cc***(out=**5**);

\*<2> EXTRACT COVARIATES BY INTERVAL;

**%macro** covariate(out=);

%do strategy=**1** %to **4**;

data temp1;set m.step2\_strategy&strategy.\_out&out.;run;

data temp2; set temp1; if interval\_no=**1**; interval\_no=**0**; interval\_line=interval\_line+**10000000**; date\_ipw=date\_stt; format date\_ipw yymmdd10.; run;

data total;set temp1 temp2; run;

proc sort data=total; by indi\_dscm\_no interval\_no; quit;

proc sql;

create table m.dx\_s&strategy.\_out&out. as

select distinct a.indi\_dscm\_no, a.interval\_no, interval\_line, a.date\_ipw, a.start\_interval, b.\*

from total as a inner join x.sick\_int as b

on a.indi\_dscm\_no=b.indi\_dscm\_no and a.date\_ipw-**365**<=b.start\_dt<a.date\_ipw;

quit;

proc sql;

create table m.rx\_s&strategy.\_out&out. as

select distinct a.indi\_dscm\_no, a.interval\_no, interval\_line, a.date\_ipw, a.start\_interval, b.\*

from total as a inner join x.drug\_int as b

on a.indi\_dscm\_no=b.indi\_dscm\_no and a.date\_ipw-**365**<=b.start\_dt<a.date\_ipw;

quit;

proc sql;

create table m.proc\_s&strategy.\_out&out. as

select distinct a.indi\_dscm\_no, a.interval\_no, interval\_line, a.date\_ipw, a.start\_interval, b.\*

from total as a inner join x.proc\_int as b

on a.indi\_dscm\_no=b.indi\_dscm\_no and a.date\_ipw-**365**<=b.start\_dt<a.date\_ipw;

quit;

proc sql;

create table m.ds\_all\_s&strategy.\_out&out. as

select distinct a.indi\_dscm\_no, a.interval\_no, interval\_line, a.date\_ipw, a.start\_interval, b.\*

from total as a inner join x.sick\_all as b

on a.indi\_dscm\_no=b.indi\_dscm\_no and a.date\_ipw-**365**<=b.start\_dt<a.date\_ipw;

quit;

**%macro** ***cov***;

proc sql;

create table temp1 as

select distinct indi\_dscm\_no, date\_ipw, interval\_line, start\_interval, start\_dt, inpat

%do a=**1** %to **8**;

, (case when nm\_dx="comor&a." then **1** else **0** end) as comor&a.

%end;

%do a=**10** %to **19**;

, (case when nm\_dx="comor&a." then **1** else **0** end) as comor&a.

%end;

from m.dx\_s&strategy.\_out&out.;

quit;

data temp2;

set temp1;

if comor5=**1** and inpat=**0** then delete;

if comor6=**1** and inpat=**0** then delete;

if comor10=**1** and inpat=**0** then delete;

run;

proc sql;

create table comor\_cht\_s&strategy.\_out&out. as

select distinct indi\_dscm\_no, interval\_line

%do a=**1** %to **8**;

, max(comor&a.) as comor&a.

%end;

%do a=**10** %to **19**;

, max(comor&a.) as comor&a.

%end;

from temp2

group by indi\_dscm\_no, interval\_line;

quit;

proc sql;

create table tmp1 as

select distinct indi\_dscm\_no, date\_ipw, interval\_line, start\_interval, start\_dt

%do a=**9** %to **9**;

, (case when nm\_proc="comor&a." then **1** else **0** end) as comor&a.

%end;

from m.proc\_s&strategy.\_out&out.;

quit;

proc sql;

create table tmp2 as

select distinct indi\_dscm\_no, interval\_line

%do a=**9** %to **9**;

, max(comor&a.) as comor&a.

%end;

from tmp1

group by indi\_dscm\_no, interval\_line;

quit;

data comor9\_cht\_s&strategy.\_out&out.;

set tmp2;

run;

proc sql;

create table tmp1 as

select distinct indi\_dscm\_no, date\_ipw, interval\_line, start\_interval, start\_dt

%do a=**1** %to **11**;

, (case when nm\_rx="comed&a." then **1** else **0** end) as comed&a.

%end;

from m.rx\_s&strategy.\_out&out.;

quit;

proc sql;

create table comed\_cht\_s&strategy.\_out&out. as

select distinct indi\_dscm\_no, interval\_line

%do a=**1** %to **11**;

, max(comed&a.) as comed&a.

%end;

from tmp1

group by indi\_dscm\_no, interval\_line;

quit;

proc sql;

create table tmp2 as

select distinct indi\_dscm\_no, date\_ipw, interval\_line, start\_interval, start\_dt

%do a=**1** %to **8**;

, (case when nm\_rx="DM\_med&a." then **1** else **0** end) as dm\_med&a.

%end;

from m.rx\_s&strategy.\_out&out.;

quit;

proc sql;

create table dmmed\_cht\_s&strategy.\_out&out. as

select distinct indi\_dscm\_no, interval\_line

%do a=**1** %to **8**;

, max(dm\_med&a.) as dm\_med&a.

%end;

from tmp2

group by indi\_dscm\_no, interval\_line;

quit;

**%mend**;

%***cov***;

proc sql; create table hu1 as select distinct indi\_dscm\_no, interval\_line, count(distinct cmn\_key) as n\_out from m.ds\_all\_s&strategy.\_out&out. group by **1**, **2**; quit;

proc sql; create table hu2 as select distinct indi\_dscm\_no, interval\_line, count(distinct cmn\_key) as n\_inp from m.ds\_all\_s&strategy.\_out&out. where inpat=**1** group by **1**, **2**; quit;

proc sql; create table hu3 as select distinct indi\_dscm\_no, interval\_line, count(distinct cmn\_key) as n\_ed from m.proc\_s&strategy.\_out&out. where nm\_proc="visit\_ed" group by **1**, **2**; quit;

data temp; set m.ds\_all\_s&strategy.\_out&out.; if date\_ipw-**30**<=start\_dt<date\_ipw then phy=**1**; else phy=**0**; run;

proc sql; create table hu4 as select distinct indi\_dscm\_no, interval\_line, max(phy) as phy from temp group by indi\_dscm\_no, interval\_line; quit;

proc sql;

create table temp as

select distinct a.indi\_dscm\_no, a.interval\_line, b.\*, c.\*, d.\*, e.\*

from total as a left join hu1 as b on a.indi\_dscm\_no=b.indi\_dscm\_no and a.interval\_line=b.interval\_line

left join hu2 as c on a.indi\_dscm\_no=c.indi\_dscm\_no and a.interval\_line=c.interval\_line

left join hu3 as d on a.indi\_dscm\_no=d.indi\_dscm\_no and a.interval\_line=d.interval\_line

left join hu4 as e on a.indi\_dscm\_no=e.indi\_dscm\_no and a.interval\_line=e.interval\_line;

quit;

data hu\_cht\_s&strategy.\_out&out.;

set temp;

if n\_ed=**.** or n\_ed=**0** then g\_ed=**1**; else g\_ed=**2**;

if n\_inp=**.** or n\_inp=**0** then g\_inp=**1**; else if n\_inp=**1** or n\_inp=**2** then g\_inp=**2**; else if n\_inp >=**3** then g\_inp=**3**;

if **0** <= n\_out <= **5** or n\_out=**.** then g\_out=**1**; else if **6** <= n\_out <= **10** then g\_out=**2**; else if **11** <= n\_out <= **15** then g\_out=**3**; else if **16** <= n\_out then g\_out=**4**;

if phy =**.** or phy=**0** then g\_phy=**1**; else if phy =**1** then g\_phy=**2**;

keep indi\_dscm\_no interval\_line g\_ed g\_inp g\_out g\_phy;

run;

proc sql;

create table s1 as

select distinct a.indi\_dscm\_no, a.start\_interval, a.date\_ipw, a.interval\_line, b.byear, b.sex\_type, b.gaibja\_type, b.calc\_ctrb\_vtile\_fd

from total as a left join stt.bfc\_1223 as b

on a.indi\_dscm\_no=b.indi\_dscm\_no and year(a.date\_ipw)=b.std\_year;

quit;

data s2;

set s1;

birth\_y=byear\***1**;

age=year(date\_ipw)-birth\_y;

if age <**40** then g\_age=**1**;

else if **40** <= age <**65** then g\_age=**2**;

else if age >= **65** then g\_age=**3**;

if calc\_ctrb\_vtile\_fd>=**16** then g\_income=**3**;

else if calc\_ctrb\_vtile\_fd>=**8** then g\_income=**2**;

else g\_income=**1**;

if sex\_type="2" then g\_sex=**2**;

else g\_sex=**1**;

if year(date\_ipw)=**2014** then g\_cyear=**1**;

else if year(date\_ipw)=**2015** then g\_cyear=**2**;

else if year(date\_ipw)=**2016** then g\_cyear=**3**;

else if year(date\_ipw)=**2017** then g\_cyear=**4**;

else if year(date\_ipw)=**2018** then g\_cyear=**5**;

else if year(date\_ipw)=**2019** then g\_cyear=**6**;

else if year(date\_ipw)=**2020** then g\_cyear=**7**;

else if year(date\_ipw)=**2021** then g\_cyear=**8**;

else if year(date\_ipw)=**2022** then g\_cyear=**9**;

else if year(date\_ipw)=**2023** then g\_cyear=**10**;

drop byear calc\_ctrb\_vtile\_fd gaibja\_type sex\_type;

run;

data s3;

set s2;

by indi\_dscm\_no;

retain birthyear;

if not missing(birth\_y) then birthyear=birth\_y; else birth\_y=birthyear;

drop birthyear;

run;

data ses\_cht\_s&strategy.\_out&out.;

set s3;

age=year(date\_ipw)-birth\_y;

if age <**40** then g\_age=**1**;

else if **40** <= age <**65** then g\_age=**2**;

else if age >= **65** then g\_age=**3**;

keep indi\_dscm\_no start\_interval date\_ipw interval\_line age g\_age g\_cyear g\_sex g\_income;

run;

data cci\_2;

set m.ds\_all\_s&strategy.\_out&out.;

if substr(sick\_cd,**1**,**3**) in ('I21','I22','I25') then c1=**1**; else c1=**0**;

if substr(sick\_cd,**1**,**3**) in ('I50') then c2=**1**; else c2=**0**;

if substr(sick\_cd,**1**,**3**) in ('I71','I79','I73','R02','Z95') then c3=**1**; else c3=**0**;

if substr(sick\_cd,**1**,**3**) in ('I60','I61','I62','I63','I64','I65','I66','I67','I68','I69','G45','G46') then c4=**1**; else c4=**0**;

if substr(sick\_cd,**1**,**3**) in ('F00','F01','F02','F05') then c5=**1**; else c5=**0**;

if substr(sick\_cd,**1**,**3**) in ('J40','J41','J42','J43','J44','J45','J46','J47','J60','J61','J62','J63','J64','J65','J66','J67') then c6=**1**; else c6=**0**;

if substr(sick\_cd,**1**,**3**) in ('M32','M33','M05','M06','M35') then c7=**1**; else c7=**0**;

if substr(sick\_cd,**1**,**3**) in ('K25','K26','K27','K28') then c8=**1**; else c8=**0**;

if substr(sick\_cd,**1**,**3**) in ('K70','K71','K74') then c9=**1**; else c9=**0**;

if substr(sick\_cd,**1**,**4**) in ('E109','E119','E139','E149','E101','E111','E131','E141','E105','E115','E135','E145') then c10=**1**; else c10=**0**;

if substr(sick\_cd,**1**,**4**) in ('E102','E112','E132','E142','E103','E113','E143','E104','E114','E134','E144') then c11=**1**; else c11=**0**;

if substr(sick\_cd,**1**,**3**) in ('G81','G04','G82') then c12=**1**; else c12=**0**;

if substr(sick\_cd,**1**,**3**) in ('N03','N05','N07','N01','N18','N19','N25') then c13=**1**; else c13=**0**;

if substr(sick\_cd,**1**,**4**) in ('K729','K766','K767','K721') then c14=**1**; else c14=**0**;

if substr(sick\_cd,**1**,**3**) in ('B20','B21','B22','B23','B24') then c15=**1**; else c15=**0**;

run;

proc sql;

create table cci\_3 as

select distinct indi\_dscm\_no, start\_interval, interval\_line, date\_ipw, max(c1) as c1, max(c2) as c2, max(c3) as c3, max(c4) as c4, max(c5) as c5, max(c6) as c6, max(c7) as c7, max(c8) as c8, max(c9) as c9, max(c10) as c10, max(c11) as c11, max(c12) as c12, max(c13) as c13, max(c14) as c14, max(c15) as c15

from cci\_2

group by indi\_dscm\_no, interval\_line;

quit;

data cci\_4;

set cci\_3;

if missing(c1) then c1=**0**; if missing(c2) then c2=**0**; if missing(c3) then c3=**0**; if missing(c4) then c4=**0**; if missing(c5) then c5=**0**; if missing(c6) then c6=**0**; if missing(c7) then c7=**0**; if missing(c8) then c8=**0**; if missing(c9) then c9=**0**; if missing(c10) then c10=**0**; if missing(c11) then c11=**0**; if missing(c12) then c12=**0**; if missing(c13) then c13=**0**; if missing(c14) then c14=**0**; if missing(c15) then c15=**0**;

cci=(c1\***1**)+(c2\***1**)+(c3\***1**)+(c4\***1**)+(c5\***1**)+(c6\***1**)+(c7\***1**)+(c8\***1**)+(c9\***1**)+(c10\***1**)+(c11\***2**)+(c12\***2**)+(c13\***2**)+(c14\***3**)+(c15\***6**);

run;

data cci\_cht\_s&strategy.\_out&out.;

set cci\_4;

if cci=**0** then g\_cci=**1**; else if cci=**1** then g\_cci=**2**; else if cci=**2** then g\_cci=**3**; else if cci>=**3** then g\_cci=**4**; else if cci="." then g\_cci=**1**;

keep indi\_dscm\_no interval\_line cci g\_cci;

run;

proc sql; create table tmp1 as select distinct \* from total as a left join comor\_cht\_s&strategy.\_out&out. as b on a.indi\_dscm\_no=b.indi\_dscm\_no and a.interval\_line=b.interval\_line;quit;

proc sql; create table tmp2 as select distinct \* from tmp1 as a left join comor9\_cht\_s&strategy.\_out&out. as b on a.indi\_dscm\_no=b.indi\_dscm\_no and a.interval\_line=b.interval\_line; quit;

proc sql; create table tmp3 as select distinct \* from tmp2 as a left join comed\_cht\_s&strategy.\_out&out. as b on a.indi\_dscm\_no=b.indi\_dscm\_no and a.interval\_line=b.interval\_line; quit;

proc sql; create table tmp4 as select distinct \* from tmp3 as a left join dmmed\_cht\_s&strategy.\_out&out. as b on a.indi\_dscm\_no=b.indi\_dscm\_no and a.interval\_line=b.interval\_line; quit;

proc sql; create table tmp5 as select distinct \* from tmp4 as a left join cci\_cht\_s&strategy.\_out&out. as b on a.indi\_dscm\_no=b.indi\_dscm\_no and a.interval\_line=b.interval\_line; quit;

proc sql; create table tmp6 as select distinct \* from tmp5 as a left join hu\_cht\_s&strategy.\_out&out. as b on a.indi\_dscm\_no=b.indi\_dscm\_no and a.interval\_line=b.interval\_line; quit;

proc sql; create table temp\_strategy\_1 as select distinct \* from tmp6 as a left join ses\_cht\_s&strategy.\_out&out. as b on a.indi\_dscm\_no=b.indi\_dscm\_no and a.interval\_line=b.interval\_line; quit;

proc stdize data=temp\_strategy\_1 out=temp\_strategy\_2 reponly missing=**0**; quit;

data m.step3\_strategy&strategy.\_out&out.;

set temp\_strategy\_2;

n\_drug\_dm=sum(dm\_med1,dm\_med2,dm\_med3,dm\_med4,dm\_med5,dm\_med6,dm\_med7,dm\_med8);

if **0**<=n\_drug\_dm<**2** then g\_drug\_dm=**1**; else if **2**<=n\_drug\_dm<**4** then g\_drug\_dm=**2**; else g\_drug\_dm=**3**;

if dm\_med7=**1** then lv\_drug\_dm=**3**; else if n\_drug\_dm>=**2** then lv\_drug\_dm=**2**; else lv\_drug\_dm=**1**;

run;

%end;

**%mend**;

%***covariate***(out=**0**);

%***covariate***(out=**1**);

%***covariate***(out=**2**);

%***covariate***(out=**3**);

%***covariate***(out=**4**);

%***covariate***(out=**5**);

\*<3> CREATE DATASET FOR IPCW;

**%macro** dataset\_ipcw(out=);

%do strategy=**1** %to **4**;

data xemp1; set m.step3\_strategy&strategy.\_out&out.; if interval\_no=**0**; run;

data baseline;

set xemp1;

rename

cens\_fu=b\_cens\_fu

age=b\_age

comor1=b\_comor1

comor2=b\_comor2

comor3=b\_comor3

comor4=b\_comor4

comor5=b\_comor5

comor6=b\_comor6

comor7=b\_comor7

comor8=b\_comor8

comor9=b\_comor9

comor10=b\_comor10

comor11=b\_comor11

comor12=b\_comor12

comor13=b\_comor13

comor14=b\_comor14

comor15=b\_comor15

comor16=b\_comor16

comor17=b\_comor17

comor18=b\_comor18

comor19=b\_comor19

comed1=b\_comed1

comed2=b\_comed2

comed3=b\_comed3

comed4=b\_comed4

comed5=b\_comed5

comed6=b\_comed6

comed7=b\_comed7

comed8=b\_comed8

comed9=b\_comed9

comed10=b\_comed10

comed11=b\_comed11

dm\_med1=b\_dm\_med1

dm\_med2=b\_dm\_med2

dm\_med3=b\_dm\_med3

dm\_med4=b\_dm\_med4

dm\_med5=b\_dm\_med5

dm\_med6=b\_dm\_med6

dm\_med7=b\_dm\_med7

dm\_med8=b\_dm\_med8

g\_cci=b\_g\_cci

g\_ed=b\_g\_ed

g\_inp=b\_g\_inp

g\_out=b\_g\_out

g\_phy=b\_g\_phy

g\_income=b\_g\_income

g\_sex=b\_g\_sex

g\_cyear=b\_g\_cyear

lv\_drug\_dm=b\_lv\_drug\_dm

g\_drug\_dm=b\_g\_drug\_dm

;

run;

data xemp2; set m.step3\_strategy&strategy.\_out&out.; if interval\_no=**0** then delete; run;

proc sql; create table temp as select \* from xemp2 as a left join baseline as b on a.indi\_dscm\_no=b.indi\_dscm\_no; quit;

data m.step4\_strategy&strategy.\_out&out.;

set temp;

if g\_cci=**0** then g\_cci=**1**;

if b\_g\_cci=**0** then b\_g\_cci=**1**;

run;

proc datasets lib=work kill nolist; quit;

%end;

**%mend**;

%***dataset\_ipcw***(out=**0**);

%***dataset\_ipcw***(out=**1**);

%***dataset\_ipcw***(out=**2**);

%***dataset\_ipcw***(out=**3**);

%***dataset\_ipcw***(out=**4**);

%***dataset\_ipcw***(out=**5**);

\*<4> WEIGHT ESTIMATION;

**%macro** weight(out=);

\*\*Strategy 1: Continue for 0-1 year;

data s1\_0\_1 s1\_1\_5; set m.step4\_strategy1\_out&out.; IF start\_interval = **0** THEN OUTPUT s1\_0\_1; ELSE IF start\_interval = **360** THEN OUTPUT s1\_1\_5; run;

DATA s1\_0\_1\_wt; SET s1\_0\_1; wt\_base=**1**; wt=**1**; wt1=**1**; wt2=**1**; RUN;

\*\*\*Weight for interval\_nostop;

proc logistic data=s1\_1\_5;

class b\_g\_sex b\_g\_income b\_g\_cyear b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy;

effect b\_rcs\_age=spline(b\_age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_nostop(event='0')=b\_rcs\_age b\_g\_sex b\_g\_income b\_g\_cyear b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=base\_s1 prob=wt\_base;

quit;

proc logistic data=s1\_1\_5;

class g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy;

effect rcs\_age=spline(age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_nostop(event='0')=

rcs\_age g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=interval\_s1 prob=wt;

quit;

proc sql; create table temp1 as select distinct a.\*, b.wt\_base from interval\_s1 as a left join base\_s1 as b on a.indi\_dscm\_no = b.indi\_dscm\_no; quit;

data temp2; set temp1; wt1=wt\_base/wt; wt2=**1**/wt; run;

DATA s1\_1\_5\_wt;

SET temp2;

BY indi\_dscm\_no start\_interval;

IF interval\_nostop = **0** THEN wt1 = wt1; ELSE IF interval\_nostop = **1** then wt1 = **0**;

IF interval\_nostop = **0** THEN wt2 = wt2; ELSE IF interval\_nostop = **1** then wt2 = **0**;

RUN;

proc sort data=s1\_0\_1\_wt; by indi\_dscm\_no start\_interval; run;

proc sort data=s1\_1\_5\_wt; by indi\_dscm\_no start\_interval; run;

DATA s1\_wt\_1;

SET s1\_0\_1\_wt s1\_1\_5\_wt;

BY indi\_dscm\_no;

RETAIN cu\_wt1 cu\_wt2;

IF first.indi\_dscm\_no THEN do; cu\_wt1 = wt1; cu\_wt2 = wt2; END;

ELSE DO; cu\_wt1 = wt1 \* cu\_wt1; cu\_wt2 = wt2 \* cu\_wt2; END;

drop comor1 -- b\_lv\_drug\_dm;

RUN;

data m.step5\_strategy1\_out&out.; set s1\_wt\_1; run;

\*\*Strategy 2: Continue for 1-2 year;

data s2\_0\_1 s2\_1\_3 s2\_3\_5;

set m.step4\_strategy2\_out&out.;

IF start\_interval <**360** THEN OUTPUT s2\_0\_1;

ELSE IF start\_interval = **360** THEN OUTPUT s2\_1\_3;

ELSE IF start\_interval = **720** THEN OUTPUT s2\_3\_5;

run;

DATA s2\_1\_3\_wt; SET s2\_1\_3; wt\_base=**1**; wt=**1**; wt1=**1**; wt2=**1**; RUN;

\*\*\*Weight for interval\_stopearly;

proc logistic data=s2\_0\_1;

class b\_g\_sex b\_g\_income b\_g\_cyear b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy;

effect b\_rcs\_age=spline(b\_age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_stopearly(event='0')=b\_rcs\_age b\_g\_sex b\_g\_income b\_g\_cyear b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=base\_s2 prob=wt\_base;

quit;

proc logistic data=s2\_0\_1;

class g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy;

effect rcs\_age=spline(age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_stopearly(event='0')=rcs\_age g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=interval\_s2 prob=wt;

quit;

proc sql; create table temp1 as select distinct a.\*, b.wt\_base from interval\_s2 as a left join base\_s2 as b on a.indi\_dscm\_no = b.indi\_dscm\_no; quit;

data s2\_0\_1\_wt; set temp1; wt1=wt\_base/wt; wt2=**1**/wt; run;

\*\*\*Weight for interval\_nostop;

proc logistic data=s2\_3\_5;

class b\_g\_sex b\_g\_income b\_g\_cyear b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy;

effect b\_rcs\_age=spline(b\_age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_nostop(event='0')=b\_rcs\_age b\_g\_sex b\_g\_income b\_g\_cyear

b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=base\_s2 prob=wt\_base;

quit;

proc logistic data=s2\_3\_5;

class g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy;

effect rcs\_age=spline(age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_nostop(event='0')=rcs\_age g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=interval\_s2 prob=wt;

quit;

proc sql; create table temp1 as select distinct a.\*, b.wt\_base from interval\_s2 as a left join base\_s2 as b on a.indi\_dscm\_no = b.indi\_dscm\_no; quit;

data temp2; set temp1; wt1=wt\_base/wt; wt2=**1**/wt; run;

DATA s2\_3\_5\_wt;

SET temp2;

BY indi\_dscm\_no start\_interval;

IF interval\_nostop = **0** THEN wt1 = wt1; ELSE IF interval\_nostop = **1** then wt1 = **0**;

IF interval\_nostop = **0** THEN wt2 = wt2; ELSE IF interval\_nostop = **1** then wt2 = **0**;

RUN;

proc sort data=s2\_0\_1\_wt; by indi\_dscm\_no start\_interval; run;

proc sort data=s2\_1\_3\_wt; by indi\_dscm\_no start\_interval; run;

proc sort data=s2\_3\_5\_wt; by indi\_dscm\_no start\_interval; run;

DATA s2\_wt\_1;

SET s2\_0\_1\_wt s2\_1\_3\_wt s2\_3\_5\_wt;

BY indi\_dscm\_no;

RETAIN cu\_wt1 cu\_wt2;

IF first.indi\_dscm\_no THEN do;cu\_wt1 = wt1; cu\_wt2 = wt2; END;

ELSE DO; cu\_wt1 = wt1 \* cu\_wt1; cu\_wt2 = wt2 \* cu\_wt2; END;

drop comor1 -- b\_lv\_drug\_dm;

RUN;

data m.step5\_strategy2\_out&out.; set s2\_wt\_1; run;

\*\*Strategy 3: Continue for 2-3 year;

data s3\_0\_1 s3\_1\_3 s3\_3\_5;

set m.step4\_strategy3\_out&out.;

IF start\_interval <**720** THEN OUTPUT s3\_0\_1;

ELSE IF start\_interval = **720** THEN OUTPUT s3\_1\_3;

ELSE IF start\_interval = **1080** THEN OUTPUT s3\_3\_5;

run;

DATA s3\_1\_3\_wt; SET s3\_1\_3; wt\_base=**1**; wt=**1**; wt1=**1**; wt2=**1**; RUN;

\*\*\*Weight for interval\_stopearly;

proc logistic data=s3\_0\_1;

class b\_g\_sex b\_g\_income b\_g\_cyear b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy;

effect b\_rcs\_age=spline(b\_age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_stopearly(event='0')=b\_rcs\_age b\_g\_sex b\_g\_income b\_g\_cyear b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=base\_s3 prob=wt\_base;

quit;

proc logistic data=s3\_0\_1;

class g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy;

effect rcs\_age=spline(age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_stopearly(event='0')=rcs\_age g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=interval\_s3 prob=wt;

quit;

proc sql; create table temp1 as select distinct a.\*, b.wt\_base from interval\_s3 as a left join base\_s3 as b on a.indi\_dscm\_no = b.indi\_dscm\_no; quit;

data s3\_0\_1\_wt; set temp1; wt1=wt\_base/wt; wt2=**1**/wt; run;

\*\*\*Weight for interval\_nostop;

proc logistic data=s3\_3\_5;

class b\_g\_sex b\_g\_income b\_g\_cyear b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy;

effect b\_rcs\_age=spline(b\_age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_nostop(event='0')=b\_rcs\_age b\_g\_sex b\_g\_income b\_g\_cyear

b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=base\_s3 prob=wt\_base;

quit;

proc logistic data=s3\_3\_5;

class g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy;

effect rcs\_age=spline(age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_nostop(event='0')=rcs\_age g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=interval\_s3 prob=wt;

quit;

proc sql; create table temp1 as select distinct a.\*, b.wt\_base from interval\_s3 as a left join base\_s3 as b on a.indi\_dscm\_no = b.indi\_dscm\_no; quit;

data temp2; set temp1; wt1=wt\_base/wt; wt2=**1**/wt; run;

DATA s3\_3\_5\_wt;

SET temp2;

BY indi\_dscm\_no start\_interval;

IF interval\_nostop = **0** THEN wt1 = wt1; ELSE IF interval\_nostop = **1** then wt1 = **0**;

IF interval\_nostop = **0** THEN wt2 = wt2; ELSE IF interval\_nostop = **1** then wt2 = **0**;

RUN;

proc sort data=s3\_0\_1\_wt; by indi\_dscm\_no start\_interval; run;

proc sort data=s3\_1\_3\_wt; by indi\_dscm\_no start\_interval; run;

proc sort data=s3\_3\_5\_wt; by indi\_dscm\_no start\_interval; run;

DATA s3\_wt\_1;

SET s3\_0\_1\_wt s3\_1\_3\_wt s3\_3\_5\_wt;

BY indi\_dscm\_no;

RETAIN cu\_wt1 cu\_wt2;

IF first.indi\_dscm\_no THEN do;cu\_wt1 = wt1; cu\_wt2 = wt2; END;

ELSE DO; cu\_wt1 = wt1 \* cu\_wt1; cu\_wt2 = wt2 \* cu\_wt2; END;

drop comor1 -- b\_lv\_drug\_dm;

RUN;

data m.step5\_strategy3\_out&out.; set s3\_wt\_1; run;

\*\*Strategy 4: Continue for 3-5 year;

data s4\_0\_3 s4\_3\_5;

set m.step4\_strategy4\_out&out.;

IF start\_interval = **0** THEN OUTPUT s4\_0\_3;

ELSE IF start\_interval = **1080** THEN OUTPUT s4\_3\_5;

run;

DATA s4\_3\_5\_wt; SET s4\_3\_5; wt\_base=**1**; wt=**1**; wt1=**1**; wt2=**1**; RUN;

\*\*\*Weight for interval\_stopearly;

proc logistic data=s4\_0\_3;

class b\_g\_sex b\_g\_income b\_g\_cyear b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy;

effect b\_rcs\_age=spline(b\_age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_stopearly(event='0')=b\_rcs\_age b\_g\_sex b\_g\_income b\_g\_cyear b\_g\_drug\_dm b\_dm\_med1-b\_dm\_med8 b\_comor1-b\_comor19 b\_comed1-b\_comed11 b\_g\_cci b\_g\_ed b\_g\_inp b\_g\_out b\_g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=base\_s4 prob=wt\_base;

quit;

proc logistic data=s4\_0\_3;

class g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy;

effect rcs\_age=spline(age / naturalcubic basis=tpf(noint) knotmethod=Rangefractions (**0.05** **0.35** **0.65** **0.95**));

model interval\_stopearly(event='0')=rcs\_age g\_sex g\_income g\_cyear g\_drug\_dm dm\_med1-dm\_med8 comor1-comor19 comed1-comed11 g\_cci g\_ed g\_inp g\_out g\_phy

/ maxiter=**100000** absfconv=**1e-8** gconv=**1e-8**;

output out=interval\_s4 prob=wt;

quit;

proc sql; create table temp1 as select distinct a.\*, b.wt\_base from interval\_s4 as a left join base\_s4 as b on a.indi\_dscm\_no = b.indi\_dscm\_no; quit;

data s4\_0\_3\_wt; set temp1; wt1=wt\_base/wt; wt2=**1**/wt; run;

DATA s4\_wt\_1;

SET s4\_0\_3\_wt s4\_3\_5\_wt;

BY indi\_dscm\_no;

RETAIN cu\_wt1 cu\_wt2;

IF first.indi\_dscm\_no THEN do;cu\_wt1 = wt1;cu\_wt2 = wt2; END;

ELSE DO;cu\_wt1 = wt1 \* cu\_wt1; cu\_wt2 = wt2 \* cu\_wt2; END;

drop comor1 -- b\_lv\_drug\_dm;

RUN;

data m.step5\_strategy4\_out&out.; set s4\_wt\_1; run;

**%mend**;

%***weight***(out=**0**);

%***weight***(out=**1**);

%***weight***(out=**2**);

%***weight***(out=**3**);

%***weight***(out=**4**);

%***weight***(out=**5**);

\*<5> RISK ESTIMATION;

**%macro** risk\_estimation(out=);

%do strategy=**1** %to **4**;

DATA final zero; SET m.step5\_strategy&strategy.\_out&out.; BY indi\_dscm\_no start\_interval; IF cu\_wt1 ^= **0** THEN OUTPUT final; ELSE OUTPUT zero; run;

PROC PHREG DATA=final; MODEL interval\_end\*interval\_out (**0**) = / entrytime=start\_interval; weight cu\_wt1; BASELINE OUT=km survival=surv; RUN;

DATA risk; SET km end=last; strategy="s&strategy.\_stablized"; risk\_s&strategy. = **1**-surv; flag = **1**; IF last; RUN;

data m.km\_stablized\_s&strategy.\_out&out.; set km; run;

data m.rzt\_stablized\_s&strategy.\_out&out.; set risk; run;

%end;

**%mend**;

%***risk\_estimation***(out=**0**);

%***risk\_estimation***(out=**1**);

%***risk\_estimation***(out=**2**);

%***risk\_estimation***(out=**3**);

%***risk\_estimation***(out=**4**);

%***risk\_estimation***(out=**5**);

**%macro** merge\_risk(out=);

set temp3;

r\_s1=**100**\*risk\_s1;

r\_s2=**100**\*risk\_s2;

r\_s3=**100**\*risk\_s3;

r\_s4=**100**\*risk\_s4;

rd\_s2=r\_s2-r\_s1;

rd\_s3=r\_s3-r\_s1;

rd\_s4=r\_s4-r\_s1;

rr\_s2=r\_s2/r\_s1;

rr\_s3=r\_s3/r\_s1;

rr\_s4=r\_s4/r\_s1;

drop risk\_s1 risk\_s2 risk\_s3 risk\_s4;

run;

**%mend**;

%***merge\_risk***(out=**0**);

%***merge\_risk***(out=**1**);

%***merge\_risk***(out=**2**);

%***merge\_risk***(out=**3**);

%***merge\_risk***(out=**4**);

%***merge\_risk***(out=**5**);