# Trajectories of Health-Related Quality of Life in Coronary Artery Disease

**Study Abstract**

Health-related quality of life (HRQOL) assessment is an important health outcome for measuring the efficacy of treatments and interventions for coronary artery disease (CAD). HRQOL is known to improve over the first year after interventions for CAD, but there is limited knowledge of the changes in HRQOL beyond 1 year. We investigated heterogeneity in long-term trajectories of HRQOL in patients with CAD.

Data were obtained from 6226 patients identified from the Alberta Provincial Project for Outcome Assessment in Coronary Heart Disease with at least 1-vessel CAD who underwent their first catheterization between 2006 and 2009. HRQOL was assessed using the Seattle Angina Questionnaire, a 19-item disease-specific measure of HRQOL for patients with CAD. Group-based trajectory analysis was used to identify various subgroups of Seattle Angina Questionnaire trajectories over time while adjusting for missing data through a longitudinal multiple imputation model. Multinomial logistic regression was used to identify the predictors of differences among the identified subgroups.

**SAS codes script:**

\*\*\*\*\*\*SAS codes for "Trajectories of Health-Related Quality of Life in Coronary Artery Disease"\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*;

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\*Multiple Imputations;

\*Y1, y2 y3... include dependent variables (longitudinally, wide format), and covariates (anything can be related to the outcome);

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**proc** **mi** data=mydata seed= **9854321** nimpute=**5** out=mi\_saq maximum=**100** minimum=**0** minmaxiter=**100000**;

mcmc chain=multiple displayinit initial=em(itprint) ;

var y1 y2 y3 **....**;

**run**;

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\*Multiple Trajectory Analysis after multiple imputation;

\*\*\*\*step 1: prepare dataset

\*\*\*\*step 2: modeling selection (only final code was included)

\*\*\*\*step 3: incorporating model results from five imputed datasets, including calculate posterior group membership probability ,

calculate preds and confidence intervals

\*\*\*\*Step 4: Merge two datasets: imputed datasets and model results from trajectory analysis;

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\*\*\*\*step 1: prepare dataset;

**%macro** ***datami***;

%do i=**1** %to **5**;

data mi&i;

set mi\_saq;

where \_imputation\_=&i;

run;

%end;

**%mend** datami;

%***datami***;

\*\*\*\*step 2: modeling selection (selected model was shown);

**%MACRO** ***SAQtraj***;

%do i=**1** %to **5**;

PROC TRAJ DATA=mi&i OUTPLOT=OP1\_SAQi&i OUTSTAT=OS1\_SAQi&i OUT=OF1\_SAQi&i OUTEST=OE1\_SAQi&i

OUTPLOT2=OP2\_SAQi&i OUTSTAT2=OS2\_SAQi&i

OUTPLOT3=OP3\_SAQi&i OUTSTAT3=OS3\_SAQi&i

OUTPLOT4=OP4\_SAQi&i OUTSTAT4=OS4\_SAQi&i

OUTPLOT5=OP5\_SAQi&i OUTSTAT5=OS5\_SAQi&i ;

ID file\_no;

VAR SAQAF\_0 SAQAF\_1 SAQAF\_3 SAQAF\_5 ; INDEP time1-time4 ; MIN **0**; MAX **100**; MODEL CNORM; ORDER **3** **3** **3** **3**;

VAR2 SAQAS\_0 SAQAS\_1 SAQAS\_3 SAQAS\_5; INDEP2 time1-time4 ; MIN2 **0**; MAX2 **100**; MODEL2 CNORM; ORDER2 **3** **3** **3** **3**;

VAR3 SAQDP\_0 SAQDP\_1 SAQDP\_3 SAQDP\_5; INDEP3 time1-time4 ; MIN3 **0**; MAX3 **100**; MODEL3 CNORM; ORDER3 **3** **3** **3** **3**;

VAR4 SAQPL\_0 SAQPL\_1 SAQPL\_3 SAQPL\_5; INDEP4 time1-time4 ; MIN4 **0**; MAX4 **100**; MODEL4 CNORM; ORDER4 **3** **3** **3** **3**;

VAR5 SAQTS\_0 SAQTS\_1 SAQTS\_3 SAQTS\_5; INDEP5 time1-time4 ; MIN5 **0**; MAX5 **100**; MODEL5 CNORM; ORDER5 **3** **3** **3** **3**;

MULTGROUPS **4**;

run;

%***TRAJPLOTnew***(OP1\_SAQi&i,OS1\_SAQi&i,,,'SAQAF','Time')

%***TRAJPLOTnew***(OP2\_SAQi&i,OS2\_SAQi&i,,,'SAQAS','Time')

%***TRAJPLOTnew***(OP3\_SAQi&i,OS3\_SAQi&i,,,'SAQDP','Time')

%***TRAJPLOTnew***(OP4\_SAQi&i,OS4\_SAQi&i,,,'SAQPL','Time')

%***TRAJPLOTnew***(OP5\_SAQi&i,OS5\_SAQi&i,,,'SAQTS','Time')

%end;

**%MEND**;

%***SAQtraj***;

\*\*\*\*step 3: incorporating model results from five imputed datasets;

**%MACRO** ***betastats***;

\* AF;

%do j=**1** %to **5**;

data OS1\_SAQi&j ; set OS1\_SAQi&j ; group=\_n\_; \_imputation\_=&j;run;

%end;

data os1\_saqimp\_set1to5 ;

set

%do k=**1** %to **5**;

os1\_saqi&k (in=in&k)

%end;

;

by group;

run;

\*AS;

%do j=**1** %to **5**;

data OS2\_SAQi&j ; set OS2\_SAQi&j ;group=\_n\_;\_imputation\_=&j;run;

%end;

data os2\_saqimp\_set1to5 ;

set

%do k=**1** %to **5**;

os2\_saqi&k (in=in&k)

%end;

;

by group;

run;

\*DP;

%do j=**1** %to **5**;

data OS3\_SAQi&j ; set OS3\_SAQi&j ;group=\_n\_;\_imputation\_=&j;run;

%end;

data os3\_saqimp\_set1to5 ;

set

%do k=**1** %to **5**;

os3\_saqi&k (in=in&k)

%end;

;

by group;

run;

\*PL;

%do j=**1** %to **5**;

data OS4\_SAQi&j ; set OS4\_SAQi&j ;group=\_n\_;\_imputation\_=&j;run;

%end;

data os4\_saqimp\_set1to5 ;

set

%do k=**1** %to **5**;

os4\_saqi&k (in=in&k)

%end;

;

by group;

run;

\*TS;

%do j=**1** %to **5**;

data OS5\_SAQi&j ; set OS5\_SAQi&j ;group=\_n\_;\_imputation\_=&j;run;

%end;

data os5\_saqimp\_set1to5 ;

set

%do k=**1** %to **5**;

os5\_saqi&k (in=in&k)

%end;

;

by group;

run;

**%MEND**;

%***betastats***;

\* calculate posterior group membership probability ;

**%MACRO** ***gmpmerge***;

%do j=**1** %to **5**;

data of\_saqi&j (keep=file\_no group pgi \_imputation\_ grp1prb grp2prb grp3prb grp4prb);

set OF1\_SAQi&j;

array pr(**4**) grp1prb grp2prb grp3prb grp4prb;

pgi=pr(group);

\_imputation\_=&j;

run;

%end;

data saq.of\_saqimp\_set1to5 (keep=file\_no \_imputation\_ group pgi grp1prb grp2prb grp3prb grp4prb);

set

%do k=**1** %to **5**;

of\_saqi&k (in=in&K)

%end;

;

by file\_no;

run;

proc sort data=saq.of\_saqimp\_set1to5 ;

by \_imputation\_ file\_no;

run;

data saq.ofi\_1to5fit (keep=bic1189 bic408 aic);

set

%do i=**1** %to **5**;

saq.oe\_saqi&i (where=(\_TYPE\_='PARMS') rename=(\_BIC1\_=bic1189 \_BIC2\_=bic408 \_AIC\_=AIC ))

%end;

;

run;

**%MEND**;

%***gmpmerge*** ;

\* calculate preds and confidence intervals;

**%MACRO** ***predstats***;

%do j=**1** %to **5**;

data OP1\_SAQi&j ; set OP1\_SAQi&j ; tpoint=\_n\_; \_imputation\_=&j; run;

%end;

data op1\_saqimp\_set1to5 ;set %do k=**1** %to **5**; op1\_saqi&k (in=in&k) %end;; by tpoint;run;

%do j=**1** %to **5**;

data OP2\_SAQi&j ; set OP2\_SAQi&j ; tpoint=\_n\_; \_imputation\_=&j; run;

%end;

data op2\_saqimp\_set1to5 ;set %do k=**1** %to **5**; op2\_saqi&k (in=in&k) %end;; by tpoint;run;

%do j=**1** %to **5**;

data OP3\_SAQi&j ; set OP3\_SAQi&j ; tpoint=\_n\_; \_imputation\_=&j; run;

%end;

data op3\_saqimp\_set1to5 ;set %do k=**1** %to **5**; op3\_saqi&k (in=in&k) %end;; by tpoint;run;

%do j=**1** %to **5**;

data OP4\_SAQi&j ; set OP4\_SAQi&j ; tpoint=\_n\_; \_imputation\_=&j; run;

%end;

data op4\_saqimp\_set1to5 ;set %do k=**1** %to **5**; op4\_saqi&k (in=in&k) %end;; by tpoint;run;

%do j=**1** %to **5**;

data OP5\_SAQi&j ; set OP5\_SAQi&j ; tpoint=\_n\_; \_imputation\_=&j; run;

%end;

data op5\_saqimp\_set1to5 ;set %do k=**1** %to **5**; op5\_saqi&k (in=in&k) %end;; by tpoint;run;

**%MEND**;

%***predstats***;

\*Step 5: Merge two datasets: imputed datasets and model results from trajectory analysis;

**data** saq.post\_domain;

merge saq\_im SAQ.OF\_SAQIMP\_SET1TO5;

by \_imputation\_ file\_no;

**run**;

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\*multinomial logistic regression;

\* y is dependent variable, in our case, group

\* x1, x2, x3 are indpendent variable, in our case, treatment, sex, age, etc.

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**proc** **logistic** data=saq.post\_domain outest=imp\_parms covout;

by \_Imputation\_;

class x1 x2 **.....** ;

model y=x1 x2 x3 **....**/ link=glogit ;

**run**;

**proc** **mianalyze** data=imp\_parms ;

class x1 x2 **...** ;

modeleffects int x1 x2 x3 **...** ;

**run**;