**Plot of Cumulative Incidence for Competing Risk Analysis**

**Macro:** %Plots\_CIF

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**Last Update Date/Person**:

**Current Version**: V2

**Working Environment:** SAS 9.4 English version 01M5 OS: X64\_10PRO

**Purpose:** To create a cumulative incidence plot. The SAS macro %Plots\_CIF implements appropriate Nonparametric methods for estimating cumulative incidence functions. The macro also implements Gray’s method (Gray 1988) for testing differences between these functions in multiple groups. And also, the number at risk at specified time-point with accumulated number of events of interest, accumulated number of competing by the specified time-point, and censored information was shown below the CIF plot.  **Notes:** The model runs using PROC Lifetest.

**Reference**: 1. SAS Institute Inc, 2017 SAS/STAT® 14.3 User’s Guide. Cary, NC: SAS Institute Inc. User’s

Guide the Lifetest Procedure.

2. Sanjay Matange, Annotate your SGPLOT Graphs. Paper CC01-2014

**Parameters:**

|  |  |  |
| --- | --- | --- |
| **Macro variable** | **Description** | **required** |
| DSN | The name of the data set to be analyzed. | Yes |
| TIME\_EVENT | Name of time to event outcome variable. | Yes |
| CENSOR | Name of censoring indicator variable. Values of 0 indicate censored. | Yes |
| EVENTCODE | The value in CENSOR that indicate event of interest, and this value will appear EVENTCODE= option. The default value is 1. | Yes |
| GRPLIST | The variable list that defines the groups for comparison (optional). | Optional |
| YAXISVALUE | Specify the ticket of y axis, such as 0 .2 .4 .6 .8 The default value is (0 .1 .2 .3 .4 .5 .6 .7 .8 .9 1.0); | Optional |
| XAXISVALUE | Usage xaxisvalue = 0 12 24 36 ...; specify the ticket value of X axis.  Number atRisk, accumulated # events of interest, accumulated # competing shown correspond to the values of X axis. | Optional |
| TIMELIST | List of time points separated by spaces to report CIF estimates and 95% CI. | Optional |
| NatRisk | List the number at risk of specified time-point, accumulated number of events of interest, and accumulated number of competing(set to T). The default value is F. | Optional |
| UNITS | Units of the time variable, i.e. days, months, etc. The default value is none. | Optional |
| FNAME | File name for output table. | Yes |
| OUTPATH | File path for output table to be stored. | Yes |
| DEBUG | Set to T if running in debug mode (optional). Work datasets will not be deleted in debug mode. This is useful if you are editing the code or want to further manipulate the resulting data sets. The default value is F. | Optional |

**Usage Example:**

**proc** **format**;

value DiseaseGroup **1**='ALL' **2**='AML-Low Risk' **3**='AML-High Risk';

run;

**data** Bmt;

input Disease T Status @@;

label T='Disease-Free Survival in Days';

format Disease DiseaseGroup.;

datalines;

1 2081 0 1 1602 0 1 1496 0 1 1462 0 1 1433 0

1 1377 0 1 1330 0 1 996 0 1 226 0 1 1199 0

1 1111 0 1 530 0 1 1182 0 1 1167 0 1 418 2

1 383 1 1 276 2 1 104 1 1 609 1 1 172 2

1 487 2 1 662 1 1 194 2 1 230 1 1 526 2

1 122 2 1 129 1 1 74 1 1 122 1 1 86 2

1 466 2 1 192 1 1 109 1 1 55 1 1 1 2

1 107 2 1 110 1 1 332 2 2 2569 0 2 2506 0

2 2409 0 2 2218 0 2 1857 0 2 1829 0 2 1562 0

2 1470 0 2 1363 0 2 1030 0 2 860 0 2 1258 0

2 2246 0 2 1870 0 2 1799 0 2 1709 0 2 1674 0

2 1568 0 2 1527 0 2 1324 0 2 957 0 2 932 0

2 847 0 2 848 0 2 1850 0 2 1843 0 2 1535 0

2 1447 0 2 1384 0 2 414 2 2 2204 2 2 1063 2

2 481 2 2 105 2 2 641 2 2 390 2 2 288 2

2 421 1 2 79 2 2 748 1 2 486 1 2 48 2

2 272 1 2 1074 2 2 381 1 2 10 2 2 53 2

2 80 2 2 35 2 2 248 1 2 704 2 2 211 1

2 219 1 2 606 1 3 2640 0 3 2430 0 3 2252 0

3 2140 0 3 2133 0 3 1238 0 3 1631 0 3 2024 0

3 1345 0 3 1136 0 3 845 0 3 422 1 3 162 2

3 84 1 3 100 1 3 2 2 3 47 1 3 242 1

3 456 1 3 268 1 3 318 2 3 32 1 3 467 1

3 47 1 3 390 1 3 183 2 3 105 2 3 115 1

3 164 2 3 93 1 3 120 1 3 80 2 3 677 2

3 64 1 3 168 2 3 74 2 3 16 2 3 157 1

3 625 1 3 48 1 3 273 1 3 63 2 3 76 1

3 113 1 3 363 2

;

**data** bmt; set bmt; call streaminit(**123**);

u = rand("Uniform");

if u>=**0.7** then Sex='Female'; else if u<**0.5** then Sex='Male';

if u>=**0.4** then Race='white'; else Race='AA';

call streaminit(**456**); Age = rand("Uniform")\***90**; Dftime= t / **365**;

Drop u;

**run**;

%let dir = C:\;

Title " Fig 1 Plot of CIF for different patient groups " ;

%***Plots\_CIF***(dsn= bmt,

grplist= group race ,

time\_event=Dftime,

censor=status,

eventcode=**1**,

xaxisvalue=**0** **1** **2** **3** **4** **5** **6** ,

yaxisvalue= ,

timelist= **0** **2** **4** **6** ,

NatRisk = T,

units= Years,

filename= CIF PLOTS,

outpath= &dir.\ ,

debug=T)

**Summary Plots Example:**



| **patient group** | **TIME (Years)** | **CIF Estimate (95% CI)** |
| --- | --- | --- |
| ALL | 2 | 0.324 (0.179, 0.479) |
|  | 4 | 0.324 (0.179, 0.479) |
|  | 6 | NA (NA, NA) |
| AML-High Risk | 2 | 0.467 (0.314, 0.606) |
|  | 4 | 0.467 (0.314, 0.606) |
|  | 6 | 0.467 (0.314, 0.606) |
| AML-Low Risk | 2 | 0.148 (0.069, 0.257) |
|  | 4 | 0.167 (0.081, 0.278) |
|  | 6 | 0.167 (0.081, 0.278) |



| **race** | **TIME (Years)** | **CIF Estimate (95% CI)** |
| --- | --- | --- |
| AA | 2 | 0.381 (0.246, 0.515) |
|  | 4 | 0.402 (0.264, 0.536) |
|  | 6 | NA (NA, NA) |
| white | 2 | 0.256 (0.169, 0.352) |
|  | 4 | 0.256 (0.169, 0.352) |
|  | 6 | 0.256 (0.169, 0.352) |

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**Log of Updates:**