**Plot of Cumulative Incidence for Competing Risk Analysis by Fine & Gray Model**

**Macro:** %CIF\_PLOT

**Created Date/Author:** Sep 23, 2016/Yaqi Jia, Chao Zhang

**Last Update Date/Person**: Oct 2016/Yuan Liu

**Current Version**: V3

**Working Environment:** SAS 9.4 English version

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**Purpose:** To create a cumulative incidence plot. The proportional subdistribution hazards model as proposed by Fine and Gray (1999) was used. Generate time specific event rate with 95% confidence interval and Fine and Gray p value for comparison in term of event of interest.

**Notes:** All calculation is based on PROC PHREG in SAS 9.4 with EVENTCODE option. See SAS help manual for more

technique details.

**Reference**: Fine, J. P. and Gray, R. J. (1999), “A Proportional Hazards Model for the Subdistribution of a Competing Risk,” *Journal of the American Statistical Association*, 94, 496–509.

**Parameters:**

|  |  |
| --- | --- |
| **Macro variable** | **Description** |
| DSN | The name of the data set to be analyzed. |
| TIME\_EVENT | Name of time to event outcome variable. |
| CENSOR | Name of censoring indicator variable. Values of 0 indicate censored. |
| EVENTCODE | The value in CENSOR that indicate event of interest, and this value will appear EVENTCODE= option. The default value is 1. |
| GRPLIST | The variable list that defines the groups for comparison (optional) separated by space. |
| YAXISVALUE | Specify the ticket value of y axis, for example, 0 to 0.5 by 0.1 |
| XAXISVALUE | Specify the ticket value of y axis, for example, 0 to 24 by 6 |
| TIMELIST | List of time points separated by spaces to report survival estimates and 95% CI (optional). |
| UNITS | Units of the time variable, i.e. days, months, etc. The default value is none. |
| FNAME | File name for output table. |
| OUTPATH | File path for output table to be stored. |
| 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. |

**Usage Example:**

**proc** **format**;

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

**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**;

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=t, censor=status,

eventcode=**1**,

title1=Cumulative Incidence Function,

xaxisvalue=**0** **200** **400** **600** **800** **1000** ,

yaxisvalue=**0** **0.1** **0.2** **0.3** **0.4** **0.5** ,

timelist= **60** **100** ,

units= Mo,

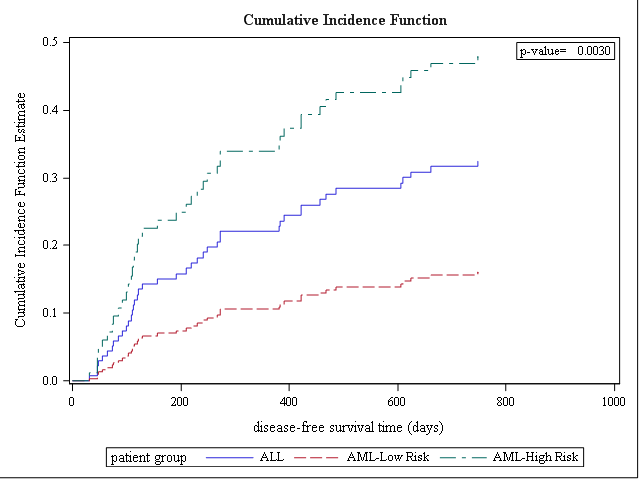
filename= Plot of CIF for different patient groups,

outpath= &dir.\ ,

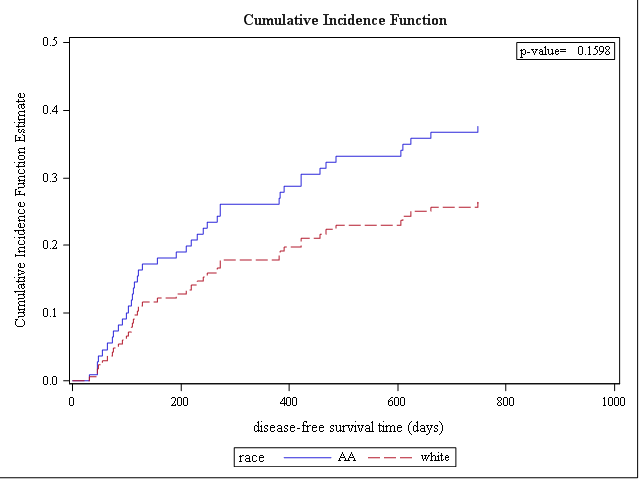
debug=F)

Title ;

**Summary Plots Example:**

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| **patient group** | **Time (Mo)** | **CIF Estimate (95% CI)** |
| --- | --- | --- |
| ALL | 60 | 3.66% (1.45%, 9.26%) |
|  | 100 | 8.16% (4.41%, 15.11%) |
| AML-High Risk | 60 | 6.02% (2.33%, 15.57%) |
|  | 100 | 13.19% (6.87%, 25.35%) |
| AML-Low Risk | 60 | 1.66% (0.65%, 4.23%) |
|  | 100 | 3.74% (1.95%, 7.17%) |



| **race** | **Time (Mo)** | **CIF Estimate (95% CI)** |
| --- | --- | --- |
| AA | 60 | 4.63% (1.82%, 11.79%) |
|  | 100 | 10.12% (5.83%, 17.54%) |
| white | 60 | 3.04% (1.29%, 7.17%) |
|  | 100 | 6.71% (3.56%, 12.65%) |

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**Log of Updates:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Date** | **By** | **Description** | **Version** |
| Mar, 2016 | Yaqi Jia | Initial Creation | V1 |
| Oct, 2016 | Chao Zhang | Simplify macro; directly use Proc Phreg to create the plot. Reduce some parameters of the macro. | V2 |
| Oct, 2016 | Yuan Liu | Allow GRPLIST to be empty | V3 |