

Paper 195-2013**Using SAS ® to Create Code for Current Triage Systems during Chemical Incidents**

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Abstract

Chemical incidents involve irritant chemicals such as chlorine poses a significant threat to life and require rapid assessment. This paper used the first outcomes-level study (NIH/NLM 1R21LM010833) involved an actual mass casualty chemical incident to create code for four triage systems (CBRN, SALT, START and ESI). Data used for this paper from six datasets collected by the project team from a 60-ton railroad chlorine leak that occurred in Graniteville, South Carolina in 2005 include patient demographics, exposure estimates, symptoms, outcome categories, and physiological measurements. Data collected for approximately 900 victims of a chlorine leak were merged to generate a research dataset. SAS ® 9.2 used to create code from logic to mimic the triage decision tree yielding classifications for each system.

Keywords: SAS, Chemical, Triage,

University of South Carolina, College of Nursing.

The project described was supported by NIH/NLM Award Number R21LM010833 from the National Cancer Institute.

Introduction

Disaster happens in the world each day. Disasters can be categorized as natural and unnatural.¹ One of the greatest challenges is effective disaster response to all hazards events.² Natural and unnatural catastrophic events may necessitate the effective and timely management of mass casualties.³ Mass casualties can overwhelm healthcare capabilities, jeopardizing the lives of victims and healthcare providers alike.² Chemical incidents involve irritant chemicals such as chlorine pose a significant threat to life and require rapid assessment. When chemical incident happen, first responders have only seconds to assess the condition of a victim before they need to move onto another patient.

Purpose

The purpose of this paper is to describe the use of SAS to create code for four current triage systems (CBRN, SALT, START and ESI) in mass causality chemical incident.

Background

Mass causality studies are descriptive study. No consensus currently exists on standardized indicators for specific aspects of disaster triage response.² Mass casualty triage is characterized by multidisciplinary teams working together in chaotic, highly dynamic technical environments. Successful triage depends on the meaningful use of accurate, valid, and relevant data by all emergency responders. This study integrates and analyzes data from multiple databases collected from a large chlorine leak in a community to identify valid data points that can be used to benchmark initial triage decisions. This is the first outcomes-level study to determine whether data from the four most frequently used triage systems (Simple Triage and Rapid Treatment [START], Emergency Severity Index [ESI], Sort, Assess, Life Saving Interventions Treatment and/or Transport [SALT], Chemical/Biological/Radiation/Nuclear Mass Casualty Triage System [CBRN]) correlate with patient outcomes during a chemical exposure induced mass casualty incident. Six datasets collected by the project team from a 60-ton railroad chlorine leak that occurred in Graniteville, South Carolina in 2005 include patient demographics, exposure estimates, symptoms, outcome categories, and physiological measurements. The datasets were merged to generate a research dataset useful for further analysis. These data were used to determine whether triage data from the four most frequently used triage systems correlate with patient outcomes and to explore what additional information would improve predictions of accurate triage classifications during chemical incidents. Emergency department, abstracted hospital medical records, hospital discharge, and public health agency data collected from the chlorine leak for more than 600 victims were merged to generate a research dataset. The merged dataset was used to create code for four triage systems.

Data Analyses

All data analyses were performed using **SAS/STAT**® statistical software, version 9.2.⁴ Decision logic was developed to aid in the assessment of variables where the columns appear in multiple datasets and for the case when a direct variable was not available in any of the datasets. From these results, modifications were implemented to address issues of missing variables, values, and outliers. Figure 1 showed the logic for creation of new variables. Attachment A part 1 indicated the SAS code for the creation of all new variables. Figure 2-5 indicated the algorithms for four current triage systems (CBRN, SALT, START and ESI). The SAS code for each triage system presented in attachment A part 2- 5. PROC FREQ was used to describe the variables for this study (See attachment A part 6 for SAS code).

Results

Table 1 showed the frequency distribution for START. Six percent (n=38) was categorized as red. Also, six percent of the sample did not classify to any categories. Table 2 indicated the frequency distribution for ESI. Twenty-seven of the observations (4.52%) were categorized as level 1. Table 3 was the result of CBRN. Thirty of the observations (4.75%) were classified as red. Table 4 showed the frequency distribution of SALT. Seventy-eight of observations (12.36 %) were categorized as red.

Conclusion

In this paper, SAS used logics to create code for four current triage systems (CBRN, SALT, START and ESI) in mass casualty chemical incident. The frequency tables easily were created. SAS is the most powerful statistical software to use in research.

References

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Figure 1. Variable Creation

EDWALK -- Set to 'Y' when any of the following are true; all others 'N'

- NOTESFROME = 'Intubated'
- EDHYPOXIAO = 1 (Yes) or (EDHYPOXIAO is missing and ADHYPOXIAO = 1)
- EDHYPOXIAR = 1 (Yes) or (EDHYPOXIAR is missing and ADHYPOXIAR = 1)

EDFOLLOW – Set the same as EDWALK

NORESOURCES – Set to sum of the following. Range 0 to 6.

- IF EDO2DELIV NOT IN 'RA' or (ED02DELIV is missing AND ADO2_DELIV NOT IN 'RA') THEN 1 ELSE 0
- IF EKGDATE = 1/6/2005 THEN 1 ELSE 0
- IF BRONCH1DAT = 1/6/2005 THEN 1 ELSE 0
- IF PFTDATE = 1/6/2005 THEN 1 ELSE 0
- IF IVDATE = 1/6/2005 THEN 1 ELSE 0
- NOTESFROM = 'Intubated' THEN 1 ELSE 0

PAIN – Set to Y if any of the following are true

- EDTHROATER = Y
- EDENTOTHER = Y or (EDENTOTHER is missing and ADENTOTHER = Y)
- EDDERMOTHE = Y or (EDDERMOTHE is missing and ADDERMOTHE = Y)
- EDDERMBURN = Y or (EDDERMBURN is missing and ADDERM = Y)
- FirstSx like burn%, Burn%, pain%

CLEXPOSR – Set to Y if any of the following are true

- EDEYE = Y or (EDEYE is missing and ADEYE = Y or CCEYE = Y)
- EDENT = Y or (EDENT is missing and ADENT = Y or CCENT = Y)
- EDCOUGH = Y or (EDCOUGH is missing and ADCOUGH = Y or CCCOUGH = Y)
- EDWHEEZE = Y or (EDWHEEZE is missing and ADWHEEZE = Y or CCWHEEZING = Y)
- EDDERMBURN = Y
- FirstSx = Vomiting, vomiting (with one t and two ts), Nausea, nausea

INJURY – Set to Y if any of the following are true:

- CONSULTOP11 contains 'inj'
- PRIMAYRDX contains 'inj'

OTHER MISSING VALUE RULES:

- EDHR – when missing set to value of ADHR
- EDRR – when missing set to value of ADRR
- EDSYSTOLIC – when missing set to value of ADSYSTOLIC
- EDO2SAT – when missing set to value of ADO2_SAT
- EDRESPDIST – when missing set to value of ADRESPDIST

Figure2. S.T.A.R.T. Simple Treatment and Rapid Transport

Inputs: EDWALK, EDFOLLOW, EDRR, EDSYSTOLIC

IF EDWALK = 'Y' THEN GREEN

IF AGE <=8 THEN TOOYOUNG

IF EDRR = 0 THEN BLACK

IF EDRR > 45 OR EDRR < 15 THEN RED

IF EDRR <= 45 AND EDFOLLOW = N THEN RED

IF EDRR <=45 AND EDFOLLOW = Y THEN YELLOW

IF AGE >8 THEN

IF EDRR = 0 THEN BLACK

IF EDRR > 30 OR EDRR < 10 THEN RED

IF EDRR <= 30 AND EDSYSTOLIC < 70 THEN RED

IF EDRR <= 30 AND EDSYTOL IC >= 70 AND EDFOLLOW = N THEN RED

IF EDRR <=30 AND EDSYSTOLIC >= 70 AND EDFOLLOW = Y THEN YELLOW

ELSE NOTCLASSIFIED (if we get this, then logic is wrong)

Figure3. ESI Emergency Severity Index Adults

```

Inputs: EDFOLLOW, PAIN, EDHR, EDRR, EDSYSTOLIC, EDO2SAT, NORESOURCES
IF AGE < 3 months THEN
  IF EDFOLLOW = N AND EDRESPDIST = Y AND (EDHR>180 OR EDRR > 50 OR EDO2SAT <
  90) AND NORESOURCES > 1 THEN LEVEL 1
  IF EDFOLLOW = N AND EDRESPDIST = Y AND (EDHR>180 OR EDRR > 50 OR EDO2SAT <
  92) AND NORESOURCES > 1 AND PAIN = Y THEN LEVEL 2
  IF EDFOLLOW = Y AND EDRESPDIST = N AND (EDHR>180 OR EDRR > 50 OR EDO2SAT <
  92) AND NORESOURCES > 1 AND PAIN = N THEN LEVEL 3
  IF EDFOLLOW = Y AND EDRESPDIST = N AND NORESOURCES = 1 AND PAIN =N THEN
  LEVEL 4
  IF EDFOLLOW = Y AND EDRESPDIST = N AND PAIN = N THEN LEVEL 5

IF AGE >= 3 months TO AGE < 3 years THEN
  IF EDFOLLOW = N AND EDRESPDIST = Y AND (EDHR>160 OR EDRR > 40 OR EDO2SAT <
  90) AND NORESOURCES > 1 THEN LEVEL 1
  IF EDFOLLOW = N AND EDRESPDIST = Y AND (EDHR>160 OR EDRR > 40 OR EDO2SAT <
  92) AND NORESOURCES > 1 AND PAIN = Y THEN LEVEL 2
  IF EDFOLLOW = Y AND EDRESPDIST = N AND (EDHR>160 OR EDRR > 40 OR EDO2SAT <
  92) AND NORESOURCES > 1 AND PAIN = N THEN LEVEL 3
  IF EDFOLLOW = Y AND EDRESPDIST = N AND NORESOURCES = 1 AND PAIN =N THEN
  LEVEL 4
  IF EDFOLLOW = Y AND EDRESPDIST = N AND NORESOURCES = 0 AND PAIN = N THEN
  LEVEL 5

IF AGE >= 3 AND AGE <=8 THEN
  IF EDFOLLOW = N AND EDRESPDIST = Y AND (EDHR>140 OR EDRR > 30 OR EDO2SAT <
  90) AND NORESOURCES > 1 THEN LEVEL 1
  IF EDFOLLOW = N AND EDRESPDIST = Y AND (EDHR>140 OR EDRR > 30 OR EDO2SAT <
  92) AND NORESOURCES > 1 AND PAIN = Y THEN LEVEL 2
  IF EDFOLLOW = Y AND EDRESPDIST = N AND (EDHR>140 OR EDRR > 30 OR EDO2SAT <
  92) AND NORESOURCES > 1 AND PAIN = N THEN LEVEL 3
  IF EDFOLLOW = Y AND EDRESPDIST = N AND NORESOURCES = 1 AND PAIN =N THEN
  LEVEL 4
  IF EDFOLLOW = Y AND EDRESPDIST = N AND NORESOURCES = 0 AND PAIN = N THEN
  LEVEL 5

IF AGE > 8 THEN
  IF EDFOLLOW = N AND EDRESPDIST = Y AND (EDHR>100 OR EDHR < 30 OR EDRR < 12
  OR EDRR > 20 OR EDSYSTOLIC < 70 OR EDO2SAT < 90) AND NORESOURCES > 1 THEN
  LEVEL 1
  IF EDFOLLOW = N AND EDRESPDIST = Y AND (EDHR>100 OR EDHR < 30 OR EDRR < 12
  OR EDRR > 20 OR EDSYSTOLIC < 70 OR EDO2SAT < 92) AND NORESOURCES > 1 AND
  PAIN = Y THEN LEVEL 2
  IF EDFOLLOW = Y AND EDRESPDIST = N AND (EDHR>100 OR EDHR < 30 OR EDRR < 12
  OR EDRR > 20 OR EDSYSTOLIC < 70 OR EDO2SAT < 92) AND NORESOURCES > 1 AND
  PAIN = N THEN LEVEL 3
  IF EDFOLLOW = Y AND EDRESPDIST = N AND NORESOURCES = 1 AND PAIN =N THEN
  LEVEL 4
  IF EDFOLLOW = Y AND EDRESPDIST = N AND NORESOURCES = 0 AND PAIN = N THEN
  LEVEL 5
ELSE NOTCLASSIFIED

```

Figure4. CBRN Chemical/Biological/Radiation/Nuclear Adults only

```

Inputs: EDWALK, EDFOLLOW, EDRR, EDRESPDIST, CLEXPOSR
IF AGE < 8 THEN TOOYOUNG
IF AGE >= 8 THEN
  IF EDWALK = Y AND CLEXPOSR =N THEN T3 (Green)
  IF EDWALK = Y AND CLEXPOSR =Y THEN T2 (Yellow)
  IF EDWALK = N AND EDRR = 0 THEN T4 (Black)
  IF EDWALK = N AND EDRESPDIST = Y THEN T1 (Red)
  IF EDWALK=N AND EDRESPDIST = N AND EDFOLLOW=N THEN T1 (Red)
  IF EDWALK=N AND EDRESPDIST = N AND EDFOLLOW=Y AND CLEXPOSR =Y THEN T1
  (Red)
  IF EDWALK=N AND EDRESPDIST = N AND EDFOLLOW=Y AND CLEXPOSR =N THEN T2
  (Yellow)
  IF EDWALK=N AND CLEXPOSR =N THEN T2 (Yellow)

ELSE NOTCLASSIFIED

```

Figure5. SALT Sort, Assess lifesaving interventions, treatment and/or transport (Adults)

```

Inputs: EDFOLLOW, EDRR, EDHR, EDRESPDIST, INJURY, NORESOURCES
IF AGE < 8 THEN TOOYOUNG
IF AGE >= 8 THEN

  IF EDRR = 0 THEN DEAD (Black)
  IF EDRR > 0 AND EDRESPDIST=N AND EDFOLLOW=Y THEN NORMAL (Green)
  IF EDRR > 0 AND EDHR>0 AND EDRESPDIST=N AND EDFOLLOW=Y AND INJURY=Y THEN
  MINIMAL (Yellow)
  IF (EDHR > 0 OR EDRESPDIST=Y OR EDFOLLOW=N) THEN IMMEDIATE (Red)
  IF (EDRESPDIST=Y OR EDFOLLOW=N) AND NORESOURCES > 0 THEN EXPECTANT (Gray)
ELSE NOTCLASSIFIED

```

Table 1. Frequency table result for START

group	Frequency	Percent	Cumulative Frequency	Cumulative Percent
green	554	87.80	554	87.80
red	38	6.02	592	93.82
not classified	39	6.18	631	100.00

Table 2. Frequency table result for ESI

level	Frequency	Percent	Cumulative Frequency	Cumulative Percent
level 1	27	4.52	27	4.52
level 2	104	17.39	131	21.91
level 3	7	1.17	138	23.08
level 4	460	76.92	598	100.00

Table 3. Frequency table result for CBRN

cgroup	Frequency	Percent	Cumulative Frequency	Cumulative Percent
green	514	81.46	514	81.46
red	30	4.75	544	86.21
yellow	87	13.79	631	100.00

Table 4. Frequency table result for SALT

sgroup	Frequency	Percent	Cumulative Frequency	Cumulative Percent
green	552	87.48	552	87.48
yellow	1	0.16	553	87.64
red	78	12.36	631	100.00

Attachment A

SAS Syntax

```
proc format;
```

```

value $q1f  0='no'
            1='yes'  ;
value q2f   0='no'
            1='yes' ;
value $expof 1= 'Deceased'
            2= 'ICU/Ventilator'
            3A= 'Hospitalized 3+ days'
            3B= 'Hospitalized 1-2 days'
            4= 'ED repeat visits'
            5= 'EC w/significant Xx'
            6= 'ED a/moderate Sx'
            7= 'EC w/o Sx'
            8= 'Physician office visit' ;

value sexf  0='male'
            1='female' ;

```

```

value racegf 1='black'
             2='white'
             3='hispanic'
             4='other' ;
value agegf  1='0-8 years'
             2='9-18 year'
             3='19 +' ;
value groupf 1='admitted in hospita'
             2='ed visit';
value outcgf 1='deceased'
             2='icu/hsop'
             3='ed w/sig sx'
             4='ed nosx';
value edrrgf 1='less 30'
             2=' 30 or more' ;
value edo2sgf 1=' less 90'
              2='90 or more' ;
value edo2sgbf 1=' less 92'
               2='92 or more' ;
value edo2sgcf 1=' 45-89%'
               2='90-92'
               3='greater than 92 %' ;

data one;
set chol.erhosp;
if outcomecategory='1' then outcg=1;
  else if outcomecategory='2' or outcomecategory='3A' or outcomecategory='3B' then outcg=2;
  else if outcomecategory='4' or outcomecategory='5' or outcomecategory='6' then outcg=3;
  else if outcomecategory='7' or outcomecategory='8' then outcg=4;

if 0<edrr<30 then edrrg=1;
  else if 30<= edrr < 100 then edrrg=2;
if 0<edo2sat<90 then edo2sg=1;
  else if 90<=edo2sat<120 then edo2sg=2;
if 0<edo2sat<92 then edo2sgb=1;
  else if 92<=edo2sat<120 then edo2sgb=2;
if 44<edo2sat<90 then edo2sgc=1;
  else if 90<=edo2sat<93 then edo2sgc=2;
  else if 92<=edo2sat<120 then edo2sgc=3;

format edwalk hispanic edrespdist q2f.
sex sexf. racegf racegf. agegf agegf. groupf. outcg outcgf. outcomecategory expof.
edrrg edrrgf. edo2sg edo2sgf. edo2sgb edo2sgbf. edo2sgc edo2sgcf. ; run;

```

PART 1

```

data two;
  set one;
  *** create new variables ***;
format bronch1dat mmddyy8.;
bronch1date=put(bronch1dat,mmddyy8.);

*** Create index for firstsx ***;
if firstsx=" " then fsx=.;

```

```

flag1 = index(uppercase(firstsx),"BURN");
flag2 = index (uppercase(firstsx),"PAIN");
flag3 = index (uppercase(firstsx),"NAUSEA");
flag4 = index (uppercase(firstsx),"VOMIT");

*** Create WDWALK and EDFOLLOW ***;
if notesfrom=" " then notesfrom=.;
If notesfrom="Intubated" or edhypoxiao=1 or edhypoxiar=1 or person_transport="EMS" then edwalk=0;
  else edwalk=1;
If notesfrom="Intubated" or edhypoxiao=1 or edhypoxiar=1 or person_transport="EMS" then edfollow=0;
  else edfollow=1;

*** create the number of resources ;
if edo2deliv ="RA" then edo2g=0;
  else if edo2deliv= "FM" or edo2deliv="Missing" or edo2deliv="NC" or edo2deliv="NRB" or edo2deliv="Vent"
then edo2g=1;
If ekgdate="1/6/2005" then ekg=1;
  else if ekgdate="1/7/2005" or ekgdate="1/7/2006" or ekgdate="1/11/2005" or ekgdate="1/8/2005" or
ekgdatt="1/9/2005" then ekg=0;
If bronch1dat="01/06/05" then bron=1;
  else if bronch1dat="01/09/05" then bron=0;
If pftdate="1/6/2005" then pft=1;
  else if pftdate="1/7/2005" or pftdate="1/10/2005" or pftdate="1/11/2005" or pftdate="1/12/2005" or
pftdat="1/19/2005" or pftdate="1/26/2005" then pft=0;
If notesfrom="Intubated" then nres=1;
  else nres=0;
noresources = sum (of edo2g ekg bron pft nres);

*** Create CLEXPOSR ***;
if flag3>0 or flag4>0 then fsxc=1;
  else fsxc=0;
tclexposr = sum (of edeye edent edcough edwheeze fsxc);
if 0<tclexposr<5 then clexposr=1;
  else if tclexposr=0 then clexposr=0;

*** Create PAIN ***;
if edthroater=. then edth=.;
  else if edthroater=1 then edth=1;
  else if edthroater=0 then edth=0;
if edentother=" " then edentg=.;
  else if edentother="throat bu" or edentotehr="sore thro" then edentg=1;
  else edentg=0;
if eddermothe=" " then edemg=.;
  else if eddermothe="pain - ne" then edemg=1;
  else edemg=0;
if eddermburn=" " then edembug=.;
  else if eddermburn="2- AL" or eddermburn="2 - T and" then edembug=1;
if flag1>0 or flag2>0 then fsxp=1;
  else fsxp=0;
tpain= sum (of edth edentg edemg edembug fsxp);
If 0<tpain<5 then pain=1;
  else if tpain=0 then pain=0;

**** create injury ***;

if consultop1l=" " then consultg=.;

```



```

    else if consultop11="Eyes inje" then consultg=1;
    else consultg=0;
if primarydx=" " then pdxg=.;
    else if primarydx="Lung inju" then pdxg=1;
    else pdxg=0;
injury = sum (of consultg pdxg);
if injury = . then injury =0;
format edwalk edfollow pain toxidrome clexposr injury fsxc fsxp q2f.;
run;

```

PART 2

```

proc format;
    value groupf 1='green'
                2='black'
                3='red'
                4='yellow'
                5='too young'
                6='not classified' ;

Data start;
    set two;
if edwalk= 1 then group=1 ;
else group =.;

if group=. and (0<=age<9) then do;
if edrr=0 then group=2; end;

if group=. and (0<=age<9) then do;
if (0<edrr<15) or (45<=edrr<92) then group=3;
if (0<edrr<45) and (edfollow=0) then group=3;
if (0<edrr<45) and (edfollow=1) then group=4; end;

If age>8 and group=. then do ;
if edrr=0 then group=2;
if (0<edrr<10) or (29<edrr<92) then group=3;
if (0<edrr<31) and (0<edsystolic<70) then group=3;
if (0<edrr<31) and (70<=edsystolic<271) and (edfollow=0) then group=3;
if (0<edrr<31) and (70<=edsystolic<271) and (edfollow=1) then group=4; end;

if group=. then group=6;
format group groupf. ; run;

```

PART 3

```

proc format;
    value levelf 1='level 1'
                2='level 2'
                3='level 3'
                4='level 4'
                5='level 5'
                6='not classified' ;

Data esi;
    set two;
if edrespdist=. then edrespdist=0;
if ((edfollow=0) and (edrespdist=1)) then edf=1 ; else edf=0;
if ((edfollow=1) and (edrespdist=0)) then edfb=1 ; else edfb=0;
if ((edfollow=0) and (edrespdist=0)) then edfc=1 ; else edfc=0;
if (99<edhr<200) or (0<edhr<30) or (0<edrr<12) or (19<edrr<92)

```

```

    or (0<edsystolic<71) or (92<=edo2sat=<100)      then edhrg=1 ; else edhrg=0;
if      (0<noresources<10) and (pain=1) then npain=1; else npain=0;
if      (0<noresources<10) and (pain=0) then npainb=1; else npainb=0;

if age=0 then do;
if level=. then do;
if      (edrespdist=1 and edfollow=0 or 0<EDO2SAT < 90) then level=1; end;

if level=. then do;
if (edfollow=0 and 180<EDHR<200 or 50<EDRR<100 or 0<EDO2SAT < 92) or pain=1 then level=2; end;

if level=. then do;
if (edfollow=1) and (pain=0) and (1<noresources<10) then level=3; end;

if level=. then do;
if (edfollow=1) and (noresources=1) and (pain=0) then level=4; end;

if level=. then do;
if (edfollow=1) and (noresources=0) and (pain=0) then level=5; end;
end;

if 0<age<3 then do;
if level=. then do;
if      (edrespdist=1 and edfollow=0 or 0<EDO2SAT < 90) then level=1; end;

if level=. then do;
if (edfollow=0 and 160<EDHR<200 or 40<EDRR<100 or 0<EDO2SAT < 92) or pain=1 then level=2; end;

if level=. then do;
if (edfollow=1) and (pain=0) and (1<noresources<10) then level=3; end;

if level=. then do;
if (edfollow=1) and (noresources=1) and (pain=0) then level=4; end;

if level=. then do;
if (edfollow=1) and (noresources=0) and (pain=0) then level=5; end;
end;

if 3<=age<9 then do;
if level=. then do;
if      (edrespdist=1 and edfollow=0 or 0<EDO2SAT < 90) then level=1; end;

if level=. then do;
if (edfollow=0 and 140<EDHR<200 or 30<EDRR<100 or 0<EDO2SAT < 92) or pain=1 then level=2; end;

if level=. then do;
if (edfollow=1) and (pain=0) and (1<noresources<10) then level=3; end;

if level=. then do;
if (edfollow=1) and (noresources=1) and (pain=0) then level=4; end;

if level=. then do;
if (edfollow=1) and (noresources=0) and (pain=0) then level=5; end;
end;

if (8<age<99) then do;

```

```

if level=. then do;
if      (edrespdist=1 and edfollow=0 or 0<EDO2SAT < 90) then level=1; end;

if level=. then do;
if (edfollow=0 and 100<EDHR<200 or 20<EDRR<100 or 0<EDO2SAT < 92) or pain=1 then level=2; end;

if level=. then do;
if (edfollow=1) and (pain=0) and (1<noresources<10) then level=3;
if (edfollow=0) and (pain=0) and (1<noresources<10) then level=3;  end;

if level=. then do;
if (edfollow=1) and (noresources=1) and (pain=0) then level=4; end;

if level=. then do;
if (edfollow=1) and (noresources=0) and (pain=0) then level=5; end;
end;

if age = . and level=. then do;
if (edfollow=1) and (noresources=1) and (pain=0) then level=4; end;

```

```

if level=. then level=6;
format level levelf.; run;

```

PART 4

```
proc format;
```

```

value cgroupf  1='green'
               2='black'
               3='red'
               4='yellow'
               5='too young'
               6='not classified' ;

```

```
Data cbrn;
```

```

set two;
if 0<=age<100 or age=. then do;
if ((edwalk=1) and (clexposr=0)) then cgroup=1;
if ((edwalk=1) and (clexposr=1)) then cgroup=4;
if ((edwalk=0) and (edrr=0)) then cgroup=2;
if ((edwalk=0) and (edrespdist=1)) then cgroup=3; end;

if cgroup=. then do;
if ((edwalk=0) and (edrespdist=0) and (clexposr=1)) then cgroup=3;  end;

if cgroup=. then do;
if ((edwalk=0) and (edrespdist=0) and (clexposr=0)) then cgroup=4;  end;

if cgroup=. then do;
if ((edwalk=0) and (clexposr=0)) then cgroup=4; end;

if cgroup=. then do;
if ((edwalk=0) and (clexposr=1)) then cgroup=3; end;

```

```

if cgroup=. then cgroup=6;
format Cgroup cgroupf. ; run;

```

PART 5

```
proc format;
```

```

value sgroupf  0='dead'

```

```

        1='green'
        2='yellow'
        3='red'
        4='Gray'
        5='too young'
        6='not classified';

Data salt;
    set two;
if edfollow=1 and edrespdist=0 then edfr=1; else edfr=0;

if sgroup=. then do ;
if edrr=0 then sgroup=0;
if edfr=1 and 0<edrr=<90 and injury=0 then sgroup=1; end;

if sgroup=. then do;
if edfr=1 and 0<edrr=<92 and 0<edhr<200 and injury=1 then sgroup=2; end;

if sgroup=. then do;
if edfollow=0 then sgroup=3;
if edrespdist=1 then sgroup=3; end;

if sgroup=. then do;
if edfollow=1 then sgroup=1; end;

if sgroup=. then do;
if ((edfollow=0) or (edrespdist=1)) and (0<noresources<10) then sgroup=4; end;

if sgroup=. then sgroup=6;

format Sgroup sgroupf. ;
Run;
PART 6
ods rtf;
ods listing close;

proc freq data = esi ;
    tables level ;
    title 'FREQUENCY TABLE: ESI ' ;
run;
proc freq data = cbrn ;
    tables cgroup ;
    title 'FREQUENCY TABLE : CBRN ' ;
run;
proc freq data = start ;
    tables group ;
    title 'FREQUENCY TABLE : start ' ;
run;
proc freq data = salt ;
    tables sgroup ;
    title 'FREQUENCY TABLE : SALT ' ;
run;

ods rtf close;
ods listing;
quit; run;

```