

USE OF THE SAS SYSTEM FOR A THREE-FILE APPLICATION OF PATIENTS, DONORS, AND TRANSFUSIONS: USE OF THE MERGE, FIRST, AND LAST STATEMENTS AND THE FORMAT PROCEDURE.

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Introduction

This paper describes the use of the SAS system for a research project involving patients who received platelet transfusions. The success of a transfusion depends upon the condition of the patient at the time of the transfusion (fever, infection, etc.), the number of platelets transfused, the patient's ABO blood group and HLA type and the donor's ABO and HLA type. A successful outcome is an increase in the patient's platelet count at 24-hours following the platelet transfusion (platelet increment).

File Description

Three separate files contain the basic data. These files are:

1. Patient file - containing patient specific information including disease codes, age, gender, ABO and HLA type;
2. Donor file - containing the donors age, gender, ABO and HLA type;
3. Transfusion file - containing information specific to each transfusion, including the patient's condition at the time of the transfusion, the number of platelets transfused, other blood products transfused, the 1-hour and the 24-hour platelet increments, the donor ID and the patient ID.

The information that is specific for each donor or patient is not repeated in the transfusion file. Each patient can receive several transfusions from several different donors and a donor can be used for different patients. If a donor or a patient is retyped for HLA, only the one record of the donor file or the patient file needs to be updated.

The FIRST and LAST statements are used to keep track of the first transfusion for any specific donor to any one patient, the number of donations of that specific donor to a particular patient and the total number of transfusions that a patient has received. In the analysis of the 24-hour increment in platelets, it is important to consider the number of times a particular donor was used for each patient and the previous transfusion history of the patient.

SAS Data Steps

The three separate files are maintained as SAS data sets:

1. Patient - PLATLET.PAT
2. Donor - PLATLET.DON
3. Transfusion - PLATLET.TRA

The transfusion file is first sorted by patient ID and transfusion date (TTDATE). The FIRST and LAST statements and a counter are included in the SAS data step and saved in the SAS data set PLATLET.TRA.

```
PROC SORT DATA=TRANS;
  BY PATID TTDATE;
DATA PLATLET.TRA;
  SET TRANS;
  BY PATID TTDATE;
  FRSTID=FIRST.PATID;
  LASTID= LAST.PATID;
  IF FIRST.PATID THEN PATCNT=0;
  PATCNT+1;
PROC PRINT;
VAR TRANUM TTDATE PATID PLNAME
BLEED INFECT WEIGHT TEMPPRE SPLENO
DIC SEPTIC MED1 MED2 INC1HR INC24HR
LYMP1 FRSTID LASTID PATCNT DONID
DLNAME;

TITLE 'TRANSFUSION FILE SORTED BY
PATID WITH FIRST & LAST PATID ';
```

Next the patient file (PLATLET.PAT) is merged with the PLATLET.TRA file by patient ID for every occurrence of the patient in the PLATLET.TRA file (IF PF), resulting in the file PLATLET.TTPP.

```
DATA PLATLET.TTPP;
MERGE PLATLET.TRA
(IN=PF DROP=PLNAME PFNAME)
  PLATLET.PAT
(RENAME=(PIDNUM=PATID) );
  BY PATID;
  IF PF;
PROC PRINT ;
VAR TRANUM TTDATE PATID PLNAME
BLEED INFECT WEIGHT PATSEX PAGE
PLA1 PLA2 PLB1 PLB2 PLCC PW4W6 PRH
INC1HR INC24HR LYMP1 FRSTID LASTID
PATCNT DONID DLNAME ;

TITLE 'MERGE OF PATIENT &
TRANSFUSION FILES ';
```

The file PLATLET.TTPP is next sorted by Donor ID and merged with the PLATLET.DON file for every every occurrence of the donor, resulting in the work file TRANSSD. The file TRANSSD is then sorted by Patient ID, Donor ID and transfusion date. The FIRST and LAST statements and a counter are included in the SAS data step to identify the number of times a specific donor's platelets are used for each patient and the first and last occurrence. Finally, the data is sorted by Patient ID and Transfusion date with out file PLATLET.TTPPDD.

```

PROC SORT DATA=PLATLET.TTPP
          OUT=PLATTPP;
  BY DONID;
DATA TRANSSD;
  MERGE PLATTPP
  (IN=DF DROP=DLNAME DFNAME)
  PLATLET.DON
  (RENAME=(DONIDN=DONID) );
  BY DONID;
  IF DF;
PROC SORT DATA=TRANSSD;
  BY PATID DONID TDATE;
DATA TRANDDD;
  SET TRANSSD;
  BY PATID DONID;
  FRSDID=FIRST.DONID;
  LASDID=LAST.DONID;
  IF FRIST.DONID THEN DONCNT=0;
  DONCNT+1;
PROC SORT DATA=TRANDDD
          OUT=PLATLET.TTPPDD;
  BY PATID TDATE;
RUN;
PROC CONTENTS DATA=PLATLET.TTPPDD;
PROC PRINT;
VAR TRANUM TDATE PATID PLNAME PABO
PLA1 PLA2 PLB1 PLB2 DONID DLNAME
DABO DLA1 DLA2 DLB1 DLB2 ABOMAT
INC1HR INC24HR FRSTID LASTID PATCNT
FRSDID LASDID DONCNT

TITLE 'DONOR FIRST & LAST MERGED
WITH PATIENT-TRANFUSION FILE ';

```

The criteria for the degree of compatibility between a patient's HLA type and a donor's HLA type (match grade) is stored in a Format library. The HLA typing consists of an identifier of the type A1,A2/B1,B2 (A-Locus/B-Locus) where each location contains a unique identified antigen or is an unknown. The quality of the match of the donor's HLA type to the patient's HLA type depends upon how well the A's to A's and the B's to B's match, or are unknown or are cross-reactive. If new antigens are determined the Format library is updated and the merges are rerun.

```

PROC FORMAT LIBRARY=SASLIB;
VALUE $LOCO1A '01'='M'
              '36'='S' 'OX'='U'
              '03'='X' '11'='X'
              OTHER=' ';
VALUE $LOCO2A '02'='M'
              '68'='X' 'OX'='U'
              '03'='X' '28'='X'
              OTHER=' ';
VALUE $LOCO3A '03'='M'
              '11'='X' 'OX'='U'
              '36'='X' '01'='X'
              OTHER=' ';
VALUE $LOCO9A '09'='M'
              '23'='X' 'OX'='U'
              '24'='X'
              OTHER=' ';
VALUE $LOCOXA 'OX'='M'
              OTHER=' ';
VALUE $LOCO10A '10'='M'
              '25'='S' 'OX'='U'
              '26'='S' '34'='S'
              '66'='S' '32'='X'
              '11'='X'
              OTHER=' ';
VALUE $LOCI1A '11'='M'
              '03'='X' 'OX'='U'
              MORE

```

```

DATA PLATLET.HLA;
SET PLATLET.TTPPDD;
MTA11=' '; MTA12=' ';
MTA21=' '; MTA22=' ';
MTB11=' '; MTB12=' ';
MTB21=' '; MTB22=' ';
IF DLA1='01' THEN
MTA11=PUT(PLA1,$LOCO1A.);
IF DLA1='02' THEN
MTA11=PUT(PLA1,$LOCO2A.);
IF DLA1='03' THEN
MTA11=PUT(PLA1,$LOCO3A.);
IF DLA1='09' THEN
MTA11=PUT(PLA1,$LOCO9A.);
IF DLA1='OX' THEN
MTA11=PUT(PLA1,$LOCOXA.);
MORE

```

```

PROC PRINT DATA=PLATLET.HLA;
VAR TRANUM TDATE PATID PLA1 PLA2
PLB1 PLB2 DONID DLA1 DLA2 DLB1 DLB2
ABOMAT INC1HR INC24HR FRSTID LASTID
PATCNT FRSDID LASDID DONCNT MTA11
MTA12 MTA21 MTA22 MTB11 MTB12 MTB21
MTB22 FORMUL MATGRAD

TITLE 'SAS DATA SET THAT INCLUDES
HLA MATCH GRADES';

```


