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************************************************************;
***                                                      ***;
*** Random.sas - Randomizes subjects and assigns therapist ***;
***                                                      ***;
*** Created by: DLF                                      ***;
************************************************************;
*%let root=H:\Presentations\DsugApr08;
%let root=C:\Projects\UCHSC\DsugApr08;
option nofmterr;
*options mlogic mprint macrogen; * For Debugging *;

proc format;
    value TxGroup 1='CBT' 2='SNDT';
    value Site    1='Pitt' 2='Boston';
    value logical 0='No' 1='Yes';
    value Strata1x 1='Crohns' 2='Colitus';
    value Strata2x 1='Sub-syndromal' 2='Syndromal';
    value Strata3x 1='9-12 Years' 2='13-17 Years';
    value Strata 1='Crohns/Sub/9-12'
                 2='Crohns/Sub/13-17'
                 3='Crohns/Syndr/9-12'
                 4='Crohns/Syndr/13-17'
                 5='Colitus/Sub/9-12'
                 6='Colitus/Sub/13-17'
                 7='Colitus/Syndr/9-12'
                 8='Colitus/Syndr/13-17'
                 ;
  run;

%macro Login; *** User login ***;
   *** Declares global macro variables USER, PW and XXX ***;
   %global USER PW Site;
   *** Queries User Name, PW and Site ***;
   %window interface1 color=yellow
     #5 @15 "*** Randomization Program ***"
     #7 @15 "Please type in your username and password"
     #9 @15  'User Name:       ' +1 USER 6 ATTR=UNDERLINE REQUIRED=YES
     #11 @15 'Password:        ' +1 PW   6 ATTR=UNDERLINE REQUIRED=YES DISPLAY=NO
     #13 @15 'Site (1=Pitt,2=Boston)' +1 SITE 1 ATTR=UNDERLINE REQUIRED=YES
     #24 @15 "Press ENTER to continue";
  %display interface1;
%mend;

%macro GetData;
  *** Reads Previous Randomization Assignments ***;
  PROC IMPORT OUT= WORK.RandomAssign
            DATATABLE= "RandomAssign"
            DBMS=ACCESS REPLACE;
     DATABASE="&root\RECRUITMENT.mdb";
     USEDATE=Yes;
  RUN;
  proc sort data=work.RandomAssign;
    by RandID;
  run;
  *** Number of subjects Randomized per Site ***;
  Proc summary data=work.randomassign nway;
    class Site;
    var RandID;
    output out=work.SiteN max=NSite;
  run;
  *proc print data=work.SiteN; run;
%mend;

%macro NewData;
  *** Declares global macro variables ***;
  %global StudyID Initials Strata1 Strata2 AgeYr Confirm;
  *** Queries Data on Child to be Randomized ***;
  %window interface2 color=grey
     #5 @15 "*** Randomization Program (Cont) ***"
     #7 @15 "Please type in the following information"
     #8 @15 'Childs Study ID:                ' +1 StudyID 3 ATTR=UNDERLINE REQUIRED=YES
     #9 @15 'Childs Initials:                ' +1 Initials 3 ATTR=UNDERLINE REQUIRED=YES
     #10 @15 'Diagnosis (1=Crohns D 2=Colitus):' +1 Strata1 1 ATTR=UNDERLINE REQUIRED=YES
     #11 @15 'Sub-Syndromal(1) or Syndormal(2)' +1 Strata2 1 ATTR=UNDERLINE REQUIRED=YES
     #12 @15 'Age in Years (9-17 only):       ' +1 AgeYr   2 ATTR=UNDERLINE REQUIRED=YES
     #15 @15 'Have all eligability requirement been satisfied?'
                               +2  Confirm 1 ATTR=UNDERLINE REQUIRED=Yes
     #20 @15 "Press ENTER to continue";
  %display interface2;
  *** Creates Record for New Child ***;
  data work.dummy; * Initializes variables when not assigned*;
    site=1; Nsite=1000; output;
    site=2; Nsite=2000; output;
  run;
  data work.new; * Merges number previously randomized at site *;
    update work.dummy work.SiteN;
    by Site;
    if Site=&site; * Selects Total for Site *;

    *** Computes ID and Assigns variables ***;
    RandID=(Nsite+1);
    StudyID=&StudyID+0;
    Initials="&Initials";

    *** Creates messages when entries are incorrect ***;
    window ReEnter color=grey
     group=problem1
       #3 @15 'Diagnosis must be either 1=Crohns D 2=Colitus'
       #4 @15 "Delete and ReEnter:" +1 Strata1 1. ATTR=UNDERLINE REQUIRED=YES
       #6 @15 "Press ENTER to continue"
     group=problem2
       #9 @15 'Severity must be either 1=Sub-Syndromal or 2=Syndormal'
       #10 @15  "Delete and ReEnter:" +1 Strata2 1. ATTR=UNDERLINE REQUIRED=YES
       #12 @15 "Press ENTER to continue"
     group=problem3
       #15 @15 'Age in Years must be between 9 and 17'
       #16 @15 'Press Delete x2 and ReEnter:' +1 AgeYr 2. ATTR=UNDERLINE REQUIRED=YES
       #18 @15 "Press ENTER to continue" ;

    *** Compute Strata and Send Message if a problem ***;
    Strata1=&Strata1+0;  * Site *;
    if &Strata1 ^in(1,2) then display ReEnter.Problem1;
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    Strata2=&Strata2+0;  * Severity *;
    if &Strata2 ^in(1,2) then display ReEnter.Problem2;

    AgeYr=&AgeYr+0;
    if &AgeYr <9 or &AgeYr>17 then display ReEnter.Problem3;
    Strata3=(9<=AgeYr<=12)+(13<=AgeYr<=17)*2; * Age Group *;

    *** Combines 3 factors to get overall Strata ***;
    if Strata eq . then Strata=(Strata1-1)*4+(Strata2-1)*2+Strata3;

    format Strata1 strata1x. strata2 strata2x. Strata3 strata3x.
           Strata strata.;
    drop _type_ _Freq_;
    *Proc print data=work.new;
    run;
%mend;

%macro Balance;
  *** Calculates current balance for each strata ***;

  * Creates a dataset with N=0 for All Strata and Tx Groups *;
  data work.Bdummy;
    do site=1 to 2;
       do strata=1 to 8;
          do txgroup=1 to 2;
             n=0; output;
    end; end; end;
  * Sums the acutual numbers in all Strata and Tx Groups *;
  Proc summary data=work.randomassign nway;
    class site strata TxGroup;
    var RandID;
    output out=work.assign n=N;
  run;
  * Updates the dataset with N=0 *;
  data work.assign;
    update work.Bdummy work.assign;
    by site strata TxGroup;
  proc sort data=work.assign;
    by site strata TxGroup;
  run;
  * Reshapes the dataset *;
  proc transpose data=work.assign out=work.balance prefix=TxGroup;
    by site strata;
    id TxGroup;
    Var N;
  run;

  *** Merges Balance with Data from current subject ***;
  data work.random;
    merge work.new(in=ok)
          work.balance(Keep=site strata TxGroup1 TxGroup2);
    by site strata;
    *** Selects patient to be randomized ***;
    if ok;
    *** Calculates balance within strata ***;
    if TxGroup1 eq . then TxGroup1=0;
    if TxGroup2 eq . then TxGroup2=0;
    balance=TxGroup1-TxGroup2;
    *** Generates random number and assignment ***;
    random=ranuni(int(Time())); * Random Number for TxGroup *;
    if random le (.5-balance*.2) then TxGroup=1;
    else TxGroup=2;
    format TxGroup TxGroup.;
    *** Randomization Date and User for documentation ***;
    RandDate=today();
    RandUser="&user";
    *** Creates Macro variable for Therapist Time ***;
    if txgroup eq 1 then %let TherProp=TherCBT;;
    if txgroup eq 2 then %let TherProp=TherSNDT;;
  *proc print data=work.random;
  run;
%mend;

%macro AssgnTher;
  *** Reads Dataset of Therapists ***;
  PROC IMPORT OUT= WORK.Therapist
            DATATABLE= "Therapists"
            DBMS=ACCESS REPLACE;
     DATABASE="&root\RECRUITMENT.mdb";
  RUN;
  proc sort data=work.Therapist;
    by TherInit;
  run;
  *** Sums Current Active Assignments ***;
  proc summary data=work.randomassign nway;
    class TherInit;
    var active;
    output out=work.temp sum=Active;
  run;
  data work.Ther2;
    merge work.therapist work.temp(keep=TherInit Active);
    by TherInit;
    if Active eq . then Active=0;
    RandUser="&user"; * Added so that merge will work *;
  data work.ther2b;
    merge work.ther2 work.random(keep=txgroup randuser);
    by RAndUser;
    if TxGroup eq 1 then Avail=max(Thermax*TherCBT-Active-.5,0);
    if TxGroup eq 2 then Avail=max(Thermax*TherSNDT-Active-.5,0);
    if TherID eq 1 then Avail=.001; * Small positive value for ES *;
    rename Active=TherActive;
  *proc print data=work.Ther2b;run;
  proc sql; * Calculates Proportion of Total Availability *;
    create table work.Ther3 as
    select *,
    (Avail/sum(Avail)) as PAvail label='Prop of Total Availability'
    from work.Ther2b;
  quit;
  *proc print data=work.Ther3;run;

  *** Compares Random Variable to Cummulative Proportion *;
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data work.Ther4;
   set work.Ther3;
   * Calculates Cumulative Distribution of Available Time *;
   retain CAvail1 CAvail2;
   if _N_ eq 1 then CAvail1=0;
   else  Cavail1=Cavail2;
   Cavail2=Cavail1+PAvail;
   * Generates Random Number and Selects Therapist *;
   retain random2;
   if _N_ eq 1 then random2=ranuni(int(time()));
   Select=(CAvail1<Random2<=CAvail2);
   if Select then output; * Outputs Selected Therapist *;
   label CAvail1='Lower Boundary'
         CAvail2='Upper Boundary';

*proc print data=work.ther4;run;

*** Selects address of assigned Therapist and Creates a Macro Variable ***;
data addcontacts;
  merge work.Therapist work.Ther4(in=ok);
  by TherInit;
  if ok;
  CALL SYMPUT('TherLIST',TherEmail);
run;
data addcontacts;
  merge addcontacts work.random;
  rename Select=Active;
 *** Displays the results ***;
 window ShowRan color=yellow
     #5 @10 "The assigment for:"
         +1               Initials PROTECT=YES AUTOSKIP=YES
         +2 "Study ID:" +1 StudyID  PROTECT=YES AUTOSKIP=YES
         +2 "is" +1        TxGroup  PROTECT=YES AUTOSKIP=YES
     #7 @10  "Diagnosis:" +1 Strata1  PROTECT=YES AUTOSKIP=YES
         +3 "Severity: " +1 Strata2  PROTECT=YES AUTOSKIP=YES
         +3  "Age (yrs):" +1 AgeYr  PROTECT=YES AUTOSKIP=YES
     #10 @10 "The assigned therapist is:"
         +2 TherFirst  PROTECT=YES AUTOSKIP=YES
         +2 TherLast  PROTECT=YES AUTOSKIP=YES
     #12 @15 "who currently has"
         +1 TherActive PROTECT=YES AUTOSKIP=YES
         +1 "patients"
     #18 @10 "Type ENTER to continue";
 display ShowRan;
 run;
*** Sends E-mail Message to Therapist or PV if Control ***;
FILENAME MAIL EMAIL EMAILSYS=MAPI
   TO=("&TherLIST")
   FROM=("diane.fairclough@uchsc.edu")
   SUBJECT="New Randomization"
   ;
Data _NULL_;
  Set Addcontacts;
  File MAIL;
   Put @1 TherFirst "-";
   Put @4 "You have been assigned patient"
          +1 Initials
          +1 "(Study ID " StudyID")";
     Put @4 "who has been assigned to the " TxGroup txgroup.;
     Put @14 "Diagnosis:" +1 Strata1;
     Put @14 "Severity: " +1 Strata2;
     Put @14 "Age (yrs):" +1 AgeYr;
  run;
%mend;

%macro Update;
*** Writes randomization assignment to ACCESS tables ***;
  data work.update;
    set work.randomassign
        work.addcontacts(keep=StudyID RandID Initials Site strata
                              Strata1 strata2 Ageyr TxGroup
                              RandDate RandUser TherInit Active);
    by RandID;
    format randdate mmddyy10.;
  *proc print data=work.update;
  run;
  PROC EXPORT DATA= WORK.UPDATE
           OUTTABLE= "RandomAssign"
           DBMS=ACCESS REPLACE;
     DATABASE="&root\RECRUITMENT.mdb";
  RUN;
%mend;

%macro RunAll;
  %Login;
  *** Check Password ***;
  %if %upcase(&PW)=RANDOM %then %do;
    %GetData; * Reads data from ACCESS Database *;
    %Newdata; * Queries data on new subject *;
    *** Run Randomization for those who have not been randomized ***;
    %if %upcase(&Confirm)=Y %then %do;
      %Balance;
      %AssgnTher;
      %Update;
    %end;
  %end;
  proc tabulate data=work.update;
    title 'Summary of All Randomizations';
    class site strata txgroup TherInit Active;
    table site*strata all, txgroup*N*F=4./rts=40;
    table (TherInit) all, Active*(TxGroup='Tx' All)*N*F=4./rts=40;
    format txgroup txgroup. strata strata. site site. Active logical.;
    run;
%mend;

%RunAll;
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