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*****
*          CLIENT: Moderna
*          PROTOCOL: mRNA-1273-p201
*
*          PURPOSE:  Create ADAR Dataset
*
*          INPUT FILES:  TRANS.face, TRANS.vs
*          OUTPUT FILES:  ADAR.LST, ADAR.LOG, ADAR.sas7bdat
*
*          USAGE NOTES:
*          Modification History:27May2021:(b) (4), (b) (6):spec updates replace CRFTMPT with
FATPT due to SDTM change
*****
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*****;

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dm'log;clear;output;clear';
options missing = ' ' validvarname=upcase compress=yes;
options mprint nomprint missing=' ';

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%include "madam.sas";

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proc format;
  value $pamcd (multilabel)
    'Rash' = 'RASH'
    'Rash Occurrence' = 'RASHOCC'
    'Lymphadenopathy Occurrence' = 'LYMPHOCC'
    'Underarm Gland Swelling or Tenderness' = 'LYMPH'
    'Pain' = 'PAIN'
    'Erythema Longest Diameter (mm)' = 'ERYTHDIA'
    'Swelling Longest Diameter (mm)' = 'SWELLDIA'
    'Headache' = 'HEADACHE'
    'Fatigue' = 'FATIGUE'
    'Myalgia' = 'MYALGIA'
    'Arthralgia' = 'ARTHRALG'
    'Nausea/Vomiting' = 'NAUSEA'
    'Chills' = 'CHILLS'
    'Receive Medical Attention?' = 'MEDATTEN'
    'Fever (C)' = 'FEVER'
    'Prevent Pain or Fever from Occurring' = 'MEDTAKP'
    'Treat Pain or Fever already Occurred' = 'MEDTAKT'
    'Medication Taken Today for Pain or Fever' = 'MEDTAK'
  ;

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run;

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%revsupp(libin=TRANS, libout=WORK, ds=FACE, supp=SUPPface);

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%revsupp(libin=TRANS, libout=WORK, ds=VS, supp=SUPPvs);

data fa;
    set face;
    *if index(fatptref, 'OL');
run;

data co;
    set trans.co;
run;

%REVCO(libin=work, libout=WORK, ds=fa, outds=faco,comds=CO,delco=Y,movco=Y);

proc sort data=adb.adsl out=adsl; by studyid usubjid; run;

data ar1;
length MAAEFL $1.;
    merge ADSL (in=ina) faco (in=inface rename = (MAAEFL = _MAAEFL));
    by studyid usubjid;
    if ina and inface;
    if faobj in ('Erythema','Swelling') and index(upcase(fatest), 'OCCURRENCE')
> 0 and FAORRES = 'Y' then delete;
    MAAEFL = _MAAEFL;
    drop _MAAEFL;
run;

/*proc freq data=ar1; tables faobj*fatest /list missing; run;

proc freq data=ar1; tables faobj*fatest*faorres /list missing; where faobj in
('Erythema','Swelling'); run;*/

proc freq data=ar1; tables fatpt /list missing; run;

proc print data=ar1; where fatpt = 'DAY 0'; var usubjid faobj fatest faorres fatpt
fadtc; run;

data ar2;
    merge adsl (in=ina) vs (in=invs drop=subjid);
    by studyid usubjid;
    if ina and invs;
    if vscat = 'REACTOGENICITY' and . < vstptnum <= 7;
;
run;

data takp;
    set ar2;
    where medtakp = 'Y';
    length PARAM $200;
    if medtakp = 'Y' then param = 'Prevent Pain or Fever from Occurring';

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run;

data takt;
    set ar2;
    where medtakt = 'Y';
    length PARAM $200;
    if medtakt = 'Y' then param = 'Treat Pain or Fever already Occurred';
run;

data tak;
    set ar2;
    where medtak = 'Y';
    length PARAM $200;
    if medtak = 'Y' then param = 'Medication Taken Today for Pain or Fever';
run;

data ar2;
    set ar2 takp takt tak;
run;

/*proc print data=ar2; where usubjid = 'mRNA-1273-P201-US203-1095' and VSTESTCD =
'TEMP'; var usubjid vstestcd vstest vstpt vsseq vsstresn vsstresu; run;*/

/*proc freq data=ar2; tables vscat*vstestcd*vsstresu /list missing; run;*/

data ar3;
    set ar1(in=ar1 rename=(domain=_domain lymphevl=_lymphevl srevl=_srevl))
    ar2(in=ar2 rename=(medtakp=_medtakp medtakt = _medtakt medtak = _medtak));

*** PARAMCD/PARAM ***;
    length PARAMCD $8 PARAM $200;
    if ar1 then do;
        if faobj = 'Rash' and fatestd ne 'SEV' then param = 'Rash
Occurrence';
        else if faobj = 'Solicited Rash' then param = 'Rash';
        else if faobj = 'Underarm Gland Swelling or Tenderness' and
fatestd = 'SEV' then param = 'Underarm Gland Swelling or Tenderness';
        else if faobj = 'Nausea/Vomiting' and fatestd = 'SEV' then param =
'Nausea/Vomiting';
        else if faobj = 'Lymphadenopathy' then param = 'Lymphadenopathy
Occurrence';
        else if faobj in ('Erythema','Swelling') and upcase(fatest) =
'OCCURRENCE INDICATOR' then param = strip(faobj)||' Longest Diameter (mm)';
        else if faobj in ('Erythema','Swelling') and index(upcase(fatest),
'INTENSITY' ) > 0 then param = strip(faobj)||' Longest Diameter (mm)';
        else if faobj in ('Erythema','Swelling') and upcase(fatest)
='LONGEST DIAMETER' then param =strip(faobj)||' '||strip(propcase(fatest))||'
('||strip(FAORRESU)||')';
        else if faobj in ('Fever') then param = 'Fever (C)';

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        else param = strip(faobj);
    end;
    if ar2 then do;
        if missing(param) then do;
            if vstestcd = 'TEMP' and ~missing(vsstresu) then param =
'Fever' || ' (' || strip(vsstresu) || ')';
            if vstestcd = 'VSALL' or (vstestcd = 'TEMP' and
missing(vsstresu)) then param = 'Fever (C)';
        end;
    end;

    paramcd = strip(put(param, $pamcd.));

    *** SRCDOM, SRCSEQ, SRCVAR ***;
    length SRCDOM $20 SRCVAR $50;
    if ar1 then do;
        SRCDOM = strip(_domain);
        SRCSEQ = faseq;
        SRCVAR = 'FASTRESC';
    end;
    if ar2 then do;
        SRCDOM = strip(domain);
        SRCSEQ = vsseq;
        SRCVAR = 'VSSTRESN';
    end;
    if paramcd in ('MEDTAKP' 'MEDTAKT' 'MEDTAK') then SRCVAR =
cats("SUPPVS.QVAL where QNAM=", paramcd, "");

    *** ATPT ***;
    length ATPT $50;
    if ar1 then do;
        if FAEVAL='STUDY SUBJECT' then atpt=strip(FATPT);
        if FAEVAL='INVESTIGATOR' then atpt=strip(FATPT);
    end;

    if ar2 then atpt=strip(VSTPT);

    if ATPT = 'DAY 1' and FAEVAL='INVESTIGATOR' and PARAMCD not in ('RASH'
'LYMPHOCC' ) then ATPT = 'DAY 1, AFTER VACCINATION (AT HOME)';

    *** ATPTN ***;
    if ATPT = 'DAY 1, 30 MINS AFTER VACCINATION (AT STUDY CLINIC)' then ATPTN =
1.05;
    if ATPT = 'DAY 1, 1 HOUR AFTER VACCINATION (AT STUDY CLINIC)' then ATPTN =
1.1;
    else if ATPT = 'DAY 1, AFTER VACCINATION (AT HOME)' then ATPTN = 1.2;
    else if index(ATPT,'DAY') > 0 then ATPTN = input(substr(ATPT,index(ATPT,
'DAY')+4),best.);

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        if ATPT = 'DAY 0' then do;
            ATPTN = .;
            put 'ALERT_C: subject with DAY 0 ' USUBJID ' ' SRCDOM ' ' SRCSEQ '
' ATPT;
        end;

        *** ATPTREF ***;
        length ATPTREF $50;
        if ar1 then do;
            if index(upcase(fatptref), 'DOSE 1') > 0 and index(upcase(fatptref),
'OL') = 0 then ATPTREF = 'Vaccination 1';
            else if index(upcase(fatptref), 'DOSE 2') > 0 and
index(upcase(fatptref), 'OL') = 0 then ATPTREF = 'Vaccination 2';
            else if index(upcase(fatptref), 'DOSE 1 OL') > 0 then ATPTREF = 'OL
Vaccination 1';
            else if index(upcase(fatptref), 'DOSE 2 OL') > 0 then ATPTREF = 'OL
Vaccination 2';
        end;
        if ar2 then do;
            if index(upcase(vstptref), 'DOSE 1') > 0 and index(upcase(vstptref),
'OL') = 0 then ATPTREF = 'Vaccination 1';
            else if index(upcase(vstptref), 'DOSE 2') > 0 and
index(upcase(vstptref), 'OL') = 0 then ATPTREF = 'Vaccination 2';
            else if index(upcase(vstptref), 'DOSE 1 OL') > 0 then ATPTREF = 'OL
Vaccination 1';
            else if index(upcase(vstptref), 'DOSE 2 OL') > 0 then ATPTREF = 'OL
Vaccination 2';
        end;

        *** ATPTGR1, ATPTGR1N ***;
        length ATPTGR1 $50;
        if index(ATPT, 'DAY 1') > 0 then ATPTGR1 = 'DAY 1';
        else ATPTGR1 = strip(ATPT);

        if not missing(ATPTGR1) then ATPTGR1N = input(substr(ATPTGR1,
index(ATPTGR1, 'Day')+4), best.);
        if ATPTGR1 = 'DAY 0' then ATPTGR1N = .;

        *** Numeric of FADTC, VSDTC ***;
        %iso2sas(isodate = fadtc, datec = fadtc9, daten = fadtn, timec = fatmc);
        %iso2sas(isodate = vsdtk, datec = vsdtk9, daten = vsdtn, timec = vstmc);

        *** ADT, ATM, ADTM, ADY ***;
        if ar1 then do;
            adt = fadtn;
            atm = input(fatmc, time5.);
            if not missing(fadtc9) and not missing(fatmc) then adtm =
input(fadtc, E8601DT.);

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        ady = fady;
    end;
    if ar2 then do;
        adt = vsdtn;
        atm = input(vstmc, time5.);
        if not missing(vsdtc9) and not missing(vstmc) then adtm =
input(vsdtc,E8601DT.);
        ady = vsdy;
    end;

    *** AVAL, AVALC ***;
    length AVALC $100;
    if ar1 then do;
        avalc = strip(fastresc);
        if faobj in ('Erythema','Swelling') and index(upcase(fatest),
'OCCURRENCE')>0 then do;
            if faorres = 'N' then aval = 0;
            else aval = fastresn;
        end;
        else aval = fastresn;
    end;
    if ar2 then do;
        if paramcd in ('MEDTAKP' 'MEDTAKT' 'MEDTAK') then do;
            avalc = 'Y';
        end;
        else do;
            aval = vsstresn;
            avalc = strip(vsstresc);
        end;
    end;

    end;

%macro ATOXGR();
    if index(upcase(FASTRESC),"GRADE 0") > 0 then ATOXGR = 'Grade 0';
    if index(upcase(FASTRESC),"GRADE 1") > 0 then ATOXGR = 'Grade 1';
    if index(upcase(FASTRESC),"GRADE 2") > 0 then ATOXGR = 'Grade 2';
    if index(upcase(FASTRESC),"GRADE 3") > 0 then ATOXGR = 'Grade 3';
    if index(upcase(FASTRESC),"GRADE 4") > 0 then ATOXGR = 'Grade 4';
%mend;

*** ATOXGR ***;
length ATOXGR $20;
if paramcd in ('ERYTHDIA','SWELLDIA') then do;
    if . < aval < 25 then ATOXGR = 'Grade 0';
    else if 25 <= aval <= 50 then ATOXGR = 'Grade 1';
    else if 51 <= aval <= 100 then ATOXGR = 'Grade 2';
    else if aval > 100 then ATOXGR = 'Grade 3';

    %ATOXGR();
end;
if paramcd = 'FEVER' then do;

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        if . < aval < 38.0 then ATOXGR = 'Grade 0';
        else if 38.0 <= aval < 38.4 then ATOXGR = 'Grade 1';
        else if 38.4 <= aval <= 38.9 then ATOXGR = 'Grade 2';
        else if 38.9 < aval <= 40.0 then ATOXGR = 'Grade 3';
        else if aval > 40 then ATOXGR = 'Grade 4';

        %ATOXGR();
    end;
    if paramcd in ('PAIN') then do;
        if FASTRESC = 'NONE' then ATOXGR = 'Grade 0';
        else if FASTRESC = 'DOES NOT INTERFERE WITH ACTIVITY' then ATOXGR =
'Grade 1';
            else if FASTRESC = 'REPEATED USE OF OVER-THE-COUNTER PAIN RELIEVER
> 24 HOURS OR INTERFERES WITH ACTIVITY' then ATOXGR = 'Grade 2';
            else if FASTRESC = 'ANY USE OF PRESCRIPTION PAIN RELIEVER OR
PREVENTS DAILY ACTIVITY' then ATOXGR = 'Grade 3';

            %ATOXGR();
        end;
        if paramcd in ('LYMPH') then do;
            if FASTRESC = 'NONE' then ATOXGR = 'Grade 0';
            else if FASTRESC = 'DOES NOT INTERFERE WITH ACTIVITY' then ATOXGR =
'Grade 1';
                else if index(FASTRESC,'REPEATED USE OF OVER-THE-COUNTER PAIN
RELIEVER > 24 HOURS OR INTERFER')>0 then ATOXGR = 'Grade 2';
                else if FASTRESC = 'ANY USE OF PRESCRIPTION PAIN RELIEVER OR
PREVENTS DAILY ACTIVITY' then ATOXGR = 'Grade 3';

                %ATOXGR();
            end;
            if paramcd in ('HEADACHE') then do;
                if FASTRESC = 'NONE' then ATOXGR = 'Grade 0';
                else if FASTRESC = 'NO INTERFERENCE WITH ACTIVITY' then ATOXGR =
'Grade 1';
                    else if index(FASTRESC,'REPEATED USE OF OVER-THE-COUNTER PAIN
RELIEVER > 24 HOURS OR SOME INTERFER')>0 then ATOXGR = 'Grade 2';
                    else if FASTRESC = 'ANY USE OF PRESCRIPTION PAIN RELIEVER OR
PREVENTS DAILY ACTIVITY' then ATOXGR = 'Grade 3';

                    %ATOXGR();
                end;
                if paramcd in ('FATIGUE','MYALGIA','ARTHRALG') then do;
                    if FASTRESC = 'NONE' then ATOXGR = 'Grade 0';
                    if FASTRESC = 'NO INTERFERENCE WITH ACTIVITY' then ATOXGR = 'Grade
1';
                        if FASTRESC = 'SOME INTERFERENCE WITH ACTIVITY' then ATOXGR =
'Grade 2';
                            if FASTRESC = 'SIGNIFICANT; PREVENTS DAILY ACTIVITY' then ATOXGR =
'Grade 3';

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        %ATOXGR();
    end;
    if paramcd = 'NAUSEA' then do;
        if FASTRESC = 'NONE' then ATOXGR = 'Grade 0';
        if FASTRESC= 'NO INTERFERENCE WITH ACTIVITY OR 1-2 EPISODES/24
HOURS' then ATOXGR = 'Grade 1';
        if FASTRESC= 'SOME INTERFERENCE WITH ACTIVITY OR >2 EPISODES/24
HOURS' then ATOXGR = 'Grade 2';
        if FASTRESC= 'PREVENTS DAILY ACTIVITY, REQUIRES OUTPATIENT IV
HYDRATION' then ATOXGR = 'Grade 3';

        %ATOXGR();
    end;
    if paramcd = 'CHILLS' then do;
        if FASTRESC = 'NONE' then ATOXGR = 'Grade 0';
        if FASTRESC = 'NO INTERFERENCE WITH ACTIVITY' then ATOXGR = 'Grade
1';
        if FASTRESC = 'SOME INTERFERENCE WITH ACTIVITY NOT REQUIRING
MEDICAL ATTENTION' then ATOXGR = 'Grade 2';
        if FASTRESC = 'PREVENTS DAILY ACTIVITY AND REQUIRES MEDICAL
ATTENTION' then ATOXGR = 'Grade 3';

        %ATOXGR();
    end;
    if paramcd = 'RASH' then do;
        %ATOXGR();
    end;
    if not missing(ATOXGR) then ATOXGRN = input(substr(ATOXGR,7,1), best.);

    *** CRIT1-CRIT4 ***;
    length CRIT1FL CRIT2FL CRIT3FL CRIT4FL $1 CRIT1 CRIT2 CRIT3 CRIT4 $20;
    if paramcd = 'FEVER' and not missing(aval) then do;
        if (9*aval/5)+32 > 104.1 then do;
            CRIT4FL = 'Y';
            CRIT4 = '> 104.1 degrees F';
        end;
        if (9*aval/5)+32 > 103.6 then do;
            CRIT3FL = 'Y';
            CRIT3 = '> 103.6 degrees F';
        end;
        if (9*aval/5)+32 > 103.1 then do;
            CRIT2FL = 'Y';
            CRIT2 = '> 103.1 degrees F';
        end;
        if (9*aval/5)+32 > 102.6 then do;
            CRIT1FL = 'Y';
            CRIT1 = '> 102.6 degrees F';
        end;
    end;
end;

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*** PARCAT1 ***;
length PARCAT1 $50;
if ar1 then do;
    if FASCAT = 'ADMINISTRATION SITE' then PARCAT1 = 'LOCAL';
    else parcat1 = strip(fascap);
    if upcase(paramcd) = 'RASH' then parcat1 = 'SYSTEMIC';
    if upcase(paramcd) = 'LYMPHOCC' then parcat1 = 'LOCAL';
end;
if ar2 then do;
    parcat1 = strip(vsscatt);
end;

*** PARCAT1N ***;
if parcat1 = 'LOCAL' then PARCAT1N = 1;
else if parcat1 = 'SYSTEMIC' then parcat1N = 2;

***ASTAT ***;
length ASTAT $20;
if ar1 then ASTAT = strip(fastat);
if ar2 then ASTAT = strip(vssstat);

*** LYPHPEVL, SREVLFL ***;
length LYPHPEVL SREVLFL $1;
if not missing(_LYPHEVL) then LYPHPEVL = strip(_LYPHEVL);
if not missing(_SREVL) then SREVLFL = strip(_SREVL);

*** LYMPHCOM, SRCOMM ***;
if LYMPHCOM = '' then LYMPHCOM = strip(LYMPHCOM);
if SRCOMM = '' then SRCOMM = strip(SRCOMM);

if (ar1 and ASTAT = 'NOT DONE') or (ar2 and paramcd='FEVER' and ASTAT =
'NOT DONE') then delete;

*** MEDTAKP, MEDTAKT, MEDTAK ***;
length MEDTAKP MEDTAKT MEDTAK $1;
if not missing(_MEDTAKP) then MEDTAKP = strip(_MEDTAKP);
if not missing(_MEDTAKT) then MEDTAKT = strip(_MEDTAKT);
if not missing(_MEDTAK) then MEDTAK = strip(_MEDTAK);

if FAEVAL='STUDY SUBJECT' or (PARAMCD='FEVER' and FAEVAL='') then ANL01_CHK
= 0;
else ANL01_CHK = 1;

if AVALC = 'Y' then AVALC_CHK = 0;
else AVALC_CHK = 1;

format ADT Date9. ATM time5. ADTM datetime15.;

drop _: fadtc9 fadtn fatmc vsdct9 vsdtn vstmc ;

run;

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*ANL02FL derivation;
proc sort data = ar3;
    by usubjid parcat1 paramcd atptref atptn descending ATOXGRN ANL01_CHK
    AVALC_CHK adt adtm;
run;

*** ANL02FL***;
data ar3_1 ar3_2;
    set ar3;
    if paramcd not in ('RASHOCC' 'LYMPHOCC') then output ar3_1;
    else output ar3_2;
run;

data ar3_1;
    set ar3_1(where = (~missing(atoxgrn)));
    by usubjid parcat1 paramcd atptref atptn descending ATOXGRN ANL01_CHK
    AVALC_CHK adt adtm;
    if first.atptn then ANL02FL = 'Y';
run;

data ar3_2;
    set ar3_2;
    by usubjid parcat1 paramcd atptref atptn descending ATOXGRN ANL01_CHK
    AVALC_CHK adt adtm;
    if first.atptn then ANL02FL = 'Y';
run;

data ar3_anl02fl;
    set ar3_1 ar3_2;
    keep usubjid parcat1 paramcd atptref atptn adt adtm srcseq atoxgrn anl01_chk
    avalc_chk anl02fl;
run;
proc sort data=ar3_anl02fl; by usubjid parcat1 paramcd atptref atptn adt adtm
srcseq; run;
proc sort data=ar3; by usubjid parcat1 paramcd atptref atptn adt adtm srcseq; run;

data ar3;
    merge ar3 ar3_anl02fl;
    by usubjid parcat1 paramcd atptref atptn adt adtm srcseq atoxgrn anl01_chk
    avalc_chk;
run;
proc sort data = ar3;
    by usubjid parcat1 paramcd atptref atptn adt adtm srcseq;
run;

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data adar;
    set ar3;
    by usubjid parcat1 paramcd atptref atptn adt adtm srcseq;
    retain aseq;
    if first.usubjid then aseq = 1;
    else aseq = aseq + 1;
run;

proc freq data=adar; tables param*paramcd /list missing; run;

*** ANL01FL***;
data adar1 adar2;
    set adar;
    if paramcd in ('RASHOCC','LYMPHOCC') then output adar1;
    else output adar2;
run;

data anl01fla;
    set adar1;
    if not missing(avalc);
    keep usubjid param atptref atptgr1 avalc adt aseq ANL01_CHK AVALC_CHK;
run;

proc sort data=anl01fla; by usubjid param atptref atptgr1 AVALC_CHK ANL01_CHK
avalc adt aseq; run;

data anl01fla;
    set anl01fla;
    by usubjid param atptref atptgr1 AVALC_CHK ANL01_CHK avalc adt aseq;
    if first.atptgr1;
    anl01fl = 'Y';
    keep usubjid param atptref atptgr1 avalc adt aseq anl01fl;
run;

proc sort data=anl01fla; by usubjid param atptref atptgr1 adt aseq avalc; run;

data anl01flb;
    set adar2;
    if not missing(atoxgrn);
    keep usubjid param atptref atoxgrn atptgr1 adtm adt aseq ANL01_CHK
AVALC_CHK;
run;

proc sort data=anl01flb; by usubjid param atptref atptgr1 descending atoxgrn
descending AVALC_CHK ANL01_CHK adt ANL01_CHK adtm aseq; run;

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data anl01flb;
    set anl01flb;
    by usubjid param atptref atptgr1 descending atoxgrn descending AVALC_CHK
ANL01_CHK adt adtm aseq;
    if first.atptgr1;
    anl01fl = 'Y';
    keep usubjid param atptref atptgr1 atoxgrn adtm adt aseq anl01fl;
run;

proc sort data=adar1; by usubjid param atptref atptgr1 adt aseq avalc; run;

data adar1;
    merge adar1(in=a) anl01fla(in=b);
    by usubjid param atptref atptgr1 adt aseq avalc;
    if a;
run;

proc sort data=adar2; by usubjid param atptref atptgr1 adtm adt aseq atoxgrn; run;

proc sort data=anl01flb; by usubjid param atptref atptgr1 adtm adt aseq atoxgrn;
run;

data adar2;
    merge adar2(in=a) anl01flb(in=b);
    by usubjid param atptref atptgr1 adtm adt aseq atoxgrn;
    if a;
run;

data adar;
    set adar1 adar2;
run;

proc freq data=adar; tables parcat1n*parcat1*paramcd /list missing; run;

proc freq data=adar; tables SRCDOM /list missing; run;

proc sort data=adar; by usubjid atptref; run;

%trta(dsname=adar);

proc freq data=adar; tables atptref*trta*trtan /list missing; run;

proc freq data=adar; tables srcdom*atptn*atpt /list missing; run;

%ADaM_Dataset_Update(
    ds=ADAR
    ,libin=WORK
    ,libout=output

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```
,adsl1lib=ADB  
,addcomvar=Y  
,addseq=N  
,dropinfmt=Y  
,mapspecfile= &ADAM_SPEC  
,maploc=&ADAM_SPEC_LOC  
,debug=N);
```