

```

data oud;
set alloud;
if site_Id=44 then site_id=43; /*Medical Center of the Rockies-crosses with PVH to PVH*/
if site_id=54 then site_id=53; /*Baystate Mary Lane to Baystate Wing*/
if site_id=32 then site_id=31; /*UAB-Highlands to UAB-Main*/
;
run;

/*covariate constrained randomization*/
proc format;
value system 1="Yale"
             2="UNC"
             3="UAB"
             4="Colorado"
             5="Baystate"
;

data RCT;
set RCT_temp;
if count=1 then site_id=11; /*SRC*/
if count=2 then site_id=12; /*Bridgeport*/
if count=3 then site_id=13; /*L&M*/
if count=4 then site_id=14; /*Greenwich*/
if count=5 then site_id=21; /*UNC main*/ /*Academic*/
if count=6 then site_id=22; /*Chatham*/
if count=7 then site_id=23; /*Rex*/
if count=8 then site_id=24; /*Smithfield*/
if count=9 then site_id=25; /*UNC-Nash*/
if count=10 then site_id=31; /*UAB Main*/ /*Academic*/
if count=11 then site_id=33; /*UAB Gardendale*/
if count=12 then site_id=41; /*AMC*/ /*Academic*/
if count=13 then site_id=42; /*Memorial central*/
if count=14 then site_id=43; /*Poudre Valley*/
if count=15 then site_id=51; /*Baystate Springfield*/ /*Academic*/
if count=16 then site_id=52; /*Baystate Franklin*/
if count=17 then site_id=53; /*Wing*/
if count=18 then site_id=55; /*Noble*/

if _Other_providers_in_ED__EM_resid="EM residents" then _Other_providers_in_ED__EM_resid="EM Residen

%let RCTlist=
_EHR_vendor
_Community_or_academic
_Rural__Suburban__Urban
_Other_providers_in_ED__EM_resid
_Annual_Volume_Cat
_DATA_waiver_cat__2__2_or_more_
_Distance_Cat__2__2_
;

proc sort data=rct; by site_id;
proc sort data=oud; by site_id;

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data OUDnew;
merge OUD RCT(keep=site_id Randomization_Arm__1__Intervent Site);
by site_id;
run;

proc freq data=oudNew;
table Randomization_Arm__1__Intervent*oud;
run;

/*3443 vs 3820 = 7263 OUD visits*/
proc freq data=OUDnew;
tables Attending_Of_Record_Prov_ID;
run;
/*320 OUD vist with missing ID*/

proc sort data=OUDnew nodupkey out=Drs; by Attending_Of_Record_Prov_ID; run;

/*Step 1: cross over physician*/
/*Attendings on arm1*/
proc sort data=OUDnew(where=(Randomization_Arm__1__Intervent=1)) nodupkey out=DrINT; by Attending_0
/*352*/

proc sort data=OUDnew (where=(Randomization_Arm__1__Intervent=2)) nodupkey out=DrCTL; by Attending_
/*338*/

/*crossover physicians*/
/*How many cross-over*/
data crossDr;
merge DrINT(in=a) DrCTL(in=b);
by Attending_Of_Record_Prov_ID;
if a and b;
crossDr=1;
run;
/*55 (54 indeed, one is -99999), need to add two more who crossed over after day 540*/

proc sort data=oudNew; by Attending_Of_Record_Prov_ID; run;
data CrossTemp;
merge crossDr(in=a keep=Attending_Of_Record_Prov_ID crossDr) OudNew ;
by Attending_Of_Record_Prov_ID;
run;

data noCrossCTL;
set Crosstemp;
if crossDr=1 and Randomization_Arm__1__Intervent=2 then delete;
if Attending_Of_Record_Prov_ID in ('1111035', '110517') and Randomization_Arm__1__Intervent=2 then d
run;
/*6220*/
proc freq; tables Randomization_Arm__1__Intervent; run;

/*Step 2: duplicate*/
proc sort data=noCrossCTL; by Demographics_UId Arrival_Dt Arrival_Hr; run;
proc sort data=noCrossCTL nodupkey out=firstED_Haseena; by Demographics_UId; run;
/*5126: same number as Harini's subject level data*/
proc freq; tables Randomization_Arm__1__Intervent; run;

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OPTIONS FORMCHAR=" | - - - - | + | - - - - + = | - / \ < > * " ;

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proc format;  
value randfor 1="Intervention" 2="Usual Care";  
value hcsfor 40='Colorado' 50='Baystate' 30='UAB' 10= 'Yale' 20='UNC';  
run;
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proc format;  
value rangewk  
0-6='WK 01 '  
7-13='WK 02 '  
14-20='WK 03 '  
21-27='WK 04 '  
28-34='WK 05 '  
35-41='WK 06 '  
42-48='WK 07 '  
49-55='WK 08 '  
56-62='WK 09 '  
63-69='WK 10 '  
70-76='WK 11 '  
77-83='WK 12 '  
84-90='WK 13 '  
91-97='WK 14 '  
98-104='WK 15 '  
105-111='WK 16 '  
112-118='WK 17 '  
119-125='WK 18 '  
126-132='WK 19 '  
133-139='WK 20 '  
140-146='WK 21 '  
147-153='WK 22 '  
154-160='WK 23 '  
161-167='WK 24 '  
168-174='WK 25 '  
175-181='WK 26 '  
182-188='WK 27 '  
189-195='WK 28 '  
196-202='WK 29 '  
203-209='WK 30 '  
210-216='WK 31 '  
217-223='WK 32 '  
224-230='WK 33 '  
231-237='WK 34 '  
238-244='WK 35 '  
245-251='WK 36 '  
252-258='WK 37 '  
259-265='WK 38 '  
266-272='WK 39 '  
273-279='WK 40 '  
280-286='WK 41 '  
287-293='WK 42 '  
294-300='WK 43 '  
301-307='WK 44 '  
308-314='WK 45 '  
315-321='WK 46 '
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322-328='Wk 47'
329-335='Wk 48'
336-342='Wk 49'
343-349='Wk 50'
350-356='Wk 51'
357-363='Wk 52'
364-370='Wk 53'
371-377='Wk 54'
378-384='Wk 55'
385-391='Wk 56'
392-398='Wk 57'
399-405='Wk 58'
406-412='Wk 59'
413-419='Wk 60'
420-426='Wk 61'
427-433='Wk 62'
434-440='Wk 63'
441-447='Wk 64'
448-454='Wk 65'
455-461='Wk 66'
462-468='Wk 67'
469-475='Wk 68'
476-482='Wk 69'
483-489='Wk 70'
490-496='Wk 71'
497-503='Wk 72'
504-510='Wk 73'
511-517='Wk 74'
518-524='Wk 75'
525-531='Wk 76'
532-538='Wk 77'
539-545='Wk 78'
546-552='Wk 79'
553-559='Wk 80'
560-566='Wk 81'
567-570='Wk 81.5'

;

value rangemonth
0-30='Month 1'
31-60='Month 2'
61-90='Month 3'
91-120='Month 4'
121-150='Month 5'
151-180='Month 6'
181-210='Month 7'
211-240='Month 8'
241-270='Month 9'
271-300='Month 10'
301-330='Month 11'
331-360='Month 12'
361-390='Month 13'
391-420='Month 14'
421-450='Month 15'
451-480='Month 16'
481-510='Month 17'

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511-540='Month 18'
541-570='Month 19'
;

value quarter
0-90    ='Quarter 1'
91-180  ='Quarter 2'
181-270 ='Quarter 3'
271-360 ='Quarter 4'
361-450 ='Quarter 5'
451-570 ='Quarter 6'
;

value split
0-95    ='Q1'
96-190  ='Q2'
191-285 ='Q3'
286-380 ='Q4'
381-475 ='Q5'
476-570='Maintenance'
;
run;
/*Wk 69 only has 5 days*/

/*****Subject level data will be used for primary analysis*****/
data subjectLevel;
set x.keepssubjects_aug2021;
if Arrival_Dt > 540 then delete; /*up to 18 months*/

if race="other pacific islander" then race="native hawaiian or other pacific islander";
else if race="other/not listed" then race="other";
else if race="patient refused" then race="Unknown or Not Reported";
else if race in ("unknown","patient refused", "-99999") then race="Unknown or Not Reported";

if ethnicity in ("unknown","patient refused", "-99999" ) then ethnicity="Unknown or Not Reported";
if insurance_class = ("-99999") then insurance_class="Unknown or Not Reported";

if Narcan_Inpatient=-99999 then Narcan_Inpatient=.;
if Narcan24Mo not in (1,2) then Narcan24Mo=.;

if On_CS_Med = -99999 then On_CS_Med=.;

label OUD_Dx="Phenotype";
label Narcan_Inpatient="Naloxone prescribed during encounter as inpatient medication";
label Narcan24Mo="Prescribed Naloxone within past 24 months";
label PL_OUD_Dx="OUD Diagnosis on Problems List at time of encounter";

run;
/*5126 unique OUD patients*/

proc contents data=subjectLevel varnum; run;
proc sort data=subjectLevel nodupkey; by Demographics_UId Arrival_Dt /*Arrival_Dt*/; run;
/*no duplicates: 5126*/

/*****Care team*****/

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data careTeam;
set x.edata_care_teams;
if Arrival_Dt > 540 then delete; /*up to 18 months*/
run;
/*18337*/

/*Find team_relation for each attending_id*/
data teamRole;
set careTeam;
where prov_id ne "-99999";
rename prov_id=Attending_Of_Record_Prov_ID;
keep prov_id Team_Relation;
run;

proc sort data=TeamRole nodupkey; by Attending_Of_Record_Prov_ID; run;
/*1425 unique provide ID with a role (title)*/

/*how many encounters are by nurse*/
proc sort data=subjectLevel; by Attending_Of_Record_Prov_ID; run;

Data FirstEncounters noTeamRol;
merge subjectLevel(in=a) teamRole(in=b);
by Attending_Of_Record_Prov_ID;
if a then output FirstEncounters;          /*5126*/
if a and not b then output noTeamRol;      /*650 provider ID (include duplicates) not have a team r
run;

proc freq data=FirstEncounters;
tables team_relation/missing;
run;
/*From Ted: exclude 31+27 encounters*/

proc sort data=noTeamROL nodupkey; by Attending_Of_Record_Prov_ID; run;
/*118 (exclue -99999) attending ID without role*/

/*provider data*/
proc format;
*value randfor 1="Intervention" 2="Control";
value hcsfor 40='Colorado' 50='Baystate' 30='UAB' 10= 'Yale' 20='UNC';
value provgen 1='Female' 2='Male' 0='Unknown';
value provage
  0='Unknown'
  1='<35'
  2='35-44'
  3='45-54'
  4='55-64'
  5='>64';
value newProvage
  0='Unknown'
  1='<35'
  2='35-44'
  3='45+'
  ;
value ptAge
  1='18-25'
  2='26-55'

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3='56+'
;
value provwaiv
1='No'
2='Yes, before trial started'
3='Yes, received Nov 2019-Jan 2020'
4='Yes, received Feb-Apr 2020'
5='Yes, received May-Jul 2020'
6='Yes, received Aug-Oct 2020'
7='Yes, received Nov 2020-Jan 2021'
8='Yes, received Feb-Apr 2021';
value siteid
10='Yale'
20='University of North Carolina'
30='University of Alabama-Birmingham'
40='Colorado'
50='Baystate'
100='Universal Access';

value numb
1="<5"
2="5-20"
3="20+"
;

value xw
0="Unknown"
1="Not waived"
2="Before trial"
3="During trial"
;
run;

/*****Provider demographics etc*****/
data provider;
set x.prov_demographics;
newID=Healthcare_System_UId||"- "||prov_id;
if age_code in (3,4,5) then provide_age_new=3;
else provide_age_new=age_code;
format Age_Code provage. Gender provgen. XWaiver_Stat_Code provwaiv. Healthcare_System_UId siteid.
provide_age_new newProvage.;
run;
/*530: 34928 and 8916 */

/*Check to confirm whether weived physican could be PA/NP*****/
proc sort data=provider; by Prov_Id;
proc sort data=FirstEncounters; by Attending_Of_Record_Prov_ID;

data ckk;
merge provider(in=a rename=(prov_id=Attending_Of_Record_Prov_ID) drop=gender)
      FirstEncounters (in=b where=(team_relation in ('Nurse Practitioner','Physician Assistant')));
by Attending_Of_Record_Prov_ID;
if b;
run;
/*68*/

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proc freq data=ckk;
tables team_relation*XWaiver_Stat_Code/list missing;
run;
/*9 "no" are PA. No "yes" are PA*/
/*No problem*/

/*Create dataset for attending provider*/
/*Number of attending*/
proc sort data=FirstEncounters (where=(Attending_Of_Record_Prov_ID ne "-99999" and
team_relation not in ('Nurse Practitioner','Physician Assistant'))) nodupkey out=attendCK; by Health
/*599*/

/*number of ED OUD patients*/
proc freq data=FirstEncounters;
where Attending_Of_Record_Prov_ID ne "-99999" and
team_relation not in ('Nurse Practitioner','Physician Assistant');
tables Rand_Arm*Healthcare_System_Uid*Attending_Of_Record_Prov_ID/list out=ckatt(drop=PERCENT);
run;
/*variable count in data ckatt is number of OUD visits each ID had*/

data Attend599;
set ckatt;

/*
if Healthcare_System_Name="Yale" then sysID=10;
if find(Healthcare_System_Name,"Carolina") then sysID=20;
if find(Healthcare_System_Name,"Alabama") then sysID=30;
if Healthcare_System_Name="Colorado" then sysID=40;
if find(Healthcare_System_Name,"Baystate") then sysID=50;
if find(Healthcare_System_Name,"Universal Access") then sysID=100;
*/

newID=Healthcare_System_Uid||"-"||Attending_Of_Record_Prov_ID;
run;

proc freq data=attend599; tables Healthcare_System_Uid newID ; run;

proc sort data=provider; by newID;
proc sort data=Attend599; by newID; run;

data attendings;
merge Attend599(keep=newID Healthcare_System_Uid Attending_Of_Record_Prov_ID count Rand_Arm in=a)
provider(in=b)
;
by newID;
if a;

if XWaiver_Stat_Code=-99999 then XWaiver_Stat_Code=.;
else if XWaiver_Stat_Code in (1,2) then xwaiver= XWaiver_Stat_Code;
else if XWaiver_Stat_Code > 2 then xwaiver=3; /*waived during study*/

if count <5 then patient_num=1;
else if count <21 then patient_num=2;
else if count > 20 then patient_num=3;

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format patient_num numb. xwaiver xw.;
run;

/*two different system*/
proc print data=provider;
where prov_id in ("34928","8916");
run;

/*two providers are not from first visit*/
/*
Obs prov_id Prov_Demographics_UId Gender Healthcare_System_UId Age_Code XWaiver_Stat_Code Entry_Date
1 110598 152 Female University of North Carolina <35 Yes, received Aug-Oct 2020 05JUL2021:11:37:57.4
2 20159442 199 Male University of North Carolina 35-44 Yes, received Aug-Oct 2020 05JUL2021:11:38:09

Three?
Obs prov_id Team_Relation Prov_Demographics_UId Gender Healthcare_System_UId Age_Code XWaiver_Stat_C
1 110598 152 Female University of North Carolina <35 Yes, received Aug-Oct 2020 05JUL2021:11:37:57
2 20159442 199 Male University of North Carolina 35-44 Yes, received Aug-Oct 2020 05JUL2021:11:38:
3 45051 334 Male Colorado 55-64 No 05JUL2021:11:39:38.617

*/

/*****Use new data:3/3/2022*****/
/*BUP admin and RX*/
data bup_inED;
set x.edata_bup_in_ed;
if Arrival_Dt > 540 then delete; /*up to 18 months*/
BUP_ED=1;
if site_Id=44 then site_id=43; /*Medical Center of the Rockies-crosses with PVH to PVH*/
if site_id=54 then site_id=53; /*Baystate Mary Lane to Baystate Wing*/
if site_id=32 then site_id=31; /*UAB-Highlands to UAB-Main*/
if ED_BUP_Description="nalOXONE" then delete;
run;
/*779*/
proc freq data=bup_inEd;
tables
Arrival_Dt
ED_BUP_Description
ED_BUP_Mar_Action
ED_BUP_Time
;
run;

proc sort data=BUP_inED; by Demographics_UId Arrival_Dt Arrival_Hr; run;

proc print data=bup_inED; where Demographics_UId=865; run;

proc sort data=BUP_inED nodupkey out=bup_inED_noDup; by Demographics_UId Arrival_Dt /*Arrival_Hr*/;
/*592: same arrival hour may have more than one BUP admin*/

data bup_rx;
set x.edata_bup_rx;
if Arrival_Dt > 540 then delete; /*up to 18 months*/
BUP_rx_new=1;
if site_Id=44 then site_id=43; /*Medical Center of the Rockies-crosses with PVH to PVH*/
if site_id=54 then site_id=53; /*Baystate Mary Lane to Baystate Wing*/

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if site_id=32 then site_id=31; /*UAB-Highlands to UAB-Main*/
if BUP_Rx_Description in ("Acetaminophen","Albuterol","Cephalexin","Gabapentin","Methadone","Tramadol",
"Clonidine", "Docusate","Loratadine","Lorazepam","MethylPREDNISolone","Neomycin/Colistin/Hydrocortis",
"Ondansetron","Oxymetazoline Nasal")
then delete;
run;
/*885*/

proc sort data=BUP_Rx; by Demographics_UserId Arrival_Dt Arrival_Hr; run;
proc print data=BUP_rx; where Demographics_UserId in (865,309, 192); run;

proc sort data=BUP_rx nodupkey out=BUP_rx_noDup; by Demographics_UserId Arrival_Dt Arrival_Hr;run; /*66

Data BUP_comb_temp;
merge BUP_rx_noDUP(drop=Entry_date -- Deleted_reason in=a)
      BUP_inED_noDUP(drop=Entry_date -- Deleted_reason in=b)
      ;
by Demographics_UserId Arrival_Dt Arrival_Hr;
*if a and b;
run;
/*353 overlap (may have duplicates)/900*/
proc print; run;

proc sort data=Firstencounters; by Demographics_UserId Arrival_Dt Arrival_Hr;

data BUP_comb_temp1;
merge BUP_comb_temp Firstencounters(in=a keep=Demographics_UserId Arrival_Dt Arrival_Hr);
by Demographics_UserId Arrival_Dt Arrival_Hr;
if a;
run;
/*5126*/

proc freq data=bup_comb_temp1;
tables BUP_ED*BUP_rx_new/missing;
run;

proc sort data=Firstencounters; by Demographics_UserId; run;
data one5126;
merge /*subjectLevel*/ Firstencounters
      bup_comb_temp1(keep=Demographics_UserId BUP_ED BUP_rx_new BUP_Rx_Ord_Prov_Id
BUP_Rx_Authrzing_Prov_Id ED_BUP_Presc_Prov_Id ED_BUP_Ord_Prov_Id BUP_Rx_Description ED_BUP_Descripti
/*one(keep=Demographics_UserId tot_bupRx any_bupRx)*/ ;
by Demographics_UserId;
if first.Demographics_UserId then count=0;
count+1;
month=arrival_dt;
quarter=arrival_dt;
split=arrival_dt;
*if Attending_Of_Record_Prov_ID = "-99999" then delete; /*missing attending ID*/

if site_Id=44 then site_id=43; /*Medical Center of the Rockies-crosses with PVH to PVH*/
if site_id=54 then site_id=53; /*Baystate Mary Lane to Baystate Wing*/
if site_id=32 then site_id=31; /*UAB-Highlands to UAB-Main*/

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format arrival_dt rangewk.;
format month rangemonth.;
format quarter quarter.;
format split split.;
run;
/*5126 patients/encounters: each patient counted once */
proc sort data=one5126; by Healthcare_System_UId Attending_Of_Record_Prov_ID; run;
proc sort data=attendings; by Healthcare_System_UId Attending_Of_Record_Prov_ID; run;

data final_temp;
merge one5126 attendings(rename=(gender=provider_gender));
by Healthcare_System_UId Attending_Of_Record_Prov_ID;
if Attending_Of_Record_Prov_ID = "-99999" or
team_relation in ('Nurse Practitioner','Physician Assistant') then delete;
run;

/*Merge with RCT to include constrained covariates*/
proc sort data=RCT; by site_id;
proc sort data=final_temp; by site_id;

data final;
length race_pt $50. insurance $50.;
merge final_temp RCT;
by site_id;
if race='white or caucasian' then race_pt="White";
else if race='black or african american' then race_pt="Black";
else race_pt="Others";

if Insurance_class in ("Other", "Unknown or Not Reported", "") then Insurance="Other";
else Insurance=Insurance_class;

if team_relation = "" then team_relation="Unknown";
if provider_gender =. then provider_gender=0;
if age_code=. then age_code=0;
if xwaiver=. then xwaiver=0;

Narcans=(Narcans_Outpatient=1);/*<1% missing, treated as no*/

EMBED=(intervention=1);
if bup_rx_new=. then bup_rx_new=0;
if bup_ed=. then bup_ED=0;

if BUP_ed=1 or BUP_rx_new=1 then bupRX=1;
else bupRX=0;

if Attending_Of_Record_Prov_ID in ("34928","8916") then Attending_Of_Record_Prov_ID=Healthcare_Syste

run;
/*5047*/
proc sort data=colorado; by Demographics_UId;
proc sort data=final; by Demographics_UId; run;

data final_update_1;
update final colorado(keep=Demographics_UId intervention);
by Demographics_UId;

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run;
PROC IMPORT OUT= colorado_new
      DATAFILE= "Y:\PI Folder\Melnick Ted\EMBED\Analysis 2021, Fangyong\Documentation and email
\Haseena 4_6_2022 CO resaved.xlsx"
      DBMS=EXCEL REPLACE;
      sheet="sheet1$";
      GETNAMES=YES;
      MIXED=NO;
      SCANTEXT=YES;
      USEDATE=YES;
      SCANTIME=YES;
RUN;
/*5047 107*/

/*only need to updated colorado ethnicity*/
data final_update;
length ethn_new $25.;
merge final_update_1 colorado_new(keep=Demographics_UId Updated_Ethnicity);
by Demographics_UId;
if Healthcare_System_UId=40 then
do;
  if updated_ethnicity in ("Hispanic", "hispanic or latino") then ethn_new="hispanic or latino";
  else if updated_ethnicity in ("Unknown", "unknown") then ethn_new="Unknown or Not Reported";
  else ethn_new="non-hispanic";
end;
else ethn_new=ethnicity;

run;
```