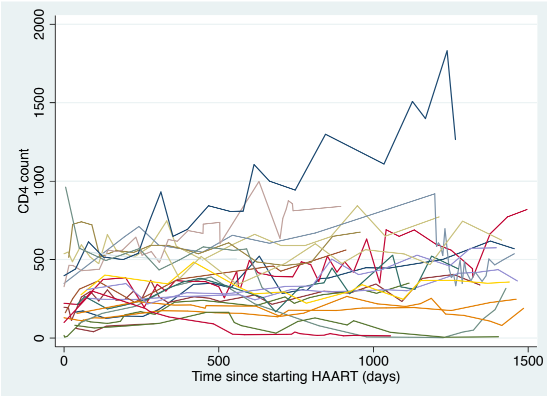

Longitudinal Data
Fall 2015

Chapter 7, part 3

Mixed, Random Effects, Random Coefficients, Multilevel, …**Models**

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General Mixed Model for Logistic Regression - Theoretically

- Similar to linear model, can be generally described as a model with the logit of the probability of the outcome conditional on covariates and the specific unit (and possibly sub-unit).

- Consists of parameters (β)*covariates($X_{ijk..}$) and random variables(U_i)*covariates($Z_{ijk..}$), where usually $Z_{ijk..}$ is a subset of $X_{ijk..}$.

$$\operatorname{logit}\left[P(Y_{ijk...} = 1 \mid \vec{X}_{ijk..}, \vec{U}_i, \vec{Z}_{ijk...})\right] = \vec{X}^T{}_{ijk..}\vec{\beta} + \vec{Z}^T{}_{ijk...}\vec{U}_i$$

General Mixed Model for Logistic Regression - Theoretically

- Assumption is typically U_i~MVN($0,\Sigma$).

- Solve using MLE -

$$L_{\beta,\Sigma}(\vec{Y}_{i.} \mid \mathbf{X}_i) = \int_{\vec{U}_i} P(Y_i \mid \mathbf{X}_i, \mathbf{Z}_i, \vec{U}_i) dP(\vec{U}_i)$$

General Mixed Model for Logistic Regression - Practically

Like linear mixed models, one can use these models to:

1. Introduce complicated correlation structures to account for repeated measures structures.
2. Model source of variation at different hierarchical levels.
3. Get estimates of *within unit* associations as opposed as population average associations (from GEE models).
4. Predict random effects.

- Use xtmelogit in STATA.

Random Effects Model for Teenage Sex and Drug-Use

$$\log it[P(Y_{ij}=1 \mid \beta_{0i}, X_{ij}=x_{ij})] = \log\left(\frac{P(Y_{ij}=1 \mid \beta_{0i}, X_{ij}=x_{ij})}{P(Y_{ij}=0 \mid \beta_{0i}, X_{ij}=x_{ij})}\right) = \beta_0^* + \beta_{0i} + \beta_1^* x_{ij}$$

- Assume that the repeated observations for the ith teenager are independent of one another given β_{i0} and X_{ij}.

- Must assume parametric distribution for the β_{i0} , usually β_{i0} ~N(0,τ^2).

- exp(β_1*) is odds ratio for having sex infection when subject *i* reports drug-use relative to when same subject does not report drug-use.

Teenage Sex and Drug-Use

Number of observations per teen

```
tab cattot if cnt==1
```

Total # Obs per teen	Freq.	Percent	Cum.
1-10	35	31.82	31.82
11-20	22	20.00	51.82
21-30	48	43.64	95.45
>31	5	4.55	100.00
Total	110	100.00	

Proportion of days with Sexual Activity by Number of observations total on a teen

Total # Obs per teen	sx24hrs no	sx24hrs yes	Total
1-10	98	68	166
	59.04	40.96	100.00
11-20	225	100	325
	69.23	30.77	100.00
21-30	928	291	1,219
	76.13	23.87	100.00
>31	156	43	199
	78.39	21.61	100.00
Total	1,407	502	1,909
	73.70	26.30	100.00

Proportion of days with Drug/Alcohol use by Number of observations total on a teen

Total # Obs per teen	drgalcoh no	yes	Total
1-10	88	68	156
	56.41	43.59	100.00
11-20	205	112	317
	64.67	35.33	100.00
21-30	840	256	1,096
	76.64	23.36	100.00
>31	118	21	139
	84.89	15.11	100.00
Total	1,251	457	1,708
	73.24	26.76	100.00

```
. cs sx24hrs drgalcoh, or

                 | drgalcoh                 |
                 |   Exposed   Unexposed    |      Total
-----------------+--------------------------+------------
           Cases |       171         320    |        491
        Noncases |       286         931    |       1217
-----------------+--------------------------+------------
           Total |       457        1251    |       1708
                 |                          |
            Risk |  .3741794    .2557954    |   .2874707
                 |                          |
                 |      Point estimate      |    [95% Conf. Interval]
                 |--------------------------+------------------------
 Risk difference |         .1183841         |    .0678575    .1689107
      Risk ratio |         1.462808         |    1.256995    1.702318
 Attr. frac. ex. |         .3163832         |    .2044521    .4125659
Attr. frac. pop  |         .1101864         |
      Odds ratio |         1.739521         |    1.385047    2.184751 (Cornfield)
                 +--------------------------------------------------
                               chi2(1) =    22.90  Pr>chi2 = 0.0000
```

Random effects for teenage sex vs drug use

```
. xtmelogit sx24hrs drgalcoh || eid:,  stddeviations


------------------------------------------------------------------------------
     sx24hrs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    drgalcoh |   .3882629   .1552394     2.50   0.012     .0839993    .6925264
       _cons |   -1.08007   .1537975    -7.02   0.000    -1.381507    -.778632
------------------------------------------------------------------------------
------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
eid: Identity                |
                   sd(_cons) |   1.274216   .1424908      1.023426    1.586462
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =   183.36 Prob>=chibar2 = 0.0000
. lincom drgalcoh, or
------------------------------------------------------------------------------
     sx24hrs | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   1.474417   .2288876     2.50   0.012     1.087628    1.998759
------------------------------------------------------------------------------
```

Random effects for teenage sex vs drug use

```
. estat ic

Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------
       Model |    Obs    ll(null)   ll(model)     df          AIC         BIC
-------------+---------------------------------------------------------------
           . |   1708           .   -921.7965      3     1849.593    1865.922
-----------------------------------------------------------------------------
               Note:  N=Obs used in calculating BIC; see [R] BIC note

. estat icc
Residual intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                         eid |   .3304423   .0494831      .2414885    .4334388
------------------------------------------------------------------------------
```

Random effects for teenage sex vs drug use

- So how do they calculate the ICC?
  - estat command gave ICC = 0.3304423
  - results gave σ^2_u = 1.274216^2 = 1.623626
  - ICC = $\sigma^2_u / (\sigma^2_u + \sigma^2_e)$ → $\boldsymbol{\sigma^2_e}$ **= 3.289867**
  - Where does this number come from?
  - Stata assumes individual errors come from the logistic distribution, mean 0, variance $\pi^2 / 3$ (also parameterized as location 0, scale 1)

Re-do to get Robust SE's with Clustered Bootstrap

```
set seed 123456
bootstrap, cluster(eid) idcluster(newid) group(eid) reps(50): meqrlogit sx24hrs drgalcoh ||
newid:,  stddeviations
(running meqrlogit on estimation sample)

Bootstrap replications (50)
----+--- 1 ---+--- 2 ---+--- 3 ---+--- 4 ---+--- 5
..................................................    50

Mixed-effects logistic regression               Number of obs      =      1708
Group variable: newid                           Number of groups   =       109

                                                Obs per group: min =         1
                                                               avg =      15.7
                                                               max =        33

Integration points =   7                        Wald chi2(1)       =      6.07
Log likelihood = -921.79647                     Prob > chi2        =    0.0138

                                 (Replications based on 109 clusters in eid)
------------------------------------------------------------------------------
             |   Observed   Bootstrap                         Normal-based
     sx24hrs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    drgalcoh |   .3882629   .1576392     2.46   0.014     .0792958    .6972299
       _cons |   -1.08007   .1580662    -6.83   0.000    -1.389874   -.7702655
------------------------------------------------------------------------------

------------------------------------------------------------------------------
                             |   Observed   Bootstrap         Normal-based
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
newid: Identity              |
                  var(_cons) |   1.623626   .4010462      1.000538    2.634743
------------------------------------------------------------------------------
LR test vs. logistic regression: chibar2(01) =   183.36 Prob>=chibar2 = 0.0000
```

Random *coefficients* model for teenage sex vs drug use

$$\log it[P(Y_{ij}=1 \mid \beta_{0i},\beta_{1i},X_{ij}=x_{ij})] = \log\left(\frac{P(Y_{ij}=1 \mid \beta_{0i},\beta_{1i},X_{ij}=x_{ij})}{1-P(Y_{ij}=1 \mid \beta_{0i},\beta_{1i},X_{ij}=x_{ij})}\right) = (\beta_0+\beta_{0i})+(\beta_1+\beta_{1i})x_{ij}$$

```
. meqrlogit sx24hrs drgalcoh || eid: drgalcoh,  stddeviations cov(unstruct)


[a bunch of information removed from here]
------------------------------------------------------------------------------
     sx24hrs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    drgalcoh |   .3287796   .1913386     1.72   0.086    -.0462372    .7037965
       _cons |  -1.077791   .1437309    -7.50   0.000    -1.359498   -.7960831
------------------------------------------------------------------------------
```

Random *coefficients* model for teenage sex vs drug use

$$\log it[P(Y_{ij}=1\,|\,\beta_{0i},\beta_{1i},X_{ij}=x_{ij})]=\log\left(\frac{P(Y_{ij}=1\,|\,\beta_{0i},\beta_{1i},X_{ij}=x_{ij})}{1-P(Y_{ij}=1\,|\,\beta_{0i},\beta_{1i},X_{ij}=x_{ij})}\right)=(\beta_0+\beta_{0i})+(\beta_1+\beta_{1i})x_{ij}$$

```
------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
eid: Unstructured            |
               sd(drgalcoh) |   .7279197   .2996808      .3248241    1.631243
                  sd(_cons) |    1.16517   .1544805      .8985357    1.510926
        corr(drgalcoh,_cons) |   .4527734   .3999896     -.4604965     .900396
------------------------------------------------------------------------------
LR test vs. logistic regression:     chi2(3) =   187.82   Prob > chi2 = 0.0000
. lincom drgalcoh, or
------------------------------------------------------------------------------
     sx24hrs | Odds Ratio   Std. Err.       z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   1.389272   .2658214     1.72   0.086      .9548154    2.021412
------------------------------------------------------------------------------
```

```
 estat ic

Akaike's information criterion and Bayesian information criterion

-----------------------------------------------------------------------------
       Model |        Obs  ll(null)  ll(model)      df         AIC        BIC
-------------+---------------------------------------------------------------
           . |      1708         .   -919.5649       5     1849.13   1876.345
-----------------------------------------------------------------------------
               Note:  N=Obs used in calculating BIC; see [R] BIC note

. estat icc

Conditional intraclass correlation

------------------------------------------------------------------------------
                       Level |        ICC   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
                         eid |   .2921193   .0548321      .1970516    .4096525
------------------------------------------------------------------------------
Note: ICC is conditional on zero values of random-effects covariates.
```

Model	Parameter	Estimate	SE(Naïve)
Simple Random Effects	β_0	-1.08	0.15
	β_1	0.39	0.15
	OR	1.47	0.23
	$SD(\beta_{0i})$	1.27	0.14
	ICC	0.33	0.049
Fit Statistic	AIC	1849.6	
Random Coefficients	β_0	-1.08	0.14
	β_1	0.33	0.19
	OR	1.38	0.27
	$SD(\beta_{0i})$	1.16	0.15
	$SD(\beta_{1i})$	0.73	0.30
	ICC	0.29	0.055
	$Cor(\beta_{0i,}\beta_{2i})$	0.45	0.40
Fit Statistic	AIC	1849.1	

Range of Impacts (defined by odds ratio) of drug/alcohol use on sexual activity

$$\log it[P(Y_{ij}=1 \mid \beta_{0i},\beta_{1i},X_{ij}=x_{ij})] = \log\left(\frac{P(Y_{ij}=1 \mid \beta_{0i},\beta_{1i},X_{ij}=x_{ij})}{1-P(Y_{ij}=1 \mid \beta_{0i},\beta_{1i},X_{ij}=x_{ij})}\right) = (\beta_0+\beta_{0i})+(\beta_1+\beta_{1i})x_{ij}$$

- The estimated IQR of the odds ratios in pop^n is

$$(\exp\{\hat{\beta}_1 - Z_{0.75} * \hat{\sigma}_{\beta_{1i}}\}, \exp\{\hat{\beta}_1 + Z_{0.75} * \hat{\sigma}_{\beta_{1i}}\}) =$$

$$(\exp\{0.33-0.67*0.73\}, \exp\{0.33+0.67*0.73\})$$

```
. display "(" exp(.3287796-invnormal(0.75)*.7279197)    " , "
          exp(.3287796+invnormal(0.75)*.7279197) " )"

.  (.85027557 , 2.2699413 )
```

This interval contains 1.

Random coefficients model adjusting for *history of sexual activity*

Does using a transition model in this context give us more information?

$$\operatorname{logit}[P(Y_{ij}=1 \mid \beta_{0i}, \beta_{1i}, X_{ij}=x_{ij}, \bar{Y}_{i,j-1})] = (\beta_0+\beta_{0i}) + (\beta_1+\beta_{1i})x_{ij} + \beta_2 \bar{Y}_{i,j-1}$$

```
*** Creating "cumulative average"
sort eid time
capture drop cumsum cumprop cumlag
gen cumsum = 0
replace cumsum = sx24hrs if ct==1
by eid: replace cumsum = cumsum[_n-1]+sx24hrs if ct > 1
gen cumprop = cumsum/ct
by eid: gen cumlag = cumprop[_n-1] if ct > 1
replace cumlag = 0 if ct==1
```

Random coefficients model adjusting for *history of sexual activity*

$$\log it[P(Y_{ij}=1 \mid \beta_{0i},\beta_{1i},X_{ij}=x_{ij},\bar{Y}_{i,j-1})]=(\beta_0+\beta_{0i})+(\beta_1+\beta_{1i})x_{ij}+\beta_2\bar{Y}_{i,j-1}$$

```
meqrlogit sx24hrs drgalcoh cumlag || eid: drgalcoh, stddeviations cov(unstruct)
------------------------------------------------------------------------------
     sx24hrs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    drgalcoh |   .3158968   .2025083     1.56   0.119    -.0810122    .7128059
      cumlag |  -.6029536   .5978829    -1.01   0.313    -1.774783    .5688754
       _cons |  -.8357194   .2291452    -3.65   0.000    -1.284836    -.386603
------------------------------------------------------------------------------
 lincom drgalcoh, or
------------------------------------------------------------------------------
     sx24hrs | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         (1) |   1.371489   .2777379     1.56   0.119     .9221824    2.039706
------------------------------------------------------------------------------
```

Compare random effects models

Did adding history of sexual activity to the model predicting sex in the last 24 hours from drug/alcohol use make a statistical difference?

Model	OR	95% CI
Random slope, without cumlag	1.389	(.955, 2.021)
Random slope, with cumlag	1.371	(.922, 2.040)

```
lrtest A B
Likelihood-ratio test
LR chi2(1)  =       0.61
(Assumption: B nested in A)
Prob > chi2 =    0.4333
```

Random Effects Model for Diarrhea Study in Children

$$\log\left(\frac{P(Y_{ijk}=1)}{1-P(Y_{ijk}=1)}\right)=\beta_0+\beta_{0i}+\beta_{0ij}$$

- Measurements made on children (k) within households (j) within villages (i).
- Question of interest: Are households or villages the greatest sources of variation?
  - households – $var(\beta_{0ij})$ or
  - villages – $var(\beta_{0i})$
- Assumes children in same household have same probability of diarrhea.
  - Use meqrlogit in STATA

Random Effects Model for Diarrhea Study in Children

```
xtmelogit diarrhea || vilid: || hhid:,  intpoints(5)

Mixed-effects logistic regression               Number of obs      =     30371

--------------------------------------------------------------------------
                |   No. of       Observations per Group       Integration
 Group Variable |   Groups    Minimum    Average    Maximum      Points
----------------+---------------------------------------------------------
          vilid |       12        610     2530.9       5452           5
           hhid |       95         20      319.7        672           5
--------------------------------------------------------------------------

                                                Wald chi2(0)       =         .
Log likelihood = -8614.8567                     Prob > chi2        =         .

------------------------------------------------------------------------------
    diarrhea |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       _cons |  -2.482402    .082076   -30.25   0.000    -2.643268   -2.321536
------------------------------------------------------------------------------
```

Random Effects Model for Diarrhea Study in Children Variance of Random Effects

```
------------------------------------------------------------------------------
  Random-effects Parameters  |   Estimate   Std. Err.     [95% Conf. Interval]
-----------------------------+------------------------------------------------
vilid: Identity  estim. SD(β0 i)  |
                   sd(_cons) |   .0001116   .0211476      4.8e-166    2.6e+157
-----------------------------+------------------------------------------------
hhid: Identity  estim. SD(β0i j)  |
                   sd(_cons) |   .7594603   .0651984       .641846    .8986268
------------------------------------------------------------------------------
LR test vs. logistic regression:     chi2(2) =   828.69   Prob > chi2 = 0.0000
```

Cluster correlation coefficient (based on latent response model) – not as simple for logistic mixed models as it is for linear

$$\hat{\rho}_{house} = \frac{\hat{\mathrm{var}}(\beta_{0ij})}{\hat{\mathrm{var}}(\beta_{0ij}) + \hat{\mathrm{var}}(\beta_{0i}) + \pi^2/3} = \frac{0.76^2}{0.76^2 + 0.0001^2 + 3.29} = 0.15$$

$$\hat{\rho}_{village} = \frac{\hat{\mathrm{var}}(\beta_{0i})}{\hat{\mathrm{var}}(\beta_{0ij}) + \hat{\mathrm{var}}(\beta_{0i}) + \pi^2/3} = \frac{0.0001^2}{0.76^2 + 0.0001^2 + 3.29} = 0.00$$

Using conditional logistic regression for estimating within unit OR in logistic regression models

Treat Individual as a stratification variable for Teen Sex and Drugs

- For the teen sex and drugs example, we can represent the data on each individual, i, as a simple 2x2 table:

Sex		yes	no	
Drugs	yes	a_i	b_i	
	no	c_i	d_i	
				n_i

- Can get the OR for every subject: $\hat{O}R_i = \frac{a_i d_i}{b_i c_i}$

- $$\log it[P(Y_{ij}=1 \mid \beta_{0i}, X_{ij}=x_{ij})] = \log\left(\frac{P(Y_{ij}=1 \mid \beta_{0i}, X_{ij}=x_{ij})}{P(Y_{ij}=0 \mid \beta_{0i}, X_{ij}=x_{ij})}\right) = \beta_0^* + \beta_{0i} + \beta_1^* x_{ij}$$

assumes every person has the same OR, so one can average each estimated OR to get the estimate.

Mantel-Haenszel Average of Stratified OR's

- Then the MH estimate is:

$$\hat{O}R_{MH} = \exp(\hat{\beta}_1^*) = \frac{\sum_{i=1}^{m} w_i \hat{O}R_i}{\sum_{i=1}^{m} w_i} = \frac{\sum_{i=1}^{m} (a_i d_i)/n_i}{\sum_{i=1}^{m} (b_i c_i)/n_i}$$

- Note, that for any subject who has identical exposure (drug use) or outcomes (sex) for all observations, the OR is undefined and that person does not contribute to the estimate (their 2x2 table are dropped).

Conditional Logistic Regression

$$\log it[P(Y_{ij}=1\mid\beta_{0i},X_{ij}=x_{ij})]=\log\left(\frac{P(Y_{ij}=1\mid\beta_{0i},X_{ij}=x_{ij})}{P(Y_{ij}=0\mid\beta_{0i},X_{ij}=x_{ij})}\right)=\beta_0^*+\beta_{0i}+\beta_1^*x_{ij}$$

- To illustrate, use the teenage sex and drugs example, assume just two observation for a person, and that one had the outcome ($Y_{i1}=1$) with drugs ($X_{i1}=1$) one observation had neither ($Y_{i2}=0$, $X_{i2}=0$).

- Then, the conditional likelihood contribution for this observation is:

$$CondLik_i=\frac{P(Y_{i1}=1\mid X_{i1}=1)P(Y_{i2}=0\mid X_{i2}=0)}{P(Y_{i1}=1\mid X_{i1}=1)P(Y_{i2}=0\mid X_{i2}=0)+P(Y_{i1}=1\mid X_{i1}=0)P(Y_{i2}=0\mid X_{i2}=1)}$$

Conditional Logistic Regression

- After plugging in the model for $Y_{ij:}$ and doing some algebra, one gets:

$$CondLik_i = \frac{1}{1 + \exp(\beta_1^* (X_{i2} - X_{i1}))}$$

- Notice, the individual level intercept (whether random or not) drops out.

Conditional Logistic Regression

- What it means is that the estimate of the within subject OR no longer depends on assumptions on the distribution of the random effect.
- Can only use this to estimate the association of time-varying covariates.
- Subjects with identical outcomes will be dropped from analysis.
- For those covariates that do not change in a subject, they will not contribute to estimation of the OR for that covariate.

Conditional Logistic Regression

- More generally, you might want to estimate the within subject OR for several variables simultaneously and/or the OR for a unit change in a continuous variable.

- Can still do so by using the conditional likelihood - a method used to estimated OR's for matched case-control studies.

- The conditional likelihood (in example of a cohort) is the probability of observing that the cases have covariates they have and the controls have their observed covariates, given the distribution of covariates observed over all the repeated measurements.

- To define the likelihood, one normalizes the probability of observing the outcomes conditional on the covariates by the summed probabilities over all possible combinations of covariates and outcomes.

Teenage Sex and Drug-Use Using M-H summary OR.

```
. cs sx24hrs drgalcoh, by(eid) or

            eid |       OR       [95% Conf. Interval]   M-H Weight
-----------------+-------------------------------------------------
              1 |          .            .          .            0 (Cornfield)
              2 |          0            0   10.56942      .3478261 (Cornfield)
              3 |          .            0          .            0 (Cornfield)
              4 |          .            .          .            0 (Cornfield)
              5 |          .            .          .            0 (Cornfield)
              6 |   1.333333     .2058078    8.53481      .8823529 (Cornfield)
              7 |          .            .          .            0 (Cornfield)
              8 |          .            0          .            0 (Cornfield)
              9 |        1.5     .1778039   12.91562      .5714286 (Cornfield)
             10 |          .            0          .            0 (Cornfield)

            105 |          .            .          .            0 (Cornfield)
            106 |          0            0          .      .6363636 (Cornfield)
            107 |         .8     .1388054     4.9008           1.2 (Cornfield)
            108 |          0            0          .          .125 (Cornfield)
            109 |          .            .          .            0 (Cornfield)
            110 |          .            0          .            0 (Cornfield)
-----------------+-------------------------------------------------
    MH Combined |        1.315498     .9584698   1.805519
-------------------------------------------------------------------
```

Conditional Logistic Estimate

```
. clogit sx24hrs drgalcoh, or group(eid)
note: multiple positive outcomes within groups encountered.
note: 23 groups (161 obs) dropped due to all positive or
all negative outcomes.

Iteration 0:   log likelihood = -664.37829
Iteration 1:   log likelihood = -663.20668
Iteration 2:   log likelihood = -663.20668

Conditional (fixed-effects) logistic regression   Number of obs   =       1547
                                                  LR chi2(1)      =       2.93
                                                  Prob > chi2     =     0.0867
Log likelihood = -663.20668                       Pseudo R2       =     0.0022

------------------------------------------------------------------------------
     sx24hrs | Odds Ratio   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    drgalcoh |   1.323141   .2158621     1.72   0.086     .9610325    1.821689
------------------------------------------------------------------------------
```