Biostatistics 140.623
Second Term, 2014-2015
Quiz 2
March 5, 2015
Answer Key

Below find a set of years until death or censoring for a group of 5 patients who had a surgical intervention and a second group of 5 who received a medical intervention. The plus notation (+) indicates a censored observation.

Surgical group: 1, 1, 3, 7, 10+
Medical group: 1+, 2, 3+, 5, 8

Now **group** the data into 2 time intervals (bins). To aid you in answering the questions below, complete the following table using the survival data above:

Group	**Interval (years)**	**Deaths**	**Person-years**	**Incidence (Death) rate**
Surgical	0 - 2	2	1+1+3(2)=8	2/8=0.25
	> 2 -10	2	1+5+8 =14	2/14 = 0.14
Medical	0 - 2	1	1+4(2)=9	1/9 = 0.11
	> 2 - 10	2	1+3+6 = 10	2/10 = 0.20

1. The **overall incidence (death) rate** in the **surgical group** is: *(Circle only one response)*

   a) 0.045 deaths per person-year
   b) 0.18 deaths per person-year
   = (2+2 deaths)/(8+14 person-years) =(4 deaths)/(22 person-years)
   c) 0.20 deaths per person-year
   d) 0.33 deaths per person-year
   e) 0.80 deaths per person-year

2. The **total person-years** in the **time bin "0- 2 years"** in the **medical group** is: *(Circle only one response)*

   a) 3 person-years
   b) 9 person-years = 1+ 2(4)
   c) 0.20 deaths per year
   d) 15 person-years
   e) 19 person-years

The grouped survival data are defined as:
trt=1 if surgical, 0 if medical**;**
bin=1 if >2-10 years, and 0 if 0-2 years**;**
D= # events in bin**;** and **N** =person-weeks in bin

for the Poisson regression model: $\log(\lambda j) = \beta_0 + \beta_1 trt + \beta_2 bin$

which is the same as $\log(\mu_j) = \log(N_j) + \beta_0 + \beta_1 trt + \beta_2 bin$

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. poisson D trt bin, exposure(N)
Poisson regression                                Number of obs   =          4
                                                  LR chi2(2)      =       0.04
                                                  Prob > chi2     =     0.9785
Log likelihood = -5.1919167                       Pseudo R2       =     0.0042
------------------------------------------------------------------------------
           D |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         trt |   .1492553   .7685318     0.19   0.846    -1.357039     1.65555
         bin |  -.0738883   .7685318    -0.10   0.923    -1.580183    1.432406
       _cons |  -1.807619   .6969053    -2.59   0.009    -3.173529   -.4417101
      ln(N) |          1  (exposure)
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3. In this Poisson regression model, $\beta_0 + \beta_2$ can be interpreted as: *(Circle only one response)*
   a) The log incidence rate in the surgical group in time bin "0-2 years".
   b) The log incidence rate ratio in the surgical versus medical group, adjusted for time bin.
   c) The log incidence rate ratio in time bin ">2-10 years" versus time bin "0-2 years", adjusted for treatment.
   d) The log incidence rate in the medical group in time bin ">2-10 years".
   We can write:
   $\log(\lambda j) = \beta_0 + \beta_1 trt + \beta_2 bin = \beta_0 + \beta_1(0) + \beta_2(1)$ when trt=0 (medical group) and bin=1 (>2 – 10 years).

   e) The incidence rate adjusted for both treatment and time bin.

4. From the Poisson regression model, the **incidence (death) rate ratio i**n the **surgical patients** as compared to the **medical patients, after controlling for time bin,** is: *(Circle only one response)*
   a) 0.149
   b) -0.074
   c) 1.16= $e^{b1}=e^{0.149}$
   d) 0.93
   e) -1.73

5. The proportional hazards assumption in a Poisson regression model means that: *(Circle only one response)*

   a) The incidence rate in the surgical group is constant over time.
   b) The incidence rate ratio of death comparing surgical to medical treatment groups is constant over time.
   c) The difference in the incidence rate in the surgical group minus the medical group is constant over time.
   d) The incidence rate ratio of death comparing surgical to medical treatment groups increases linearly over time.
   e) The log incidence rate in the standard group is the same as the log incidence rate in the medical group.

