Statistics 426: Exam 2 Spring 2015

(Due March 30, 2015)

Between January 1996 and December 1998, 174 women underwent elective abdominal hysterectomies for cervical or uterine cancer on the gynecologic oncology service at the University of Wisconsin. Of these, 149 patients were included in the study population. Patients were excluded if any of the following were true:

1. surgery involved bowel resection or pelvic exenteration
2. patient had contraindication to Toradol
3. epidural was used for post-operative pain control
4. medical records were incomplete

Two outliers were removed from the study: one experienced morbidity as a result of concomitant panniculectomy and the other had delays in nursing home placement.

Previous studies found that the analgesic Toradol was associated with decreased morphine requirements and decreased post-operative pain. Morphine has a paralyzing effect on the digestive system, and decreasing morphine use might allow patients to resume a normal diet in less time, which might result in fewer days in the hospital following surgery. These questions motivated researchers at UW to conduct this study.

The primary scientific questions of the study are listed below:

1. Does use of Toradol decrease the probability of have a very long stay (greater than 5 days) in the hospital after surgery?
2. Is Toradol associated with a decreased chance of bad pain on day after surgery?

Some possible confounding factors.

a. Use of Toradol increased over time. However, there was a general trend in hospitals to limit length of stay during this time period for all patients, partly due to policies of HMO's.

b. It's possible that the distributions of certain variables which might influence length of stay are different for Toradol users and Toradol non-users. For instance, these variables might be stage of cancer, diagnosis, duration of surgery, age, or additional complications in surgery.

Assignment
Use logistic regression techniques to provide answers for research questions 1 and 2. Begin by tabulating the odds-ratios for how each separate predictor is associated with a long hospital stay or bad pain, and provide confidence intervals.

Then consider multiple logistic regression models including Toradol use and other predictors that might confound our interpretation of the effect of Toradol if omitted. Check for outliers and influential points, and apply a reasonable method for variable selection.

Here is an outline for how to prepare your reports.

Outline for reports

1.Introduction Do a little reading, maybe simply on Wikipedia, so you can give some background information on the clinical use of Toradol. Also, discuss how the other predictors in your dataset might play a role. Paraphrase the main objectives of your analysis.

2.The Data Provide some summaries of your data, search for outliers and consider what to do with them in your analyses. Do some bivariate analyses, to see how predictors are associated with a long stay and bad pain.

3.Methods Discuss your methods for selecting variables and a link function for your models, and any model diagnostics you might perform.

4.Results Show the results and details of the fitted regression models in appropriate tables and possibly any relevant graphs. Provide an interpretation of the results and the role each predictor plays, especially Toradol.

5.Summary Give a summary of what you have found in a non-technical manner, like you might explain it to an audience of surgeons.

6.Appendix Provide the most critical R-code that you used to conduct your analysis.

Keep in mind, this is an exam and there can be no collaboration or discussion with other students. Your work should be entirely your own.

Description of variables and variable coding.

Pt.No- patient id number
DOS.yr -surgery year
Age - age at surgery

duration- duration of surgery
0. < 2 hours, 1. 2-3 hours, 2. 3-4 hours,
3. 4-5 hours, 4. 5-6 hours, 5. > 6 hours

Diagnosis-1= cervical cancer,
2= endometrial cancer, 3=uterine sarcoma

Stage-ordinal variable indicating
how invasive the cancer is
1.IA 2.IB 3.IC 4.IIA 5.IIB 6.IIIA
7.IIIB 8.IIIC 9.IVA 10.IVB 11.IVC

General.diet -days until normal diet resumed

BadPain - Indicator of whether average pain on a
1-10 scale was greater than a 4 the day after surgery.

LongStay-Indicator of whether hospital stay was
greater than 5 days after surgery

HYS-radical hysterectomy 1=yes, 0=no

OV-ordinal variable (1-3) of degree
of oophorectomy in terms of surgical trauma
1=no oophorectomy, 2= 1 ovary removed,
3=both ovaries removed

LNS ordinal variable of lymph node
sampling in terms of surgial trauma 1-3 (1=not done)

TOR- 1 if Toradol (Ketorolac) was used, 0 otherwise

AddPro- 1 if additional surgical procedures
were done in addition to

surgery for primary cancer, and 0 otherwise.

Comps- 1 if any complications took place during surgery and
       0 otherwise

Morphine- total amount of morphine used while in hospital in mg