A Example Data Set

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## Chemotherapy for Stage B/C Colon Cancer

Here is a data example. I got the data from the survival R package.

See ?survival::colon

Because we are dealing with small sample issues. Consider only those with a perforation of the colon.

library(survival)  
data(cancer,package="survival")  
# use time to death only (etype==2)  
d<- subset(colon,perfor==1 & rx!="Obs" & etype==2)  
#d<- subset(colon,obstruct==1 & rx!="Obs" & etype==2)  
# change time to years  
d$time<- d$time/365.25  
  
s<-survfit(Surv(time,status)~rx,data=d)  
plot(s,lty=c(1,2),mark.time=TRUE)  
legend("bottomleft",levels(d$rx)[2:3],lty=1:2)



Consider the tests at different years.

bpcp2samp(d$time,d$status,d$rx,testtime=2)

##   
## Two-Sample Melded BPCP Test  
##   
## data: S(2;group=Lev+5FU)-S(2;group=Lev)  
## estimate 1 = 0.9, estimate 2 = 0.75, p-value = 0.8235  
## alternative hypothesis: true difference is not equal to 0  
## 95 percent confidence interval:  
## -0.5876144 0.2951290  
## sample estimates:  
## difference   
## -0.15

fixtdelta(d$time,d$status,d$rx,testtime=2)

##   
## Delta Method Test using S2(t) - S1(t) with S(t)=0 or 1 modifications  
##   
## data: Group 1=Lev, Group 2=Lev+5FU, testtime=2  
## S1(t) = 0.9, S2(t) = 0.75, p-value = 0.4049  
## alternative hypothesis: true S2(t) - S1(t) is not equal to 0  
## 95 percent confidence interval:  
## -0.5029976 0.2029976  
## sample estimates:  
## S2(t) - S1(t)   
## -0.15

bpcp2samp(d$time,d$status,d$rx,testtime=3)

##   
## Two-Sample Melded BPCP Test  
##   
## data: S(3;group=Lev+5FU)-S(3;group=Lev)  
## estimate 1 = 0.7, estimate 2 = 0.75, p-value = 1  
## alternative hypothesis: true difference is not equal to 0  
## 95 percent confidence interval:  
## -0.4497573 0.5051633  
## sample estimates:  
## difference   
## 0.05

fixtdelta(d$time,d$status,d$rx,testtime=3)

##   
## Delta Method Test using S2(t) - S1(t) with S(t)=0 or 1 modifications  
##   
## data: Group 1=Lev, Group 2=Lev+5FU, testtime=3  
## S1(t) = 0.7, S2(t) = 0.75, p-value = 0.8125  
## alternative hypothesis: true S2(t) - S1(t) is not equal to 0  
## 95 percent confidence interval:  
## -0.3631644 0.4631644  
## sample estimates:  
## S2(t) - S1(t)   
## 0.05

bpcp2samp(d$time,d$status,d$rx,testtime=4)

##   
## Two-Sample Melded BPCP Test  
##   
## data: S(4;group=Lev+5FU)-S(4;group=Lev)  
## estimate 1 = 0.5, estimate 2 = 0.75, p-value = 0.5566  
## alternative hypothesis: true difference is not equal to 0  
## 95 percent confidence interval:  
## -0.2947099 0.6753095  
## sample estimates:  
## difference   
## 0.25

fixtdelta(d$time,d$status,d$rx,testtime=4)

##   
## Delta Method Test using S2(t) - S1(t) with S(t)=0 or 1 modifications  
##   
## data: Group 1=Lev, Group 2=Lev+5FU, testtime=4  
## S1(t) = 0.5, S2(t) = 0.75, p-value = 0.256  
## alternative hypothesis: true S2(t) - S1(t) is not equal to 0  
## 95 percent confidence interval:  
## -0.1813591 0.6813591  
## sample estimates:  
## S2(t) - S1(t)   
## 0.25

bpcp2samp(d$time,d$status,d$rx,testtime=5)

##   
## Two-Sample Melded BPCP Test  
##   
## data: S(5;group=Lev+5FU)-S(5;group=Lev)  
## estimate 1 = 0.5, estimate 2 = 0.75, p-value = 0.5566  
## alternative hypothesis: true difference is not equal to 0  
## 95 percent confidence interval:  
## -0.2947099 0.6753095  
## sample estimates:  
## difference   
## 0.25

fixtdelta(d$time,d$status,d$rx,testtime=5)

##   
## Delta Method Test using S2(t) - S1(t) with S(t)=0 or 1 modifications  
##   
## data: Group 1=Lev, Group 2=Lev+5FU, testtime=5  
## S1(t) = 0.5, S2(t) = 0.75, p-value = 0.256  
## alternative hypothesis: true S2(t) - S1(t) is not equal to 0  
## 95 percent confidence interval:  
## -0.1813591 0.6813591  
## sample estimates:  
## S2(t) - S1(t)   
## 0.25

bpcp2samp(d$time,d$status,d$rx,testtime=6)

##   
## Two-Sample Melded BPCP Test  
##   
## data: S(6;group=Lev+5FU)-S(6;group=Lev)  
## estimate 1 = 0.375, estimate 2 = 0.75, p-value = 0.3329  
## alternative hypothesis: true difference is not equal to 0  
## 95 percent confidence interval:  
## -0.2250671 0.7845011  
## sample estimates:  
## difference   
## 0.375

fixtdelta(d$time,d$status,d$rx,testtime=6)

##   
## Delta Method Test using S2(t) - S1(t) with S(t)=0 or 1 modifications  
##   
## data: Group 1=Lev, Group 2=Lev+5FU, testtime=6  
## S1(t) = 0.375, S2(t) = 0.75, p-value = 0.09097  
## alternative hypothesis: true S2(t) - S1(t) is not equal to 0  
## 95 percent confidence interval:  
## -0.05982387 0.80982387  
## sample estimates:  
## S2(t) - S1(t)   
## 0.375

bpcp2samp(d$time,d$status,d$rx,testtime=7)

##   
## Two-Sample Melded BPCP Test  
##   
## data: S(7;group=Lev+5FU)-S(7;group=Lev)  
## estimate 1 = 0.375, estimate 2 = 0.75, p-value = 1  
## alternative hypothesis: true difference is not equal to 0  
## 95 percent confidence interval:  
## -0.545704 0.819827  
## sample estimates:  
## difference   
## 0.375

fixtdelta(d$time,d$status,d$rx,testtime=7)

##   
## Delta Method Test using S2(t) - S1(t) with S(t)=0 or 1 modifications  
##   
## data: Group 1=Lev, Group 2=Lev+5FU, testtime=7  
## S1(t) = 0.375, S2(t) = 0.75, p-value = 0.09097  
## alternative hypothesis: true S2(t) - S1(t) is not equal to 0  
## 95 percent confidence interval:  
## -0.05982387 0.80982387  
## sample estimates:  
## S2(t) - S1(t)   
## 0.375

We could talk about how the delta method does not change between years 4 and 5 nor does it change between years 6 and 7.

It would also be nice to have some simulated data sets that look similar to the Kaplan-Meier curves, but also have a simulated scenario that looks similar to the Kaplan-Meier curves except that at year 7 the curves are equal. And hopefully when we simulate the tests at year 7, only the bpcp2samp maintains the type I error rate.