

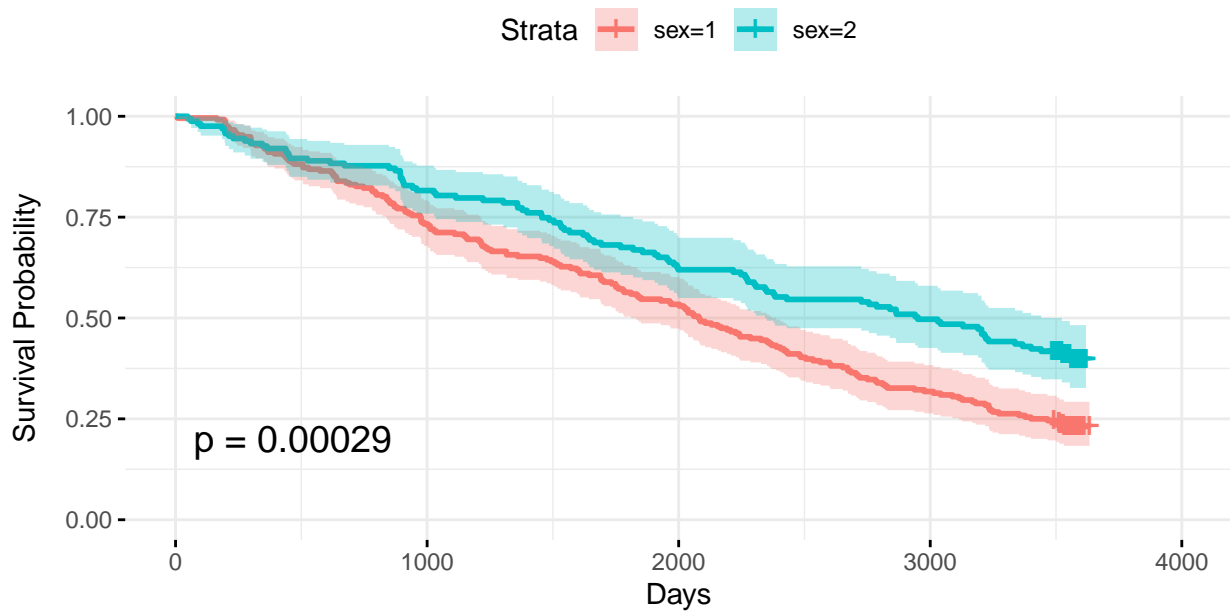
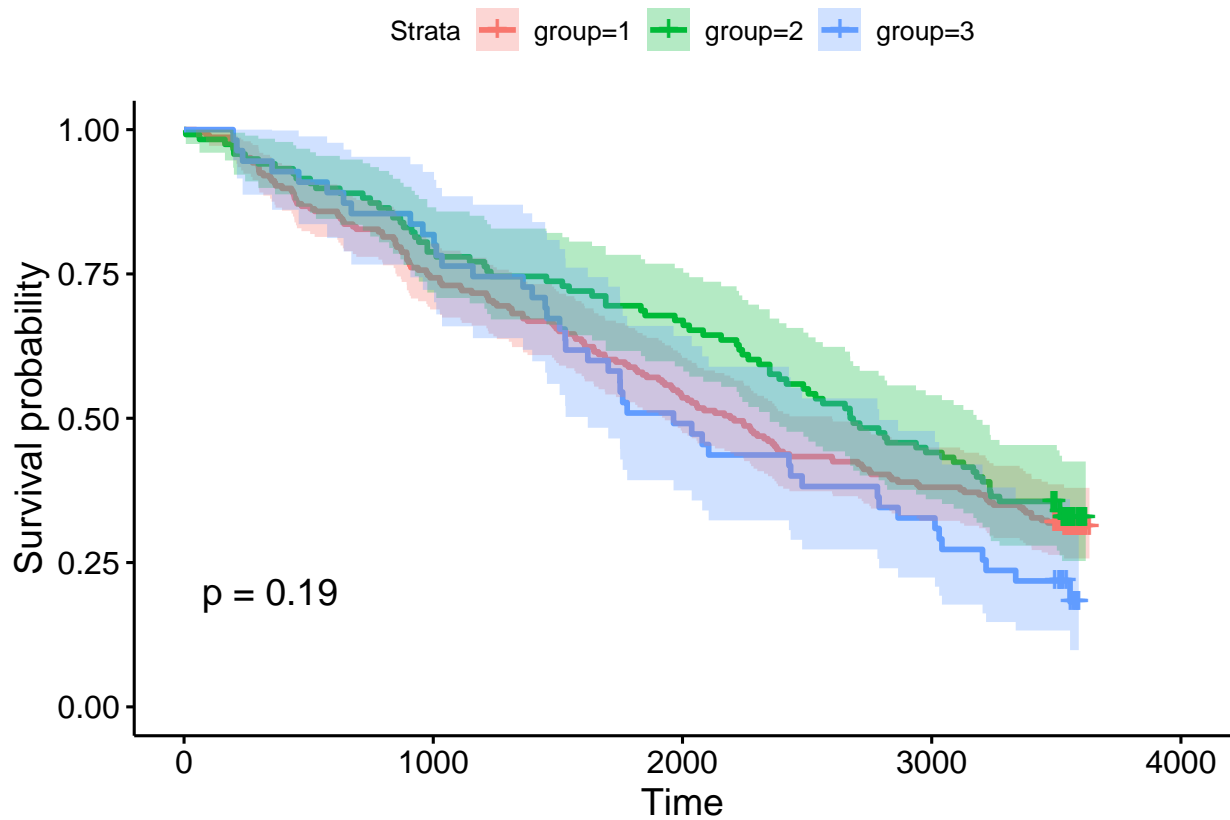
# statistical method

yimin chen

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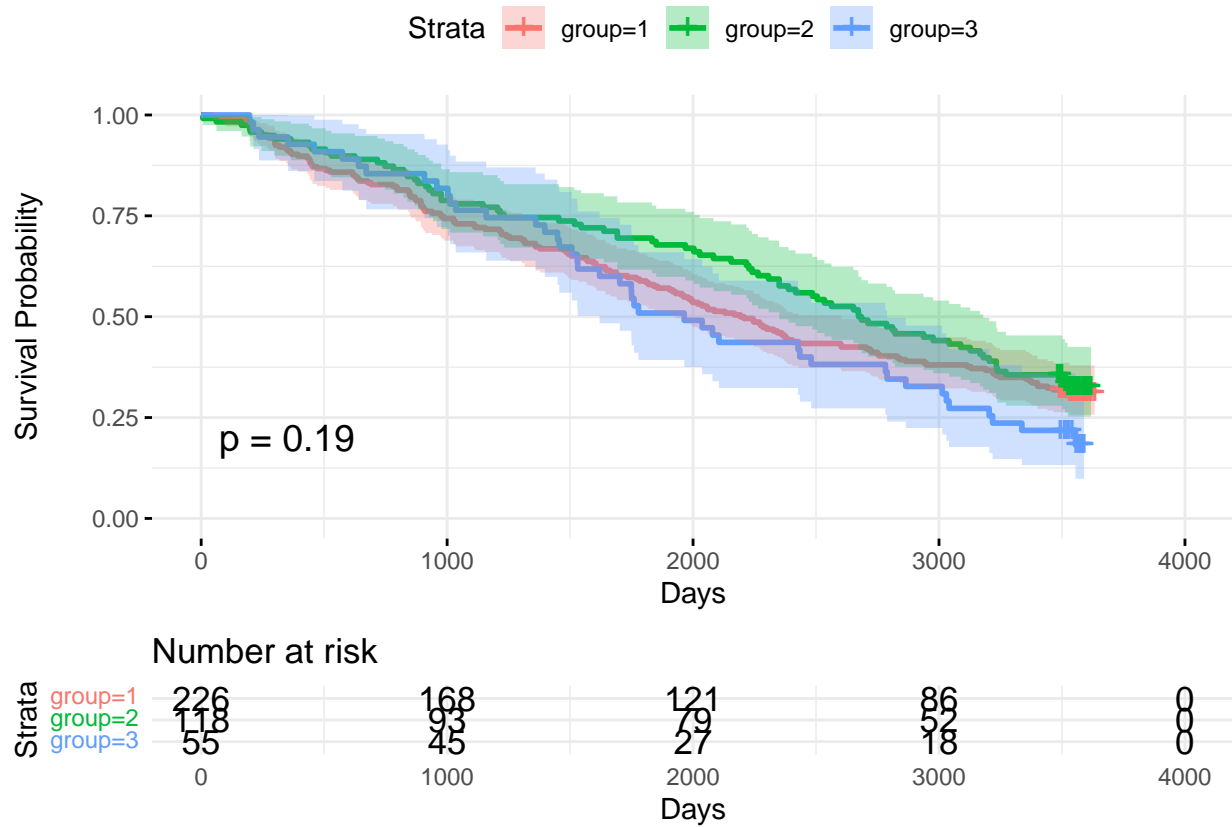
```
## Call:
## coxph(formula = surv_obj ~ ., data = brv)
##
##   n= 399, number of events= 278
##
##              coef exp(coef)    se(coef)      z Pr(>|z|)
## id          2.802e-06  1.000e+00  1.184e-05   0.237   0.813
## couple -2.653e-03   9.974e-01  1.645e-03  -1.613   0.107
## dob       4.051e-05   1.000e+00  8.990e-05   0.451   0.652
## doe       3.118e-01   1.366e+00  2.607e-03  119.608 <2e-16 ***
## dox      -3.110e-01   7.327e-01  2.602e-03 -119.551 <2e-16 ***
## dosp     5.955e-06   1.000e+00  4.813e-05   0.124   0.902
## fail     6.643e+00   7.671e+02  5.758e+00   1.154   0.249
## group   -8.489e-02   9.186e-01  1.577e-01  -0.538   0.590
## disab    2.197e-02   1.022e+00  1.162e-01   0.189   0.850
## health  -8.354e-03   9.917e-01  2.094e-01  -0.040   0.968
## sex      7.317e-02   1.076e+00  2.562e-01   0.286   0.775
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
##              exp(coef) exp(-coef) lower .95 upper .95
## id              1.0000   0.999997  0.999980  1.000e+00
## couple          0.9974   1.002656  0.994140  1.001e+00
## dob              1.0000   0.999959  0.999864  1.000e+00
## doe              1.3658   0.732151  1.358878  1.373e+00
## dox              0.7327   1.364817  0.728972  7.364e-01
## dosp            1.0000   0.999994  0.999912  1.000e+00
## fail            767.0831   0.001304  0.009628  6.111e+07
## group           0.9186   1.088598  0.674428  1.251e+00
## disab           1.0222   0.978270  0.813937  1.284e+00
## health          0.9917   1.008389  0.657892  1.495e+00
## sex             1.0759   0.929441  0.651162  1.778e+00
##
## Concordance= 1 (se = 0 )
## Likelihood ratio test= 2947  on 11 df,  p=<2e-16
## Wald test               = 28603  on 11 df,  p=<2e-16
## Score (logrank) test = 906.5  on 11 df,  p=<2e-16
##
##      chisq df    p
## id      NaN  1 NaN
## couple  NaN  1 NaN
## dob     NaN  1 NaN
## doe     NaN  1 NaN
```

## dox	NaN	1	NaN
## dosp	NaN	1	NaN
## fail	NaN	1	NaN
## group	NaN	1	NaN
## disab	NaN	1	NaN
## health	NaN	1	NaN
## sex	NaN	1	NaN
## GLOBAL	NaN	11	NaN



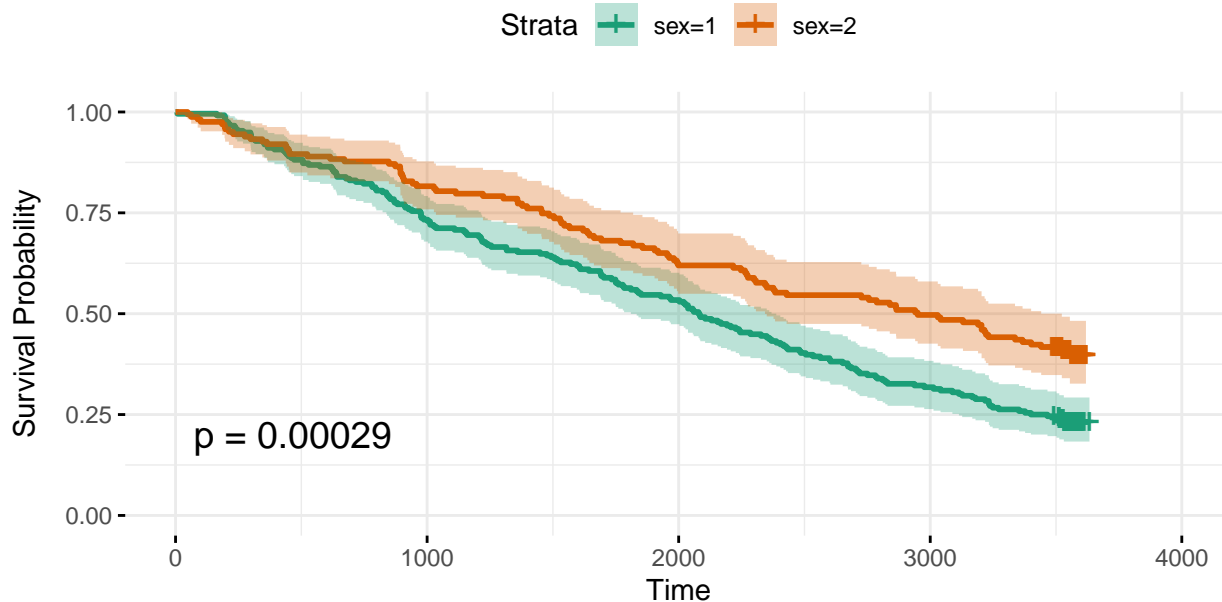
Number at risk

Strata					
<span style="color: red;">sex=1</span>	236	173	126	75	0
<span style="color: teal;">sex=2</span>	163	133	101	81	0
	0	1000	2000	3000	4000
	Days				



```
km_fit2 <- survfit(surv_obj ~ brv$sex)

ggsurvplot(km_fit2, data=brv,
  pval = TRUE,
  conf.int = TRUE,
  risk.table = TRUE,
  ggtheme = theme_minimal(),
  palette = "Dark2",
  main = "Kaplan-Meier Survival Curve",
  xlab = "Time",
  ylab = "Survival Probability")
```



Number at risk

Strata					
<span style="color: green;">+</span> sex=1	236	173	126	75	0
<span style="color: orange;">+</span> sex=2	163	133	101	81	0
	0	1000	2000	3000	4000
	Time				

```
## Call:
## survdiff(formula = surv_obj ~ group, data = brv)
##
##           N Observed Expected (O-E)^2/E (O-E)^2/V
## group=1 226      155   153.2    0.0212    0.0472
## group=2 118       79    89.5    1.2217    1.8051
## group=3  55       44    35.3    2.1183    2.4336
##
##  Chisq= 3.4  on 2 degrees of freedom, p= 0.2
```

### Log-rank test (death as event) comparing group

```
surv_obj1 <- Surv(time = brv$dox-brv$doe, event = brv$fail)

log_rank_test <- survdiff(surv_obj1 ~ group, data = brv)

print(log_rank_test)
```

```
## Call:
## survdiff(formula = surv_obj1 ~ group, data = brv)
##
##           N Observed Expected (O-E)^2/E (O-E)^2/V
## group=1 226      155   153.2    0.0212    0.0472
## group=2 118       79    89.5    1.2217    1.8051
## group=3  55       44    35.3    2.1183    2.4336
##
##  Chisq= 3.4  on 2 degrees of freedom, p= 0.2
```

```

surv_obj1 <- Surv(time = brv$dox-brv$doe, event = brv$fail)

log_rank_test2 <- survdiff(surv_obj1 ~ sex, data = brv)

print(log_rank_test2)

```

```

## Call:
## survdiff(formula = surv_obj1 ~ sex, data = brv)
##
##           N Observed Expected (O-E)^2/E (O-E)^2/V
## sex=1 236      181      151      5.95      13.1
## sex=2 163       97      127      7.08      13.1
##
##  Chisq= 13.1 on 1 degrees of freedom, p= 3e-04

```

```

# Creating the survival object
surv_obj <- Surv(time = brv$dox - brv$doe, event = brv$fail)

# Fit Cox model (specify variables or use '.' for all variables)
cox_model <- coxph(surv_obj ~ ., data = brv)

```

```

## Warning in coxph.fit(X, Y, istrat, offset, init, control, weights = weights, :
## Ran out of iterations and did not converge

## Warning in coxph.fit(X, Y, istrat, offset, init, control, weights = weights, :
## one or more coefficients may be infinite

```

```

summary(cox_model)

```

```

## Call:
## coxph(formula = surv_obj ~ ., data = brv)
##
##    n= 399, number of events= 278
##
##              coef exp(coef)    se(coef)      z Pr(>|z|)
## id          2.802e-06  1.000e+00  1.184e-05   0.237   0.813
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## doe              1.3658   0.732151  1.358878  1.373e+00
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```

```
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## group      0.9186    1.088598    0.674428 1.251e+00
## disab      1.0222    0.978270    0.813937 1.284e+00
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## Score (logrank) test = 906.5 on 11 df, p=<2e-16

# Check proportional hazards assumption
cox.zph(cox_model)
```

```
##          chisq df    p
## id          NaN  1 NaN
## couple      NaN  1 NaN
## dob          NaN  1 NaN
## doe          NaN  1 NaN
## dox          NaN  1 NaN
## dosp         NaN  1 NaN
## fail         NaN  1 NaN
## group        NaN  1 NaN
## disab        NaN  1 NaN
## health       NaN  1 NaN
## sex          NaN  1 NaN
## GLOBAL      NaN 11 NaN
```