Reinterventions exploration

```
xls_path <- 'data/ESSG extraction December 2020 - DEF.xlsx'
revision_0 <- read_excel(xls_path, sheet = "Revision surgeries") %>%
  data.table
complications_0 <- read_excel(xls_path, sheet = "Complications") %>%
  data.table
```

Controling Variables

```
cat(controlling_vars %>% as.yaml())
```

```
- Age
- Gender
- Site
- Prior Spine Surgery
- ASA classification
- 3CO
- Pelvic Fixation
- Number of Posterior Instrumented Levels
- SPOs
- BMI_First Visit
- Osteoporosis / osteopenia
- LGap
- Global Tilt
- ideal LL
- Lordosis (top of L1-S1)
- RLL
- ODI - Score (%)_First Visit
- SRS22 - SRS Total score_First Visit
- SF36 - PCS_First Visit
- SF36 - MCS_First Visit
- Major curve Cobb angle
```

Definition of final_status

```
get_surgery_status <- function(status){
  final_status <- 'Resolved without sequelae'
  if( 'Not resolved' %in% status){
    final_status <- 'Not resolved'
  }else if('Not resolved' %in% status){
    final_status <- 'Resolved with sequelae'
  }
  final_status
}
```

Impact of final status and number of reinterventions associated to an index surgery in 2Y HRQL Gain

```
complications_0 %>%
  .['Days since surgery' < 365*2] %>%
  .['Code of the patient' %in% valid_patients] %>%
  .['Reoperation Due to Complication' == 'Yes'] %>%
  .[!is.na('Date of Reoperation')] %>%
  .[, .(
    final_status = get_surgery_status('Status of the complication'),
    reinterventions = 'Date of Reoperation' %>% uniqueN),
    .('Complication associated to surgery', 'Code of the patient' )] ->
  complicated_surgeries

complicated_surgeries_n <- complicated_surgeries[, 'Complication associated to surgery'] %>% uniqueN

complicated_surgeries %<>% .['Complication associated to surgery' %in% index_surgeries]
complicated_surgeries_n_index <- complicated_surgeries[, 'Complication associated to surgery'] %>% uniqu
```

- Surgeries with complications before 2y with valid patients: 99
- Index surgeries with complications before 2y with valid patients: 65
- Valid patients: 316

```
##                    final_status  N
## 1: Resolved without sequelae 64
## 2:            Not resolved  1
```

```
vars_ <- c(
  controlling_vars,
  outcomes,
  base_outcomes %>% unlist,
  'Code of the patient'
) %>% unique


clinical_data %>%
  .[, .SD, .SDcols=vars_] %>%
  merge(
    complicated_surgeries,
    by='Code of the patient',
    all.x=TRUE) %>%
  .[, 'Complication associated to surgery' := NULL] %>%
  .[, 'Code of the patient' := NULL] %>%
  .[is.na(final_status), final_status :='no complication'] %>%
  .[is.na(reinterventions), reinterventions := 0] ->
  index_data_
```

```
outcome <- outcomes[1]
base_outcome <- base_outcomes[[outcome]]
outcome_gain <- '{outcome}_gain' %>% f
```

```r
lm_vars_ <- c(
  controlling_vars,
  outcome_gain,
  'reinterventions',
  'final_status'
)

formula <- 'outcome_gain ~ . + reinterventions * final_status' %>% as.formula

index_data_ %>%
  copy %>%
  .[, outcome_gain := get(outcome) - get(base_outcome)] %>%
  lm(formula, data=.) %>% summary %>% coefficients
```

```
##                                                     Estimate    Std. Error
## (Intercept)                                     1.217793e-14  3.967936e-14
## Age                                            -3.014107e-17  1.758162e-16
## GenderMale                                     -6.917689e-17  4.703756e-15
## SiteBOR Op                                     -7.662132e-15  6.162603e-15
## SiteIST Op                                     -7.271815e-15  8.810784e-15
## SiteMAD Op                                     -4.279151e-15  6.054644e-15
## SiteZUR Op                                      1.905321e-15  6.547847e-15
## 'Prior Spine Surgery'Yes                        8.000048e-16  4.301975e-15
## 'ASA classification'                           -8.374620e-15  3.712391e-15
## '3CO'Yes                                        5.814922e-16  5.941207e-15
## 'Pelvic Fixation'Yes                            5.437443e-15  5.326360e-15
## 'Number of Posterior Instrumented Levels'       2.404596e-16  5.439088e-16
## SPOs                                           -6.933834e-16  1.134196e-15
## 'BMI_First Visit'                              -1.386735e-16  4.599346e-16
## 'Osteoporosis / osteopenia'Yes                 -7.717096e-15  4.912826e-15
## LGap                                            3.568028e-16  1.566777e-16
## 'Global Tilt'                                  -3.769293e-16  2.279973e-16
## 'ideal LL'                                      1.984368e-16  2.929276e-16
## 'ODI - Score (%)_First Visit'                  -1.000000e+00  2.069088e-16
## 'SRS22 - SRS Total score_First Visit'          -3.899418e-14  2.767206e-14
## 'SF36 - PCS_First Visit'                        2.906346e-17  3.483658e-16
## 'SF36 - MCS_First Visit'                       -1.589670e-16  2.341930e-16
## 'Major curve Cobb angle'                       -5.429869e-17  1.038445e-16
## '2Y. ODI - Score (%)'                           1.000000e+00  2.271306e-16
## '2Y. SRS22 - SRS Subtotal score'                6.474306e-15  6.961211e-15
## '2Y. SF36 - MCS'                                1.226749e-16  2.710465e-16
## '2Y. SF36 - PCS'                                2.383090e-17  3.794358e-16
## 'SRS22 - SRS Subtotal score_First Visit'        3.594356e-14  2.767115e-14
## final_statusResolved without sequelae           6.799669e-15  9.626185e-15
## reinterventions                                -8.157662e-15  6.602892e-15
##                                                      t value    Pr(>|t|)
## (Intercept)                                     3.069084e-01  0.75921155
## Age                                            -1.714352e-01  0.86404361
## GenderMale                                     -1.470673e-02  0.98827985
## SiteBOR Op                                     -1.243327e+00  0.21510763
## SiteIST Op                                     -8.253312e-01  0.41010267
## SiteMAD Op                                     -7.067552e-01  0.48048746
## SiteZUR Op                                      2.909844e-01  0.77134511
```
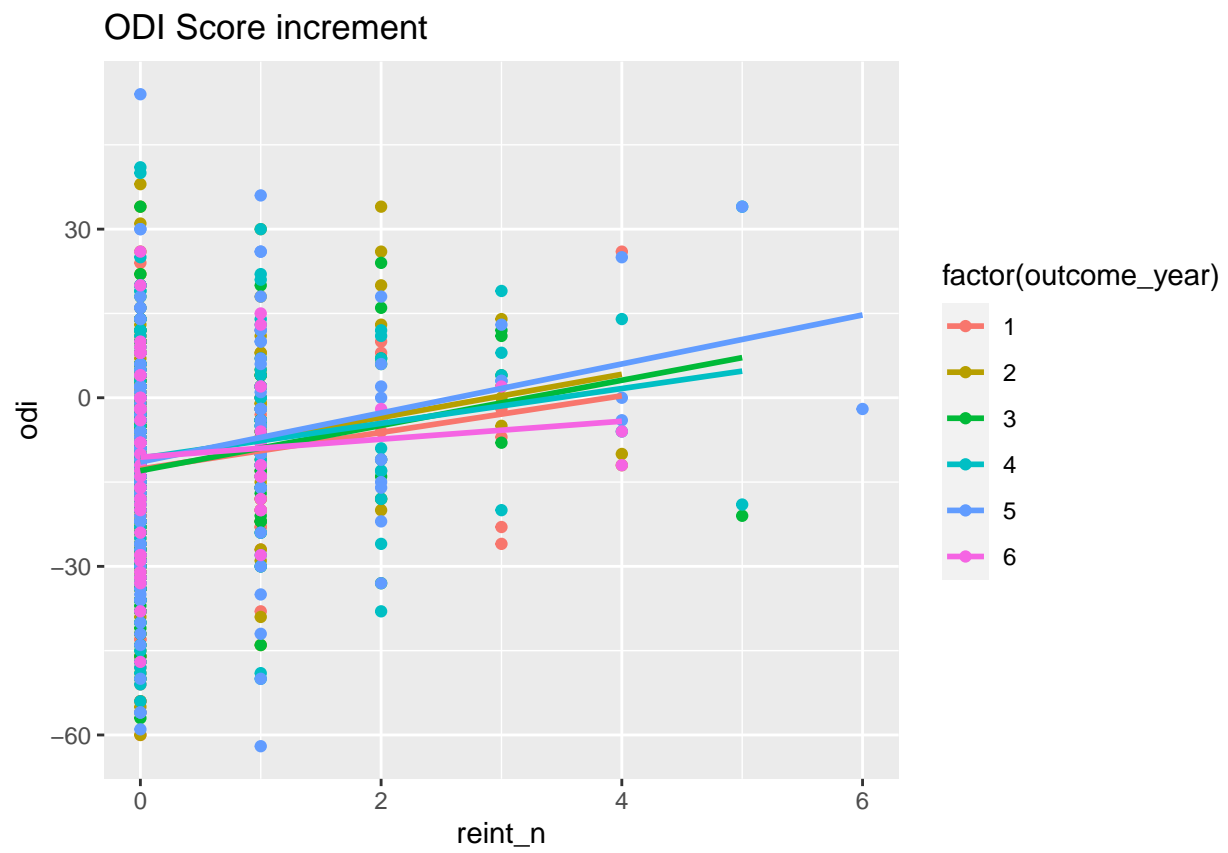
```
## `Prior Spine Surgery`Yes                      1.859622e-01 0.85265054
## `ASA classification`                         -2.255856e+00 0.02509078
## `3CO`Yes                                      9.787442e-02 0.92212362
## `Pelvic Fixation`Yes                          1.020855e+00 0.30847564
## `Number of Posterior Instrumented Levels`     4.420955e-01 0.65886654
## SPOs                                         -6.113433e-01 0.54162117
## `BMI_First Visit`                            -3.015069e-01 0.76332078
## `Osteoporosis / osteopenia`Yes              -1.570806e+00 0.11770506
## LGap                                          2.277303e+00 0.02375635
## `Global Tilt`                                -1.653218e+00 0.09975264
## `ideal LL`                                    6.774262e-01 0.49886727
## `ODI - Score (%)_First Visit`                -4.833046e+15 0.00000000
## `SRS22 - SRS Total score_First Visit`        -1.409154e+00 0.16024112
## `SF36 - PCS_First Visit`                      8.342798e-02 0.93358923
## `SF36 - MCS_First Visit`                     -6.787862e-01 0.49800675
## `Major curve Cobb angle`                     -5.228847e-01 0.60159544
## `2Y. ODI - Score (%)`                         4.402752e+15 0.00000000
## `2Y. SRS22 - SRS Subtotal score`             9.300545e-01 0.35339080
## `2Y. SF36 - MCS`                             4.525974e-01 0.65129712
## `2Y. SF36 - PCS`                             6.280614e-02 0.94997950
## `SRS22 - SRS Subtotal score_First Visit`     1.298954e+00 0.19535742
## final_statusResolved without sequelae        7.063721e-01 0.48072510
## reinterventions                             -1.235468e+00 0.21801092
```

Proportion of reinterventions by year
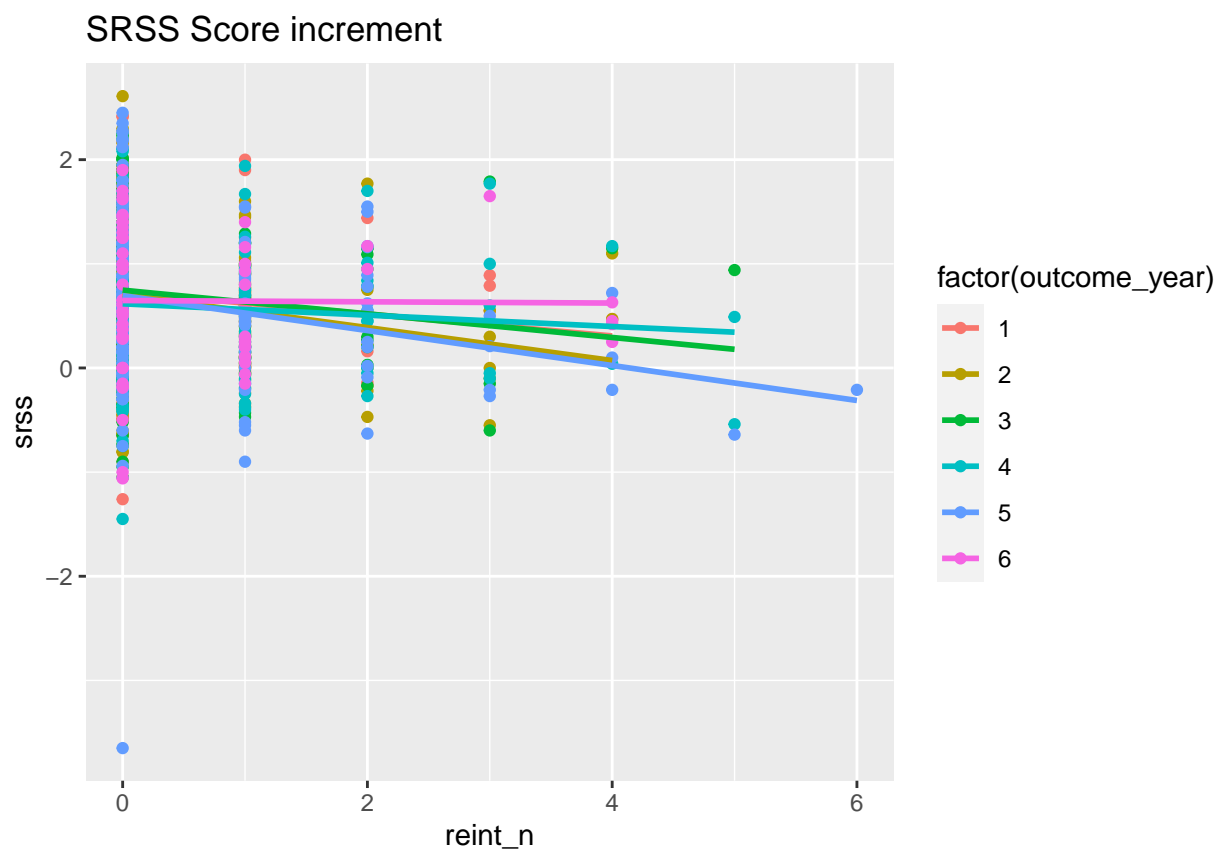
```
   year  N prop
1:    1 59 35.8
2:    2 27 16.4
3:    3 19 11.5
4:    4 20 12.1
5:    5 15  9.1
6:    6 10  6.1
7:    7  7  4.2
8:    8  7  4.2
9:    9  1  0.6
```

Reinterventions Impact

ODI Score increment

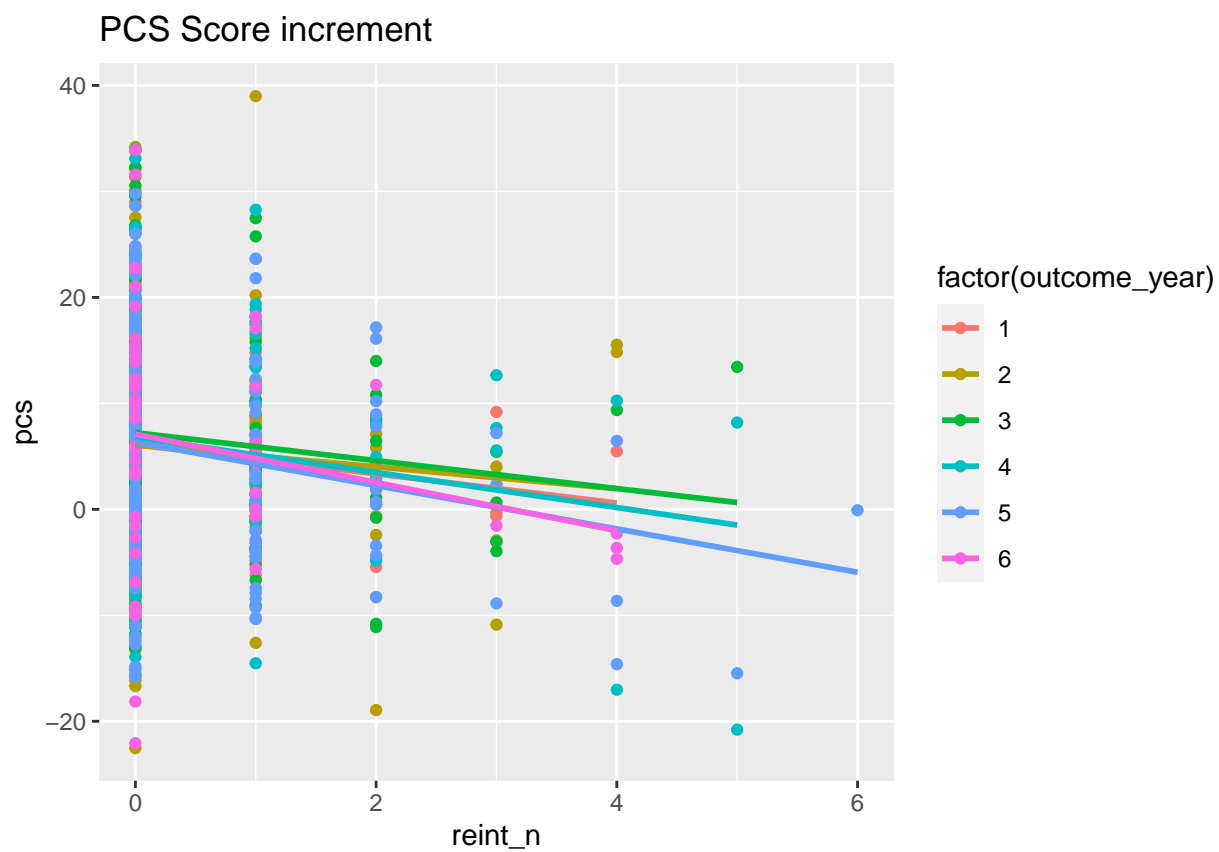Dilution effect of odi: time since last operation (controlling by same variables plus number of reinterventions
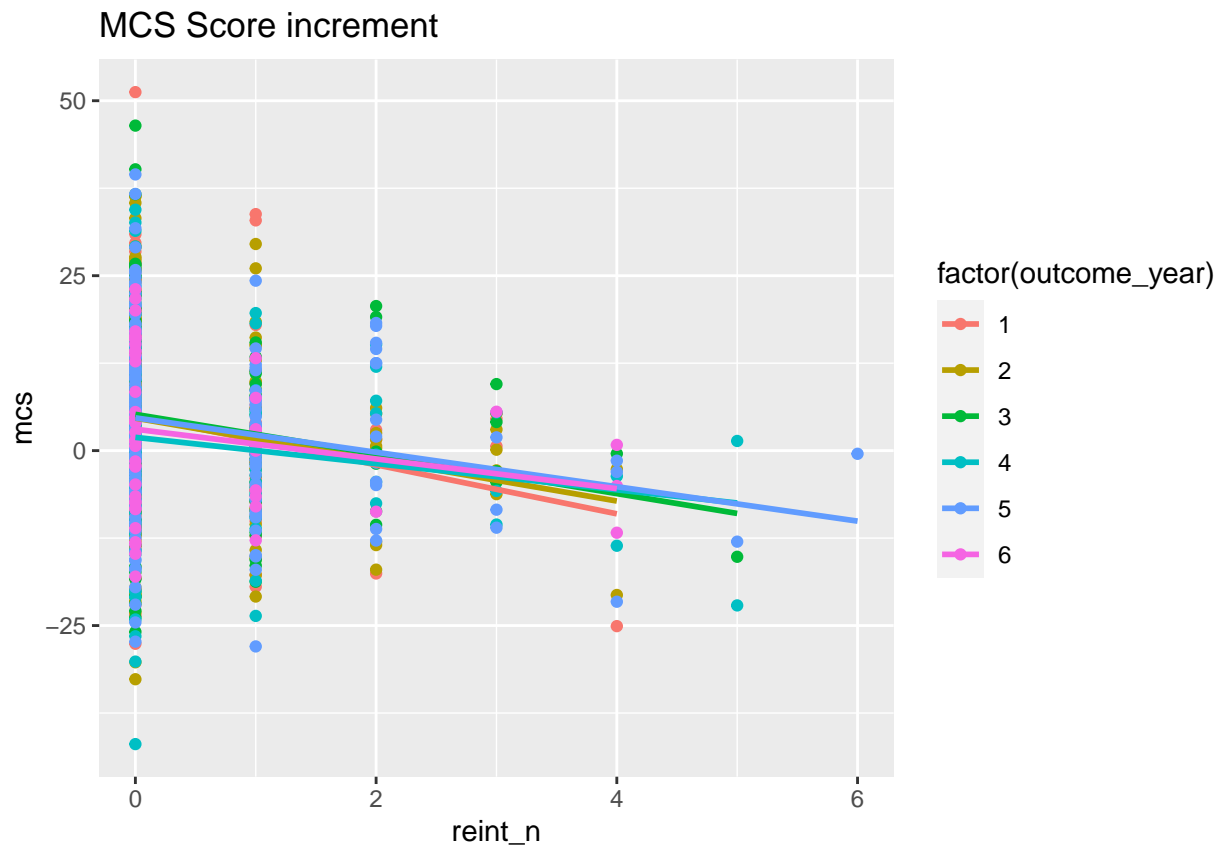
and outcome year) in first 6 years.

SRSS Score increment

Dilution effect of srss: time since last operation (controlling by same variables plus number of reinterventions

and outcome year) in first 5 years.

Dilution effect of pcs: time since last operation (controlling by same variables plus number of reinterventions

and outcome year) in first 6 years.

MCS Score increment

Dilution effect of mcs: time since last operation (controlling by same variables plus number of reinterventions and outcome year) in first years.