

Factors Associated with Missed Nursing Care

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Import Data

```
library(tidyverse)

## — Attaching core tidyverse packages — tidyverse 2.0.0 —
## ✓ dplyr      1.2.1      ✓ readr      2.2.0
## ✓ forcats    1.0.1      ✓ stringr    1.6.0
## ✓ ggplot2     4.0.3      ✓ tibble     3.3.1
## ✓ lubridate  1.9.5      ✓ tidyr      1.3.2
## ✓ purrr      1.2.2
## — Conflicts — tidyverse_conflicts() —
## ✗ dplyr::filter() masks stats::filter()
## ✗ dplyr::lag()     masks stats::lag()
## ⓘ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors

library(robustbase)
library(broom)

data <- read.csv(
  "/Users/XXXX/XXXX/XXXX/XXXX/XXXX
  XXXX/XXXX/XXXX/XXXX.csv"
)
```

Inspect Data

```
data1 <- tibble(data)

head(data1)

## # A tibble: 6 × 24
##   AGE1 AGE2 female married COLLEGE LESS1 ONET05 SIX210 AE ICU MICU
##   <int> <int> <int>   <int>   <int> <int> <int> <int> <int> <int> <int>
## 1     0     1     1     1     1     0     1     0     0     0     0
##   0
```

```
## 2      0      0      0      0      0      0      0      1      0      1      0      0
##      0
## 3      0      0      0      0      0      0      0      1      0      1      0      0
##      0
## 4      0      1      1      1      1      0      1      0      1      0      0
##      0
## 5      0      1      0      0      0      0      1      0      1      0      0
##      0
## 6      0      0      0      0      0      0      0      1      0      0      1
##      0
## #  12 more variables: OBS <int>, PACU <int>, PaedEm <int>, ROTATION <int>,
## #   ONETOFOIVE <int>, FACTOR2 <int>, FACTOR7 <int>, FACTOR8 <int>,
## #   FACTOR9 <int>, FACTOR12 <int>, FACTOR15 <int>, MNC <dbl>

dim(data1)

names(data1)

## [1] "AGE1"      "AGE2"      "female"    "married"   "COLLEGE"   "LESS1"
## [7] "ONETO5"    "SIX210"    "AE"        "ICU"       "MICU"      "NICU"
## [13] "OBS"       "PACU"      "PaedEm"    "ROTATION"  "ONETOFOIVE" "FACTOR2"
## [19] "FACTOR7"   "FACTOR8"   "FACTOR9"   "FACTOR12"  "FACTOR15"  "MNC"
```

Robust Regression Analysis

```
model11 <- lmrob(
  MNC ~ AGE1 + AGE2 + female + married + COLLEGE + LESS1 +
    ONETO5 + SIX210 + AE + ICU + MICU + NICU + OBS + PACU + PaedEm +
    ROTATION + ONETOFOIVE + FACTOR2 + FACTOR7 + FACTOR8 +
    FACTOR9 + FACTOR12 + FACTOR15,
  data = data,
  method = "MM"
)

summary(model11)

##
## Call:
## lmrob(formula = MNC ~ AGE1 + AGE2 + female + married + COLLEGE + LESS1 +
##      ONETO5 + SIX210 + AE + ICU + MICU + NICU + OBS + PACU + PaedEm + ROTATION +
##      ONETOFOIVE + FACTOR2 + FACTOR7 + FACTOR8 + FACTOR9 + FACTOR12 + FACTOR15,
##      data = data, method = "MM")
```

```

## \--> method = "MM"
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.703691 -0.224208 -0.007856  0.254570  1.755073
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.082097   0.167700  12.416 < 2e-16 ***
## AGE1         0.114136   0.124254   0.919  0.35939
## AGE2        -0.001819   0.070257  -0.026  0.97937
## female       -0.056683   0.064301  -0.882  0.37906
## married     -0.021973   0.071094  -0.309  0.75757
## COLLEGE      0.073016   0.070724   1.032  0.30308
## LESS1       -0.005695   0.163071  -0.035  0.97217
## ONETO5       0.054706   0.145110   0.377  0.70656
## SIX210       0.108367   0.148636   0.729  0.46678
## AE           0.163367   0.082745   1.974  0.04967 *
## ICU          -0.092366   0.091223  -1.013  0.31247
## MICU         0.087987   0.151168   0.582  0.56117
## NICU         0.102699   0.116118   0.884  0.37749
## OBS          0.611606   0.196260   3.116  0.00209 **
## PACU         -0.109296   0.139156  -0.785  0.43311
## PaedEm       -0.012253   0.071550  -0.171  0.86419
## ROTATION     -0.070519   0.075918  -0.929  0.35403
## ONETO5FIVE  -0.067863   0.073347  -0.925  0.35592
## FACTOR2      -0.065962   0.070013  -0.942  0.34722
## FACTOR7      -0.044496   0.072730  -0.612  0.54134
## FACTOR8      -0.171954   0.083512  -2.059  0.04074 *
## FACTOR9      -0.004261   0.080338  -0.053  0.95775
## FACTOR12     -0.103444   0.069048  -1.498  0.13562
## FACTOR15     -0.295949   0.121194  -2.442  0.01545 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Robust residual standard error: 0.3581
## Multiple R-squared:  0.3063, Adjusted R-squared:  0.2292
## Convergence in 21 IRWLS iterations
##
## Robustness weights:
## observation 85 is an outlier with |weight| = 0 ( < 0.00043);
## 17 weights are ~= 1. The remaining 213 ones are summarized as
##      Min. 1st Qu.  Median      Mean 3rd Qu.      Max.
## 0.002296 0.840500 0.954900 0.873600 0.985600 0.999000
## Algorithmic parameters:
##      tuning.chi          bb      tuning.psi      refine.tol
##      1.548e+00          5.000e-01      4.685e+00      1.000e-07
##      rel.tol          scale.tol      solve.tol      zero.tol
##      1.000e-07          1.000e-10      1.000e-07      1.000e-10
##      eps.outlier          eps.x warn.limit.reject warn.limit.meanrw
##      4.329e-04          1.819e-12      5.000e-01      5.000e-01

```

```
##           nResample           max.it           best.r.s           k.fast.s           k.max
##           500           50           2           1           200
##           maxit.scale           trace.lev           mts           compute.rd fast.s.large.n
##           200           0           1000           0           2000
##           psi           subsampling           cov
##           "bisquare"           "nonsingular"           ".vcov.avar1"
## compute.outlier.stats
##           "SM"
## seed : int(0)
```

95% Confidence Intervals

```
ci <- confint(model1, level = 0.95)
```

```
round(ci, 3)
```

```
##           2.5 % 97.5 %
## (Intercept)  1.751  2.413
## AGE1        -0.131  0.359
## AGE2        -0.140  0.137
## female      -0.183  0.070
## married     -0.162  0.118
## COLLEGE     -0.066  0.212
## LESS1       -0.327  0.316
## ONETO5      -0.231  0.341
## SIX210      -0.185  0.401
## AE          0.000  0.326
## ICU         -0.272  0.087
## MICU        -0.210  0.386
## NICU        -0.126  0.332
## OBS         0.225  0.999
## PACU        -0.384  0.165
## PaedEm      -0.153  0.129
## ROTATION    -0.220  0.079
## ONETOFOIVE  -0.212  0.077
## FACTOR2     -0.204  0.072
## FACTOR7     -0.188  0.099
## FACTOR8     -0.337 -0.007
## FACTOR9     -0.163  0.154
## FACTOR12    -0.240  0.033
## FACTOR15    -0.535 -0.057
```

Regression Results with 95% Confidence Intervals

```
results <- tidy(  
  model1,  
  conf.int = TRUE,  
  conf.level = 0.95  
)
```

```
results <- results %>%  
  mutate(  
    estimate = round(estimate, 3),  
    std.error = round(std.error, 3),  
    statistic = round(statistic, 3),  
    p.value = round(p.value, 3),  
    conf.low = round(conf.low, 3),  
    conf.high = round(conf.high, 3)  
  )
```

results

##	term	estimate	std.error	statistic	p.value	conf.low	conf.high
## 1	(Intercept)	2.082	0.168	12.416	0.000	1.753	2.411
## 2	AGE1	0.114	0.124	0.919	0.359	-0.129	0.358
## 3	AGE2	-0.002	0.070	-0.026	0.979	-0.140	0.136
## 4	female	-0.057	0.064	-0.882	0.379	-0.183	0.069
## 5	married	-0.022	0.071	-0.309	0.758	-0.161	0.117
## 6	COLLEGE	0.073	0.071	1.032	0.303	-0.066	0.212
## 7	LESS1	-0.006	0.163	-0.035	0.972	-0.325	0.314
## 8	ONETO5	0.055	0.145	0.377	0.707	-0.230	0.339
## 9	SIX210	0.108	0.149	0.729	0.467	-0.183	0.400
## 10	AE	0.163	0.083	1.974	0.049	0.001	0.326
## 11	ICU	-0.092	0.091	-1.013	0.312	-0.271	0.086
## 12	MICU	0.088	0.151	0.582	0.561	-0.208	0.384
## 13	NICU	0.103	0.116	0.884	0.377	-0.125	0.330
## 14	OBS	0.612	0.196	3.116	0.002	0.227	0.996
## 15	PACU	-0.109	0.139	-0.785	0.433	-0.382	0.163
## 16	PaedEm	-0.012	0.072	-0.171	0.864	-0.152	0.128
## 17	ROTATION	-0.071	0.076	-0.929	0.354	-0.219	0.078
## 18	ONETO5	-0.068	0.073	-0.925	0.356	-0.212	0.076
## 19	FACTOR2	-0.066	0.070	-0.942	0.347	-0.203	0.071
## 20	FACTOR7	-0.044	0.073	-0.612	0.541	-0.187	0.098
## 21	FACTOR8	-0.172	0.084	-2.059	0.041	-0.336	-0.008
## 22	FACTOR9	-0.004	0.080	-0.053	0.958	-0.162	0.153
## 23	FACTOR12	-0.103	0.069	-1.498	0.136	-0.239	0.032
## 24	FACTOR15	-0.296	0.121	-2.442	0.015	-0.533	-0.058