

# OSIA presentation

# Amy Attaway

3/19/20

 Open Access Full Text Article

ORIGINAL RESEARCH

# Hand grip strength and chronic obstructive pulmonary disease in Korea: an analysis in KNHANES VI

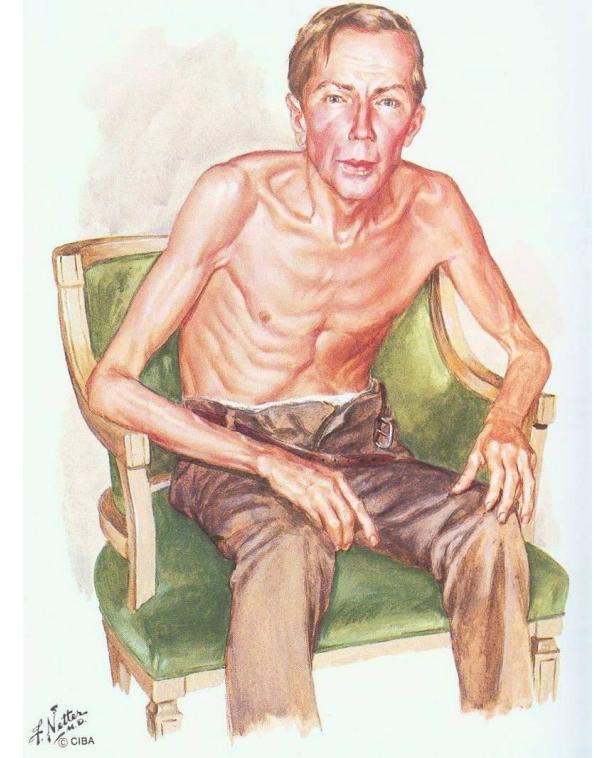
Su Hwan Lee  
Soo Jung Kim  
Yeji Han  
Yon Ju Ryu  
Jin Hwa Lee  
Jung Hyun Chang

This article was published in the following Dove Press journal:  
International Journal of COPD  
4 August 2017

Division of Pulmonary and Critical Care Medicine, Department of Internal Medicine, Ewha Medical Research Institute, Ewha Womans University School of Medicine, Seoul, Korea

# Background

- COPD (chronic obstructive pulmonary disease) is a disease of chronic inflammation due to smoking, which has been known to cause skeletal muscle loss or sarcopenia in advanced disease.
- HGS (handgrip strength) is a simple measure of upper limb muscle function that can be performed at a clinic visit.
- It is unknown if HGS can be used as a screening tool to determine if reductions in handgrip strength correlate with a diagnosis of COPD.



# Methods

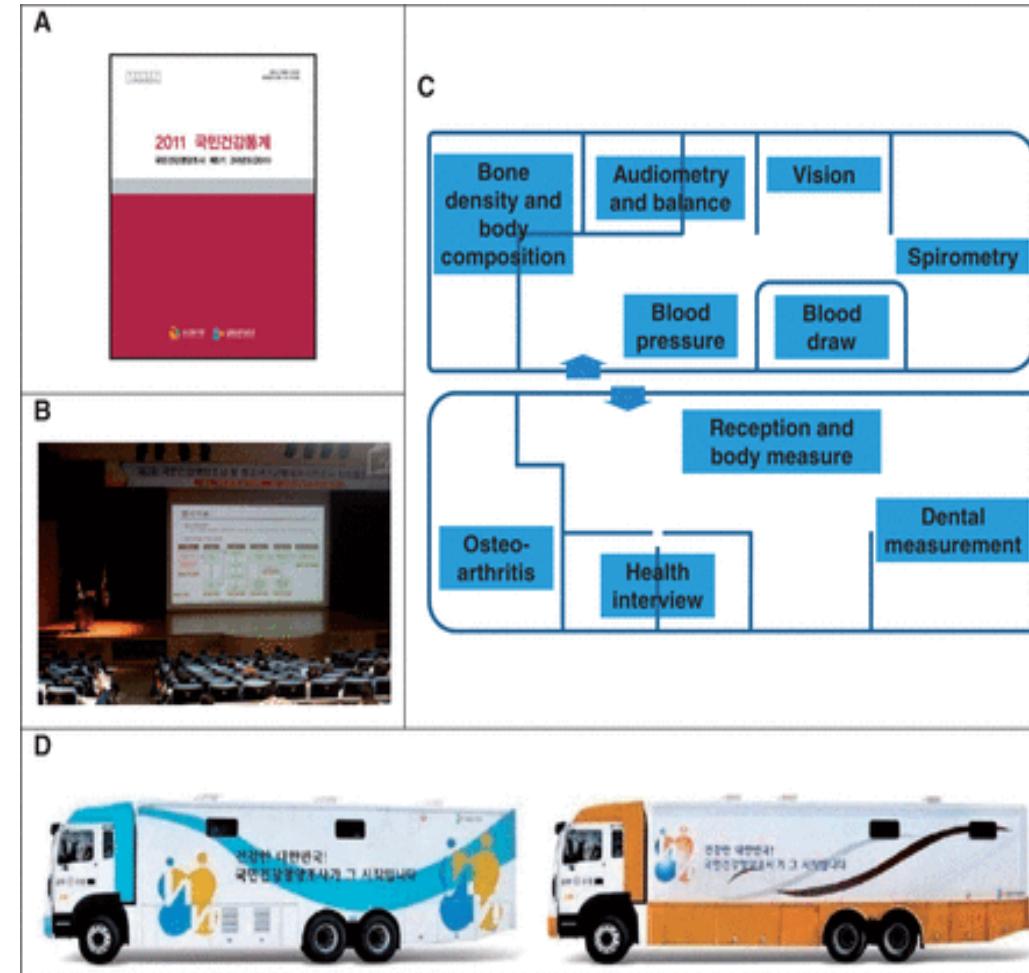
- Data was taken from a population-based cross-sectional study from the 6th KHANES survey (2013-2015)
- Smoking status was defined as current smoker, ex-smoker, or never smoker (smoked <100 cigarettes during the lifetime)
- Spirometry defined as pre bronchodilator  $\text{FEV}_1/\text{FVC} < 0.70$  (in accordance with guidelines)
- HGS measured 3 times in each hand using digital grip strength dynamometer
- EQ5D was developed by the EuroQol Group to evaluate multidimensional health-related quality of life

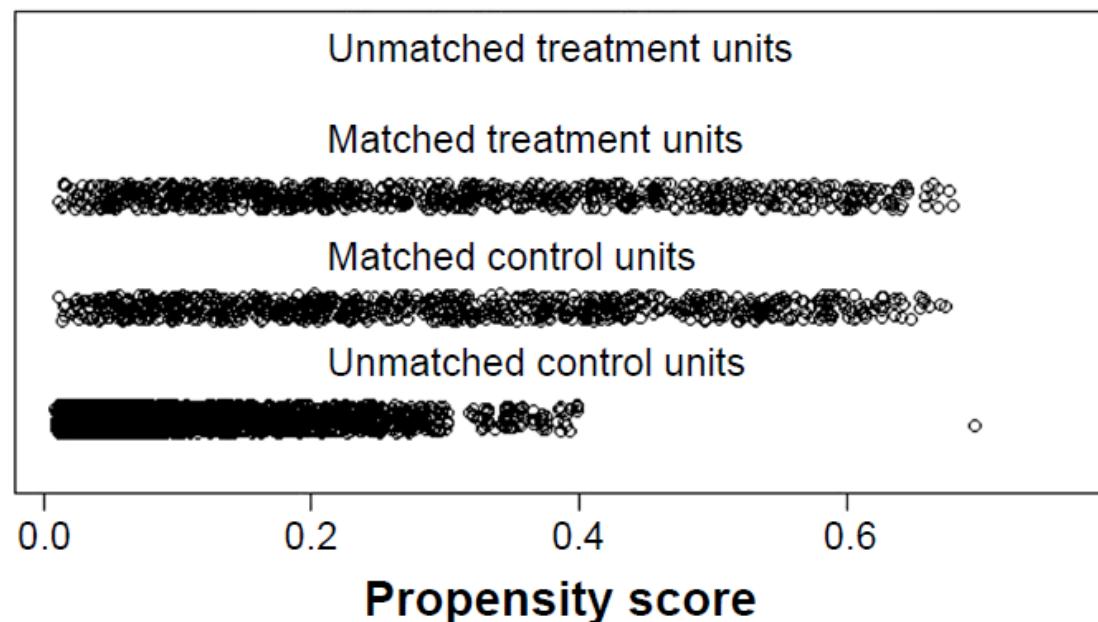
## Methods (contd)

- Propensity score matching was used to match COPD and non-COPD subjects.
- Covariates were: age, sex, body mass index (BMI), cardiovascular disease (including hypertension, dyslipidemia and ischemic heart disease), stroke, DM and depression.
- Kruskal–Wallis test was used to investigate associations among HGS, EQ5D and lung function in COPD subjects.
- To assess the association between HGS and EQ5D, a partial correlation analysis was performed to adjust for age and BMI.

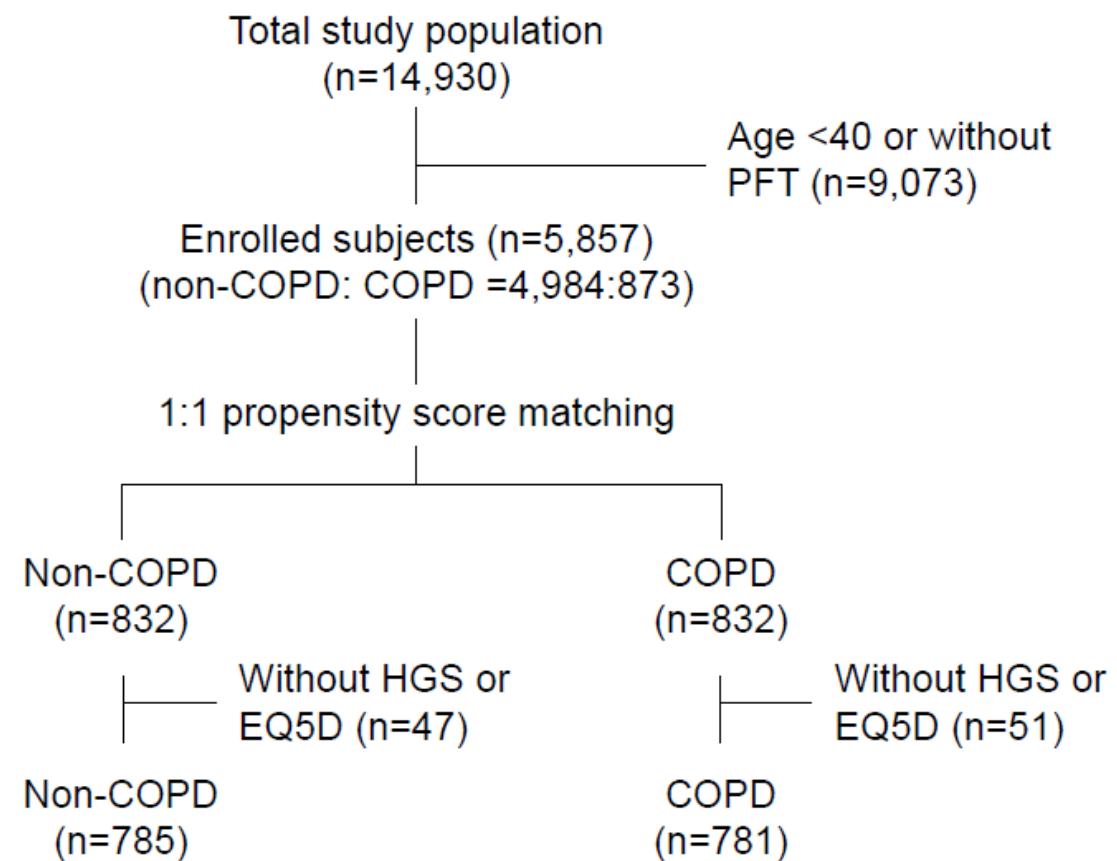
# KNHANES

- National surveillance system assessing the health and nutritional status of Koreans since 1998
- Includes approx 10,000 individuals each year
- Collects SES status, health-related behaviours, QOL, healthcare utilization, anthropometric measures, biochemical and clinical profiles and dietary intakes with three component surveys: health interview, health examination and nutrition survey





**Figure 1** Distribution of propensity score.



**Figure 2** Flow diagram for the study.

**Abbreviations:** COPD, chronic obstructive pulmonary disease; EQ5D, EuroQol Five-Dimension Questionnaire; HGS, hand grip strength; PFT, pulmonary function test.

**Table I** Subject demographics before and after propensity score matching

| Variables                             | Overall series      |               |         | Propensity score matching |               |         |
|---------------------------------------|---------------------|---------------|---------|---------------------------|---------------|---------|
|                                       | Non-COPD<br>n=4,984 | COPD<br>n=873 | P-value | Non-COPD<br>n=832         | COPD<br>n=832 | P-value |
| Age, years                            | 56.3±10.3           | 65.3±9.1      | <0.001  | 64.9±9.3                  | 65.4±9.1      | 0.308   |
| Male sex                              | 1,929 (38.7)        | 644 (73.8)    | <0.001  | 620 (74.5)                | 606 (72.8)    | 0.436   |
| Height, cm                            | 160.8±8.7           | 164.0±8.58    | <0.001  | 163.2±8.3                 | 163.9±8.62    | 0.136   |
| BMI, kg/m <sup>2</sup>                | 24.2±3.1            | 24.0±2.8      | 0.053   | 23.9±2.8                  | 24.0±2.8      | 0.424   |
| HTN                                   | 1,312 (26.6)        | 399 (39.2)    | <0.001  | 330 (39.7)                | 338 (40.6)    | 0.689   |
| Dyslipidemia                          | 956 (19.4)          | 188 (21.7)    | 0.256   | 178 (21.4)                | 188 (22.6)    | 0.554   |
| Stroke                                | 92 (1.9)            | 32 (3.7)      | <0.002  | 29 (3.5)                  | 32 (3.8)      | 0.696   |
| IHD                                   | 125 (2.6)           | 42 (5)        | <0.001  | 34 (4.1)                  | 42 (5)        | 0.348   |
| DM                                    | 464 (9.4)           | 133 (15.4)    | <0.001  | 137 (16.5)                | 132 (15.9)    | 0.739   |
| Arthritis                             | 792 (16.8)          | 145 (17.4)    | 0.643   | 154 (18.5)                | 145 (17.4)    | 0.566   |
| Depression                            | 282 (5.7)           | 28 (3.2)      | 0.008   | 35 (4.2)                  | 28 (3.4)      | 0.369   |
| Self-reported functional limitation   | 379 (7.7)           | 81 (9.4)      | 0.208   | 79 (9.5)                  | 81 (9.7)      | 0.833   |
| Ever smoker, n (%)                    | 1,756 (35.6)        | 581 (67.2)    | <0.001  | 494 (59.4)                | 551 (66.2)    | 0.004   |
| FEV <sub>1</sub> % of predicted value | 95.1±11.9           | 79.6±15.5     | <0.001  | 96.0±12.6                 | 79.7±15.6     | <0.001  |
| GOLD stage I                          |                     | 444 (50.9)    |         |                           | 425 (51.1)    |         |
| GOLD stage II                         |                     | 394 (45.1)    |         |                           | 374 (45.0)    |         |
| GOLD stage III                        |                     | 35 (4.0)      |         |                           | 33 (4.0)      |         |

Note: Data represented as mean ± SD or n (%).

Abbreviations: BMI, body mass index; COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus; FEV<sub>1</sub>, forced expiratory volume in 1 second; GOLD, Global Initiative for Chronic Obstructive Lung Disease; HTN, hypertension; IHD, ischemic heart disease; SD, standard deviation.

# Additional notes

- They used “ever smokers” for the propensity score.
- Current smoking status imparts an ongoing insult to the lungs known to promote chronic inflammation and skeletal muscle loss in addition to the risk caused by COPD.

**Table 2** Comparison of clinical characteristics between non-COPD and COPD subjects

| Variables                             | Male (n=1,179)    |               |         | Female (n=387)    |               |         |
|---------------------------------------|-------------------|---------------|---------|-------------------|---------------|---------|
|                                       | Non-COPD<br>n=597 | COPD<br>n=582 | P-value | Non-COPD<br>n=188 | COPD<br>n=199 | P-value |
| Age, years                            | 64.5±9.3          | 65.0±9.1      | 0.325   | 66.0±9.3          | 65.6±9.0      | 0.653   |
| Age category, years                   |                   |               |         |                   |               |         |
| 40–49                                 | 50 (8.4)          | 42 (7.2)      | 0.554   | 12 (6.4)          | 10 (5.0)      | 0.818   |
| 50–59                                 | 124 (20.8)        | 110 (18.9)    |         | 30 (16)           | 38 (19.1)     |         |
| 60–69                                 | 248 (41.5)        | 240 (41.2)    |         | 78 (41.5)         | 79 (39.7)     |         |
| ≥70                                   | 175 (29.3)        | 190 (32.6)    |         | 68 (36.2)         | 72 (36.2)     |         |
| Smoking status                        |                   |               |         |                   |               |         |
| Never                                 | 136 (22.8)        | 76 (13.1)     | <0.001  | 176 (93.6)        | 183 (92)      | 0.704   |
| Ex-smoker                             | 328 (54.9)        | 298 (51.2)    |         | 8 (4.3)           | 9 (4.5)       |         |
| Current                               | 133 (22.3)        | 208 (35.7)    |         | 4 (2.1)           | 7 (3.5)       |         |
| Anemia                                | 55 (9.6)          | 34 (6.1)      | 0.039   | 17 (9.6)          | 17 (9.2)      | 0.905   |
| HGS, kg                               | 38.0±7.0          | 38.9±7.0      | 0.044   | 23.8±4.6          | 24.2±4.9      | 0.342   |
| FEV <sub>1</sub> % of predicted value | 95.3±12.5         | 79.5±14.7     | <0.001  | 98.3±12.9         | 80.0±17.6     | <0.001  |
| GOLD stage                            |                   |               |         |                   |               |         |
| GOLD I                                |                   | 300 (51.5)    |         |                   | 102 (51.3)    |         |
| GOLD II                               |                   | 261 (44.8)    |         |                   | 86 (43.2)     |         |
| GOLD III, IV                          |                   | 21 (3.6)      |         |                   | 11 (5.5)      |         |

**Note:** Data represented as mean ± SD or n (%).

**Abbreviations:** COPD, chronic obstructive pulmonary disease; SD, standard deviation; HGS, hand grip strength; FEV<sub>1</sub>, forced expiratory volume in 1 second; GOLD, Global Initiative for Chronic Obstructive Lung Disease.

# Results

- Among the subjects with HGS data, male COPD subjects showed lower HGS than male non-COPD subjects (non-COPD vs COPD  $41.7 \pm 7.2$  vs  $38.9 \pm 6.9$  kg,  $P < 0.001$ ).
- A similar pattern of results was observed for female subjects (non-COPD vs COPD  $25.7 \pm 4.6$  vs  $24.2 \pm 4.9$  kg,  $P < 0.001$ ).
- After propensity score matching, no significant statistical differences remained, except for lung function and smoking status.
- Significant association between HGS and EQ5D utility score in male subjects after adjusting for age and BMI ( $r = 0.201$ ,  $P = 0.001$ ), while female subjects did not show the correlation ( $r = 0.098$ ,  $P = 0.170$ ).

# Discussion

- They used pre bronchodilator FEV1/FVC, which could have included asthmatics and diluted the effects of HGS
- The number of samples in the severe COPD group enrolled was low and the evaluation of HGS was limited to mild to moderate COPD group
- The number of female subjects was small
- A lot of excluded patients

# OSIA PRESENTATION – SECOND READER

Laurie Ann Moennich

# Hand grip strength and chronic obstructive pulmonary disease in Korea: an analysis in KNHANES VI

**International Journal of COPD**

 Open Access Full Text Article

**Dovepress**  
open access to scientific and medical research

**ORIGINAL RESEARCH**

## Hand grip strength and chronic obstructive pulmonary disease in Korea: an analysis in KNHANES VI

This article was published in the following Dove Press journal:  
*International Journal of COPD*  
4 August 2017  
[Number of times this article has been viewed](#)

---

**Su Hwan Lee**  
**Soo Jung Kim**  
**Yeji Han**  
**Yon Ju Ryu**  
**Jin Hwa Lee**  
**Jung Hyun Chang**

Division of Pulmonary and Critical Care Medicine, Department of Internal Medicine, Ewha Medical Research Institute, Ewha Womans University School of Medicine, Seoul, Korea

**Background:** Muscle mass is known to be associated with mortality in elderly adults. Because hand grip strength (HGS) is known as a simple assessment tool for muscular strength, many researchers have studied the association between HGS and disease. However, empirical evidence for the relationship between chronic obstructive pulmonary disease (COPD) and HGS is still controversial. The aim of this study was to evaluate the association between COPD and HGS, using Korean population data.

**Methods:** This was a population-based cross-sectional study. Data were obtained from the sixth Korean National Health and Nutrition Examination Survey, which was conducted from 2013 to 2015. To reduce the effects of HGS-related factors and potential confounding factors, propensity score matching was used to match subjects with and without COPD.

**Results:** Among 14,930 subjects, 832 were enrolled in each group (non-COPD and COPD) after propensity score matching. COPD subjects did not have lower HGS than non-COPD subjects (non-COPD vs COPD, male,  $38.0 \pm 7.0$  vs  $38.9 \pm 7.0$  kg,  $P=0.044$ , female,  $23.8 \pm 4.6$  vs  $24.2 \pm 4.9$  kg,  $P=0.342$ ). Lung function was classified by Global Initiative for Chronic Obstructive Lung Disease stages and was not significantly associated with HGS. For male COPD subjects, there was a significant correlation between HGS and the EuroQol Five-Dimension Questionnaire (EQ5D) utility score index, which is an indicator of quality of life that adjusts for age and body mass index ( $r=0.201$ ,  $P<0.001$ ). The correlation was absent for female subjects ( $r=0.098$ ,  $P=0.170$ ).

**Conclusion:** COPD subjects did not have lower HGS than non-COPD subjects. HGS did not associate with lung function. However, the HGS of male COPD subjects was positively associated with EQ5D utility score index, an indicator of quality of life. HGS may be helpful as an additional method to the evaluation of quality of life in male COPD patients.

**Keywords:** chronic obstructive pulmonary disease, hand strength, quality of life

# Background and Methods

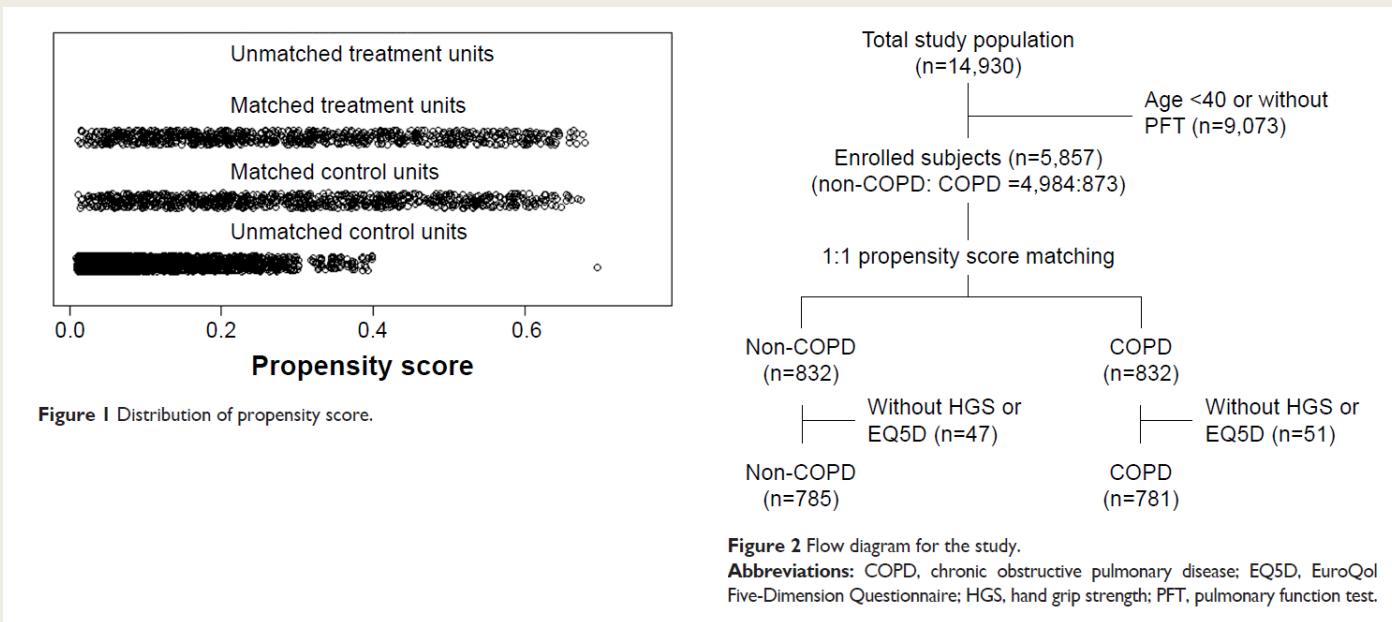
- Population based study in Korea
- Data source – the sixth Korean National Health and Nutrition Examination Survey
- Propensity score matching was used to match subjects with and without COPD
  - *To reduce the effects of hand grip strength (HGS) related factors and other potential confounders*

# Study Design

- Subjects analyzed were aged >40 years who completed the questionnaire
  - *And also had spirometry data between 2014 and 2015*
- Variables Collected:
  - *Demographics*
  - *Smoking status*
  - *Physician diagnosed comorbidities*
  - *Euroqol Five-Dimension Questionnaire (EQ5D)*

# Hand Grip Strength





- Total study population 14,930
- After propensity score matching: 832 in each group

# Table 1

**Table I** Subject demographics before and after propensity score matching

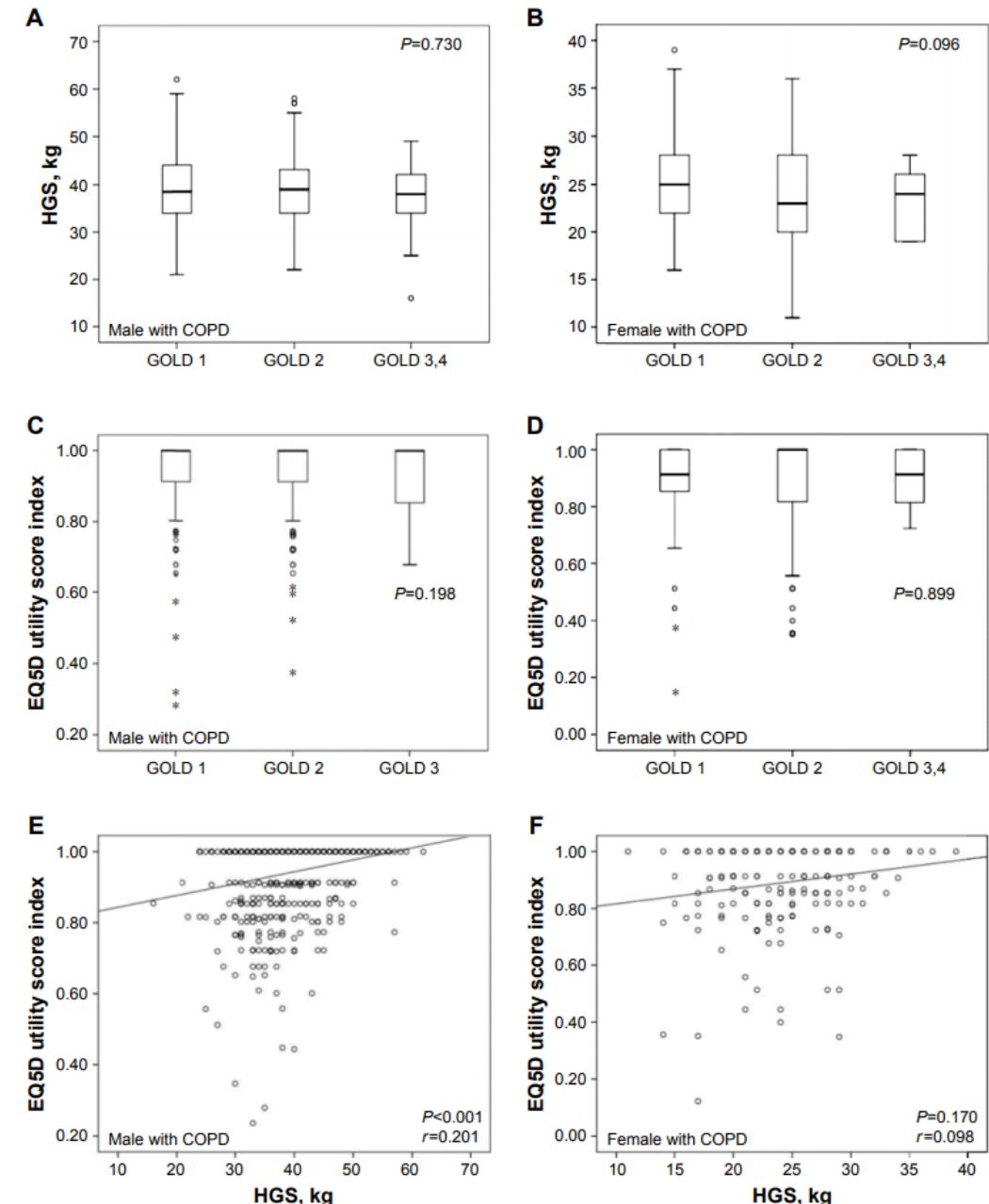
| Variables                             | Overall series      |               |         | Propensity score matching |               |         |
|---------------------------------------|---------------------|---------------|---------|---------------------------|---------------|---------|
|                                       | Non-COPD<br>n=4,984 | COPD<br>n=873 | P-value | Non-COPD<br>n=832         | COPD<br>n=832 | P-value |
| Age, years                            | 56.3±10.3           | 65.3±9.1      | <0.001  | 64.9±9.3                  | 65.4±9.1      | 0.308   |
| Male sex                              | 1,929 (38.7)        | 644 (73.8)    | <0.001  | 620 (74.5)                | 606 (72.8)    | 0.436   |
| Height, cm                            | 160.8±8.7           | 164.0±8.58    | <0.001  | 163.2±8.3                 | 163.9±8.62    | 0.136   |
| BMI, kg/m <sup>2</sup>                | 24.2±3.1            | 24.0±2.8      | 0.053   | 23.9±2.8                  | 24.0±2.8      | 0.424   |
| HTN                                   | 1,312 (26.6)        | 399 (39.2)    | <0.001  | 330 (39.7)                | 338 (40.6)    | 0.689   |
| Dyslipidemia                          | 956 (19.4)          | 188 (21.7)    | 0.256   | 178 (21.4)                | 188 (22.6)    | 0.554   |
| Stroke                                | 92 (1.9)            | 32 (3.7)      | <0.002  | 29 (3.5)                  | 32 (3.8)      | 0.696   |
| IHD                                   | 125 (2.6)           | 42 (5)        | <0.001  | 34 (4.1)                  | 42 (5)        | 0.348   |
| DM                                    | 464 (9.4)           | 133 (15.4)    | <0.001  | 137 (16.5)                | 132 (15.9)    | 0.739   |
| Arthritis                             | 792 (16.8)          | 145 (17.4)    | 0.643   | 154 (18.5)                | 145 (17.4)    | 0.566   |
| Depression                            | 282 (5.7)           | 28 (3.2)      | 0.008   | 35 (4.2)                  | 28 (3.4)      | 0.369   |
| Self-reported functional limitation   | 379 (7.7)           | 81 (9.4)      | 0.208   | 79 (9.5)                  | 81 (9.7)      | 0.833   |
| Ever smoker, n (%)                    | 1,756 (35.6)        | 581 (67.2)    | <0.001  | 494 (59.4)                | 551 (66.2)    | 0.004   |
| FEV <sub>1</sub> % of predicted value | 95.1±11.9           | 79.6±15.5     | <0.001  | 96.0±12.6                 | 79.7±15.6     | <0.001  |
| GOLD stage I                          |                     | 444 (50.9)    |         |                           | 425 (51.1)    |         |
| GOLD stage II                         |                     | 394 (45.1)    |         |                           | 374 (45.0)    |         |
| GOLD stage III                        |                     | 35 (4.0)      |         |                           | 33 (4.0)      |         |

Note: Data represented as mean ± SD or n (%).

Abbreviations: BMI, body mass index; COPD, chronic obstructive pulmonary disease; DM, diabetes mellitus; FEV<sub>1</sub>, forced expiratory volume in 1 second; GOLD, Global Initiative for Chronic Obstructive Lung Disease; HTN, hypertension; IHD, ischemic heart disease; SD, standard deviation.

# Comparisons

- Comparison of HGS in non-COPD and COPD groups after propensity score matching
- Relationship between HGS and EQ5D in male subjects with COPD
- Relationship between HGS and smoking in male subjects



# Discussion

- HGS associated with difference in EQ5D in male COPD patients only
- GOLD stages 3 and 4 in this study were small
- EQ5D scores affecting mobility and daily tasks were lower in COPD patients
- Limitations
  - *Potential over-diagnosis of COPD (misclassification or dilution of COPD group)*
  - *GOLD 3 or 4 patient sample limited*
  - *Not many females in the sample overall*

# **Single-centre comparison of robotic and open pancreatoduodenectomy: a propensity score-matched study**

Lapo Bencini<sup>1</sup>  · Federica Tofani<sup>1</sup> · Claudia Paolini<sup>1</sup> · Carla Vaccaro<sup>1</sup> · Paolo Checcacci<sup>1</sup> · Mario Annecchiarico<sup>1</sup> ·  
Luca Moraldi<sup>1</sup> · Marco Farsi<sup>2</sup> · Simone Polvani<sup>3</sup> · Andrea Coratti<sup>1</sup>

---

AMIN SAAD, MD

OBSERVATIONAL STUDIES IN ACTION

# Article

---

**Journal:** Surgical Endoscopy

**Publication Date:** 12 January, 2020

**Authors:** L. Bencini, F. Tofani, C. Paolini, C. Vaccaro, P. Checcacci, M. Annecchiarico, L. Moraldi, M. Farsi, S. Polvani, A. Coratti.

**Universities:**

- Surgical Oncology and Robotics, Careggi University Hospital, Florence, Italy
- General Surgery, Scotte University, Siena, Italy.
- Gastroenterology Research Unit, University of Florence, Florence, Italy.

# Background and significance

---

Pancreatic Cancer is a leading cause of death (4<sup>th</sup> females, 5<sup>th</sup> males)

Occurs in the 7th and 8<sup>th</sup> decades with no significant sex difference.

The stable incidence and mortality rates for the past two decades in the US reflects poor medical improvements.

# Pancreatic Surgery

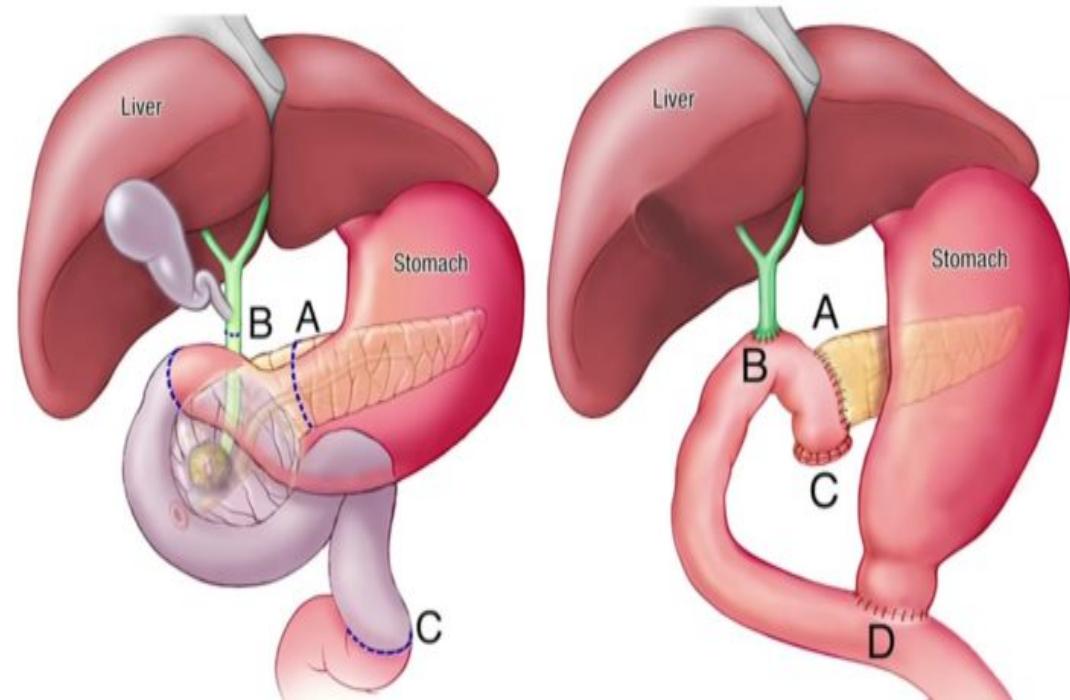
Cure of PC is with adequate oncological surgical resection (R0 stage)

Early surgery = better outcome

only 20% are eligible for surgery with 20% 5-year-survival rate.

Surgery associated with 45% morbidity and <5% mortality.

high-volume centers = better outcomes and improved survival



# Laparoscopic surgery

Laparoscopic PD was first done in 1994

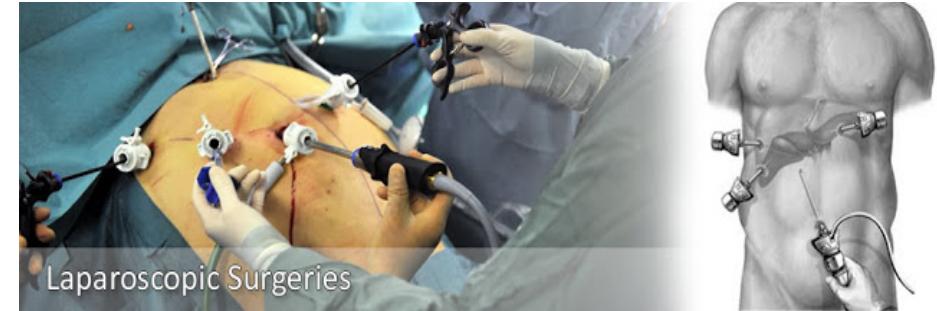
- 2 trials reported shorter hospital stay
- 1 trial interrupted due to inferior results in the laparoscopic arm

## Advantages:

- Relatively painless
- Reduced bleeding
- Faster recovery
- Smaller incisions

## Intrinsic limitations of laparoscopic surgery

- Lack of depth perception
- Use in confined spaces
- Non-articulated instruments



# Robotic surgery

---

Robotic surgery was first introduced in 2003

Advantages:

- Optimal and ergonomic surgeon position
- deeper and more stable high-definition 3D vision
- endo-wrist arm technology (better articulation)
- motion scaling and tremor filtration.

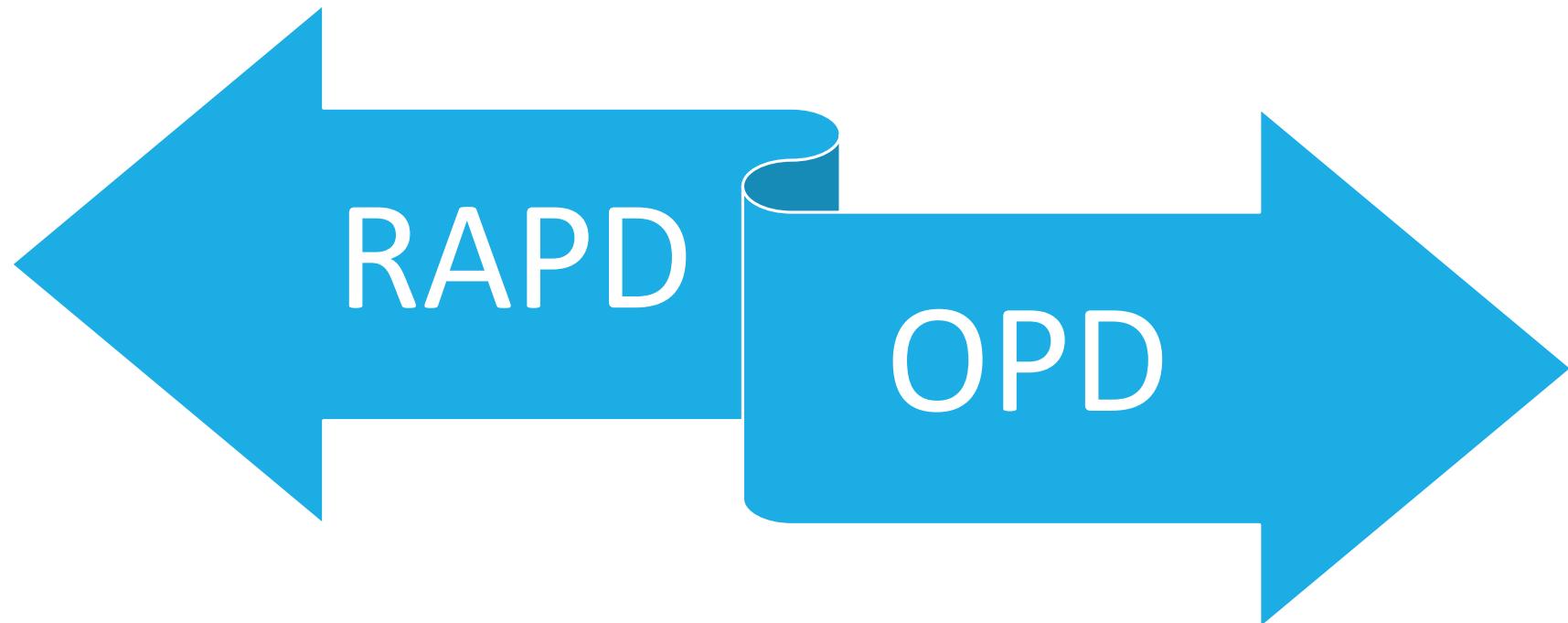
Use is reserved to specialized centers



# Aim

---

Compare the short term outcomes Robotic assisted pancreateoduodenectomy (RAPD) and Open pancreateoduodenectomy (OPD) in high-volume centers.



# Methods

---

**Study type:** retrospective analysis of a prospectively collected data

**Population:** consecutive patients undergoing elective RAPDS and OPD for malignant and borderline pancreatic nodules by experienced surgeons (>50 PD prior to 2014)

**Year:** between Jan 1<sup>st</sup>, 2014 and Dec 31<sup>st</sup> 2018

Exclusion criterion for robotic surgery was the involvement of large vessels

# Outcomes

---

Patients followed until discharge or 30 days post operatively

The International Study Group on Pancreatic Surgery (ISGPS) definitions were used to classify:

- Post-pancreatectomy Fistula (POPF)
- Post-pancreatectomy hemorrhage (PHH)
- Delayed emptying syndrome (DGE)

General complications (minor or major) were recorded based on the Calvien -Dindo Classification

The Union for International Cancer Control (UICC) TNM classification was used for pathological staging of tumors.

| Degree | Definitions  |
|--------|--|
| I      | Any deviation from the normal postoperative course without the need of intervention beyond the administration of antiemetics, antipyretics, analgesics, diuretics, electrolytes, and physical therapy* |
| II     | Complications requiring pharmacological treatment with other medicines beyond the ones used for the complications of degree I  |
| III    | Complications requiring surgical, endoscopic, or radiological intervention   |
| III-a  | Intervention without general anesthesia  |
| III-b  | Intervention under general anesthesia  |
| IV     | Life-threatening complication requiring admission to intensive care unit   |
| IV-a   | Uni-organ dysfunction (including dialysis)   |
| IV-b   | Multi-organ dysfunction  |
| V      | Death  |

\*This degree also includes drained cutaneous infections without general anesthesia.

| Classification | Description  |
|----------------|--|
| ASA 1          | Healthy patients   |
| ASA 2          | Mild to moderate systemic disease caused by the surgical condition or by other pathological processes, and medically well controlled |
| ASA 3          | Severe disease process which limits activity but is not incapacitating   |
| ASA 4          | Severe incapacitating disease process that is a constant threat to life  |
| ASA 5          | Moribund patient not expected to survive 24 hours with or without an operation   |
| ASA 6          | Declared brain-dead patient whose organs are being removed for donor purposes  |

| Comorbid conditions <sup>a,b</sup>     | cCCI weights | uCCI weights   |
|--|--------------|----------------|
| Myocardial infarction                  | 1            | 0              |
| Congestive heart failure               | 1            | 2              |
| Peripheral vascular disease            | 1            | 0              |
| Cerebrovascular disease                | 1            | 0              |
| Dementia                               | 1            | 2              |
| Chronic pulmonary disease              | 1            | 1              |
| Rheumatic disease                      | 1            | 1              |
| Peptic ulcer disease                   | 1            | 0              |
| Mild liver disease                     | 1            | 2              |
| Diabetes without chronic complication  | 1            | 0              |
| Diabetes with chronic complication     | 2            | 1              |
| Hemiplegia or paraplegia               | 2            | 2              |
| Renal disease                          | 2            | 1              |
| Any malignancy without metastasis      | 2            | 2 <sup>c</sup> |
| Leukemia                               | 2            |                |
| Lymphoma                               | 2            |                |
| Moderate or severe liver disease       | 3            | 4              |
| Metastatic solid tumour                | 6            | 6              |
| AIDS (excluded asymptomatic infection) | 6            | 4              |
| Maximum comorbidity score              | 33           | 24             |

# Statistical analysis

---

Data was collected prospectively and reviewed retrospectively

Continuous data was compared using the non-parametric Mann-Whitney U test.

Discrete variables were compared using Chi-square or Fisher's exact test

Statistical level of significance was defined as a p value < 0.05

Performed using SPSS version 20

# 1:1 nearest neighbor matching

---

Propensity score matching (PSM) was performed with R package MatchIt procedure with the nearest neighbor 1-to-1 method to minimize the effects of preoperative selection biases between the OPD and RAPD groups

13 Covariates used (e.g. sex, age, BMI, smoking and alcohol consumption, CHA, ASA, ECOG)

Cases with missing data in the matching variables were omitted from the analysis

# Results

---

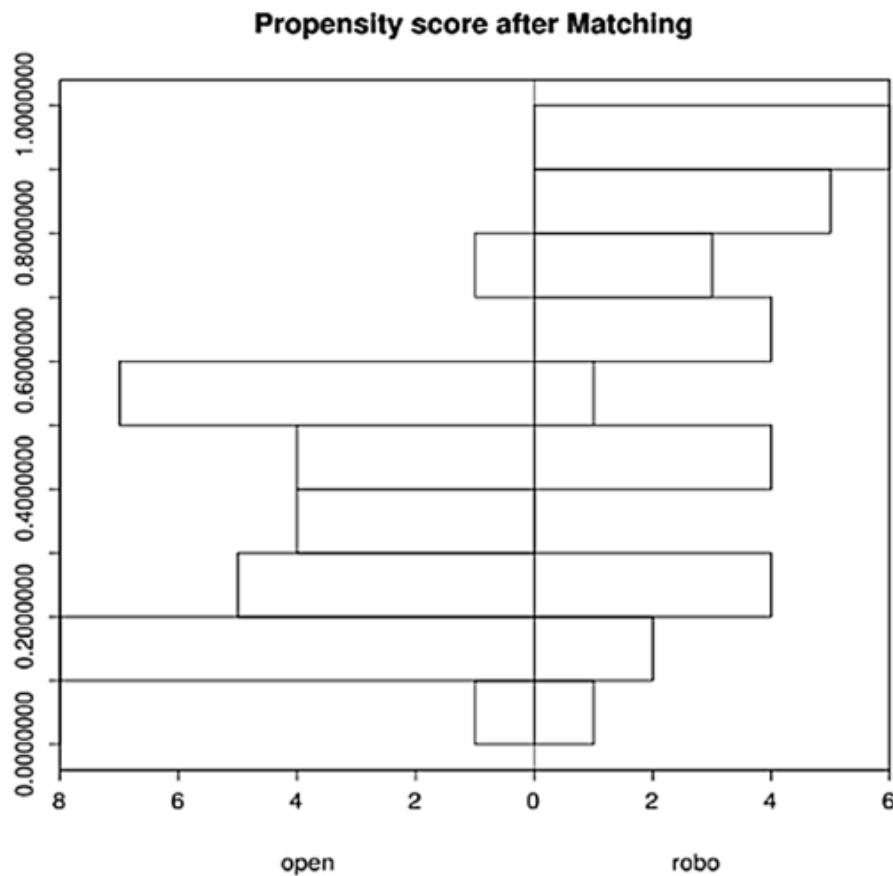
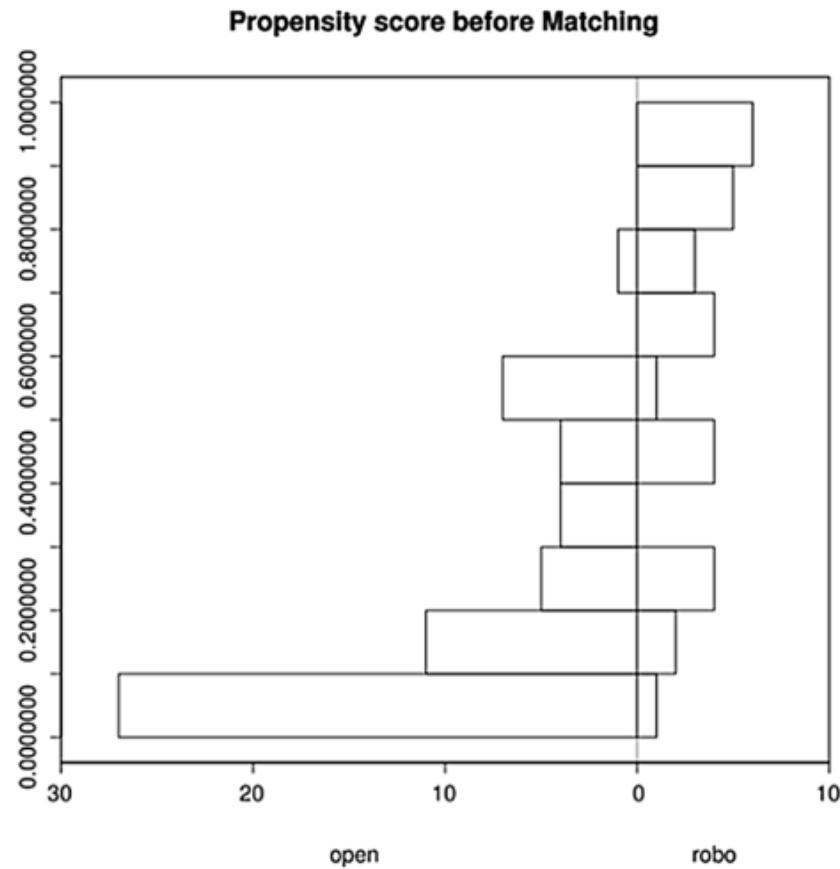
121 consecutive patients

- 77 OPD (83 after merging conversion group)
- 38 RAPD
- 6 started RAPD, then converted OPD (merged with OPD)

After matching, 35 patients in the RAPD and 35 patients in OPD were used for the statistical analysis

# After matching variables were homogeneous ?

---



**Table 1** Baseline and demographic characteristics of the pre-match and post-match cohort of patients who underwent PD

| Baseline characteristics          | OPD pre<br>N=83 | RAPD pre<br>N=38 | p value | OPD post<br>N=35 | RAPD post<br>N=35 | p value |
|-----------------------------------|-----------------|------------------|---------|------------------|-------------------|---------|
| Age (years)                       | 74 (56–91)      | 60 (42–73)       | 0.06    | 69 (50–88)       | 70.5 (42–85)      | 0.95    |
| Sex, N (%)                        |                 |                  |         |                  |                   |         |
| Female                            | 39 (47)         | 16 (42.1)        | 0.69    | 19 (56.3)        | 16 (45.7)         | 0.51    |
| Male                              | 44 (53)         | 22 (57.9)        |         | 16 (45.7)        | 19 (56.3)         |         |
| BMI (kg/m <sup>2</sup> )          | 24 (14–38)      | 26 (18–32)       | 0.07    | 24 (18–38)       | 26 (18–32)        | 0.19    |
| CHARLSON score, N (%)             |                 |                  |         |                  |                   |         |
| 2                                 | 33 (40.2)       | 17 (44.7)        | 0.92    | 18 (51.5)        | 16 (45.8)         | 0.86    |
| 3                                 | 13 (15.9)       | 8 (21.1)         |         | 7 (20)           | 7 (20)            |         |
| 4                                 | 12 (14.6)       | 6 (15.8)         |         | 4 (11.4)         | 5 (14.3)          |         |
| 5                                 | 15 (18.3)       | 6 (15.8)         |         | 6 (17.1)         | 6 (17.1)          |         |
| 6                                 | 6 (7.3)         | 1 (2.6)          |         | 0 (0)            | 1 (2.8)           |         |
| 7                                 | 2 (2.4)         | 0 (0)            |         | 0 (0)            | 0 (0)             |         |
| 9                                 | 1 (1.2)         | 0 (0)            |         |                  |                   |         |
| ASA score, N (%)                  |                 |                  |         |                  |                   |         |
| 1                                 | 6 (7.2)         | 3 (7.9)          | 0.09    | 3 (8.6)          | 3 (8.6)           | 0.05    |
| 2                                 | 47 (56.6)       | 29 (76.3)        |         | 24 (68.6)        | 27 (77.1)         |         |
| 3                                 | 28 (33.7)       | 5 (13.2)         |         | 8 (22.8)         | 5 (14.3)          |         |
| 4                                 | 2 (2.4)         | 1 (2.6)          |         | 0 (0)            | 0 (0)             |         |
| ECOG performance score, N (%)     |                 |                  |         |                  |                   |         |
| 0                                 | 69 (83.1)       | 37 (97.4)        | 0.19    | 34 (97.1)        | 34 (97.1)         | 1.000   |
| 1                                 | 8 (9.6)         | 0 (0)            |         | 0 (0)            | 0 (0)             |         |
| 2                                 | 1 (1.2)         | 0 (0)            |         | 0 (0)            | 0 (0)             |         |
| 3                                 | 4 (4.8)         | 1 (2.6)          |         | 1 (2.9)          | 1 (2.9)           |         |
| 4                                 | 1 (1.2)         | 0 (0)            |         | 0 (0)            | 0 (0)             |         |
| MOR, N (%)                        | 69 (83.1)       | 32 (84.2)        | 1.000   | 30 (85.7)        | 30 (85.7)         | 1.000   |
| Pre-op diabetes, N (%)            | 22 (26.5)       | 7 (18.4)         | 0.36    | 6 (17.1)         | 7 (20%)           | 0.75    |
| Previous abdominal surgery, N (%) | 47 (56.6)       | 17 (44.7)        | 0.24    | 21 (60)          | 16 (45.7)         | 0.23    |
| Pre-op stenting, N (%)            | 47 (56.6)       | 17 (44.7)        | 0.24    | 17 (48.6)        | 17 (48.6)         | 1.000   |
| Pre-op jaundice, N (%)            | 55 (66.3)       | 24 (63.1)        | 0.83    | 21 (60%)         | 22 (62.8)         | 0.80    |
| Weight loss (>5 kg/6 m), N (%)    | 44 (53)         | 14 (36.8)        | 0.11    | 16 (45.7)        | 12 (34.3)         | 0.32    |
| CA19.9 (U/mL)                     | 102 (2–6642)    | 85 (2–1617)      | 0.3     | 70 (2–2617)      | 143 (2–1617)      | 0.80    |
| Pre-op biopsy, N (%)              | 29 (34.9)       | 16 (42.1)        | 0.54    | 15 (42.8)        | 15 (42.8)         | 1.000   |
| Neoadjuvant treatment, N (%)      | 7 (8.4)         | 1 (2)            | 0.43    | 0 (0)            | 0 (0)             | 1.000   |

OPD open pancreatoduodenectomy, RAPD robot-assisted pancreatoduodenectomy, BMI body mass index, ASA American Society of Anaesthesiologists, ECOG Eastern Cooperative Oncology Group, MOR multidisciplinary oncology rounds, DM diabetes mellitus

| Tumour characteristics     | OPD pre<br>N=83 | RAPD pre<br>N=28 | p value       | OPD post<br>N=35 | RAPD post<br>N=35 | p value       |
|----------------------------|-----------------|------------------|---------------|------------------|-------------------|---------------|
| Localization, N (%)        |                 |                  |               |                  |                   |               |
| Pancreas                   | 58 (69.9)       | 20 (52.7)        | <b>0.000*</b> | 28 (80)          | 18 (51.4)         | <b>0.006*</b> |
| Duodenum                   | 9 (10.8)        | 17 (44.7)        |               | 4 (11.4)         | 16 (45.7)         |               |
| CBD                        | 11 (13.3)       | 1 (2.6)          |               | 3 (8.7)          | 1 (2.8)           |               |
| Others                     | 5 (6)           | 0 (0)            |               | 0 (0)            | 0 (0)             |               |
| Histology, N (%)           |                 |                  |               |                  |                   |               |
| Ductal adenocarcinoma      | 46 (55.4)       | 18 (47.4)        | <b>0.01*</b>  | 23 (65.7)        | 16 (45.7)         | <b>0.04*</b>  |
| Duodenum adenocarcinoma    | 6 (7.2)         | 13 (34.2)        |               | 3 (8.6)          | 13 (37.1)         |               |
| CCK                        | 11 (13.3)       | 1 (2.6)          |               | 3 (8.6)          | 1 (2.8)           |               |
| NET                        | 6 (7.2)         | 2 (5.3)          |               | 4 (11.4)         | 2 (5.7)           |               |
| IPMN/MCN                   | 5 (6)           | 2 (5.3)          |               | 2 (5.3)          | 1 (3.3%)          |               |
| Pancreatitis               | 1 (1.2)         | —                |               | —                | —                 |               |
| Other                      | 8 (9.6)         | 2 (5.3)          |               | —                | 2 (5.7)           |               |
| AJCC stage                 |                 |                  |               |                  |                   |               |
| Not a cancer (confirmed)   | 14 (16.9)       | 6 (15.8)         |               |                  |                   |               |
| 0                          | 1 (1.2)         | 0 (0%)           | 0.33          | 3 (8.6)          | 5 (14.3)          | 0.27          |
| Ia                         | 7 (8.4)         | 2 (5.3)          |               | 6 (17.1)         | 2 (5.7)           |               |
| Ib                         | 4 (4.8)         | 7 (18.4)         |               | 2 (5.7)          | 7 (20)            |               |
| IIa                        | 18 (21.7)       | 10 (26.3)        |               | 6 (17.1)         | 8 (22.9)          |               |
| IIb                        | 31 (37.3)       | 11 (28.9)        |               | 15 (42.9)        | 11 (41.4)         |               |
| III                        | 6 (7.2)         | 2 (5.3)          |               | 3 (8.6)          | 2 (5.7)           |               |
| IV                         | 2 (2.4)         | 0 (0%)           |               | 0 (0)            | 0 (0)             |               |
| Tumour size (mm)           | 35 (2–51)       | 30 (18–40)       | 0.2           | 37 (2–51)        | 30 (18–40)        | 0.92          |
| Wirsung duct diameter (mm) | 3 (2–10)        | 3 (2–12)         | 0.7           | 3.5 (2–7)        | 3 (2–12)          | 0.79          |
| Lymph nodes harvested (N)  | 23 (2–67)       | 22 (7–60)        | 0.88          | 23 (3–62)        | 22 (7–60)         | 0.85          |
| Lymph node ratio (N+/N)    | 0 (0–0.7)       | 0 (0–0.2)        | 0.16          | 0.3 (0–0.4)      | 0 (0–0.2)         | 0.18          |

Bold and asterisks values with statistic significance ( $p < 0.05$ )

OPD open pancreatoduodenectomy, RAPD robot-assisted pancreatoduodenectomy, AJCC American Joint Committee on Cancer

**Table 3** Intraoperative results (pre-match and post-match cohort)

| Intraoperative results              | OPD pre<br>N=83 | RAPD pre<br>N=38 | p value       | OPD post<br>N=35 | RAPD post<br>N=35 | p value       |
|-------------------------------------|-----------------|------------------|---------------|------------------|-------------------|---------------|
| Operative time (min)                | 367 (270–520)   | 560 (465–670)    | <b>0.000*</b> | 335 (220–565)    | 530 (405–660)     | <b>0.000*</b> |
| Type of resection, N (%)            |                 |                  |               |                  |                   |               |
| Pylorus-preserving PD               | 58 (69.8)       | 17 (44.8)        | <b>0.008*</b> | 24 (69)          | 16 (46)           | 0.053         |
| Whipple PD                          | 25 (30.2)       | 21 (55.2)        |               | 11 (31)          | 19 (54)           |               |
| Additional organs resected, N (%)   | 11 (13.3)       | 0 (0)            | <b>0.01*</b>  | 2 (5.7)          | 0 (0)             | 0.15          |
| Vascular resection, N (%)           | 20 (24.1)       | 0 (0)            | <b>0.001*</b> | 8 (22.8)         | 0 (0)             | <b>0.003*</b> |
| Type of anastomosis, N (%)          |                 |                  |               |                  |                   |               |
| Pancreatojejunostomy                | 11 (13.3)       | 0 (0)            | <b>0.02*</b>  | 7 (20)           | 0 (0)             | <b>0.007*</b> |
| Duct-to-mucosa                      | 61 (73.5)       | 36 (94.7)        |               | 23 (65.7)        | 33 (94.3)         |               |
| Pancreatogastrostomy                | 8 (9.6)         | 2 (5.3)          |               | 5 (14.3)         | 2 (5.7)           |               |
| None                                | 3 (3.6)         | 0 (0)            |               | 0 (0)            | 0 (0)             |               |
| Consistency of the pancreas, N (%)  |                 |                  |               |                  |                   |               |
| Hard/firm pancreas                  | 37 (44.6)       | 16 (42.1)        | 0.96          | 17 (48.6)        | 16 (45.7)         | 0.94          |
| Soft pancreas                       | 37 (44.6)       | 18 (47.4)        |               | 18 (51.4)        | 15 (42.8)         |               |
| Unknown                             | 9 (10.8)        | 4 (10.5)         |               | 0 (0)            | 0 (0)             |               |
| Intraoperative complications, N (%) | 7 (8.4)         | 0 (0)            | 0.09          | 2 (5.7)          | 0 (0)             | 0.15          |

Bold and asterisks values with statistic significance ( $p < 0.05$ )*OPD* open pancreatoduodenectomy, *RAPD* robot-assisted pancreatoduodenectomy, *POPF* postoperative pancreatic fistula, *PPH* post-pancreatectomy haemorrhage, *DGS* delayed gastric syndrome

| Postoperative complications<br>(30 days/in-hospital) | OPD pre<br>N=83 | RAPD pre<br>N=38 | p value       | OPD post<br>N=35 | RAPD post<br>N=35 | p value       |
|--|-----------------|------------------|---------------|------------------|-------------------|---------------|
| Overall morbidity, N (%)                             | 43 (51.8)       | 20 (52.6)        | 1.000         | 15 (42.8)        | 17 (48.5)         | 0.63          |
| Mortality, N (%)                                     | 4 (4.8)         | 1 (2.6)          | 1.000         | 0 (0)            | 1 (2.9)           | 1.000         |
| Clavien-Dindo classification                         |                 |                  | 0.30          |                  |                   | 0.61          |
| 0  | 24 (28.9)       | 17 (44.7)        |               | 14 (40)          | 17 (48.6)         |               |
| I  | 16 (16.9)       | 6 (15.8)         |               | 8 (22.8)         | 6 (17.1)          |               |
| II   | 21 (25.3)       | 4 (10.5)         |               | 7 (20)           | 4 (11.4)          |               |
| IIIa   | 7 (8.4)         | 2 (5.3)          |               | 2 (5.7)          | 2 (5.7)           |               |
| IIIb   | 7 (8.4)         | 5 (13.2)         |               | 3 (8.6)          | 3 (8.6)           |               |
| IVa  | 1 (1.2)         | 2 (5.3)          |               | 0 (0)            | 2 (5.7)           |               |
| IVb  | 5 (6)           | 1 (2.6)          |               | 1 (2.9)          | 0 (0)             |               |
| V  | 4 (4.8)         | 1 (2.6)          |               | 0 (0)            | 1 (2.9)           |               |
| POPF N (%)   | 12 (14.4)       | 5 (13.1)         | 0.84          | 4 (11.4)         | 4 (11.4)          | 1.00          |
| Grading of POPF, N (%)                               |                 |                  |               |                  |                   |               |
| B  | 5 (6)           | 3 (7.9)          | 0.78          | 2 (5.7)          | 2 (5.7)           | 1.00          |
| C  | 7 (8.4)         | 2 (5.2)          |               | 2 (5.7)          | 2 (5.7)           |               |
| PPH, N (%)   | 8 (9.6)         | 4 (10.5)         | 1.000         | 4 (11.4)         | 3 (8.6)           | 0.69          |
| Grading of PPH, N (%)                                |                 |                  |               |                  |                   |               |
| A  | 0 (0)           | 1 (2.6)          | 0.25          | 0 (0)            | 1 (2.8)           | <b>0.03*</b>  |
| B  | 1 (2.5)         | 2 (5.2)          |               | 0 (0)            | 2 (6.7)           |               |
| C  | 7 (87.5)        | 1 (2.6)          |               | 4 (11.4)         | 0 (0)             |               |
| DGS, N (%)   | 12 (14.4)       | 5 (13.1)         | 0.84          | 5 (14.2)         | 4 (11.4)          | 0.72          |
| Blood transfusion, N (%)                             | 32 (38.6)       | 7 (18.4)         | <b>0.03*</b>  | 8 (22.8)         | 6 (17.1)          | 0.55          |
| Refeeding (days)                                     | 3.5 (2–8)       | 3 (2–7)          | <b>0.002*</b> | 4 (2–19)         | 3 (1–5)           | <b>0.002*</b> |
| Gas canalization (days)                              | 3 (1–9)         | 4 (2–7)          | 0.5           | 3 (1–7)          | 3 (2–7)           | 0.36          |
| Faeces canalization (days)                           | 4 (1–10)        | 5 (3–7)          | 0.46          | 4 (3–8)          | 5 (2–9)           | 0.29          |
| Reoperation, N (%)                                   | 14 (16.9)       | 8 (21.1)         | 0.61          | 4 (11.4)         | 6 (17.1)          | 0.49          |
| Readmission, N (%)                                   | 7 (8.4)         | 3 (7.9)          | 1.000         | 4 (11.4)         | 3 (8.6)           | 0.69          |
| Hospital stay (days)                                 | 10 (6–110)      | 8 (6–68)         | 0.09          | 10 (7–110)       | 8 (6–40)          | 0.13          |

Bold and asterisks values with statistic significance ( $p < 0.05$ )

OPD open pancreatoduodenectomy, RAPD robot-assisted pancreatoduodenectomy, POPF postoperative pancreatic fistula, PPH post-pancreatectomy haemorrhage, DGS delayed gastric syndrome

# Discussion points

---

Unexplained variables: CHA variable? CCK and NET histology?

Why did they drop cases that have missing matching covariates instead of imputation?

Making the decision about matching if the covariates are not statistically significantly different at baseline.

Recommendations about publishing pre and post matching results

Main disadvantages are the lack of power, retrospective nature, highly selective patients

Is the question better answered by a RCT? low caseload, local expertise, informed consent

# Thank you for listening

---

QUESTIONS?

Bencini et al. (2020)

# Single-centre Comparison of Robotic and Open Pancreatoduodenectomy: A Propensity Score-matched Study

OSIA Second Reader: Jason Huang  
March 18<sup>th</sup>, 2020

# Key Conclusions

One

RAPD can be performed safely and according to current oncological standards in selected patients.

Two

Some perioperative benefits (refeeding, hospital stay length, blood transfusions) compared with OPD.

Three

At the price of longer operating times.

# One

RAPD can be performed safely and according to current oncological standards in selected patients.

- Adequate resection margins
  - described in the procedure
- Appropriate lymphadenectomy

| Tumour characteristics             | OPD pre<br><i>N</i> =83 | RAPD pre<br><i>N</i> =28 | <i>p</i> value | OPD post<br><i>N</i> =35 | RAPD post<br><i>N</i> =35 | <i>p</i> value |
|------------------------------------|-------------------------|--------------------------|----------------|--------------------------|---------------------------|----------------|
| Lymph nodes harvested ( <i>N</i> ) | 23 (2–67)               | 22 (7–60)                | 0.88           | 23 (3–62)                | 22 (7–60)                 | 0.85           |

\*taken from Table 2.

# TWO

Some perioperative benefits (refeeding, hospital stay length, blood transfusions) compared with OPD.

| Postoperative complications<br>(30 days/in-hospital) | OPD pre<br><i>N</i> =83 | RAPD pre<br><i>N</i> =38 | <i>p</i> value | OPD post<br><i>N</i> =35 | RAPD post<br><i>N</i> =35 | <i>p</i> value |
|--|-------------------------|--------------------------|----------------|--------------------------|---------------------------|----------------|
| Blood transfusion, <i>N</i> (%)                      | 32 (38.6)               | 7 (18.4)                 | <b>0.03*</b>   | 8 (22.8)                 | 6 (17.1)                  | 0.55           |
| Refeeding (days)                                     | 3.5 (2–8)               | 3 (2–7)                  | <b>0.002*</b>  | 4 (2–19)                 | 3 (1–5)                   | <b>0.002*</b>  |
| Hospital stay (days)                                 | 10 (6–110)              | 8 (6–68)                 | 0.09           | 10 (7–110)               | 8 (6–40)                  | 0.13           |

\*taken from Table 4.

# Three

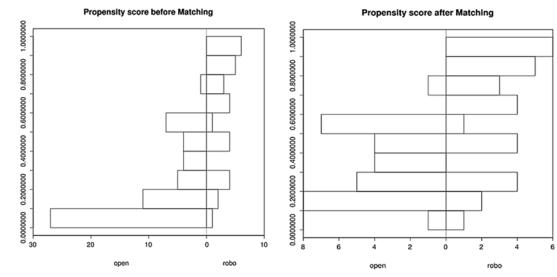
At the price of longer operating times.

| Intraoperative results | OPD pre<br><i>N</i> =83 | RAPD pre<br><i>N</i> =38 | <i>p</i> value | OPD post<br><i>N</i> =35 | RAPD post<br><i>N</i> =35 | <i>p</i> value |
|------------------------|-------------------------|--------------------------|----------------|--------------------------|---------------------------|----------------|
| Operative time (min)   | 367 (270–520)           | 560 (465–670)            | <b>0.000*</b>  | 335 (220–565)            | 530 (405–660)             | <b>0.000*</b>  |

\*taken from Table 3.

# Key Takeaways

- Effective matching, although the figure could be more convincing.
  - Bin size/width can alter the impression of this by a lot.
  - Perhaps a scatterplot (N=121 and 70) for PS.
  - And a plot with standardized differences for the covariates.
- 6 patients started RAPD but needed an early conversion to OPD (13.6%) due to intense adhesions.
  - And were considered in the OPD group.
  - This might affect the estimated effect size.





# Thank you!

# Propensity score analysis exploring the impact of smoking and drinking on the prognosis of patients with oral cancer

By: Joshua D. Froess

# Background

- Oral cancer age-standardized mortality
  - Men 2.8 in 100,000
  - Women 1.2 in 100,000
- Objective:
  - To compare the social and clinical characteristics as well as the prognosis of NSND and SD patients with oral cancer from southeast China by using PSM

**WHAT YOU NEED TO KNOW ABOUT ORAL CANCER**

While anyone can develop oral cancer, certain factors can greatly increase your risk. Routine dental exams should include life-saving oral cancer screenings. Ask your dentist about these screenings.

**Oral cancer can affect the:**

- Mouth, including roof, floor and cheeks
- Gums
- Throat
- Minor salivary glands
- Tongue
- Lips

**FAST FACTS**

More than **2x** as common in men as women

Each year in the U.S., roughly **48,000** people will be diagnosed with oral cancer. That's about **132 people per day**.

Over **90%** of cases are squamous cell carcinomas, which begin in the cells that form the lining of the mouth and throat

Average age of diagnosis – **62**

**RISK FACTORS**

The risk greatly increases when heavy use of both tobacco and alcohol are combined.

- Tobacco use
- Alcohol use
- Human papillomavirus (HPV) infection
- UV light exposure (usually from sun/tanning beds)
- Poor diet
- Compromised immune system
- Genetic syndromes
- Graft-versus-host-disease (due to stem cell transplant)
- Untreated periodontal (gum) disease

**SYMPOTMS**

If you experience any of the following symptoms for more than 2 weeks, talk to your doctor.

- Mouth sore that doesn't heal
- Persistent sore throat that doesn't get better
- Thickening or lump in the cheek
- Mouth pain
- White or red patches on the tonsils, mouth, tongue or gums
- Tingling or numbness in the mouth or tongue
- Trouble chewing, swallowing, or moving the jaw and/or tongue
- Loosening or pain around the teeth
- Lump or mass in the neck
- Swelling of the jaw (may notice dentures not fitting)
- Consistent bad breath
- Weight loss
- Voice changes

**PREVENTION**

While oral cancer is not always preventable, there are things you can do to significantly reduce your risk.

- Limit or quit smoking and drinking alcohol.
- Avoid exposure to HPV – use protection during oral sex.
- Reduce exposure to UV light – protect yourself from the sun and don't use tanning beds.
- Follow a healthy diet.
- Make sure dentures fit properly.
- Intervene early to treat pre-cancerous growths.
- Visit the dentist regularly for checkups.

**UNITED CONCORDIA DENTAL**

Important Disclosures: UnitedConcordia.com/Disclosures

Sources: Oral Cancer; National Institutes of Dental and Craniofacial Research; 2016  
Oral Cavity and Oropharyngeal Cancer; American Cancer Society; 2016  
Oral, Head & Neck Cancer Awareness Month; Oral Cancer Foundation; 2017  
Dental; Oral Cancer Foundation; 2016

# Why Propensity Score Methods?

---

- Previous studies have shown conflicting results
  - The exact relationship that smoking and drinking has on oral cancer is still unknown
- Current studies on this issue have not used PSM
- Helps address confounding bias
- Propensity Score Methods
  - Balance the covariates to better understand the causal relationship between the SD and NSND groups

# Methods

---

- Study Population
  - 1165 patients from The First Affiliated Hospital of Fujian Medical University
  - Patients were Chinese Han
  - Histologically confirmed oral cancer cases
- Data
  - Tumor characteristics were retrieved from medical records
  - Demographic characteristics and lifestyle habits were collected by self-reported questionnaires at diagnosis.
- Statistical Analysis
  - Sensitivity Analysis done to define the SD and NSND groups
  - Chi-square test was used to compare demographic characteristics
  - Survival curves were made using Kaplan-Meier method
    - Compared with log-rank test
  - Cox regression was used to compare effects
  - PS of nearest neighbor matching within a caliper of 0.02 without replacement

# Defining Exposure

Supplement table1 Adjusted hazard ratios, and 95% confidence intervals for tobacco smoking and alcohol drinking and oral cancer in full cohort

|                                   | All-cause mortality | Oral cancer specific mortality |
|-----------------------------------|---------------------|--------------------------------|
|                                   | HR (95%CI)          | HR (95%CI)                     |
| <b>Tobacco smoking duration</b>   |                     |                                |
| Never                             | 1.000               | 1.000                          |
| 0-45 years                        | 1.427(0.885,2.302)  | 1.382(0.845,2.261)             |
| >45 years                         | 2.280(1.263,4.116)  | 2.358(1.288,4.317)             |
| <b>Tobacco smoking frequency</b>  |                     |                                |
| Never                             | 1.000               | 1.000                          |
| 0-10cigarettes/day                | 0.909(0.343,2.413)  | 0.977(0.366,2.603)             |
| >10cigarettes/day                 | 1.654(1.037,2.636)  | 1.617(1.002,2.612)             |
| <b>Alcohol drinking duration</b>  |                     |                                |
| Never                             | 1.000               | 1.000                          |
| 0-35 years                        | 0.956(0.630,1.450)  | 0.976(0.635,1.499)             |
| >35 years                         | 1.136(0.732,1.764)  | 1.145(0.726,1.804)             |
| <b>Alcohol drinking frequency</b> |                     |                                |
| Never                             | 1.000               | 1.000                          |
| 0-7 times/week                    | 0.937(0.611,1.438)  | 0.848(0.518,1.390)             |
| >7 times/week                     | 1.400(1.021,1.979)  | 1.231(0.822,1.844)             |

Abbreviation: All adjusted for age, gender, occupation, education level, residence, BMI, TNM stage, pathological grading and pathological type, pathological grading and adjuvant therapy

TABLE 1 Survival analysis for SD vs NSND patients with oral cancer based on different threshold of smoking and drinking classification in full cohort

|                              | Number of patients (%) | All-cause mortality<br>HR (95%CI) | Oral cancer specific mortality<br>HR (95%CI) |
|------------------------------|------------------------|-----------------------------------|--|
| <b>Threshold of smoking</b>  |                        |                                   |  |
| 100 cigarettes <sup>a</sup>  |                        |                                   |  |
| No                           | 620 (53.22)            | 1.000                             | 1.000  |
| Yes                          | 545 (46.78)            | 1.586 (1.001, 2.512)              | 1.564 (0.975, 2.507)                         |
| 10 pack years <sup>b</sup>   |                        |                                   |  |
| No                           | 680 (58.37)            | 1.000                             | 1.000  |
| Yes                          | 485 (41.63)            | 1.842 (1.195, 2.840)              | 1.782 (1.143, 2.777)                         |
| 20 pack years <sup>c</sup>   |                        |                                   |  |
| No                           | 731 (62.75)            | 1.000                             | 1.000  |
| Yes                          | 434 (37.25)            | 1.743 (1.166, 2.604)              | 1.666 (1.104, 2.513)                         |
| <b>Threshold of drinking</b> |                        |                                   |  |
| >1 times/week <sup>d</sup>   |                        |                                   |  |
| No                           | 756 (64.89)            | 1.000                             | 1.000  |
| Yes                          | 408 (35.01)            | 1.029 (0.724, 1.462)              | 1.048 (0.729, 1.508)                         |
| >7 times/week <sup>e</sup>   |                        |                                   |  |
| No                           | 937 (80.43)            | 1.000                             | 1.000  |
| Yes                          | 228 (19.57)            | 1.463 (1.064, 2.011)              | 1.317 (0.905, 1.915)                         |

Note: All adjusted for age, gender, occupation, education level, residence, BMI, TNM stage, pathological grading and pathological type, pathological grading and adjuvant therapy.

<sup>a</sup>Smokers (ex and current smoker) were defined as those who had smoked at least 100 cigarettes in their lives.

<sup>b</sup>Smokers (ex and current smoker) were defined as those who had smoked at least 10 pack years cigarettes in their lives.

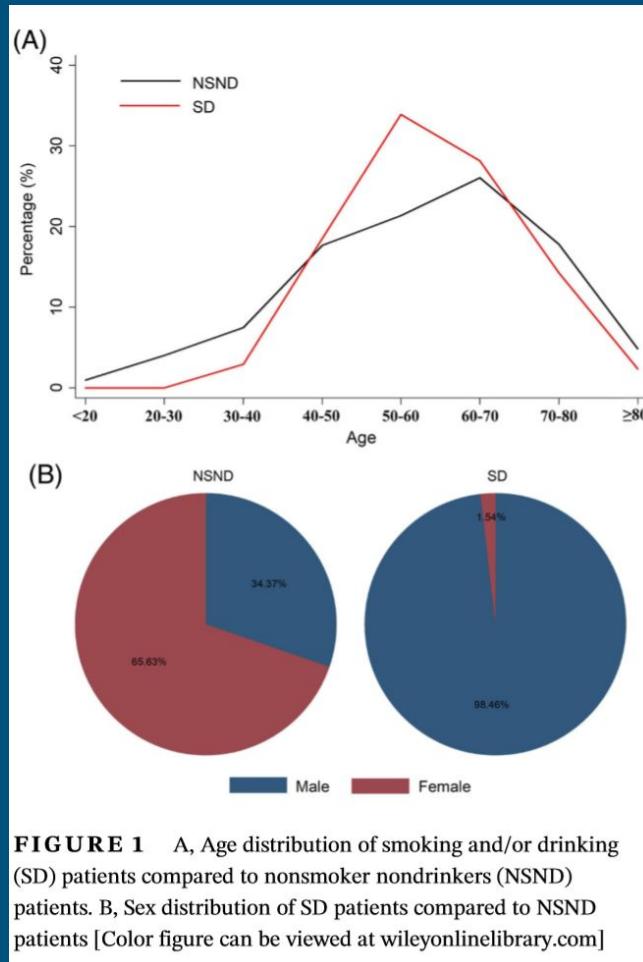
<sup>c</sup>Smokers (ex and current smoker) were defined as those who had smoked at least 20 pack years cigarettes in their lives.

<sup>d</sup>Drinkers (ex and current smoker) were defined as at least one drink a week continuously for at least 6 months.

<sup>e</sup>Drinkers (ex and current smoker) were defined as at least seven drink per week continuously for at least 1 year.

# Difference in SD vs NSND

- SD (n = 519)
  - Male: 98.46%
  - Age: 50-60 years
- NSND (n = 646)
  - Female: 65.63%
  - Age: 60-70 years



**FIGURE 1** A, Age distribution of smoking and/or drinking (SD) patients compared to nonsmoker nondrinkers (NSND) patients. B, Sex distribution of SD patients compared to NSND patients [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

# Balancing Age with PSM

---

**TABLE 2** Demographics of the patients in the SD group vs the NSND group before propensity score matching (N = 1165)

| Variables | NSND (646)<br>No. of<br>patients (%)<br>N | SD (519)<br>No. of<br>patients (%)<br>N (%) | P     |
|-----------|---|---|-------|
| Sex       |   |   | <.001 |
| Male      | 222 (34.37)                               | 511 (98.46)                                 |       |
| Female    | 424 (65.63)                               | 8 (1.54)                                    |       |

**TABLE 3** Demographics in the SD group vs the NSND group after propensity score matching (N = 370)

| Variables | NSND (185)<br>No. of patients (%) | SD (185)<br>No. of patients (%)<br>N (%) | P     |
|-----------|-----------------------------------|--|-------|
| Sex       |                                   |  | 1.000 |
| Male      | 179 (96.76)                       | 179 (96.76)                              |       |
| Female    | 6 (3.24)                          | 6 (3.24)                                 |       |

# Balancing other variables

**TABLE 2** Demographics of the patients in the SD group vs the NSND group before propensity score matching (N = 1165)

| Variables                | NSND (646)<br>No. of patients (%)<br>N | SD (519)<br>No. of patients (%)<br>N (%) | P     |
|--------------------------|--|--|-------|
| Sex                      |  |  | <.001 |
| Male                     | 222 (34.37)                            | 511 (98.46)                              |       |
| Female                   | 424 (65.63)                            | 8 (1.54)                                 |       |
| Age (years)              |  |  | .001  |
| <50                      | 194 (30.03)                            | 111 (21.39)                              |       |
| ≥50                      | 452 (69.97)                            | 408 (78.61)                              |       |
| Occupation               |  |  | <.001 |
| Farmer                   | 77 (12.11)                             | 120 (23.21)                              |       |
| Worker                   | 353 (55.50)                            | 230 (44.49)                              |       |
| Office worker and other  | 206 (32.39)                            | 167 (32.30)                              |       |
| Education level          |  |  | <.001 |
| Illiteracy               | 101 (15.64)                            | 26 (5.01)                                |       |
| Primary-middle school    | 371 (57.43)                            | 378 (72.83)                              |       |
| High school and above    | 174 (26.93)                            | 115 (22.16)                              |       |
| Origin                   |  |  | .031  |
| Urban area               | 349 (54.02)                            | 313 (60.31)                              |       |
| Rural area               | 297 (45.98)                            | 206 (39.69)                              |       |
| BMI (kg/m <sup>2</sup> ) |  |  | .002  |
| 18.5-23.9                | 394 (60.99)                            | 340 (65.51)                              |       |
| <18.5                    | 75 (11.61)                             | 80 (15.41)                               |       |
| ≥24                      | 177 (27.40)                            | 99 (19.08)                               |       |
| TNM Stage                |  |  | .001  |
| I                        | 112 (19.55)                            | 54 (11.46)                               |       |
| II                       | 141 (24.61)                            | 108 (22.93)                              |       |
| III                      | 106 (18.50)                            | 84 (17.83)                               |       |
| IV                       | 214 (37.35)                            | 225 (47.78)                              |       |

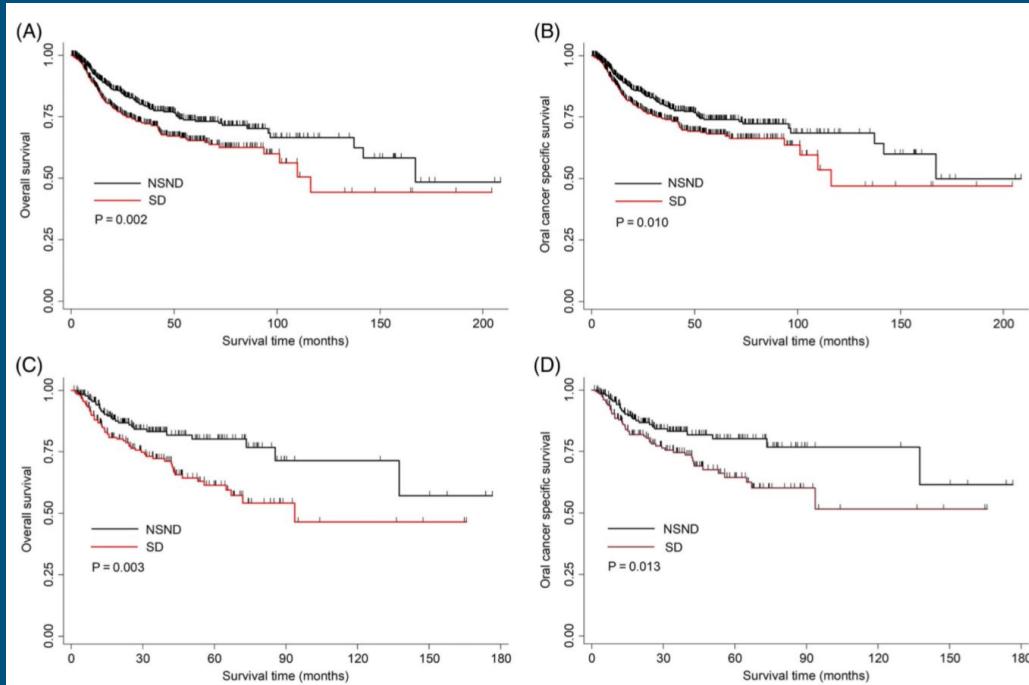
**TABLE 3** Demographics in the SD group vs the NSND group after propensity score matching (N = 370)

| Variables                | NSND (185)<br>No. of patients (%) | SD (185)<br>No. of patients (%)<br>N (%) | P     |
|--------------------------|-----------------------------------|--|-------|
| Sex                      |                                   |  | 1.000 |
| Male                     | 179 (96.76)                       | 179 (96.76)                              |       |
| Female                   | 6 (3.24)                          | 6 (3.24)                                 |       |
| Age (years)              |                                   |  | .051  |
| <50                      | 62 (33.51)                        | 45 (24.32)                               |       |
| ≥50                      | 123 (66.49)                       | 140 (75.68)                              |       |
| Occupation               |                                   |  | .990  |
| Farmer                   | 32 (17.30)                        | 31 (16.76)                               |       |
| Worker                   | 102 (55.14)                       | 103 (55.68)                              |       |
| Office worker and other  | 51 (27.57)                        | 51 (27.57)                               |       |
| Education level          |                                   |  | .568  |
| Illiteracy               | 11 (5.95)                         | 12 (6.49)                                |       |
| Primary-middle school    | 96 (51.89)                        | 105 (56.76)                              |       |
| High school and above    | 78 (42.16)                        | 68 (36.76)                               |       |
| Origin                   |                                   |  | .298  |
| Urban area               | 91 (49.19)                        | 101 (54.59)                              |       |
| Rural area               | 94 (50.81)                        | 84 (45.41)                               |       |
| BMI (kg/m <sup>2</sup> ) |                                   |  | .569  |
| 18.5-23.9                | 116 (51.56)                       | 106 (20.50)                              |       |
| <18.5                    | 16 (7.11)                         | 18 (3.48)                                |       |
| ≥24                      | 53                                | 61 (11.80)                               |       |
| TNM Stage                |                                   |  | .136  |
| I                        | 27 (14.59)                        | 41 (22.16)                               |       |
| II                       | 44 (23.79)                        | 30 (16.22)                               |       |
| III                      | 35 (18.92)                        | 34 (18.38)                               |       |
| IV                       | 79 (42.70)                        | 80 (43.24)                               |       |

# Balancing other variables cont.

| pT classification        |             |   | <.001   | pT classification        |   |   | .055                              |   |   |             |             |             |
|--------------------------|-------------|---|---|--------------------------|---|---|-----------------------------------|---|---|-------------|-------------|-------------|
| T <sub>1</sub>           | 128 (22.61) | 68 (14.38)  | T <sub>1</sub>  | 30 (16.48)               | 44 (24.04)  | T <sub>2</sub>  | 58 (31.87)                        | 37 (20.22)  |   |             |             |             |
| T <sub>2</sub>           | 188 (33.22) | 140 (29.60)   | T <sub>3</sub>  | 29 (15.93)               | 31 (16.94)  | T <sub>3</sub>  | 76 (16.07)                        | 65 (35.72)  |   |             |             |             |
| T <sub>3</sub>           | 81 (14.31)  | 76 (16.07)  | T <sub>4</sub>  | 65 (35.72)               | 71 (38.80)  | T <sub>4</sub>  | 169 (29.86)                       | 189 (39.95)   |   |             |             |             |
| pN classification        |             |   | .529  | pN classification        |   |   | .629                              |   |   |             |             |             |
| N <sub>0</sub>           | 403 (70.70) | 313 (66.74)   | N <sub>0</sub>  | 122 (66.67)              | 129 (70.10)   | N <sub>1</sub>  | 25 (13.66)                        | 28 (15.22)  |   |             |             |             |
| N <sub>1</sub>           | 77 (13.51)  | 67 (14.29)  | N <sub>2</sub>  | 34 (18.58)               | 25 (13.59)  | N <sub>2</sub>  | 86 (15.09)                        | 85 (18.12)  |   |             |             |             |
| N <sub>2</sub>           | 86 (15.09)  | 85 (18.12)  | N <sub>3</sub>  | 2 (1.09)                 | 2 (1.09)  | N <sub>3</sub>  | 4 (0.70)                          | 4 (0.85)  |   |             |             |             |
| Pathological grading     |             |   | .887  | Pathological grading     |   |   | .258                              |   |   |             |             |             |
| Well                     | 103 (21.73) | 86 (20.67)  | Well  | 34 (24.11)               | 25 (16.89)  | Moderate  | 123 (25.95)                       | 113 (27.16)   |   |             |             |             |
| Moderate                 | 123 (25.95) | 113 (27.16)   | Poor  | 39 (27.66)               | 40 (27.03)  | Poor  | 248 (52.32)                       | 217 (52.17)   |   |             |             |             |
| Pathological type        |             |   | <.001   | Pathological type        |   |   | .719                              |   |   |             |             |             |
| Squamous cell carcinoma  | 504 (78.63) | 448 (86.65)   | Squamous cell carcinoma   | 154 (84.62)              | 159 (85.95)   | Adenocarcinoma  | 137 (21.37)                       | 69 (13.35)  |   |             |             |             |
| Adenocarcinoma           | 137 (21.37) | 69 (13.35)  | Variables   |                          |   | NSND (646) No. of patients (%)N   | SD (519) No. of patients (%)N (%) | P   |   |             |             |             |
| Variables                |             |   | P   | Variables                |   |   | NSND (185) No. of patients (%)    | SD (185) No. of patients (%)N (%)                               | P   |             |             |             |
| Family history of cancer |             |   | .749  | Family history of cancer |   |   | Variables                         |   |   |             |             |             |
| No                       | 541 (83.75) | 431 (83.04)   | No  | 148 (80.00)              | 148 (80.00)   | Yes   | 105 (16.25)                       | 88 (16.96)  | Yes   | 37 (20.00)  | 37 (20.00)  |             |
| Yes                      | 105 (16.25) | 88 (16.96)  | Adjuvant therapy  |                          |   | Adjuvant therapy  |                                   |   | Variables   |             |             |             |
| Adjuvant therapy         |             |   | .323  | Adjuvant therapy         |   |   | No                                | 99 (56.25)  | 90 (50.28)  | No          | 324 (53.47) | 248 (49.80) |
| No                       | 324 (53.47) | 248 (49.80)   | RT  | 23 (13.07)               | 28 (15.64) <th>RT</th> <td>101 (16.67)</td> <td>82 (16.47)</td> <th>CT</th> <td>18 (10.23)</td> <td>24 (13.41)</td>   | RT  | 101 (16.67)                       | 82 (16.47)  | CT  | 18 (10.23)  | 24 (13.41)  |             |
| RT                       | 101 (16.67) | 82 (16.47)  | CT  | 36 (20.45)               | 37 (20.67) <th>CT</th> <td>64 (10.56)</td> <td>70 (14.06)<th>CRT</th><td>36 (20.45)</td><td>37 (20.67)</td></td>  | CT  | 64 (10.56)                        | 70 (14.06) <th>CRT</th> <td>36 (20.45)</td> <td>37 (20.67)</td> | CRT   | 36 (20.45)  | 37 (20.67)  |             |
| CT                       | 64 (10.56)  | 70 (14.06)  | CRT   | 36 (20.45)               | 37 (20.67) <th data-cs="3" data-kind="parent">Hypertension</th> <th data-kind="ghost"></th> <th data-kind="ghost"></th> <th data-cs="3" data-kind="parent">Variables</th> <th data-kind="ghost"></th> <th data-kind="ghost"></th> | Hypertension  |                                   |   | Variables   |             |             |             |
| Hypertension             |             |   | .153  | Hypertension             |   |   | No                                | 136 (73.51)   | 136 (73.51)   | No          | 473 (73.22) | 399 (76.88) |
| No                       | 473 (73.22) | 399 (76.88)   | Yes   | 49 (26.49)               | 49 (26.49) <th>Yes</th> <td>173 (26.78)</td> <td>120 (23.12)</td> <th>Yes</th> <td>173 (26.78)</td> <td>120 (23.12)</td>  | Yes   | 173 (26.78)                       | 120 (23.12)   | Yes   | 173 (26.78) | 120 (23.12) |             |
| Yes                      | 173 (26.78) | 120 (23.12)   | Diabetes  |                          |   | Diabetes  |                                   |   | Variables   |             |             |             |
| Diabetes                 |             |   | .126  | Diabetes                 |   |   | No                                | 171 (92.43)   | 167 (90.27)   | No          | 578 (89.47) | 478 (92.10) |
| No                       | 578 (89.47) | 478 (92.10)   | Yes   | 14 (7.57)                | 18 (9.73) <th>Yes</th> <td>68 (10.53)</td> <td>41 (7.90)</td> <th>Yes</th> <td>68 (10.53)</td> <td>41 (7.90)</td>   | Yes   | 68 (10.53)                        | 41 (7.90)   | Yes   | 68 (10.53)  | 41 (7.90)   |             |
| Yes                      | 68 (10.53)  | 41 (7.90) <th data-cs="3" data-kind="parent">Abbreviations: BMI, body mass index; CT, chemotherapy; CRT, chemoradiotherapy; NSND, nonsmoking and nondrinking; RT, radiotherapy; SD, smoking and/or drinking.</th> <th data-kind="ghost"></th> <th data-kind="ghost"></th> <th data-cs="3" data-kind="parent">Abbreviations: BMI, body mass index; CT, chemotherapy; CRT, chemoradiotherapy; NSND, nonsmoking and nondrinking; RT, radiotherapy; SD, smoking and/or drinking.</th> <th data-kind="ghost"></th> <th data-kind="ghost"></th> <th data-cs="3" data-kind="parent">Abbreviations: BMI, body mass index; CT, chemotherapy; CRT, chemoradiotherapy; NSND, nonsmoking and nondrinking; RT, radiotherapy; SD, smoking and/or drinking.</th> <th data-kind="ghost"></th> <th data-kind="ghost"></th> | Abbreviations: BMI, body mass index; CT, chemotherapy; CRT, chemoradiotherapy; NSND, nonsmoking and nondrinking; RT, radiotherapy; SD, smoking and/or drinking. |                          |   | Abbreviations: BMI, body mass index; CT, chemotherapy; CRT, chemoradiotherapy; NSND, nonsmoking and nondrinking; RT, radiotherapy; SD, smoking and/or drinking. |                                   |   | Abbreviations: BMI, body mass index; CT, chemotherapy; CRT, chemoradiotherapy; NSND, nonsmoking and nondrinking; RT, radiotherapy; SD, smoking and/or drinking. |             |             |             |

# Kaplan-Meier Results



**FIGURE 2** A, Overall survival rates of smoking and/or drinking (SD) patients and nonsmoker nondrinkers (NSND) patients before propensity score matching. B, Oral cancer specific survival rates of SD patients and NSND patients before propensity score matching. C, Overall survival rates of SD patients and NSND patients after propensity score matching. D, Oral cancer-specific survival rates of SD patients and NSND patients after propensity score matching [Color figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

# Table of Hazard Ratios

**TABLE 4** Survival analysis for SD vs NSND patients with oral cancer

|   | Number of censored (%) | Number of death (%) | Log rank P | Crude model             | Age- and sex-adjusted model <sup>a</sup> | Fully adjusted model <sup>b</sup> |
|---|------------------------|---------------------|------------|-------------------------|--|-----------------------------------|
| <b>Before propensity score matching</b> |                        |                     |            |                         |  |                                   |
| All-cause mortality                     |                        |                     | 0.002      |                         |  |                                   |
| NSND                                    | 519 (57.80)            | 127 (47.57)         |            | 1.000                   | 1.000                                    | 1.000                             |
| SD                                      | 379 (42.20)            | 140 (52.43)         |            | 1.474<br>(1.159, 1.875) | 1.722 (1.206,<br>2.459)                  | 1.678 (1.086,2.594)               |
| Oral cancer specific mortality          |                        |                     | 0.010      |                         |  |                                   |
| NSND                                    | 522 (57.17)            | 124 (49.21)         |            | 1.000                   | 1.000                                    | 1.000                             |
| SD                                      | 391 (42.83)            | 128 (50.79)         |            | 1.380 (1.078,1.768)     | 1.623 (1.127,2.337)                      | 1.632 (1.044,2.552)               |
| <b>After propensity score matching</b>  |                        |                     |            |                         |  |                                   |
| All-cause mortality                     |                        |                     | 0.003      |                         |  |                                   |
| NSND                                    | 155 (54.58)            | 30 (34.88)          |            | 1.000                   | 1.000                                    | 1.000                             |
| SD                                      | 129 (45.42)            | 56 (65.12)          |            | 1.933 (1.240,3.013)     | 2.010 (1.288,3.137)                      | 1.897 (1.138,3.165)               |
| Oral cancer specific mortality          |                        |                     | 0.013      |                         |  |                                   |
| NSND                                    | 156 (53.61)            | 29 (36.71)          |            | 1.000                   | 1.000                                    | 1.000                             |
| SD                                      | 135 (46.39)            | 50 (63.29)          |            | 1.778 (1.125,2.811)     | 1.844 (1.165,2.918)                      | 1.764 (1.043,2.983)               |

Abbreviation: NSND: nonsmoking and nondrinking; SD: smoking and/or drinking.

<sup>a</sup>Adjusted for age, gender.

<sup>b</sup>Adjusted for age, gender, occupation, education level, residence, BMI, TNM stage, pathological type, pathological grading and adjuvant therapy.

# Conclusions

---

- NSND patients
  - About half of patients with oral cancer
  - Average age is about 10 years older
  - Less advanced TNM stage and pT classification
  - Higher percentage of females
  - Lower BMI
- Discussion
  - NSND has a possible protective effect on oral cancer
  - SD can possibly lead to earlier and worse oral cancer
- PSM
  - Balanced the NSND and SD groups
  - Showed a clearer causal relationship of SD on all cause mortality and oral cancer specific
- Limitations
  - Possible misclassification of the exposure
  - SD status was evaluated for patients pretreatment and not post-treatment
  - This was a single-center study
  - Only generalizable to China

# References

---

- Bao X, Liu F, Chen Q, et al. Propensity score analysis exploring the impact of smoking and drinking on the prognosis of patients with oral cancer. Head & Neck. 2020; 1–11.  
<https://doi.org/10.1002/hed.26099>
- Infographic: What You Need To Know About Oral Cancer. (n.d.). Retrieved from  
<https://www.unitedconcordia.com/dental-insurance/dental-health/conditions/oral-cancer/oral-cancer-infographic/>

# Propensity score analysis exploring the impact of smoking and drinking on the prognosis of patients with oral cancer

BAO X ET. AL

REVIEWER: WEICHUAN DONG

# Introduction

**Participants:** 1,165 patients with oral cancer in Fujian, China from January 2005 to January 2019

**Exposure:** smoking and/or drinking VS. non-smoking non-drinking

Treated



Control



**Covariates**

Age  
Gender  
Occupation  
Education level  
Residence  
BMI  
TNM stage  
Pathological type

**Outcome:** overall survival, disease-specific survival  
(Kaplan Meier, Cox Proportional Hazard Model)

**Propensity Score Matching:** 1 to 1 Nearest Neighbor Matching

# Causal Effect or Stronger Association?

**Conclusions:** Social and clinical characteristics of NSND patients differed from SD patients with oral cancer. SD patients with oral cancer have higher all-cause mortality and oral cancer-specific mortality than NSND patients.

Table 1

Kaplan Meier Survival Curve

## KEY WORDS

all-cause mortality, nondrinking, nonsmoking, oral cancer, oral cancer-specific mortality

- No phrase on **causal effect** resulted from propensity score matching in this study
- What did the author think of the role of propensity score matching?
  - Balancing covariates between SD group and NSND group
  - Enhance significance of association (See next page)

# Causal Effect or Stronger Association?

## Cont.

### In Abstract

death. Additionally, PSM can improve the HR value and result in a stronger association.

### In Discussion Section

matching analysis. However, PSM can improve the HR value and enhance significance of association compared with results of unmatching, which validated the role of smoking and drinking in prognosis of oral cancer, and at the same time verified the potential value of PSM method.

1. Shouldn't PSM methods try to establish a causal effect rather than association?
2. Is it appropriate to compare HRs before and after PSM?
  - Shouldn't we say that the HRs are **still** statistically significant after PSM, so that the evidences show that smoking and drinking **lead to** higher probability of death among the cohort?

### Cox proportional hazards regression

|            | All Cause Death                                  | Cancer-specific Death                            |
|------------|--|--|
| Before PSM | HR = <b>1.678</b> (95% CI:1.086-2.594)           | HR = <b>1.632</b> (95% CI: 1.044-2.552)          |
| After PSM  | adjusted HR = <b>1.897</b> (95% CI: 1.138-3.165) | adjusted HR = <b>1.764</b> (95% CI: 1.043-2.983) |