

# Comparative effectiveness of robot-assisted radical prostatectomy versus open radical prostatectomy: a high-dimensional propensity score-matched cohort study within a nationwide claims database – ECOREPAR study



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## BACKGROUND & OBJECTIVE

Prostate cancer (PCa) is the second most prevalent cancer in men worldwide, with an estimated 1.4 million new cases and 375,304 PCa-related deaths reported in 2020. For patients with localized, non-metastatic PCa and a life expectancy of over 10 years, radical prostatectomy, a surgical procedure in which the entire prostate gland and seminal vesicles are removed, is standard of care. Robotic-assisted radical prostatectomy (**RARP**) is now widely practiced. However, its long-term effectiveness has not been clearly demonstrated in comparison with open radical prostatectomy (**ORP**).

The objective was to compare long-term progression-free survival (PFS) and overall survival (OS) between patients undergoing **RARP** and **ORP**.

## METHODS

**Cohort study designed in the French nationwide claims database with a follow-up of 5 to 8 years:**

- All men undergoing surgery for prostate cancer between 2012 and 2015 with a 2-year database history
- From a center with activity  $\geq 10$  procedures (**RARP** or **ORP**) per year
- Without previous treatment of cancer (hormone therapy, radiotherapy, brachytherapy or High Intensity Focused Ultrasound)

**Index date** = date of **RARP** or **ORP**

**Outcomes:** progression-free (death or need for further treatment) rate and 8-year overall survival rate

**Study population:**

- Matched cohort: patients matched 1:1 on a high-dimensional propensity score (hdPS)
- Overall cohort: all patients with inverse probability treatment weighting (IPTW) using the hdPS

## STATISTICAL ANALYSIS

**High-dimensional propensity score (hdPS)**

- Logistic regression **RARP** vs **ORP**
- Covariates:
  - calendar year of prostatectomy,
  - age at index date,
  - Social Deprivation Index,
  - region of residence,
  - 1-year pre-index total costs of outpatient and inpatient care,
  - 500 variables among more than 3000 (categorized into major domains such as drugs, visits, biology, diagnoses, etc.) with the greatest potential to reduce confounding bias (Bross formula).

**8-year survival analysis**

- Description: Kaplan Meier
- Comparison: Cox proportional hazards model, matched population and overall population, and according to hospital volume of activity (<50 procedures, [50-100[ procedures,  $\geq 100$  procedures)

### Disclosure

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## RESULTS

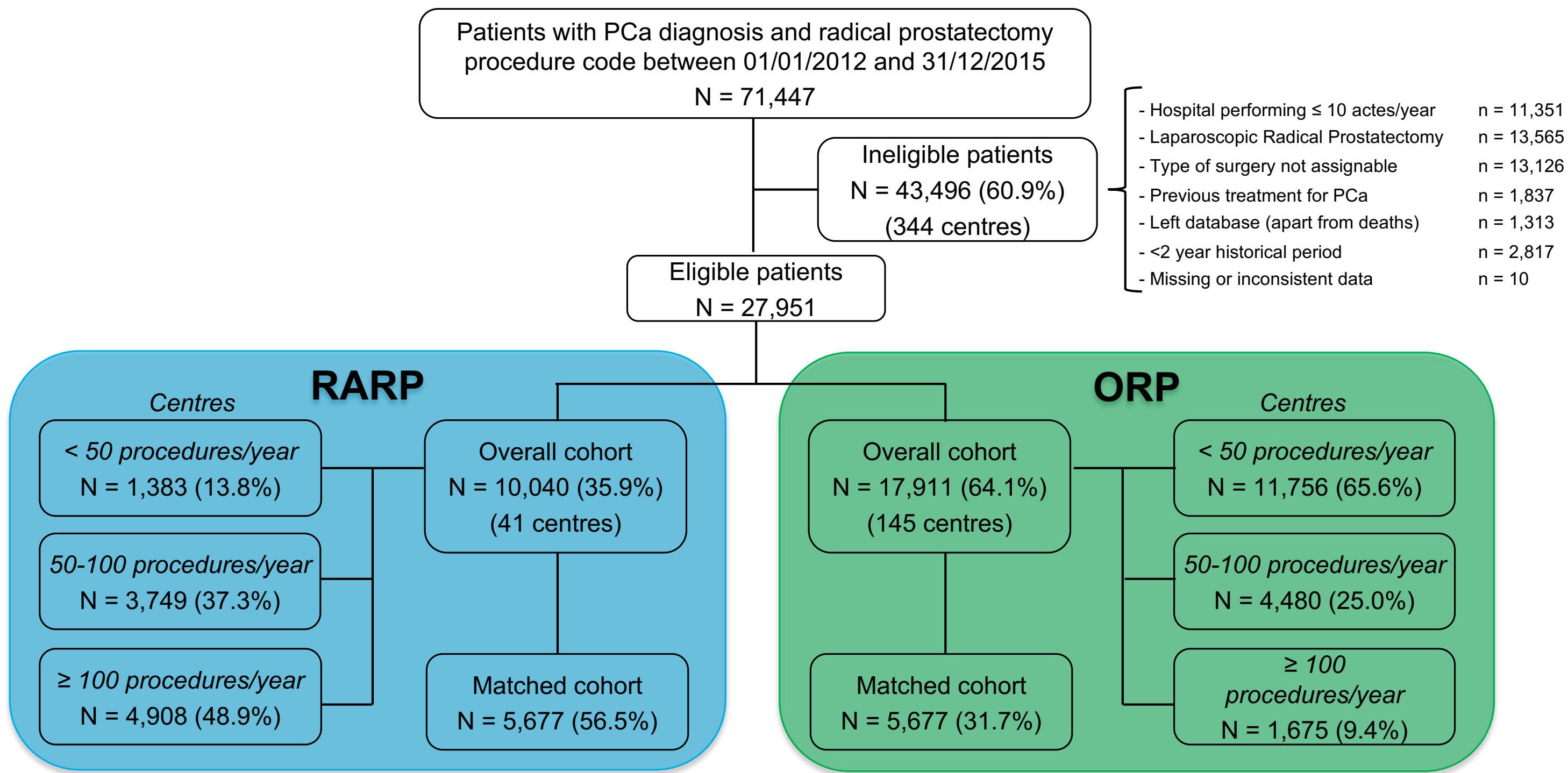


Figure 1: Selection of populations

### ❖ Distribution of hdPS RARP vs ORP (Kernel density distribution curve)

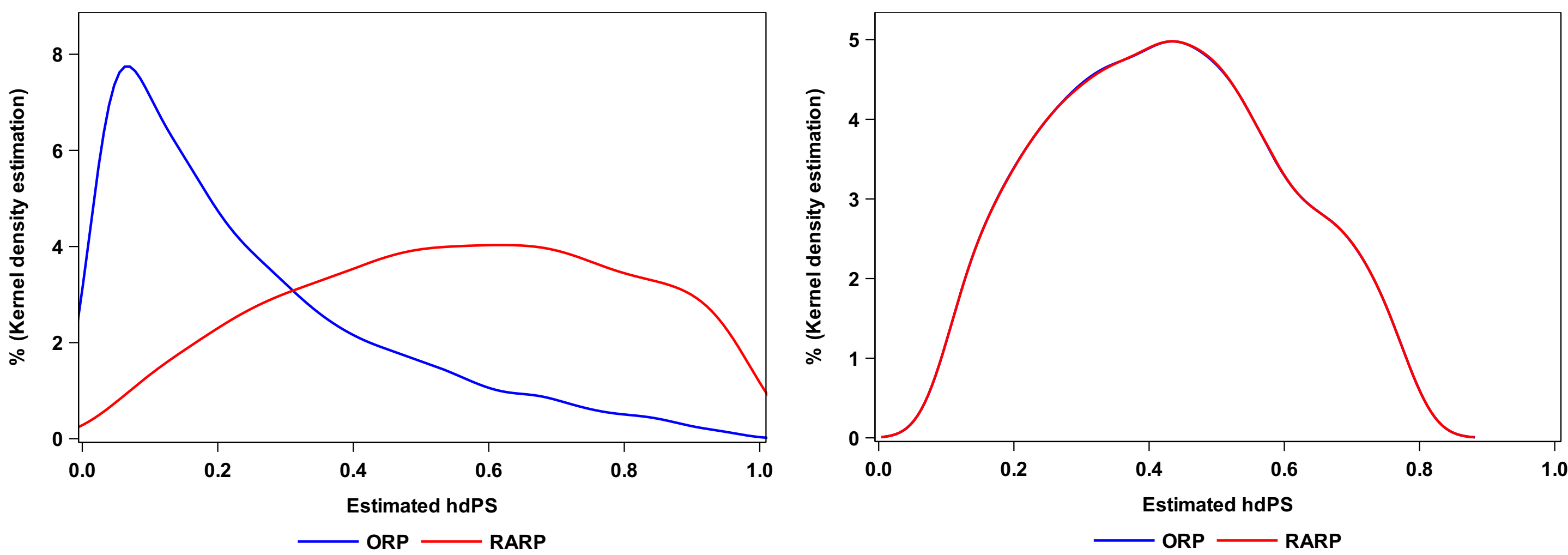


Figure 2: Overall population

Figure 3: Matched population

### ❖ Survival probability during the follow-up period in matched populations RARP and ORP

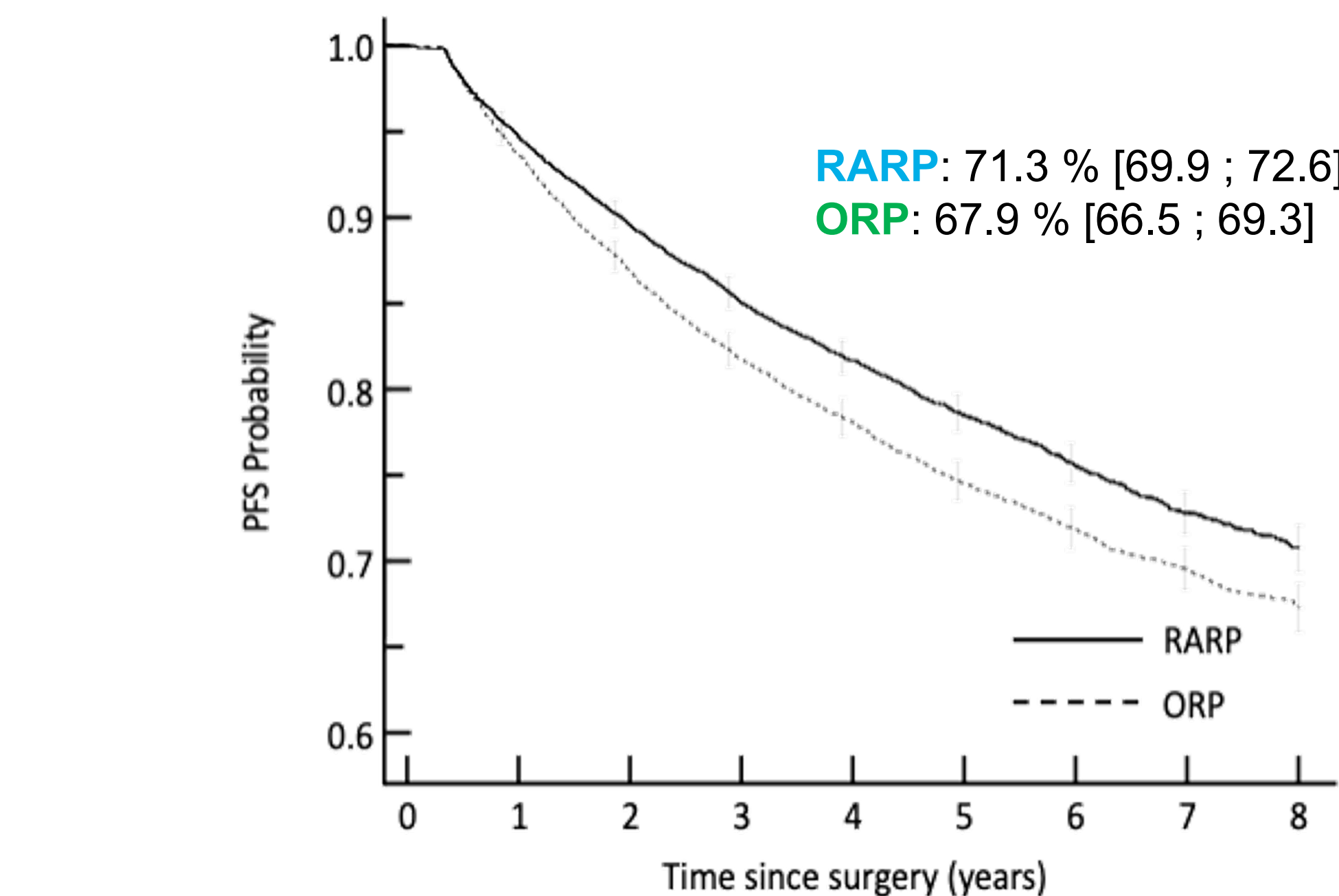


Figure 4: Progression-free survival

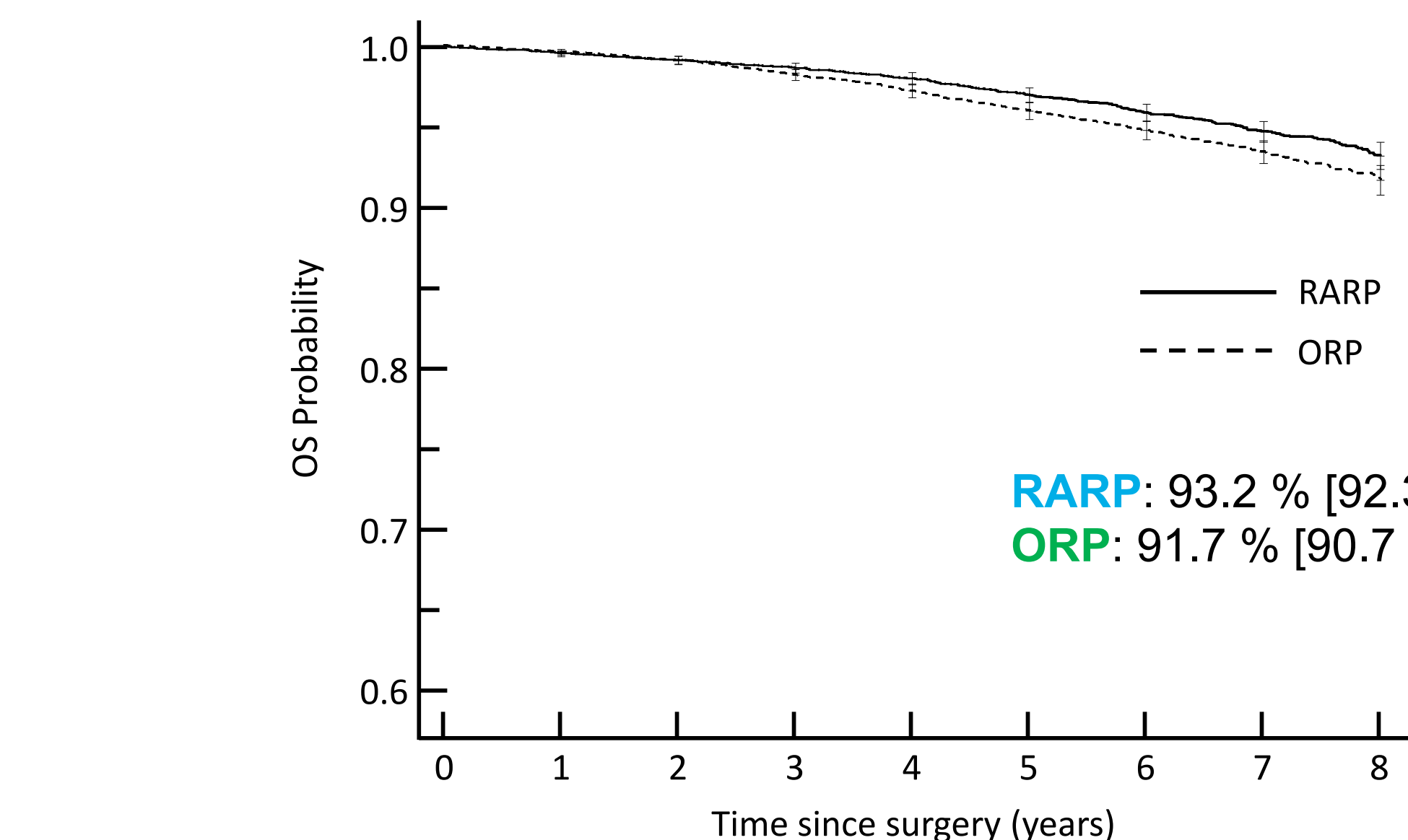


Figure 5: Overall survival

Table 1 : Baseline characteristics of the matched and overall cohorts

	Matched cohort (after trimming)		Absolute standardised difference (%) RARP vs. ORP	Overall cohort		Absolute standardised difference (%) RARP vs. ORP
	RARP* n=5677	ORP** n=5677		RARP n=10040	ORP n=17911	
Age at index date (mean $\pm$ SD)	64.2 (5.8)	64.2 (5.8)	0.0	64.1 (6.1)	64.5 (6.0)	1.0
Social Deprivation Index (in quintiles), n (%)						
1st quintile (most privileged)	1250 (22.0)	1290 (22.7)	1.7	2983 (29.7)	2526 (14.1)	1.2
2nd quintile	1280 (22.5)	1293 (22.8)	0.5	2230 (22.2)	3411 (19.0)	-0.1
3rd quintile	1129 (19.9)	1114 (19.6)	-0.7	1846 (18.4)	3720 (20.8)	-0.2
4th quintile	1014 (17.9)	989 (17.4)	-1.2	1521 (15.1)	3705 (20.7)	-0.2
5th quintile (most deprived) + unknown	1004 (17.7)	991 (17.5)	-0.6	1460 (14.5)	4549 (25.4)	-0.8
Charlson Comorbidity Index (mean $\pm$ SD)	2.0 (0.8)	2.0 (0.8)	2.2	2.0 (0.8)	2.0 (0.8)	3.6
Care for urinary incontinence before index date, n (%)	64 (1.1)	$\leq 10$	-4.5	118 (1.2)	18 (0.1)	-9.4
Care for erectile dysfunction before index date, n (%)	49 (0.9)	45 (0.8)	-0.3	94 (0.9)	125 (0.7)	-0.8
Total hospital cost in year before index date (mean $\pm$ SD; €)	1256 (4771)	1275 (2917)	0.5	1494 (5378)	1271 (3250)	-0.7
Total hospital cost in month before index date (mean $\pm$ SD; €)	109 (342)	107 (438)	-0.4	135 (630)	95 (422)	1.1
Hospital volume activity (mean number of procedures over 2012-2015 (in classes)), n (%)						
<50 procedures	870 (15.3)	3943 (69.5)	130.9	1383 (13.8)	11756 (65.6)	1.1
[50-100[ procedures	2310 (40.7)	1231 (21.7)	-41.9	3749 (37.3)	4480 (25.0)	-0.2
$\geq 100$ procedures	2497 (44.0)	503 (8.9)	-86.8	4908 (48.9)	1675 (9.4)	-1.0

\* RARP: robot-assisted radical prostatectomy \*\* ORP: open radical prostatectomy \*\*\* IPTW (Inverse Probability of Treatment Weighting) / matching weights

Table 2: Hospitalisation and complications during the follow-up period

	Matched cohort (after trimming)		Absolute standardised difference (%) RARP vs. ORP	Overall cohort		Absolute standardised difference (%) RARP vs. ORP
	RARP* n = 5677	ORP** n = 5677		RARP n = 10040	ORP n = 17911	
Duration of index hospitalisation (days, mean $\pm$ SD)	6.7 (4.0)	9.9 (5.0)	68.8	6.7 (4.1)	10.0 (5.4)	108.7
Care for urinary incontinence, n (%)	1685 (29.7)	2117 (37.3)	16.2	2992 (29.8)	6749 (37.7)	13.8
Care for erectile dysfunction, n (%)	2957 (52.1)	3197 (56.3)	8.5	5303 (52.8)	9379 (52.4)	-3.8

\* RARP: robot-assisted radical prostatectomy \*\* ORP: open radical prostatectomy \*\*\* IPTW (Inverse Probability of Treatment Weighting) / matching weights

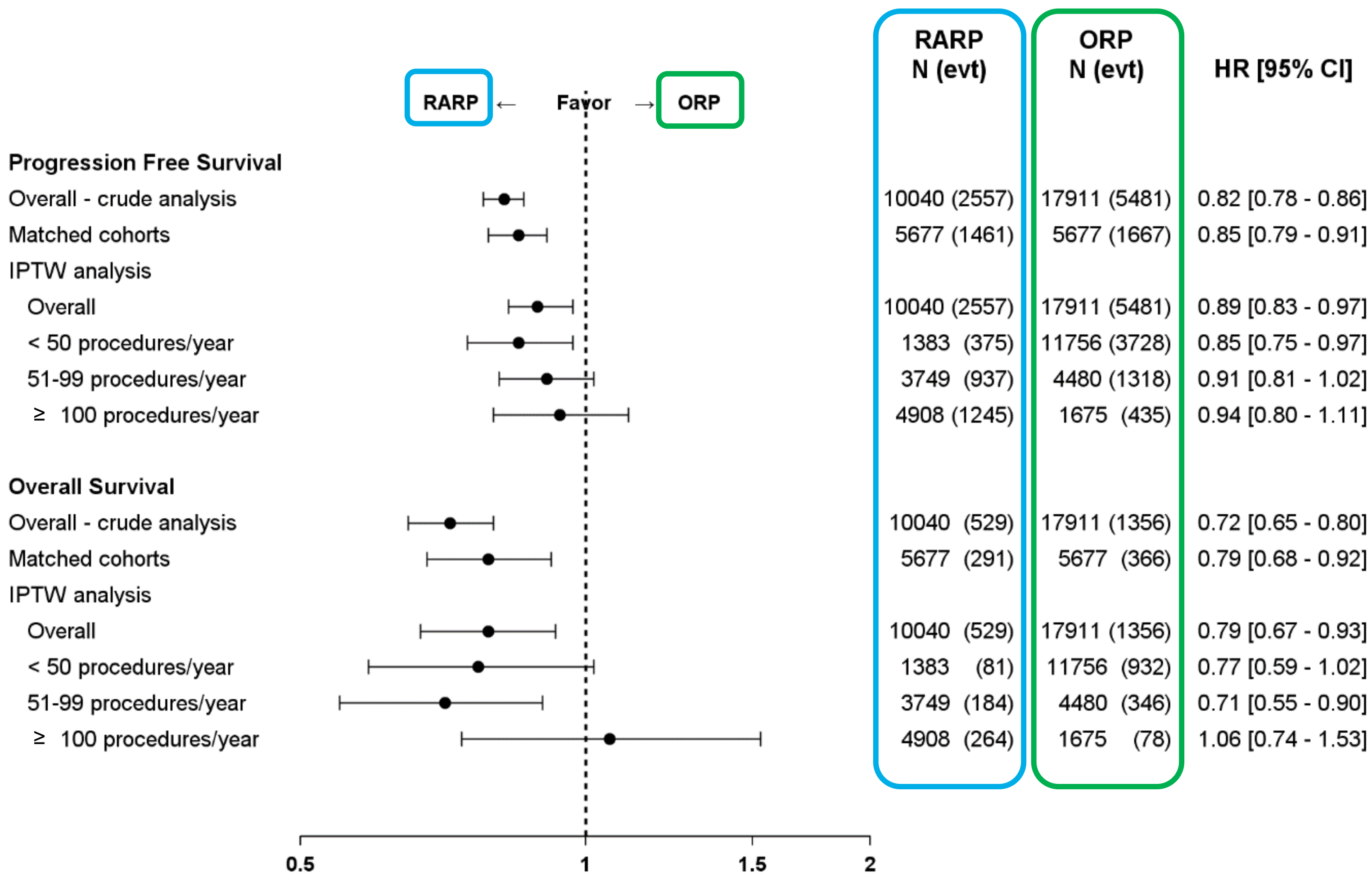


Figure 6: Comparison of the risk of death and need for further treatment or death during 8 years of follow-up (Cox models)

## CONCLUSION

Robotic-assisted radical prostatectomy (**RARP**) performed better than open radical prostatectomy (**ORP**) concerning:

- Long-term progression-free and overall survival
- Duration of the initial hospitalization
- Urinary-erectile complications rates

Robert G, Blin P, Bladou F, Jové J, Ouattara E, Rouyer M, Droz-Perroteau C, Piazza L, Preaubert N. Comparative effectiveness of robot-assisted vs. open prostatectomy: a real-life nationwide study. World J Urol. 2025 Jun 10;43(1):367. doi: 10.1007/s00345-025-05715-0. PMID: 40493202.

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