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**Supplementary table 1.** Earliest dates of data availability and last date of follow-up of included counties.

County	n	Earliest PSA-date	Latest PSA-date	Earliest date of chemotherapy	Latest date of chemotherapy	Earliest date of inclusion	Last date of follow-up
Jönköping	115,657	2011-01-01	2022-05-31	2010-01-26	2022-12-20	2010-01-26	2022-05-31
Kalmar	82,143	1999-10-01	2021-12-31	2012-10-18	2021-12-31	2012-10-18	2021-12-31
Skåne	436,942	2014-10-01	2022-10-31	2003-09-17	2022-11-11	2014-10-01	2022-10-31
Uppsala	118,420	2005-01-01	2021-12-31	2009-05-07	2021-12-30	2009-05-07	2021-12-30
Östergötland	552,455	2000-12-01	2022-12-31	2010-04-29	2019-05-15	2010-04-29	2019-05-15
Västra Götaland	147,694	2000-01-01	2022-12-31	2011-08-23	2019-05-15	2011-08-23	2019-05-15

n: men above age 30 resident in each county

**Supplementary Table 2.** CRPC definitions and PSA diagnostic criteria for PSA progression in men on androgen deprivation therapy.

Definition Name	CRPC diagnostic criteria	Criteria for PSA progression
EAU Definition	Castrate serum testosterone < 50 ng/dL or 1.7 nmol/L plus either: a. Biochemical progression: Three consecutive rises in PSA at least one week apart resulting in two 50% increases over the nadir, and a PSA > 2 ng/mL or b. Radiological progression: The appearance of new lesions: either two or more new bone lesions on bone scan or a soft tissue lesion using RECIST (Response Evaluation Criteria in Solid Tumours).	Three consecutive PSA measurements in men meeting castration criteria, with two consecutive increases of $\geq 50\%$ and PSA >2 ng/mL.
Swedish Definition	Two consecutive PSA measurements (separated by >7 days) in men meeting castration criteria, with an increase of $\geq 1$ ng/mL and PSA >2 ng/mL or radiologically new metastases in patients with a plasma testosterone value under 1,7 nmol/l	Two consecutive PSA measurements (separated by >7 days) in men meeting castration criteria, with an increase of $\geq 1$ ng/mL and PSA >2 ng/mL.
PCBase Definition	PSA must be either >2 $\times$ the PSA nadir or an increase of $\geq 5$ ng/mL compared to the prior measurement in men meeting castration criteria.	PSA must be either >2 $\times$ the PSA nadir or an increase of $\geq 5$ ng/mL compared to the prior measurement in men meeting castration criteria.
PCWG3 Definition	PSA increase of >25% within two consecutive measurements ( $\geq 1$ week apart) with a minimum increase of 2.0 ng/mL over the starting value or RECIST 1.1 radiological criteria for progression	PSA increase of >25% within two consecutive measurements ( $\geq 1$ week apart) with a minimum increase of 2.0 ng/mL over the starting value.

EAU definition: European Association of Urology [reference 2 in the text]

Swedish definition: according to the Swedish National Guidelines [reference 9 in the text]

PCBase: developed on a nationwide cohort from the Prostate Cancer database of Sweden [reference 10 and 11 in the text]

PCWG3: defined by the Prostate Cancer Working Group 3 [reference 12 in the text]

**Supplementary Table 3. Time between progression dates according to PSA progression definitions.**

	N	Time in months				
		min	Q <sub>1</sub>	median	Q <sub>3</sub>	max
<b>Time to EAU criteria (n=714)</b>						
- From PCWG3 definition	714	0.0	0.0	0.0	0.0	61.9
- From Swedish definition	701	0.0	0.6	2.9	6.3	63.8
- From PCBase definition	714	0.0	0.0	2.9	6.6	69.2
<b>Time to PCWG3 criteria (n=1021)</b>						
- From Swedish definition	954	0.0	0.4	2.6	5.8	68.7
- From PCBase definition	1012	0.0	0.0	2.3	6.0	68.7
<b>Time to Swedish criteria (n=1506)</b>						
- From PCBase definition	1284	0.0	0.0	0.0	1.6	61.9
<b>Time in number of PSA-tests</b>						
	N	Time in number of PSA-tests				
		min	Q <sub>1</sub>	median	Q <sub>3</sub>	max
<b>Time to EAU criteria (n=714)</b>						
- From PCWG3 definition	714	0	0	0	0	25
- From Swedish definition	701	0	1	1	2	26
- From PCBase definition	714	0	0	1	3	27
<b>Time to PCWG3 criteria (n=1021)</b>						
- From Swedish definition	954	0	1	1	1	26
- From PCBase definition	1012	0	0	1	2	27
<b>Time to Swedish criteria (n=1506)</b>						
- From PCBase definition	1284	0	0	0	1	13