Table 1. Descriptive statistics derived from the 4 clusters and according to HF indication

HF indication / Cluster	Size (N) [a]	GNI per capita 2017 [b] (US$), average	MV units/mill inh [c], average	Actual RT courses/ inc cases [d] (%), average	Actual/ optimal RT courses [e] (%), average	HFU [f] (%), average	Survival [g] (%), average	HF specific reimbursement [h] (%*, N*)
Breast								
1 Eastern Europe	13	10,848	2.7	37.0	70.2	37.6	76.3	100%, N*=3
2 Southern Europe	5	19,548	3.9	30.6	59.1	31.9	83.7	66.7%, N*=3
3 Central Europe	4	38,250	6.7	45.2	87.3	75.5	84.8	50.0%, N*=4
4 Mixed cluster	14	43,388	6.6	37.5	71.4	71.4	86.5	88.9%, N* 9
Prostate								
1 Eastern Europe	13	10,526	2.7	37.0	70.2	24.8	79.0	100.0%, N*=3
2 Southern Europe	5	19,548	3.9	30.6	59.1	55.1	87.6	66.7%, N* 3
4 Mixed cluster	11	44,605	6.1	36.3	69.2	51.9	90.5	85.7%, N*=7
3 Central Europe	7	46,257	7.6	43.0	82.7	43.0	88.9	66.7%, N*=6
Bone Metastases								
1 Eastern Europe	13	11,882	2.7	37.0	70.2	97.3	NA	100.0%, N*=4
2 Southern Europe	5	19,548	3.9	30.6	59.1	93.6	NA	66.7%, N*=3
3 Central Europe	5	38,250	6.7	44.4	85.4	98.2	NA	50.0%, N* 5
4 Mixed cluster	13	43,204	6.6	37.1	70.7	86.6	NA	85.7%, N* 7

Legend:
HF: Hypofractionated radiotherapy; NA: Not available
Variables b-g were used to define the clusters.
[a] Number of countries included in the cluster (N)
[b] GNI per capita 2017 Atlas method, current US$, average. Source: World Bank Data (www.data.worldbank.org)
[c] MV units/million inhabitants, average. Source: ESTRO-HERO project (Grau C, et al. 2014. Radiotherapy equipment and departments in the European countries: Final results from the ESTRO-HERO survey. *Radiother Oncol* 2014;112: 153-64.
[d] Actual radiotherapy courses, excluding re-treatments, as a percentage of all incident cancer cases (%), average. Source: ESTRO HERO project
[e] Actual radiotherapy courses, excluding re-treatments, as a percentage of the optimal number of courses defined by evidence-based guidelines (%), average. Source: ESTRO-HERO project
[f] Hypofractionation uptake (%), average. Source: 2018 ESTRO-GIRO survey
[g] Country-specific 5-year relative survival, average. Source: CONCORD-3 2018 (Allemani C, et al. Global surveillance of trends in cancer survival 2000–14 (CONCORD-3): analysis of individual records for 37 513 025 patients diagnosed with one of 18 cancers from 322 population-based registries in 71 countries. *The Lancet* 2018;391(10125):1023-75.
[h] N*: Number of countries with information on HF specific reimbursement, where %* is the percentage of these countries with HF specific reimbursement (Yes=1), 2018. Source: ESTRO-HERO project

Conclusion
Four clusters of European countries were identified based on their HFU and health-economic factors with a few countries being allocated differently depending on the treatment site. Cluster definition is related to GNI per capita, and ensuing RT availability, with variable impact on HFU. These insights may support national policy-makers and scientific societies in their pursuit of optimal HFU, and endorse better dissemination of this therapy across countries.

OC-0921 Age- and Comorbidity- Adjusted Optimal Radiotherapy Utilisation Rate for Women with Breast Cancer

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Purpose or Objective
Optimal radiotherapy utilisation (RTU) modelling estimates the proportion of people with cancer who would benefit from radiotherapy. Older adults with cancer may have comorbidities which impact on physiological reserve and affect radiotherapy recommendations. These have not been considered in previous models. We aimed to develop an age- and comorbidity- adjusted optimal RTU model for breast cancer.

Materials and Methods
NSW Cancer Registry data (2010-2014) linked to radiotherapy and hospitalisation data (2008-2015) was used to determine the number of women diagnosed with invasive breast cancer in four pre-specified age groups (<60, 60-69, 70-79 and 80+ years). The Charlson Comorbidity Index (CCI), Cancer Specific C3 'all sites' index and the Hospital Frailty Risk Score (HFRS) were derived for each woman from diagnostic codes in hospital records. Women were deemed unfit, and thus unsuitable candidates for radiotherapy, if the comorbidity indices were as follows: CCI ≥2; C3 score≥3; and HFRS ≥5. The proportions of women suitable for radiotherapy in each age group were then incorporated into a breast cancer decision tree model. The actual RTU was also calculated using the linked datasets.

Results
23601 women were diagnosed with breast cancer in NSW from 2010-2014 and 2526 were aged 80+ years. The overall comorbidity adjusted- RTU for women of all ages was 86% (CCI), 84% (C3) and 82% (HFRS). The optimal comorbidity adjusted-RTU for women aged 80+ was 76% (CCI), 70% (C3) and 62% (HFRS). The actual RTU for women aged 80+ years was 25%.

Conclusion

The vast majority of older Australian women with breast cancer are fit for radiotherapy. The overall optimal RTU is only slightly reduced when adjusted for age and comorbidities and was similar using each of the three indices. Our data suggests radiotherapy is underutilised for older women with breast cancer.

OC-0922 Socioeconomic inequality in survival after oropharyngeal cancer – a nationwide study from DAHANCA

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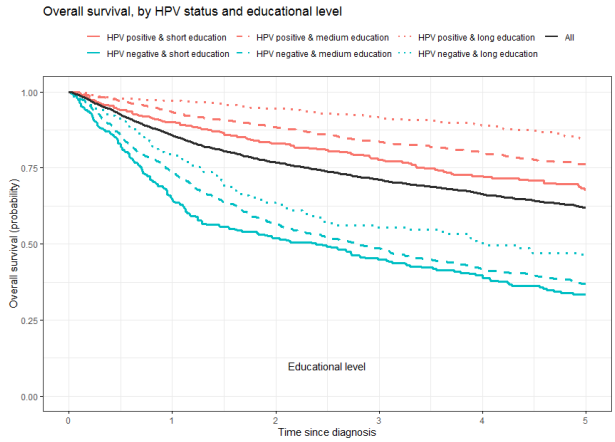
Purpose or Objective
The socioeconomic inequality in survival after cancer has increased during the past decades and is particularly pronounced for head and neck squamous cell carcinoma (HNSCC). In the same period of time, the incidence of HPV positive oropharyngeal squamous cell carcinoma (OPSCC) has increased, while the prevalence of smoking has decreased. This study investigates socioeconomic differences in survival after HPV positive and HPV negative OPSCC, respectively, and the extent to which the socioeconomic gap in survival can be explained by differences in smoking status, comorbidity and stage at diagnosis.

Materials and Methods
Clinical information on all Danish patients registered with OPSCC between 2008 and 2019 in the population-based Danish Head and Neck Cancer Group (DAHANCA) database were linked to nationwide, administrative registries, to obtain information on individual level socioeconomic position, comorbidity and vital status. The effect of socioeconomic position on five-year overall survival were estimated in Cox models adjusted for age, sex and calendar year. The mediated proportion of smoking status, comorbidity and stage at diagnosis were estimated based on the counterfactual approach.

Results
The five-year overall survival decreased gradually by decreasing socioeconomic position, both among HPV positive and HPV negative patients (Figure 1). The difference in five-year standardized survival estimates between patients with low and high socioeconomic position was approximately the same for HPV positive (-17.4 [95% CI: -22.0; -11.9]) and HPV negative (-15.3 [95% CI: -23.7; -6.9]) patients. However, the estimated mediated proportion of smoking varied, mediating 26.0% [95% CI: 16.8; 38.2] of the observed inequality in survival among HPV positive patients and 6.5% [95% CI: 1.4; 17.6] among HPV negative patients. Comorbidity mediated 14.1% [95% CI: 8.1; 22.8] and 12.7% [95% CI: 3.7; 30.8], respectively, whereas the mediated proportion of stage at diagnosis was insignificant for both HPV positive (0.3% [95% CI: -1.2; 2.1]) and HPV negative (8.4% [95% CI: -5.2; 26.8]) patients. Combined, socioeconomic differences in smoking status, comorbidity status and stage at diagnosis mediated 35.0% [95% CI: 25.0;50.1] among HPV positive patients and 27.6% [95% CI: 11.4;61.8] among HPV negative patients.

Figure 1 Crude overall survival probability according to HPV status and highest attained educational level, among Danish oropharyngeal squamous cell carcinoma patients registered in DAHANCA, 2008-2019.



Conclusion
The socioeconomic gap in OPSCC survival is significant and similar among patients diagnosed with HPV positive and HPV negative OPSCC. Most of the effect of socioeconomic position on survival after OPSCC seems to work via other pathways than those related to smoking status, comorbidity status and stage at diagnosis. Differences in smoking behavior in particular may, however, explain a considerable part of the socioeconomic inequality in survival after HPV positive OPSCC.

OC-0923 Use Of Value-Based-Healthcare To Evaluate A Novel Treatment Protocol For Localized Prostate Cancer