survival, local control or toxicity profile. Epidemiological data was searched to determine the proportion of new cases of cancer with each indication. Patient preference data were included for breast and prostate cancer. Radiation oncology and epidemiological data were reviewed by a court of external reviewers. Univariate and Monte Carlo simulations were used in sensitivity analysis.

Results: Over 600 papers and guidelines were reviewed for 20 cancer sites. The proportions of cancer types had changed markedly over 10 years. Prostate cancer increased from 12% of all cancers to 18%. The guidelines suggest that 48.6% of new cases of cancer have an indication for radiotherapy (with or without chemotherapy) at least once in the course of their illness. The range was from 0% for liver cancer to 94% for vaginal cancer. 9.1% of cases had an indication for synchronous chemoradiotherapy.

Conclusions: The small decrease in optimum radiotherapy utilisation rate was mostly due to changes in the proportions of cancer in the population and the removal of a small number of indications for radiotherapy.

PD-0368 Activity and infrastructure of radiotherapy in the European countries: Initial data from the ESTRO HERO survey

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Purpose/Objective: Documenting key parameters for the activity, utilization and infrastructure of radiotherapy in Europe is an important part of HERO - the ESTRO Health Economics in Radiation Oncology project [1]. HERO has the overall aim to develop a knowledge base of the provision of radiotherapy in Europe and build a model for health economic evaluation of radiotherapy (1). In this framework, the need for radiotherapy will be assessed in order to explore the optimum radiotherapy utilization in Europe. The percentage of new cancer patients who require radiotherapy relative to the total number of cancer patients (Attributable Radiotherapy Percentage: ARP) is one of the main measures for planning purposes of radiotherapy equipment and staffing. The objective of this work was to assess the variability of ARP according to the differences in proportional incidence and in stage at diagnosis by country in Europe.

Materials and Methods: Decision trees from the Australian CCORE- project were used to assess the percentage of patients requiring evidence-based radiotherapy (2). The original incidence data were substituted with the proportional distribution of cancers in different European countries, based on incidence data for 2008 from Globocan (International Agency for Research on Cancer) and at diagnosis from AJCC, used for exploratory purposes. The analysis was carried out with TreeAge software.

Results: The range of values of ARP among European countries varied from 52% to 57% of new cancer cases. Stage at diagnosis also contributed to the variability of ARP estimates with a range from 2% in breast cancer to 15% in rectal cancer. Most relevant factors influencing the ranges of values observed were due to the percentage of cases diagnosed at early stage with surgery as the only treatment in rectal cancer; and the important variability in the incidence by country of head and neck cancer and prostate. These estimates were evidence based and did not take into account clinical problems such as comorbidity that could influence the decision for treatment. Also, the number of patients that could require retreatment is not included in the estimate. Both factors could modify significantly the final ARP percentage of incidence cases for planning radiotherapy in a specific country.

Conclusions: ARP is a useful indicator for assessing the needs for radiotherapy; however, national differences in the incidence of cancer and stage at diagnosis should be taken into account in order to make a more realistic estimate for planning purposes. The range observed between countries and tumour stages could translate into a significant change in the number of facilities required.


PD-0370 Radiotherapy utilisation in NSW and ACT [2004-06], a data linkage and GIS experience

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Purpose/Objective: Delaney et al (2003) estimated that more than half of all cancer patients should receive radiotherapy at some point during the course of the disease. Actual Radiotherapy Utilization (RTU) rates are usually lower than the optimal rates. Our objectives were:
1) To calculate the actual RTU rates in NSW & ACT (2004-06) directly from patient treatment records with special emphasis on the effect of geographic variation on RTU.

2) To quantify factors affecting RTU.

Materials and Methods: Radiotherapy treatment data were collected from all 17 radiotherapy departments (RTD) in NSW and ACT for the period January 2004-June 2007. Through the Center for Health Record Linkage, the radiotherapy data and Central Cancer Registries (CCR) records in NSW & ACT were linked. All patients’ residential addresses were geocoded. A Geographic Information System (GIS) software was used to calculate the road distance between patients’ residential address and the closest RTD. Patients were excluded from the study if their nearest RTD was outside NSW or ACT.

Results: The overall raw RTU rate in NSW and ACT (2004-06) was 32%. After data linkage with CCR records, the overall RTU rate was 24% for unique patients diagnosed and received radiotherapy within the study period. Excluding patients at the borders with other states, the RTU rate was 26%. The RTU rates decreased with increasing distance from patient residence to the nearest radiotherapy facility (p < 0.001). There was a statistically significant difference in radiotherapy across the road distance.

Conclusions: This is the first study to use data linkage to match radiotherapy treatment data received from all RTD to all CCR records in NSW and ACT. It is also the first study to calculate the road distance between patient residence and the nearest RTD. Older patients were less likely to receive RT than younger ones (p < 0.001) and female younger patients were more likely to receive RT than younger males (p < 0.001). Our study did not show a correlation between receiving RT and the socioeconomic status of patients using Index of Relative Socioeconomic Disadvantage quintiles.

Purpose/Objective: To estimate the expected comparative costs/Quality Adjusted Life Year (QALY) gained from the guideline recommended treatments Active Surveillance (AS), Radical Prostatectomy (RP), Brachytherapy (BT), EBRT+BT and appropriate combinations hereof incl. Androgen Deprivation Therapy (ADT) in patients with low, intermediate or high risk prostate cancer over a time horizon of 10 years from an UK-NHS cost perspective.

Materials and Methods: A decision analytic model was developed considering survival, health related quality of life and costs associated with 1) initial treatment and 2) management of relapse, local recurrence, metastasis, and 3) treatment-related complications and morbidities. The wide range of appropriate treatments to be compared for low, intermediate and high risk prostate cancers were based on NICE, EAU, AUA and NCCN guidelines. Survival, relapse, recurrence, metastasis and complication rates, as well as health-related quality of life and cost data were based on systematic reviews and international experts and literature. Probabilistic sensitivity analysis, using 10,000 Monte Carlo simulations, quantified the joint decision uncertainty surrounding model outcomes at the prevailing threshold of £20k-30k/QALY.

Results: In low risk prostate cancer, AS has the highest probability for being cost-effective (C/E), i.e. 70%. When AS is unacceptable to a patient, BT dominates EBRT by generating more QALYs/patient (+0.06) at lower costs (-£14k) over 10-years. EBRT is C/E vs. RP as shown by the incremental C/E ratio of £7k/QALY which is far below the WTP threshold. In intermediate risk, EBRT+BT is the dominating treatment (5.02QALYs at £14.7k; 65% probability C/E), followed by BT as monotherapy (4.0QALYs at £16.9k; 35% probability C/E). RP generates the lowest QALYs at relatively high costs (4.06 QALYs, £28.8k). In high risk, all mono and combination radiation treatments dominate RP which generates 3.96 QALYs at £33.4 over 10 years/patient. EBRT+BT (4.7 QALYs, £35.1k) is most C/E compared to monoradiation treatments by generating more QALYs at only slightly higher total costs. BT (4.65 QALYs, £32.5k) dominates EBRT (4.62 QALYs, £32.5k) and EBRT+ADT (4.47 QALYs, £37.7k).

Conclusions: Across risk groups, RP is likely to perform worse than radiation treatments in terms of expected costs/QALY. In intermediate and high risk prostate cancer, EBRT+BT is expected to provide highest QALYs at acceptable or lower cost than monoradiation treatments and RP. In low risk prostate cancer, AS is preferred in terms of QALYs, while BT dominates EBRT and RP in terms of costs/QALYs.

As they disregard the impact of inflation, the costs calculated with ABC are lower than the required reimbursement based on the BM. Sensitivity analyses show that the required reimbursement for privately financed centres is highly sensitive to the delay in commissioning and to the interest rate. Uncertainties in investment cost have a greater impact on treatment cost and required reimbursement than changes in personnel costs. Operating scenario, product mix and fractionation schedules have a significant impact on the cost per treatment and per fraction.

Conclusions: To align costs to European reimbursement rates, our calculations suggest that the financially most attractive option for Belgium is a dedicated carbon ion centre with public financing. The choice however also depends on the clinical indications and the sociopolitical context.