

Hospital respectively. These figures were significantly lower from those published in the literature. d. The State reimburses the Hospitals with 5,130 Drs and 2,760 Drs per fraction for the linear accelerator and the cobalt unit respectively. This amount covers a small percentage of the cost, causing financial problems to radiotherapy centers in Greece.

Kardamakis D, University of Patras Medical School, Department of Radiology & Radiotherapy, 265 00 Rion Patras, Greece

PP40. Economic Analysis of cancer treatments taking QoL into consideration

Koinuma N, Ito M

Tohoku University School of Medicine, Sendai, Japan

Background: Economic recession and budget constraints increasingly determine the provision of health care services and both QoL and economic aspects seems to be indispensable to build a social consensus in the interest of securing financial resources for cancer treatment costs that are expected to balloon in the future. The purposes of this study are to clarify the relationship between the input resources and economic effects of cancer care and to attempt to combine the economic evaluation of cancer care with its QoL evaluation.

Methods: We developed a system model of prognosis of seven principal cancers and analyzed the balance of patient labor productivity and accumulated cancer treatment costs during the survival period, based on the average remaining life. We estimated the five-year survival rates of prognostic paths, the probability of the paths to follow any of the routes, and cancer treatment costs. To provide a system model most similar to the true clinical developments of cancer cases, the following conditions were assumed;

- 1) The disease progresses more rapidly in young cases than in aged.
- 2) The cancer accelerates as prognostic stages advance.
- 3) Treatment costs rise among young cases but gradually diminish with age.

The labor productivity is calculated using the age-specific wage census. Living expenses are 50% of productivity. Discount rates are set at 3% to 5%. Results are calculated according to age, route and treatment. Decline in QoL was taken into consideration as a decrease in survival years using time trade-off method (QALYs).

Results: The prognostic paths in tree structure of the system model are 50 routes in stomach, 51 in colon, 51 in rectum, 51 in lung, 52 in breast, 77 uterus and 109 in prostate cancers respectively. The cost-benefit ratios of lung(0.36), colon(0.86) and rectum(0.93) cancers are below 1, while those of other cancers are above 1. Treatment costs per QALY gradually increase as the age advances, and those of lung and colon cancers are relatively high.

Discussion: Sensitivity analysis of the cost-benefit ratio in breast cancer treatment by changing the non-resection rate showed that medical expenses change little with an increased non-resection rate. This is because reduced medical costs by increasing the non-resection rate is offset by an increase in the number of patients undergoing mastectomy after recurrence. Increased non-resection rate and decreased medical expenses did not show a linear relationship, but a critical point in the non-resection rate, providing the lowest medical cost, did exist. The economic contribution of cancer treatment is often underestimated. We can, however, define the true benefit of cancer treatment by economic analysis.

Koinuma N, 2-1, Seiryō-machi, Aoba-ku, Sendai, 980-77, Japan

PP41. Economic analysis of patients with breast cancer in a health maintenance organization

Konski A¹, Wilder L², LeSage J³

¹Dept. of Rad. Onc., Flower Hospital, Sylvania, OH, USA; ²Dept. of Economics, Bowling Green State University, Bowling Green, OH, USA;

³Dept. of Economics, University of Toledo, OH, USA

Background: Breast cancer's impact on Health Maintenance Organizations (HMO's) has increased because of increased enrollment of Medicare

patients. This study investigates patients with breast cancer in a Northwestern Ohio, USA based HMO.

Methods: Billing claims of patients with a diagnosis of breast cancer between 1990-1993 were identified from Paramount Health Plans insurance data. Paramount Health Plan is an accredited health plan in Northwest Ohio with an average enrollment of 12741 female members during the study period. Data collected from the medical record included stage at diagnosis, tumor size, method of diagnosis, type of surgery performed, treatment received, disease status, age at diagnosis, whether the patient had a previous mammogram, if they were in the insurance plan for the entire study period, mean income level, and cost measured from a payer's perspective. Average household income obtained from 1990 United States census data was used as a proxy for income. Only cost pertaining to the treatment of breast cancer were tabulated and discounted to the year of diagnosis. Regression analysis was performed with the Matlab statistical program.

Results: A total of 59 women had claims with a diagnosis of breast cancer during the study period. Of these, only 41 had the diagnosis made between 1990-1993, and of the 41 women, 30 had sufficient information in the hospital record to complete all data variables. Women diagnosed by mammography had statistically smaller cancers than if diagnosed by themselves or by a physician. Even though mammography is a covered procedure, the majority of patients were self diagnosed by feeling a lump in the breast. Patients diagnosed by themselves tended to have a lower mean income compared to mammographic diagnosis but this difference was not statistically significant. A statistically significant difference did not exist in total cost of treatment between the different types of surgery used, i.e. lumpectomy and radiation, mastectomy, and mastectomy and reconstruction. A difference, which approached statistical difference $p=0.0514$, was noted in mean income between patients undergoing mastectomy and reconstruction, \$52,690.40, and modified radical mastectomy, \$32,745.87. Results of the regression analysis will be presented.

Discussion: Although mammograms are a fully covered service in this health plan, the majority of patients had the diagnosis of breast cancer made by themselves. The cost associated with treatment as well as outcome was better in patients diagnosed by mammography. The differences in choice of surgical procedure may be related to socioeconomic status.

Konski A, Flower Hospital Radiation Oncology, 5200 Harroun Rd., Sylvania OH 43560, USA

PP42. Cost-efficacy evaluation of fludarabine phosphate in the treatment of chronic lymphocytic leukemia refractory to other therapies

Laplante S, Grenier JF

Berlex Canada Inc., Montreal, Canada

Background: The advent of purine analogs such as fludarabine phosphate (FLU) has changed the therapeutic approach of chronic lymphocytic leukemia (CLL), from palliative to curative. However, the costs associated with these medications are often perceived as high and thus, a careful evaluation is required prior to allowing their extensive use.

Methods: A cost-efficacy evaluation was conducted to compare FLU to the most common alternative treatment in Canada, i.e. cyclophosphamide-vincristine-prednisone (CVP). Efficacy data was obtained from review articles and published studies identified in MEDLINE. Costs and their structure were obtained from official tariffs and discussions with experts. As a Ministry of Health perspective was adopted, only direct medical costs were considered. Costs of treating Grade III/IV toxicity were factored into the model. In the basic scenario, 5 cycles of FLU resulted into an overall response rate of 51% - complete response (CR): 38%, partial response (PR): 13 %, survival: 3.6 years (CR), 2.8 years (PR). Whereas for CVP, the response rate was 30% (CR: 0% and PR: 30%) with a survival in responders of 1.3 years. Sensitivity analyses were performed on efficacy parameters and duration of treatment.

Results: Both alternatives appear to be highly cost-effective with cost per year of life gained (YLG) in the magnitude of CDN \$3,000-\$4,000. FLU is the best option generating savings of CDN \$476 per YLG (FLU=\$3443 YLG; CVP=\$3914/YLG). Sensitivity analyses reveal that the relationship is

linear for all parameters studied and that no exponential increase in costs per YLG can be expected.

Discussion: Trials comparing these two regimens are nonexistent in the medical literature. Thus, the model had to be based on open trials, comparative trials with other comparators, and review articles. With this information, FLU appears to be a cost-effective alternative in the treatment of CLL. This model could be verified in a retrospective case review study or preferably a prospective study. In view of FLU superior tolerance profile, especially regarding vomiting and alopecia, the use of a quality of life instrument in a comparative trial would add important information.

Laplante S, 2260-32nd avenue, Lachine, Quebec, H8T 3H4, Canada

PP43. Quality of life assessments of patients with non-small cell lung cancer receiving Gemcitabine (GemzarTM) and Cisplatin

Anton A¹, Carrato A², Gonzalez-Larriba JL³, Vadel C⁴, Masutti B⁵, Montalar J⁶, Aranda E⁷, Liepa AM⁸
¹H Miguel Servet, Zaragoza, Spain; ²H. General Universitario de Elche, Elche, Spain; ³H. Clinico de San Carlos, Madrid, Spain; ⁴H. del Mar, Barcelona, Spain; ⁵H. General Universitario de Alicante, Alicante, Spain; ⁶H. La Fe, Valencia, Spain; ⁷H. Reina Sofia, Cordoba, Spain; ⁸Eli Lilly and Company, Indianapolis, USA

Background: Traditional assessment of therapy for cancer has involved objective measurements of efficacy and safety. More recent interest in the patient's perception of therapy has led to the addition of quality of life (QoL) assessments to clinical trials.

Methods: QoL was assessed in a multicenter phase II trial of chemo-naïve patients with non-small cell lung cancer (NSCLC) receiving gemcitabine (1200 mg/m² weekly times 3 every 28 days) plus cisplatin (100 mg/m² every 28 days). QoL was assessed using the EORTC QLQ-C30 at baseline and at the end of each cycle.

Results: Thirty-eight patients completed 170 questionnaires (median = 4.5). For all patients, mean scores for the functional scales did not change significantly ($p < 0.05$) from baseline, except for a decrease in role functioning after cycle 1. However, when comparing responders ($n = 18$) to nonresponders (NRs) ($n = 18$), change from baseline was statistically different for cognitive functioning after cycle 2, with responders improving and NRs worsening. For all patients, mean scores for symptom scales changed significantly for nausea/vomiting (N/V), pain, and dyspnea. N/V scores worsened after cycles 1, 2, and 4; pain scores improved after cycle 2; and dyspnea scores improved after cycle 3. When analysing only responders, significant changes from baseline were noted with worsening of N/V scores only after cycle 1 and with improvement of pain scores after cycles 1 through 4. When comparing responders to NRs, changes from baseline were statistically different for fatigue and pain scores. For both fatigue and pain scales, responders showed improvement, while NRs showed worsening.

Discussion: Overall compliance for completion of QoL questionnaires was relatively high considering patients received a median of 5 cycles of chemotherapy. Two of the 38 patients were not evaluated for tumor response so they were not included in the comparative analysis. Statistical analyses are limited by the small patient population and by interpatient variability of scores. Despite the toxicities commonly associated with chemotherapy, QoL did not decrease in NSCLC patients receiving gemcitabine and cisplatin, irrespective of response to therapy. Although patients experienced N/V, this is expected with cisplatin therapy. Disease symptomatology improved for those patients who responded to therapy.

Liepa AM, PharmD, Global Health Economics Research, Lilly Corporate Center, Drop Code 2646, Eli Lilly and Company, Indianapolis, IN 46285, USA

PP44. Cost-quality of life study in advanced no metastatic breast cancer patients treated by a high dose chemotherapy with sequential reinfusion of blood stem cells

Macquart-Moulin G¹, Bouscary ML¹, Protière C^{1,3}, Genre D^{1,2}, Maraninchi D^{2,3}, Moatti JP^{1,3} and Viens P^{1,2}

¹INSERM - Research Unit 379 "Epidemiology and social sciences applied to medical innovation"; ²Institut Paoli-Calmettes, Regional Center for Cancer Research and Treatment; ³University of Mediterranean, Marseilles, France

Background: The aim of this study was to measure the impact, in terms of quality of life (QL) and costs, of a high dose intensity chemotherapy associating cyclophosphamide (3000 mg/m²) and doxorubicin (75 mg/m²) with RH G-CSF and blood stem cells+radiotherapy on no metastatic breast cancer patients (pts) with 4 to 10 axillary lymph nodes involved. Contrary to "classical" autograft, the intensive chemotherapy does not require isolation of pts in sterile room and may be administered with a minimal hospitalization. However, it seemed necessary to evaluate the burden for the pts of such a new modality of administration of high dose chemotherapy.

Methods: The QL study was carried out in the medical oncology unit of the Paoli-Calmettes Institute (Marseilles - France) between 04/1995 and 03/1997. Chemotherapy toxicity was evaluated by a self-administered questionnaire measuring the prevalence, duration/severity and distress level of 19 physical symptoms at 2nd and 4th cycles. Pts' QL was measured by the EORTC QLQ-C30 at the inclusion onto the protocol, the last cycle of chemotherapy and the end of radiotherapy. The same evaluation was pursued 3 and 6 months after the end of chemotherapy and 1 and 2 years later. The cost of treatment was assessed by using the standard economic analysis in health care. Direct medical costs were estimated by measuring the physical quantities of capital and labour consumed by each pt during chemotherapy+radiotherapy. Cost factors included pharmacy (chemotherapy, hematopoietic growth factor, antiemetic prophylaxis, intravenous antibiotic drugs and antifungal agents, blood products), laboratory tests, blood stem cells collection, hospitalization (supplies, staff costs, equipment depreciation, 'hotel' costs) in the medical oncology unit and outpatient clinic.

Results: All the 51 pts asked to participate to the QL study agreed and overall pts' compliance rate to questionnaires during treatment phase was 82%. Frequency of symptoms experienced by pts in 82 cycles of chemotherapy was high. Tiredness was reported in 98% of cycles, nausea in 74%, lack of appetite in 70%, fever in 65%, mucitis in 60% and vomiting in 50%. Alopecia was complete for 76% of pts after the 3rd cycle. The most distressing symptoms were cystitis, hair loss, vomiting, nausea, mucitis and tiredness. At the end of chemotherapy, all EORTC QLQ-C30 functional scales scores (including global QL score) were statistically significantly lower than baseline scores ($p < 0.01$, for all statistics). But, at the end of radiotherapy, only physical functioning score was statistically lower ($p < 0.05$) than baseline score. There was no statistically significant difference in all QL measures between baseline and 3 months after treatment. The mean cost of the treatment, assessed on 24 pts, was 90 327 FF. Main cost factors were : G-CSF (33%), hospitalization (28%), laboratory tests (16%) and radiotherapy (10%). The average cost of chemotherapy alone was only 2 734 FF (3%).

Discussion: Sequential QL self-assessment provided a quantitative estimate of the subjective impact of high dose chemotherapy with sequential reinfusion of blood stem cells. This study demonstrates that repeated QL measures can be possible with an acceptable rate of missing data. High dose chemotherapy had an clear adverse effect on self-assessed QL. However, three months after completion of the treatment, pts retrieved their preinclusion QL. Furthermore, as compared to "classical" autograft, this treatment allows a reduction of high dose chemotherapy cost of about 40%.

Macquart-Moulin G, INSERM U379, Institut Paoli-Calmettes, 232, Bld de Sainte-Marguerite, 13273 Marseille Cedex 9, France