before inclusion diagnosed -histologically confirmed-, in any progression state and already treated or under treatment. All diagnosis methods used and health care utilization resources were collected, expressed their cost as 2007 €. RESULTS: A total of 1404 patients (pts) have been evaluated (mean age: 70.2 ± 8.6). Nine percent of pts were diagnosed by screening PSA programs, 50% by either general practitioner or specialist and 42% by urologist. Screening programs were performed significantly more frequent in younger pts (<45 años), with University degree, familiar precedent and workers in assets. Three consecutive phases on diagnosis process were identified: 1) First PSA origin, 2) Confirmation/Differentiation and 3) Extension study. 1st step included: opportunistic screening, physician recognition, complete med tests and PSA; 2nd: Transrectal ultrasonografy, prostate biopsy and Gleason; & 3rd: Computed tomography (CT) magnetic resonance imaging (MRI), urography, isotopic bone scan (IBS), abdominal sonography and PET. Any additional step/test were added based on clinical criteria. Based on International Guidelines: 77.6% of IBS were well done vs. 43.8% not recommended; CT 64.8% vs 48.8% not. Final total cost, in case all steps/procedures were done, was €2339.95 ± 680.14, and for each step: 1st €246.47 ± 0.06, 2nd €1650.17 ± 587.27 and 3rd €511.43 ± 313.42. CONCLUSIONS: Prostate cancer diagnosis methods in Spain are widely variable. Gold standards are not followed strictly. Potential savings for Spanish NHS could be gather if additional not recommended test were not done increasing adherenc to gold standards.

CANCER—Conceptual Papers & Research on Methods

PCN107
NEW OPPORTUNITIES FOR DRUG OUTCOMES RESEARCH IN CANCER PATIENTS: VALIDATION OF THE LINKAGE OF THE EINDHOVEN CANCER REGISTRY AND THE PHARMO RECORD LINKAGE SYSTEM
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OBJECTIVES: To validate the linkage of the Eindhoven Cancer Registry (ECR) and the PHARMO Record Linkage System (PHARMO RLS). METHODS: The ECR records data on all newly diagnosed cancer patients in the Southeastern Netherlands whereas the PHARMO RLS includes data on e.g. in- and outpatient drug use, hospital morbidity and clinical laboratory. The overlapping catchment area of both registries includes approximately 1 million inhabitants. The linkage of the ECR and PHARMO RLS was performed with the PHARMO Probabilistic Record Linkage Engine. After pairing records from both registries on date of birth and gender, a linkage weight was calculated, based on first initial, first letter last name and 4-digit zip code. The suggested threshold weight was used to divide pairs in correct and incorrect linked pairs, i.e. pairs that include information from both registries that point to the same or to different patients, respectively. The sensitivity and specificity of this linkage process was validated using a random subset of linked and non-linked patients which were compared with a ‘gold-standard’ using detailed personal information from the original data sources. RESULTS: Of N = 38,197 cancer patients from the ECR living in the PHARMO catchment area, N = 47,012 (81%) were linked to a patient from the PHARMO RLS and regarded as being the same patient. The validated subset consisted of 2887 true positive linked pairs and the linkage of this subset yielded a specificity of 99.5% (95% CI: 99.4%–99.7%) and a sensitivity of 98.3% (95% CI: 97.7%–98.7%). CONCLUSIONS: The linkage of the ECR and the PHARMO RLS is highly sensitive and specific. The new linked database includes of more than 80% of the cancer patients detailed information on in- and outpatient drug treatment, co-medication, co-morbidity and other clinical and economical details and can be used as a new source for outcomes research in cancer treatment and post-marketing surveillance of drug-induced cancer.

PCN108
DEVELOPMENT OF AN INTERACTIVE MODEL OF FINANCIAL ACCESS TO CANCER THERAPY
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OBJECTIVES: Financial access to medical technologies in the United States may be driven by many factors, including drug costs, health insurance coverage, benefit designs, and patients’ ability or willingness to pay for treatment. Studies evaluating out-of-pocket costs for cancer treatment have been conducted; however, no national models of financial access currently exist. METHODS: We developed a conceptual framework for an interactive model of financial access to cancer therapy. To illustrate the model’s operation, we applied it to treatment of HER2+ breast cancer patients. The model traces the flow of patients along pathways of a decision tree. Beginning with the US population, the model branches by sex, breast cancer or no breast cancer, HER2+ or HER2– cancer, and insurance status. Only patients in the HER2+ branch are followed forward through the model. Patients are stratified by payor and benefit design, eligibility for patient assistance programs, and ability to pay for treatment without spending more than a pre-specified percentage of family income out-of-pocket. Data sources include custom analyses of publicly available databases (to determine incidence/prevalence and the annual income and expenditures of breast cancer patients), clinical trial data on dosages, and national survey data on the proportion of patients with different benefit designs. The user interface allows for unlimited variations in key input parameters. RESULTS: Model outputs include a series of graphs showing financial access before and after adding specific treatments, with and without support from patient assistance programs. Results are presented by payor, age, and income. Sensitivity analyses can be conducted to evaluate the robustness of results. CONCLUSIONS: While it is difficult to ascertain the number of patients who are not receiving treatment because of financial barriers, it is possible to develop a model that appropriately considers the main drivers of financial access to estimate the impact of financial barriers.

PCN109
DEALING WITH QUALITY OF LIFE MISSING DATA IN A SINGLE ARM STUDY. COMPARISON OF MULTIPLE IMPUTATION METHODS
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OBJECTIVES: Assessment of Quality of Life (QoL), a Patient Reported Outcome (PRO), has gained acceptance as a study endpoint. An open-label, multicenter phase II, single arm oncology study was conducted with a QoL endpoint aiming to assess change of scores from baseline to 12-week or End of Study (whichever occurred first). This required the availability of the baseline and at least one post-baseline assessment. Unfortunately, missing data affects the validity of QoL assessment. A set of
different techniques to deal with missing data was compared.

**METHODS:** The analysis addressed the global health status scale (QL range [1;100]) of QLC-C30, the EQ-5D utility index (Utility range [0;1]) and Visual Analysis Scale (VAS range [0;100]). Five multiple imputation (MI) techniques were carried out with two softwares (SAS, IVEware) and compared with Rubin’s efficiency: Monte-Carlo Markov Chain (MCMC), Expectation-Maximization (EM), Regression (REG), Propensity score (PROP) and Sequential regression (SEQ), using 5 simulations per technique. **RESULTS:** Changes significance varied depending on the imputation technique. At baseline, mean scores were: QL 0.73, EQ-5D index 63.4, and VAS 68. For QL score, the change estimations were (mean [95%CI]) -1.699 [-3.322; -0.076] (MCMC), -1.538 [-3.132; 0.015] (EM), -1.795 [-3.449; -0.141] (REG), -1.197 [-3.067, 0.673] (PROP), -0.895 [-5.622, 3.832] (SEQ). For EQ-5D index, estimations were: -0.020 [-0.042, 0.003] (MCMC), -0.018 [-0.043, 0.007] (EM), -0.018 [-0.034; -0.002] (REG), -0.015 [-0.045; 0.014] (PROP), -0.010 [-0.049; 0.030] (SEQ). VAS changes varied from 0.019 (SEQ) to 0.791 (PROP), no change estimation was significant. Rubin’s efficiency was comprised between 88.32% and 94.43% depending on score and technique. **CONCLUSIONS:** Results have to be carefully interpreted since they vary according to the MI method. SEQ is the only method not assuming a normal distribution of the data and consequently displays large confidence intervals. Nevertheless, multiple imputation is told to be robust to normality. A sensitivity analysis is advised in order to compare the different results.

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**Abstracts**

**PCN110**

**STATISTICAL METHODOLOGY IS CRUCIAL IN PROGNOSTIC FACTOR ANALYSIS OF HEALTH-RELATED QUALITY OF LIFE**

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**OBJECTIVES:** Whilst a number of systematic reviews (e.g. Gotay et al in press) have been analyzing prognostic value of patient-reported outcomes (PROs), including HRQOL, few have focused on the statistical methods used. In this study, we reviewed the statistical methods employed and proposed robust statistical analysis for future PROs studies predicting survival of cancer patients. **METHODS:** A total of 49 English articles were selected from published reviews, conference abstracts, Medline (1990–2008), various databases and discussions with colleagues and reviewed during June to December 2007. Each article was systematically examined for a key set of factors such as design issues, selection of HRQOL factors, control for clinical factors along with a detailed extraction of the statistical methods used for analyzing HRQOL data. Once compiled, we identified good practice and recommended approaches for future research.

**RESULTS:** Most HRQOL prognostic factor analyses, often within clinical trials, are not defined in protocols. In addition, a detailed description of the statistical methodology and reporting of the HRQOL results was often lacking in publications. Information regarding sample size, handling missing data and the verification of the model assumptions varied considerably. Pre-selection of HRQOL factors was not always done. A large number of HRQOL factors increases the risk of selecting a factor by chance and model over fitting. In the model building strategy, several approaches controlled for clinical factors in the analysis, others allowed clinical factors replacement with (perhaps slightly) more prognostic HRQOL factors. Model validation was reported in nine studies. Measures of predictive accuracy were computed in only seven studies. **CONCLUSIONS:** Undertaking HRQOL prognostic factor analysis is a challenge. The priority is validation and careful use of techniques and providing proof that the addition of HRQOL indicators significantly increases the prediction of survival in cancer patients. We hope our work will highlight these opportunities.

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**PDB1**

**THE IMPACT OF INSULIN DETEMIR COMPARED TO NEUTRAL PROTAMINE HAGEDORN INSULIN ON LONG-TERM DIABETES-RELATED Complications: A Modeling ANALYSIS IN TYPE 1 DIABETES Patients IN BELGIUM, FRANCE, GERMANY, ITALY AND SPAIN**

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**OBJECTIVES:** The aim of this analysis was to evaluate the time to onset and long-term cumulative incidence of diabetes-related complications in type 1 diabetes patients receiving either insulin detemir or Neutral Protamine Hagedorn (NPH) insulin in combination with mealtime insulin aspart in five countries (Belgium, France, Germany, Italy and Spain). **METHODS:** A published and validated computer simulation model of diabetes (CORE Diabes Model) was used to make long-term projections of clinical outcomes, based on patient characteristics and treatment effects from a 2-year, multi-national, open-label, randomized, controlled trial. In the trial, insulin detemir was associated with significant improvements in glycemic control after 24 months (HBAlc 7.36% versus 7.58%, mean difference = -0.22%, P = 0.022) and major hypoglycemic events (69% risk reduction, P = 0.001) versus NPH. Patients treated with detemir gained less weight (1.7 versus 2.7 kg, P = 0.024). Events were projected for a time horizon of 50 years. **RESULTS:** Basal-bolus therapy with insulin detemir was projected to improve mean life expectancy by 0.09 years (12.80 versus 12.71 years) versus NPH in Germany. Similar benefits were observed in the other countries (Belgium + 0.14, France + 0.13, Italy + 0.15 and Spain + 0.07 years). The time to onset of any diabetes-related complication was delayed by 0.08 years in the detemir arm (1.18 versus 1.10 years). Time to onset and cumulative incidence (CI) of diabetic eye and renal disease, neuropathy and amputations were generally decreased for detemir-based therapy, with greatest benefits observed in renal disease. The CIs of heart failure, angina and stroke were slightly raised in the detemir-based treatment arm as overall survival was increased, exposing these patients to a longer ongoing risk of these events. **CONCLUSIONS:** The modelling analysis suggests that insulin detemir is likely to improve life expectancy, delay the onset of and reduce the cumulative incidence of most diabetes related complications in type 1 diabetes patients.

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**PDB2**

**IMPROVED GLYCAEMIC CONTROL BY SWITCHING FROM INSULIN NPH TO INSULIN GLARGINE: A RETROSPECTIVE OBSERVATIONAL STUDY**

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**OBJECTIVES:** This study investigated the effect on glycaemic control of switching from a NPH-based regimen to a glargine-based regimen in 701 patients with type 1 (T1) (n = 304) or type 2 (T2) (n = 397) diabetes, using unselected primary care data. **METHODS:** Data for this retrospective observational study were...