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**DIRECT HEALTH CARE COSTS OF DIABETES MELLITUS IN HUNGARY**Vokó Z<sup>1</sup>, Nagyjanosi L<sup>2</sup>, Kalo Z<sup>1</sup><sup>1</sup>Eötvös Loránd University, Budapest, Hungary; <sup>2</sup>Syreon Research Institute, Budapest, Hungary

**OBJECTIVES:** Diabetes mellitus is responsible for a huge burden of disease. Our objective was to estimate the direct health-care costs of patients with diabetes in Hungary. **METHODS:** Real-world data were retrieved from the National Health Insurance Fund database. Diabetic patients were defined as persons who filled in a prescription of oral antidiabetics (OAD) or insulin in Q3-Q4 2007. Study population was divided into two groups depending on whether they were hospitalized for major complications of diabetes in 2007–2008. Patients without hospitalization were further divided into three subgroups according to the use of drugs (only OAD, only insulin, OAD and insulin). In all subgroups, we estimated health-care costs for each cost item by age group in the whole study group and among those who actually used a particular service. Additionally, we took samples of patients who were hospitalized for specific complications, and estimated health-care costs for the first and second year after the occurrence of the complication. Hungarian forint values were converted to Euros by employing the 2008 GDP specific PPP exchange rate (1€ = 157.64HUF). **RESULTS:** Mean health-care cost of 521,545 diabetic patients was €2125 in 2008. It was €4016 for those with hospitalization for complications, €1533 for OAD users without complications, and €2847 for insulin users without complications. Fifty-three percent of the total cost covered drug treatment and 27% acute hospital treatment; 26% of the total drug cost was spent on OADs and on insulin. **CONCLUSIONS:** Health-care cost of diabetes is already high in Hungary, especially care for its complications. Public health-care cost of diabetes exceeds 0.65% of GDP and 13% of total direct public health-care expenditure. Considering the burden of disease that manifests in premature mortality, reduction in QoL, and high cost, and the epidemiological trends, diabetes mellitus should be a public health priority in Hungary.

PDB25

**RELATIONSHIPS OF QUALITY OF LIFE AND COSTS WITH CLINICAL CHARACTERISTICS OF DIABETES PATIENTS**Cristiani M<sup>1</sup>, Scalone L<sup>2</sup>, Morsanutto A<sup>3</sup>, Moneghini M<sup>4</sup>, Cortesi PA<sup>2</sup>, Mantovani LG<sup>5</sup><sup>1</sup>Charta Foundation, Milano, Italy; <sup>2</sup>University of Milano—Bicocca, Monza, Italy; <sup>3</sup>Friuli Venezia Giulia Regional Health Authority, Trieste, Italy; <sup>4</sup>University of Trieste, Italy; <sup>5</sup>CIRFF, Federico II University, Naples, Italy

**BACKGROUND:** Recent research suggests that direct medical costs and quality of life in diabetes depends on number of diabetes-related complications. **OBJECTIVES:** To analyze relationships of quality of life and medical costs with clinical characteristics of diabetes mellitus patients. **METHODS:** A retrospective longitudinal cost of care study was conducted; type 1 and 2 diabetic patients accessing at two hospitals in the north-east area of Italy were recruited between October 2008 and March 2009. At enrollment data on demographic, clinical status and QoL (EQ-5D) were collected. Information on costs occurring during the previous 2 years was obtained from a chart review: hospitalizations, specialist medical visits, diagnostic examinations, drugs, and the main clinical parameters. Costs were quantified from the National Health Service (NHS), by applying tariffs and prices valid in 2009. Data were analyzed with a multivariable linear regression model. **RESULTS:** A total of 411 valid patients (mean + SD age = 64.1 + 12.7, 56.5% male) were enrolled: 15.9% had type 1, 83.4% type 2 diabetes, and 0.7% had other type of diabetes. Costs were on average €234.36/patient-month; hospitalization accounted for the greatest proportion of costs (58.5%), followed by pharmacological therapies (32.6%) and diagnostic exams (8.9%). With EQ-5D: VAS was on average + SD = 67.74 ± 16.71. Both Costs and HRQoL showed a linear-positive (costs) and -negative (HRQoL) relationship with number of diabetes-related complications (diabetic retinopathy, diabetic nephropathy, diabetic neuropathy, ischemic cardiopathy, vascular diseases, and diabetic foot), adjusting for age and gender and type of diabetes. On the contrast, no relationship was found with type of complications. **CONCLUSIONS:** Long-term complications carry a considerable impact on medical cost and HRQoL. Although apparently costly, strategies aimed to optimize the prevention of the onset of diabetic complications should be considered as a potential investment to gain health and reduce costs in the long run.

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**ECONOMIC BURDEN OF PAINFUL DIABETIC PERIPHERAL NEUROPATHY IN KOREA**Ko KS<sup>1</sup>, Cha BY<sup>2</sup>, Kim CH<sup>3</sup>, Kwon HS<sup>2</sup>, Lee JH<sup>4</sup>, Park TS<sup>5</sup>, Won JC<sup>1</sup>, Park HJ<sup>6</sup>, Ko SK<sup>6</sup><sup>1</sup>Inje University Sanggye Paik-Hospital, Seoul, South Korea; <sup>2</sup>The Catholic University of Korea, St. Mary's Hospital, Seoul, South Korea; <sup>3</sup>Sejong General Hospital, Bucheon-Si, Gyeonggi-do, South Korea; <sup>4</sup>Daegu Catholic University Medical Center, Daegu-City, South Korea; <sup>5</sup>Chonbuk National University Hospital, Jeonju Si, Jeollabuk-Do, South Korea; <sup>6</sup>Pfizer Pharmaceuticals Korea Ltd., Seoul, South Korea

**OBJECTIVES:** The painful diabetic peripheral neuropathy (DPN) is the most common complication of diabetes. Despite the prevalence of painful DPN and its potential risk of foot ulcer and amputation, there has been no study about painful DPN on economic burden in Korea. This study was conducted to assess the patient-level economic burden among subjects with painful DPN. **METHODS:** A cross-sectional multicenter study was performed using a standardized questionnaire, to estimate recent 3-month health-care and non-health-care cost, and productivity loss of diabetic patients. A total of 4000 patients were recruited from 40 hospitals between December 2009 and May 2010. Cost items mainly included health-care cost such as outpatient, pharmacy, inpatient, and oriental medicine; non-health-care cost such as traffic expenses, nursing cost, complementary, and alternative medicine. Cost included insurance-covered cost

as well as patient's out-of-pocket expenses during 3 months. To estimate productivity loss due to morbidity, days away from work due to painful DPN were also investigated. **RESULTS:** Among 2681 diabetic patients completed questionnaire (response rate = 67.0%), 26.3% (n = 706) had painful DPN. Numbers of outpatient visit within 3 months were higher in patients with painful DPN compared to those in patients without painful DPN, 3.79 ± 2.83 and 3.25 ± 2.36, respectively (P < 0.01). Total costs over 3 months were also higher in patients with painful DPN than in those without painful DPN (1,049,477 ± 1,549,446 and 721,933 ± 1,394,970 KRW, respectively, P < 0.01); Median costs were higher among patients with painful DPN (656,585 vs. 421,668 KRW). Within 3 months, 8.2% and 43.5% of patients with painful DPN had been away from work and reported the decreased work productivity, respectively. **CONCLUSIONS:** Painful DPN increased health-care cost and decreased work productivity of diabetic patients in Korea.

PDB27

**INDIRECT COSTS OF ILLNESS FOR DIABETES IN PORTUGAL**Gouveia M<sup>1</sup>, Borges M<sup>2</sup>, Costa J<sup>2</sup><sup>1</sup>Catholic University of Portugal, Lisbon, Portugal; <sup>2</sup>University of Lisbon, Lisbon, Portugal

**OBJECTIVES:** As in so many other countries, diabetes is one of the largest health problems faced by Portugal. Up to now, there have been no "cost of illness" studies for diabetes in Portugal. This paper provides a contribution to fill that gap by estimating the indirect costs of illness, more specifically the output loss due to short- and long-term disability attributable to diabetes in Portugal. **METHODS:** The estimates are based on the microdata of the 4th National Health Survey conducted in 2005/2006. An employment logit is estimated with covariates including age, gender, education levels, and regional dummies as well as a dummy for diabetes and dummies for other relevant health conditions for all people in the survey with ages between 20 and 74. A comparison of the baseline labor market participation/employment estimates and model predictions assuming zero diabetes prevalence provides the estimates for the labor market impact of diabetes. The estimates are specified by age groups and gender. At this point, the analysis uses microdata from the Labor Ministry, covering about 3 million workers, to estimate gross wages and employer Social Security contributions by age and gender, allowing us to use the human capital approach to put a value on the diabetes-induced labor market nonparticipation. **RESULTS:** The nonemployment estimates generated by the logit-based methodology are that diabetes reduces employment by 22,150 in a 4.6 million demographic group. The corresponding output loss is estimated to have been €324 million. **CONCLUSIONS:** The output loss is one of the main costs of diabetes in Portugal. Its amount is four times larger than the available estimates for diabetes' attributable inpatient care in National Health Service hospitals.

PDB28

**HEALTH INSURANCE COST OF DIABETES MELLITUS IN HUNGARY: A COST OF ILLNESS STUDY**Gresz M<sup>1</sup>, Varga S<sup>2</sup>, Kriszbacher I<sup>2</sup>, Sebestyén A<sup>3</sup>, Boncz I<sup>2</sup><sup>1</sup>National Health Insurance Fund Administration, Budapest, Hungary; <sup>2</sup>University of Pécs, Pécs, Hungary; <sup>3</sup>National Health Insurance Fund Administration, Pécs, Hungary

**OBJECTIVES:** Diabetes is one of that chronic diseases in which the increase of the costs cause financial problems for the National Health Insurance Fund in Hungary. Aim of the study is the examination of it in a 5-year period from 2003 to 2008. **METHODS:** The number of diabetic patients, the type of treatment services, the financial support, and the costs were analyzed. Data were derived from the National Health Insurance Fund Administration. **RESULTS:** Measuring by the medical ID, the numbers of patient increased by 34% during 5 years. The numbers of case increased in the outpatient services by 14% (from 213,790 to 243,960). The numbers of the hospital treatment day decreased by 5% (3,342,857; 3,168,263) The day off work due to sickness and the cost of it increased by 345% (from 8275€ to 36,860€). While financial support of devices for the measurement of blood sugar increased by 93% €4900 to €9400 and support of insulin treatment increased 111%, than the increase of the number of insulin-treated patients was only 46%, 91,920 (2003) and 134,617 (2008). Similarities were seen in numbers (40%) and in costs (94%) in the noninsulin-treated patients from 195,662 to 274,886 and from €7900 to €15,300. The total change in financial support was 72%. **CONCLUSIONS:** Increase in the number of diabetic patients was seen during this 5-year period. The increase of the number in outpatient services was higher than in inpatient services. The decrease in numbers of hospital bed could explain it. The economic crisis could cause the growing in the numbers of day off work. The increase in the medical financial support compared to the number of patients had to be mentioned, because it could be caused by enhancement in the administration of the innovative medical products. Basic strategy should be found against health cost explosion.

PDB29

**COST OF DIABETES MELLITUS TYPE 1 AND 2 STUDIES IN COUNTRIES OF CENTRAL AND EASTERN EUROPE—A SYSTEMATIC REVIEW OF THE LITERATURE**Kawalec P<sup>1</sup>, Czech M<sup>2</sup><sup>1</sup>Jagiellonian University, Kraków, Poland; <sup>2</sup>Novo Nordisk Pharma Sp z o.o., Warsaw, Poland

**OBJECTIVES:** Despite the rapid development of pharmacoeconomics and outcomes research in new countries joining European Union (EU), there is still scarcity of cost of illness studies compared to old EU members. The aim of the study was to review all studies concerning costs of diabetes type 1 and 2 and its complications in old and new EU members. The following countries were taken into account: Slovenia, Poland, Czech Republic, Hungary, Slovakia, Bulgaria, Romania, Lithuania, Latvia, and

Estonia—as new EU members and remaining EU countries as old members. **METHODS:** A systematic review of the following databases was conducted: Medline (PubMed), Embase, Cochrane. In addition, NICE, INAHTA, HTAI, and ISPOR Internet pages were searched. The following key words were used: *cost of illness diabetes* with name of a country or *burden of illness diabetes* with name of a country. Studies' design, methods, scope, and results were compared. Direct and indirect costs were considered separately, detailed costs' categories and costs related to complications were distinguished. Perspectives, time frames were taken into consideration and current exchange rates for communication purposes were used. Studies published in English language were included. **RESULTS:** Only 12 studies concerning cost of diabetes type 1 and 2 and their complications in new EU countries were found as compared to 67 from old EU members. On the side of new EU members, one study was found in Lithuania and Bulgaria, three in Czech Republic, and seven in Poland. In old EU countries, one study was found in Luxembourg and Greece, two in Austria, Belgium, Finland, and Ireland, three in France and The Netherlands, seven in Spain and Italy, eight in Great Britain, 13 in Sweden, and 16 in Germany. **CONCLUSIONS:** Results of this review revealed the necessity of carrying out more studies concerning cost of diabetes and its complications in new EU members.

PDB30

#### USE OF MEDICAL INFORMATION SYSTEM FOR ASSESSMENT OF THE COST OF THERAPY OF DIABETIC FOOT PATIENTS IN RUSSIA

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**OBJECTIVES:** Diabetic foot (DF) is one of the most important complications of diabetes mellitus. If not treated properly, diabetic foot may often lead to infections, amputations, and finally to disability. Unfortunately, only few studies of the cost of diabetic foot treatment were available in Russia; most of the studies were completed about 10 years ago. We suggested that the data of earlier studies could not reflect present level of expenditures. Therefore, we launched a study of the cost of diabetic foot treatment in present conditions. **METHODS:** We have analyzed the data of 146 inpatients treated in diabetic foot department at Scientific Centre for Endocrinology (Moscow, Russia) in 2008–2009. The patients' data were input into a specially designed medical information system. The patients were sorted into three main groups: 1) diabetic polyneuropathy without diabetic foot (N = 37); 2) diabetic foot without amputations (N = 58); and 3) patients with amputations due to diabetic foot (N = 51). To calculate the total cost of DF treatment, costs of diagnostic procedures, medicines, bandaging, surgical operations, and staying in the hospital were summed. **RESULTS:** Mean cost of treatment of one DF patient was equal to 81,700 rubles (US\$2645), which is about 30% higher than previously reported figures. It is mainly due to larger introduction of recombinant insulins into routine treatment of diabetic patients. Mean cost of treatment of DF patients with amputations was significantly higher than in those without amputations, mostly due to additional costs of surgical treatment and longer stay in a hospital. Moreover, the mean cost of medicines for DF patients with amputations was almost twice higher than for DF patients without amputations. **CONCLUSIONS:** The cost of diabetic foot treatment in Russia increased approximately 30% during last 10 years. The results will be used to assess cost-effectiveness of various drug treatments of diabetic foot.

PDB31

#### THE IMPACT OF NEUROMONITORING ON THYROID SURGERY COSTS

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**OBJECTIVES:** Damage to the recurrent laryngeal nerve (RLN) is one of the principal reasons for malpractice claims against surgeons in otorhinolaryngology. Intraoperative neuromonitoring (IONM), facilitating the identification of RLN, has been demonstrated to be a valid technical support to reduce intraoperative risks. Aim of this study was to evaluate the additional hospitalization costs for thyroidectomy due to IONM, against the mentioned clinical and administrative advantages. **METHODS:** The study was performed in an experienced Italian University Hospital, in which the learning curve for this technology is considered completed. Through a microcosting approach, the thyroidectomy patient care process (with and without IONM) was costed considering direct costs only (staff time, consumables, equipment, drugs, operating room, and general expenses) and according to the hospital perspective. Unit costs were collected from hospital accounting and standard tariff lists. A differential analysis was performed to highlight additional resource consumption (time effort, consumables, technology equipment) due to IONM usage. To assess the impact of the technology on hospital management, three scenarios were considered: 1) traditional thyroidectomy; 2) thyroidectomy with IONM in a high-volume setting (five procedures per week); and 3) thyroidectomy with IONM in a low-volume setting (one procedure per week). **RESULTS:** The cost for hospitalization for a traditional thyroidectomy was €3471. If IONM is used, costs increase as follows: +7% in a high-volume setting (€3713) and +9% in a low-volume setting (€3770). IONM therefore represents only the 6% to 7% of the total hospitalization costs. **CONCLUSIONS:** IONM for thyroid surgery could reduce the risk of RLN damages and, of the consequent malpractice claims against a very low impact on hospital budget, accounting only for the 7% of the hospitalization costs for a thyroidectomy. Considering that IONM could be useful in all surgical procedures where nerves are at risk, the economic impact could be even lower due to a higher level of usage of the equipment.

#### COST-EFFECTIVENESS CONSEQUENCES OF OBESITY IN T2DM BY INSULIN ANALOGUE THERAPY

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**OBJECTIVES:** The available T2DM (type 2 diabetes mellitus) therapies attend with weight gain, which affects for the disease outcomes in a very extent way. Weight gain could worsen the long-term effect of insulin therapy (increased risk of insulin resistance, hypertension, dyslipidemia), which influences the total treatment cost. Long-acting insulin analogue therapies (insulin detemir and glargine) offer improved pharmacokinetic and pharmacodynamic properties compared to regular human insulin. In a previous meta-analysis, detemir caused significant lower weight gain than glargine (−2.04 kg after 6 months therapy). Our research aimed to determine the effects of weight gain and calculate the total treatment cost. **METHODS:** On the basis of a systematic literature review, we found many consequences, which could be obesity related. Because of its important effect and bride prevalence, we analyzed the CHD (coronary heart disease) risk changes related to the weight gain. We modified the 10 years risk—calculated with the UKPDS risk engine—with the effects of the weight gain published in a meta-analysis. We aggregated the differences in natural outcomes (number of avoided fatal and nonfatal events) and in monetary unit, based on real-world data. **RESULTS:** In our analysis, we assessed that insulin detemir-treated patients—due to the favorable features regarding weight gain compared to glargine—experience smaller (cca 2%) CHD risks. It means, for the current treated Hungarian population, that there are 223 coronary (158 fatal of this) events avoidable in 10 years horizon using detemir insulin instead glargine. The estimated savings of social insurance would be around 224 million HUF on the basis of a Hungarian burden of diabetes complication study. **CONCLUSIONS:** Obesity and weight gain-related aspects should be prioritized as the main international tendencies showed. It is not only necessary on the policy level, but also in “individual” level in the cost-effectiveness analysis as well.

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#### EVALUATION OF COST AND CLINICAL OUTCOMES BY HbA1c AT DIAGNOSIS USING VARIOUS DIABETES TREATMENT STRATEGIES

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**OBJECTIVES:** To examine the association of HbA1c at diagnosis with cost and clinical outcomes in patients with type 2 diabetes (T2D) using three different diabetes treatment strategies. **METHODS:** An existing Monte Carlo diabetes model was used to generate demographic and clinical characteristics for 10,000 random patients simulated from the time of T2D diagnosis. Fixed initial HbA1c values were assigned (range: 7–12%). Input distributions were derived from the literature, with diabetes complications occurring in: retinopathy, nephropathy, neuropathy, coronary heart disease, and stroke. The diabetes-related costs, percentage of patients reaching HbA1c target (<7%), complication events, and mortality over 10 years were evaluated using the following treatment strategies: (S1) addition of oral antihyperglycemic agents (OHAs) at 3-month intervals then starting insulin after 9 months; (S2) addition of OHAs at 6-month intervals then starting insulin after 2 years; and (S3) addition of OHAs only. All treatment strategies began with metformin then sulphonylurea and/or thiazolidinedione were added if target was not reached. **RESULTS:** Diabetes-related costs increased as initial HbA1c increased for all three strategies. S1 had the greatest increase (\$5300–\$7750) followed by S3 (\$4200–\$5250) per 1% HbA1c increase from 7% to 10%. S2 had the smallest rate of increase (\$3350–\$4950). S3 was the least costly until HbA1c exceeded 10%; however, even at HbA1c of 8%, S3 had fewer patients ever reaching target (S3 = 79% vs. S1 and S2 = 95% [standard errors, SE < 0.41%]). For 10,000 patients with initial HbA1c of 9%, the total counts of complications were: S1 = 4360; S2 = 4126; S3 = 5009 (SE < 67) with mortality rates of 42.5%, 41.9%, and 45.2% (SE < 0.56%), respectively. **CONCLUSIONS:** In this model, S2 had the lowest complication rates and mortality in patients with T2D. Starting HbA1c affected S1 cost more than other strategies. Strategies with other treatments or alternative timing strategies can be specified and analyzed using this model.

PDB34

#### THE ECONOMIC VALUE OF THE EASYPD® ELECTRONIC AUTOINJECTOR IN IMPROVING THE RESPONSE TO GROWTH HORMONE (GH) IN CHILDREN WITH IDIOPATHIC GROWTH HORMONE DEFICIENCY (IGHD): A COST-CONSEQUENCE ANALYSIS

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**OBJECTIVES:** Response to GH therapy in children with IGHD can be further optimized. To evaluate the economic benefit of injecting GH with easypd®, an electronic autoinjector that objectively monitors drug administration, enabling differentiation of poor adherers from low responders. **METHODS:** A discrete event simulation model was developed to model continuous, intermittent (four injections/week) and discontinued GH usage in children with IGHD until final height. A cohort of children (age: 4–12 years, growth delay: −4.0–−2.5 standard deviation scores [SDS] at baseline) was modeled to initiate GH (0.03 mg/kg/day). Annual height gains of 1.2 to 0.8 SDS in year 1 were assumed to be 30% and 60% lower in each subsequent year of continuous and intermittent use, respectively. Baseline nonadherence was 9.3 persons per 100 person-