placed): 0.929(0.712); (undisplaced/displaced): 0.847(0.249); Comorbidities (no/yes): 0.963(0.836); Surgical types (arthroplasty/osteosynthesis): 1.405(0.026); Antiosteoporotic treatment (<2years/none): 0.512(0.006); (2years/none): 0.529 (0.004). **CONCLUSIONS:** The risk of second hip fracture in elderly 8 year follow up period was the highest in female, in older age-group, in patient after arthroplasty and in patient without pharmacologic treatment for osteoporosis. The effect of single risk factors on the risk of subsequent hip fractures should be investigated in the future.

PMS11

ESTABLISHING THE SAFETY OF TUMOUR NECROSIS FACTOR INHIBITION (TNF-I) IN RHEUMATOID ARTHRITIS (RA) FROM AN ANALYSIS OF REAL WORLD DATA

Heatley R[1], Walsh C[1], Johnson KI[1], Reynolds AV[2]
[1]*Complete Medical Group, Macclesfield, Cheshire, UK,* [2]*Reynolds Clinical Sciences Ltd, Eastleigh, Hampshire, UK*

OBJECTIVES: To perform a systematic review of prospective observational studies in patients with RA to examine the safety of TNF-I in daily practice, with particular focus on malignancy, and serious and opportunistic infections. **METHODS:** Comprehensive searches of Medline, Embase, the Cochrane Database of Systematic Reviews, and ACR, EULAR and BSR conference abstracts were performed according to a pre-specified protocol that excluded randomised controlled trials. Type and site of malignancies, as well as serious and opportunistic infections, such as tuberculosis, were extracted. Publications that reported incidence rates, standardised incidence ratios or measures of relative risk, such as incidence rate ratios, odds ratios or hazard ratios, were selected for random effects meta-analyses. **RESULTS:** A total of 2039 papers and 1979 abstracts were identified, of which 48 and 21 respectively met the pre-specified inclusion criteria. The pooled estimate for the relative risk (RR) of overall malignancy from seven studies was 0.94 (95% CI 0.84, 1.05; I2 = 0.0%). In contrast, the meta-analysis of serious infections had much higher heterogeneity, I2 = 40.9%, RR = 1.34 (95% CI 1.06, 1.62). **CONCLUSIONS:** This review included data from European, US and Japanese studies with >130,000 patient years of exposure. Data from such a large number of patients, often with extended follow-up, overcomes the weaknesses of clinical trial data, specifically fewer patient numbers and usually shorter exposure times. Observational data has known weaknesses related to non-randomisation such that statistical techniques have to be used to overcome differences between the exposed and reference cohorts. Despite such confounding factors, consideration of the available evidence leads to the conclusion that there is an increased risk of serious and opportunistic infections with TNF-I, although no evidence of increased the risk of malignancy. Meta-analyses of randomised controlled trials have come to different conclusions regarding both the risk of infections and of malignancy.

Muscular-Skeletal Disorders – Cost Studies

PMS12

A BUDGET IMPACT MODEL FOR THE USE OF ABATACEPT AS A FIRST BIOLOGIC TREATMENT FOR RHEUMATOID ARTHRITIS IN ITALY

Iannazzo S[1], Didoni G[2], Crocchiolo D[2]
[1]*AdRes HE&OR, Turin, Italy,* [2]*Bristol Myers Squibb S.r.l., Rome, Italy*

OBJECTIVES: Objective of the study was the budget impact analysis (BIA) of the use of abatacept as first biologic line for rheumatoid arthritis (RA) patients in Italy. **METHODS:** The BIA was based on a Markov model with 6-months cycles and 3-years time horizon. The target population, formed by RA patients starting a first biologic treatment, was estimated based on RA prevalence and market share data for biologic drugs. The sequence including abatacept (ABA) as first line was compared with two more traditional sequences of anti-TNFα (IFX=infliximab; ETN=etanercept; ADA=adalimumab) and rituximab (RTX). The compared sequences were: ABA-IFX-RTX; ETN-IFX-RTX; ADA-IFX-RTX. The switch between treatments for intolerance, adverse events or lack of efficacy was simulated on the basis of data from RCTs. The disease progression was classified with the ACR (American College of Rheumatology) I, II, III and IV functional states. Treatments efficacy was obtained from published RCTs as average reduction of the Health Assessment Questionnaire (HAQ) score. The HAQ score was then correlated with the ACR states. Direct costs were valued in the perspective of the Italian health care system and classified in purchasing, administration and patients routine management (visits, exams, hospital stay and other drugs). **RESULTS:** Italian target population was estimated in about 7000 RA patients. At the end of the third year patients still on first biologic drug were 5670, 4610, and 4680 in the sequence with ABA, ETN and ADA. Patients in ACR I or II were 6240, 6160 and 6000 respectively. The annual cost at the third year was €47.0 million, €48.5 million and €47.8 million for the sequence with ABA, ETN and ADA respectively. **CONCLUSIONS:** The use of ABA as first biologic line treatment for RA showed to provide better control of the disease along with a positive impact in total costs, when compared with traditional sequences based on anti-TNFα in Italy.

PMS13

THE BURDEN OF JUVENILE IDIOPATIC ARTHRITIS (JIA) IN RUSSIA: A RETROSPECTIVE REVIEW OF DIRECT AND INDIRECT COSTS

Vorobyev PA[1], Alekseeva EI[2], Bezmelnitsyna L[1], Borisenko O[1], Kirdakov FI[3], Hájek P[4]
[1]*Russian Society for Pharmacoeconomics and Outcomes Research, Moscow, Russia,* [2]*National Center for Child Health of Russian Academy of Medical Sciences, Moscow, Russia,* [3]*University Child Hospital of First Moscow Medical University named I.M.Sechenov, Moscow, Russia,* [4]*Pfizer, Praha, Czech Republic*

OBJECTIVES: Data about the burden of JIA are necessary to allocate health care resources. **METHODS:** Records were examined for 6 months retrospectively. Burden of JIA in Russia was gotten by summarizing direct and indirect medical costs of all patients with JIA. The total number of JIA patients and annualized costs were calculated based on extrapolation method. **RESULTS:** Data on 405 patients were obtained. Group with biologics included 124 patients(30.6%), without biologics – 269(66.4%), data about 9(3%) persons were absent. Among 6 biologics used in Russia for JIA treatment (Abatacept, Adalimumab, Etanercept, Infliximab, Rituximab and Tocilizumab), costs of biologics and total costs per patient were the smallest in case of Etanercept – 5,131 USD and 6,967 USD and the biggest with Rituximab - 19,530 USD and 21,944 USD. One-year direct costs per patient with biologics were 36,065 USD. One-year direct costs per patient without biologics was 3149 USD. Average one-year indirect costs were the same for patients with and without biologics - 1442 USD. Total number of patients with JIA in 2010 was 18,626 people, only 930(5%) (data of National Center for Child Health of Russian Academy of Medical Sciences, Moscow, Russia) received biologics. One-year direct costs of all patients with JIA - 89,491,976 USD; indirect costs - 27,491,976 USD; the burden of JIA -116,754,031 USD. **CONCLUSIONS:** In 2010 total number of patients with JIA in Russia was estimates as 18,626 people; burden of JIA was 116,754,031 USD.

PMS14

COST OF ETANERCEPT, ADALIMUMAB, AND INFLIXIMAB PER TREATED PATIENT ACROSS ADULT INDICATIONS USING REAL-WORLD DATA

Bonafede M[1], Gandra SR[2], Watson C[2], Princic N[3], Fox KM[4]
[1]*Thomson Reuters, Andover, MA, USA,* [2]*Amgen, Inc., Thousand Oaks, CA, USA,* [3]*Thomson Reuters, Cambridge, MA, USA,* [4]*Strategic Healthcare Solutions, LLC, Monkton, MD, USA*

OBJECTIVES: To estimate the annual cost of etanercept, adalimumab and infliximab per treated patient across adult indications using drug utilization from a US managed care population. **METHODS:** MarketScan Commercial Database was used to identify all adult patients (18-64 years) with ≥1 claim for etanercept, adalimumab, or infliximab between November 1, 2005-June 6, 2009 who were biologic-naïve or continuing TNF-blocker treatment (i.e., received a TNF-blocker before the first (index) claim in the study period) and had a diagnosis for rheumatoid arthritis, psoriasis, psoriatic arthritis, or ankylosing spondylitis. Patients were required to be continuously enrolled for 6-months pre-index and 1-year following the index claim. Patients with Crohn's disease, or ulcerative colitis in the pre-index period were excluded. Mean monthly dose was calculated for the 3 TNF-blockers for a 12-month period while patients were on therapy. Wholesale acquisition costs and the Medicare Physician Fee Schedule were applied to the mean monthly dose and related drug administration to estimate TNF-blocker cost per treated patient. **RESULTS:** Overall, 12,065 etanercept, 5,685 adalimumab, and 3,902 infliximab patients were included. Biologic-naïve patients consisted of 43% of patients. Patient characteristics were similar across treatment groups with a mean age (SD) of 49 (10) years and 66% female. The mean annual TNF-blocker cost per treated patient for all patients was $14,446 for etanercept, $18,000 for adalimumab, and $23,348 for infliximab. In biologic-naïve patients, the TNF-blocker cost per treated patient was $13,703 for etanercept, $16,932 for adalimumab, and $20,500 for infliximab; in patients continuing treatment it was $14,901 for etanercept, $19,410 for adalimumab, and $25,028 for infliximab. **CONCLUSIONS:** Patients receiving etanercept had the lowest TNF-blocker cost per treated patient for adult indications when using actual drug utilization from a US managed care population. TNF-blocker costs per treated patient on adalimumab and infliximab, respectively are approximately 25% and 62% higher than etanercept.

PMS15

COSTS OF TUMOR NECROSIS FACTOR BLOCKERS PER TREATED PATIENT ACROSS ADULT INDICATIONS USING REAL-WORLD DATA IN US COMMERCIALLY-INSURED POPULATION

Schabert V[1], Gandra SR[2], Watson C[2], Fox KM[3], Yeaw J[4], Goodman S[4], Milev S[5], Harrison DJ[2]
[1]*IMS Health, Falls Church, VA, USA,* [2]*Amgen, Inc., Thousand Oaks, CA, USA,* [3]*Strategic Healthcare Solutions, LLC, Monkton, MD, USA,* [4]*IMS Health, Watertown, MA, USA,* [5]*IMS Brogan, A unit of IMS, Ottawa, ON, Canada*

OBJECTIVES: To describe annual costs of etanercept, adalimumab and infliximab per treated patient across adult indications using real-world US drug data. **METHODS:** IMS LifeLink™ Health Plan Claims database was used to identify adult patients (≥18y) with ≥1 claim for etanercept, adalimumab or infliximab between January 1, 2005-March 31, 2009 (first TNF-blocker claim in study period is index claim); patients who were biologic-naïve or continuing TNF-blocker treatment were included. Patients had to have 360 days continuous enrollment following index claim and 180 days prior to index claim (pre-index period). In the pre-index period, patients were included if they had a diagnosis of rheumatoid arthritis, psoriasis, psoriatic arthritis, or ankylosing spondylitis, but were excluded if they had a diagnosis of Crohn's disease or ulcerative colitis. Patients were followed for 1-year. Mean monthly dose was computed for patients on therapy; wholesale acquisition costs were applied to mean monthly dose and Medicare Physician Fee Schedule was applied to related drug administrations. Costs from restarting index TNF-blocker therapy after discontinuation and costs from switching to a different TNF-blocker were attributed to patients' index therapy. **RESULTS:** Overall, 27,704 patients (14,777 etanercept, 6,862 adalimumab, 6,065 infliximab), were identified. The indication mix was 65% rheumatoid arthritis, 11% psoriasis, 13% psoriatic arthritis, 5% ankylosing spondylitis, and 6% with multiple indications. The 1-year mean cost per treated patient for all patients was lowest for etanercept, $14,013, followed by adalimumab, $17,716, then infliximab, $20,665. For biologic-naïve patients, mean cost per treated patient was $13,342 for etanercept, $16,718 adalimumab, and $18,589 infliximab. For patients continuing biologic therapy, cost per treated patient was $14,438 for etanercept, $18,816 adalimumab, and $21,846 infliximab. **CONCLUSIONS:** When comparing TNF-blocker cost per treated patient across adult indications, etanercept has the lowest cost per treated patient com-

pared to adalimumab and infliximab when using actual drug utilization data from US commercially-insured population.

PMS16

POTENTIAL COST SAVING OF EPOETIN ALFA COMPARED TO AUTOLOGOUS BLOOD DONATION OR TO NO-BLOOD-CONSERVATION-STRATEGY BEFORE ELECTIVE HIP OR KNEE SURGERY DUE TO REDUCTION IN ALLOGENEIC BLOOD TRANSFUSIONS AND ITS SIDE EFFECTS

Tomeczkowski J[1], Frietsch T[2], Müller A[3], Schleppers A[4], von Heymann C[5]
[1]*Janssen-Cilag GmbH, Neuss, Germany,* [2]*Ostseeklinik Damp GmbH, Damp, Germany,* [3]*Alfred Müller, München, Germany,* [4]*Berufsverband Deutscher Anästhesisten, Nürnberg, Germany,* [5]*Virchow-Klinikum/Campus Charité Mitte, Berlin, Germany*

OBJECTIVES: Transfusion of allogeneic blood still is common in orthopedic surgery albeit associated with higher morbidity and mortality. This analysis evaluates from the perspective of a German hospital the potential cost savings of Epoetin alfa compared to predonated autologous blood transfusions or to no-blood-conservation-strategy during elective hip and knee replacement surgery by reducing allogeneic blood transfusions and their associated infectious adverse events. **METHODS:** Individual patients (n = 10,000) were created based on data from controlled trials, the German DRG institute (InEK) and various publications and entered into a stochastic model (Monte-Carlo) one of three treatment arms: Epoetin alfa, preoperative autologous donation and no-blood-conservation-strategy. The model is focused on the costs and events of the procedure and follow-up. The model was validated by an independent external consultant. Clinical and economical variables were obtained from clinical trial databases, the German DRG System, patient records and medical publications- in particular cost per transfusion (allogeneic red blood cells: € 320/unit and autologous red blood cells: € 280/unit), pneumonia treatment (€ 5,000), and length of stay (€ 300/day). Probabilistic sensitivity analyses were performed to determine which, if any, factors had an influence on the model's clinical and cost outcomes. **RESULTS:** At acquisition costs of € 375/40,000 IE Epoetin alfa is cost saving compared to autologous blood donation, and at € 185/40,000 IE compared to no-blood-conservation-strategy. The results were most sensitive to the cost of Epoetin alfa, blood units and hospital days. **CONCLUSIONS:** Upcoming shortages and increasing prices of red blood cells will make Epoetin alfa an attractive blood conservation strategy for anemic patients at reasonable costs, due the reduction in allogeneic blood transfusions and their associated infectious adverse events.

PMS17

THE EFFECT OF BIOLOGICAL TREATMENT ON WORK PRODUCTIVITY AND PRODUCTIVITY COSTS OF RHEUMATOID ARTHRITIS PATIENTS

Klimes J[1], Dolezal T[2], Vocelka M[3], Petrikova A[4], Kruntoradova K[5]
[1]*Charles University, Faculty of Pharmacy, Hradec Kralove, Czech Republic,* [2]*Institute for Health Economics and Technology Assessment, Prague, Czech Republic,* [3]*Third Faculty of Medicine, Charles Universitiy in Prague, Praha 10, Czech Republic,* [4]*VFU Brno, Brno, Czech Republic,* [5]*Czech Technical University in Prague, Faculty of Biomedical Engineering, Kladno, Czech Republic*

OBJECTIVES: Biologics represent significant costs of rheumatic diseases treatment. Our study has focused on productivity comparison of rheumatoid arthritis (RA) patients treated with biologics and patients on DMARDs who are indicated to biologic treatment however therapy is unavailable due to economic limitations. **METHODS:** Work Productivity and Activity Impairment Questionnaire (WPAI:RA) was administered to two groups of patients - patients treated with biologics (n=76) with low disease activity and patients just on DMARDs (n=23) with high disease activity (DAS28 score ≥ 5,1). All patients were in productive age. Patients' demographics, clinical and PRO parameters (DAS28, HAQ, time from diagnosis) and working statuses we collected by rheumatologist. Productivity costs were calculated by friction cost approach using friction period of 130 work-days and average monthly gross income as denominator. **RESULTS:** Mean patients' age on biologics and on DMARDs were 41.0 years (21-61) and 45.7 (22 – 61), respectively. Mean time from diagnosis of biologics and DMARDs groups were 13.5 and 11.6 years, respectively. Average HAQ and DAS28 were 0.77 and 2.64, respectively for patients on biologics and 1.14, 5.62, respectively for patients on DMARDs. Patients on biologics were slightly more work-disable (26.3%) compare to 25.0% DMARDs patients. Overall work-impairment (for patients that reported any work-impairment) for patients on biologics and for patients on DMARDs was 28.1% and 49.6%, respectively. Patients on biologics reported less reduction of daily activities (39.8%) in compare to patients on DMARDs (50.5%). Average annual productivity costs per one patient on biologics and for DMARDs patient were € 1802 and € 2769, respectively. **CONCLUSIONS:** Despite of the fact, patients on biologics had longer time from diagnoses, they reported significantly lower work-impairment and reduction of daily activities in compare to DMARDs patients, which reflected about 53.6% higher productivity costs for patients on DMARDs. Biologic treatment preserves productivity and save productivity costs.

PMS18

BURDEN OF RHEUMATOID ARTHRITIS IN THE CZECH REPUBLIC – DIRECT AND PRODUCTIVITY COSTS

Klimes J[1], Vocelka M[2], Dolezal T[3], Petrikova A[4]
[1]*Charles University, Faculty of Pharmacy, Hradec Kralove, Czech Republic,* [2]*Third Faculty of Medicine, Charles Universitiy in Prague, Praha 10, Czech Republic,* [3]*Institute for Health Economics and Technology Assessment, Prague, Czech Republic,* [4]*VFU Brno, Brno, Czech Republic*

OBJECTIVES: International pharmacoeconomic studies suggest Health Assessment Questionnaire (HAQ) as an important predictor of evaluation both direct and productivity costs. Costs are supposed to increase with increasing HAQ score. Therefore, we calculated direct and productivity costs for five groups of patients according to their HAQ (<0.6, 0.6-1.1, 1.1-1.6, 1.6-2.1, ≥2.1) to confirm this assumption also in the Czech Republic. **METHODS:** This calculation was based on a retrospective cross-sectional study. We included 126 patients with rheumatoid arthritis, aged 18-84 years either at working status, part-time disabled or full-time disabled. For estimation of direct medical costs, we used microcosting method retrospectively reviewing individual patients' medical records. For calculation of productivity costs we excluded patients older than 63 years of age (retirement pensioners). We used friction costs approach (FCA) with defined friction period of 130 workdays, based on patients' absenteeism. Productivity of part-time-disabled and full-time disabled patients were assumed to be deteriorated by 52% and 70%, respectively, based on the Czech law on pension insurance. The height of average monthly income in year 2010, €960.3 was used as denominator. Costs were expressed as mean value per one patient with RA in each of the HAQ-group. **RESULTS:** Average patients' age was 57.3 years; average time from diagnosis was 17.5 years with mean HAQ score 1.4 and mean DAS28 3.62. Mean annual medical direct costs, for each HAQ-group, were €4076.7, €5950.2, €4691.3, €6932.1, and €6727.1, respectively. Mean annual indirect costs associated with productivity loss were €481.5, €1178.6, €1267.7, €1585.6, and €2122.5, respectively. **CONCLUSIONS:** Direct and productivity costs for patients with rheumatoid arthritis are closely related to the height of HAQ score. Total (direct and productivity) annual mean costs were €7135.6. 31.0% of all patients were treated with biological treatment which represented up to 79.4% of the overall direct medical costs.

PMS19

THE ECONOMIC BURDEN OF POST-MENOPAUSAL OSTEOPOROSIS AND RELATED FRACTURES IN GREECE

Athanasakis K[1], Karampli E[1], Hollandezos M[1], Papagiannopoulou V[2], Badamgarav E[3], Intorcia M[4], Kyriopoulos J[1]
[1]*National School of Public Health, Athens, Greece,* [2]*AMGEN Hellas, Marousi, Greece,* [3]*Amgen, Thousand Oaks, CA, USA,* [4]*Amgen S.A., Barcelona, Spain*

OBJECTIVES: To determine the healthcare resource use (HRU) and costs attributable to osteoporosis and osteoporosis-related fractures in post-menopausal women in Greece **METHODS:** A multi-point data collection procedure, based on strictly-structured interviews with 137 geographically distributed physicians, was used to construct and populate the disease management model for women with post-menopausal osteoporosis (PMO) aged >50years. The model was further validated by a group of 12 experts. Secondly, all HRU items in the model were costed in order to provide per-patient costs of treatment. Cost variables included costs of consultations, laboratory tests, osteoporotic medication, dietary supplements, hospitalization due to fractures and rehabilitation, allcalculated from a third-party payer perspective (Euros, 2011) for a 1year timeframe (retrospective). **RESULTS:** The mean annual cost per PMO patient was €1,384.67 (95%CI: 423.27 – 7281.16). When distinguishing between women with established (PMO with a previous fracture) (27.6% of total) and non-established PMO, the mean annual cost per patient was €2027.46 (95%CI: 508.09-7241.90) and €1139.63 (95%CI: 461.86 - 1324.44) respectively. For PMO women with an established osteoporosis for <1year the mean annual cost was significantly higher compared to those with an established osteoporosis for > 1year €2714.98 (95%CI: 820.17 – 7284.42) versus €1805.54 (95%CI: 508.09 – 7241.77). The mean annual cost per patient with a fracture was €4,334.27 (95%CI: 1,452.86 – 10,730.17) for a hip, €2,723.27 (95%CI: 1,470.39 – 7,839.55) for a vertebral and €1,731.35 (95%CI: 1,131.17 - 1,942.48) for a Colles fracture respectively. The sensitivity analysis (±10% change of baseline values) showed that the factors with the greatest impact on total cost were the probability of established osteoporosis, the probability of a fracture in the previous 12 months, cost of parathormone treatment and the cost of patient monitoring. **CONCLUSIONS:** Treatment of osteoporosis is costly. Efforts to control the main osteoporosis cost drivers and hence its economic impact on the health care budgets, are necessary.

PMS20

TREATMENT OF PATIENTS WITH MODERATE AND SEVERE PSORIASIS – COST-OF-ILLNESS IN THE CZECH REPUBLIC

Petrikova A[1], Klimes J[2], Dolezal T[3], Marinov L[4], Petrova G[5]
[1]*VFU Brno, Brno, Czech Republic,* [2]*Charles University, Faculty of Pharmacy, Hradec Kralove, Czech Republic,* [3]*Institute for Health Economics and Technology Assessment, Prague, Czech Republic,* [4]*Medical University, Sofia, Bulgaria,* [5]*Medical University, Faculty of Pharmacy, Sofia, Bulgaria*

OBJECTIVES: Psoriasis (prevalence 2-3%) is not directly life-threatening disease. However, patients suffering from psoriasis and psoriatic arthritis (PsA) are experiencing lower quality of life. Treatment of these diseases represents a significant financial burden for the healthcare system. **METHODS:** Study was based on 12-months retrospective electronic questionnaire reported by dermatologist. We used societal perspective using friction cost approach method for productivity costs calculation. Patients' demographics, clinical data (PASI and BSA index), direct costs (inpatient/outpatient care, local/systemic treatment etc.), productivity costs (invalidity, sick leave) and on QoL (EQ-5D, DLQI) were collected. **RESULTS:** A total of 256 patients participated in the study, average patients' age was 46.79 years (9-75 years), average time from diagnosis was 25.52 years with average PASI 13,76, BSA 28,09%, DLQI 11,74 and EQ-5D 0,7633. Occurrence of PsA was 34.4%. Major direct costs driver was phototherapy (47% of direct costs), systematic treatment (17%) and inpatient care (15%). Within the productive-age patients (18-63 years), 8.6% of patients were fully disabled, 7.4% partially disabled, 73% patients were work-active, and 11% were unemployed, retired or students. 17.2% of work-active patients reported incapacity to work with average duration of 33 days in previous 6 months. Mean indirect costs associated with productivity loss were €848.3 per work-active patient per year €1343.0 per work-active patient with PsA. Mean annual costs per patient with moderate to severe psoriasis and/or PsA were calculated to €3736.5 (direct costs 77%, €2888.2). Mean annual costs per patient with PsA were €4328.3 including €2985.3 for direct costs (69%). **CONCLUSIONS:** Direct costs remain major