**PMD105**  
**EVALUATION OF INHALER TECHNIQUE MASTERY AND HANDLING ERRORS WITH SPIROMAX®, EASYHALER®, AND TURBUHALER® DEVICES (FINHALER)**  
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**OBJECTIVES:** This single-site, cross-over study evaluated device mastery with dry powder inhalers, Spiromax®, Easyhaler® and Turbuhaler®. **METHODS:** Healthy inhaler-naive participants aged ≥18 years were observed using each of the three empty devices (Spiromax, Easyhaler, and Turbuhaler) in a counter-balanced order. To evaluate the proportion of participants achieving device mastery (defined as an absence of health care professional [HCP] observed errors), a three-stage step approach was used: 1) intuitive use (no instructions), 2) use after reading the patient information leaflet (PIL) user instructions and 3) use after HCP instructions. Trained HCPs monitored use and recorded errors based on device-specific handling error checklists. **RESULTS:** During steps 1 and 2, respectively, more participants used Spiromax without error (57.5% and 93.3%, p < 0.001) compared with Easyhaler (58% and 53.8%) and Turbuhaler (92% and 76.7%); performance level was high (>95%) with all devices during step 3. The mean proportion of errors committed by participants in steps 1 and 2 was lower with Spiromax (12.4%, 0.8%, p < 0.001) compared with Easyhaler (18.7%, 5.0%) and Turbuhaler (17.6%, 2.8%); the proportion of errors for each device was similar in step 3 (0.1%, 0.5%, 0.1%, respectively). The most common errors in step 1 were related to inhalation device mastery evidenced by intuitive use (no instructions) or PIL information, and fewer errors compared with Easyhaler and Turbuhaler. The most common errors associated with Spiromax were related to orientation. Assessing device mastery and providing training can improve drug effectiveness which may affect adherence and overall treatment costs.

**PMD106**  
**EVALUATION OF INHALER PERCEPTION AND PREFERENCE OF SPIROMAX®, EASYHALER®, AND TURBUHALER® DEVICES (FINHALER)**  
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**OBJECTIVES:** Patient preference and overall satisfaction with their inhaler is correlated with improved adherence, better clinical outcomes and reduced costs. This single-site, cross-over study evaluated preference with dry powder inhalers, Spiromax®, Easyhaler® and Turbuhaler®. **METHODS:** Healthy inhaler-naive participants aged ≥18 years (N = 120) were observed using each of the three empty devices (Spiromax, Easyhaler, and Turbuhaler) in a counter-balanced order. A three-step procedure was used: 1) intuitive use (no instructions), 2) use after the patient information leaflet (PIL) user instructions, and 3) use after HCP instructions. Devices were rated using a device preference questionnaire: participants had to complete the three steps with each device. Participants were also asked to rate their satisfaction (on a scale from 1 [unsatisfactory] to 5 [excellent]) with the following features: 1) overall ease of use, 2) quality of PIL instructions, 3) clarity of dose counter, 4) preparing the dose, 5) inhaling procedure, and 5) clarity of dose information. **RESULTS:** Patients aged ≥18 years observed using each of the three devices (Spiromax, Easyhaler, and Turbuhaler) received higher ratings (p < 0.015). **CONCLUSIONS:** This study suggests that, if prescribed an inhaler product, device-naive users prefer Spiromax and find it to be more intuitive in comparison to Easyhaler and Turbuhaler.
questionnaires based on a 0–7 points Likert scale were delivered to n=10 subscale stroke patients affected by upper limb hemiparesis and n=23 physiotherapists using two different robotic systems (InMotion2, Interactive Motion Technologies, USA and Armeo Spring, Hocoma AG, Switzerland). The (I) perceived comfort and effectiveness of robot-assisted rehabilitation treatments and (ii) evaluation of human–robot interaction for chronic obstructive pulmonary disease (COPD) patients in France, UK, Spain, Germany and Netherlands using the discrete choice experiment (DCE) method. METHODS: Attributes characterizing DPs and attribute levels were defined using focus groups among n=70 stroke patients and n=48 physiotherapists using a survey of all healthcare providers in Scotland and France. Those attributes were ease of use, accurate and easy-to-read dose counter, dose confirmation, hygiene of the mouthpiece, flexibility of device handling and use with breathing difficulties. A fractional factorial design including 3 sets of 12 choices was created. Analyses were performed using a ranked ordered logit model. Interactions between attributes and asthma/COFPD were tested. RESULTS: Participants included 601 patients with asthma and 491 with COPD. Asthma and COPD patients were on average 43 and 53 years old respectively. Preferences of patients with asthma and COPD were largely similar, but the marginal utility of the cost attribute was higher in asthma patients, compared to COPD, in three countries. In all countries, marginal utilities were highest for ease of use and ability to use the inhaler with breathing difficulties. Estimates of willingness to pay (WTP) for an inhaler requiring one step to prepare a dose instead of four ranged from €3.27 (95% CI: [2.23; 4.52]) in asthma patients in Germany to €15.14 [6.42;112.72] in asthma in Spain. The estimated WTP for ability to use with breathing difficulties ranged from €2.19 [1.03;28] in asthma patients in the Netherlands and €136.68 [11.77;145.12] in COPD/Spain. The marginal utility of the hygiene of the mouthpiece was not significant in any of the countries. CONCLUSIONS: Despite differences in valuations of attributes between countries, two attributes were consistently found to be the most important: ease of use and ability to use the inhaler in case of difficulties breathing in.

PMD112 SUBJECTIVE OUTCOMES WITH BONE CONDUCTION AND MIDDLE EAR IMPLANTS FOR PATIENTS WITH CONDUCTIVE OR MIXED HEARING LOSS Kosner K1,2,3, Zhao C1,2,3, Chopra A1,2,3, Mameghani A1,2,3, Sivakumaran M1,2,3, Urban M1,2,3
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OBJECTIVES: With the number of different hearing implants available for individuals with a conductive/mixed hearing loss (CMHL), it is becoming more and more important to demonstrate user needs and benefit, in particular for aiding in decision making. The aim of this study was to systematically review the subjective outcomes of different hearing implants for individuals with CMHL. METHODS: Several databases were searched using a comprehensive search strategy to identify studies published assessing subjective outcomes with unilateral middle ear implants (MEI), percutaneous bone conduction implants (pCi) and transcutaneous CI (tBCI). The search included papers in any language. Non-systematic reviews, case reports, letters, editorials, animal, in-vitro and laboratory studies and clinical studies with less than 5 cases were excluded. RESULTS: Out of 670 citations, 22 percutaneous and 7 transcutaneous CI, plus 10 MEI publications were identified (total n=1106). As many as 20 different questionnaires were applied. All devices lead to an improvement in HR-QOL when compared to the unaided condition. Functional outcomes were assessed by Time-Outs (TOA) with the initial session conducted on 4 patients at the different CI devices. The results indicated that pCi was less functional than the Baha which was reflected in patient preferences. Comparison of pCiCI with tBCI and MEI generally showed a similar distribution. Outcomes were related to use of CI devices (pCi, tBCI, and MEI) and general quality of life (QoL). Conclusions: tBCI and MEIs were also similar on HR-QOL measures, but were slightly in favour of the latter on a general health QOL measure (G-QOL). The common HU G-QOL measure was only available for pCi and MEI users with any type of hearing loss, and results were more similar distributed. CONCLUSIONS: There are many QOL measures for assessing hearing loss, however not many are sensitive at picking up differences between hearing implants. The studies identified in the literature, even though limited in number and quality, suggest health-related measures to be more sensitive than general health measures.

PMD113 REFERENCE PRICING FOR LABORATORY TESTS IN THE UNITED STATES: IMPACT ON PRICES AND SPENDING Robinsson Jo1, Brown T2, Whalley PB1
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OBJECTIVES: This study examines the impact of reference pricing on the price and spending of 106,906 of laboratory tests for a large private employer in the United States. METHODS: We obtained comprehensive laboratory and medical claims for employees of a major US firm from 2009 to 2013. Each claim contained the CPT code for the test, the price (paid after charge), and the identity and the location of the laboratory. Using medical lab claims we identified medical claims for the patients, obtaining information on age, gender, diagnoses and co-morbidities (CD9). Beginning in January 2011, the firm limited its payment for 566 in vitro laboratory tests to the 60th percentile in the private sector for that test. Our analyses included reference pricing policies for in vitro laboratory tests and freestanding local laboratories. Reference-priced tests generated 99,225 individual patient assays and insurance claims. Another 274 types of in vitro tests were exempted from reference pricing; these generated 33,480 individual patient assays and insurance claims. We used differences-in-differences analysis (GLM with log link and gamma distribution) to measure the rate of change in prices paid per test for laboratory tests subject to reference pricing, compared to the change in prices paid for laboratory tests exempted from reference pricing. RESULTS: Reference pricing led to a 17.8% (p<0.01) reduction in laboratory test prices paid in the first year after implementa-

PMD114 THE ASSESSMENT OF VALUE FOR MEDICAL DEVICES: A CASE STUDY ON INJECTION TECHNIQUE EDUCATION IN INSULIN DELIVERY Charter R1, Hopley C2, Su T3, Grima D2, Strauss K4
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OBJECTIVES: Education and product training are critical but overlooked variables in the value assessment of medical devices. By example, over 24 million insulin injections occur daily in Europe, with little knowledge on proper injection technique (IT). This case study illustrates the positive impact of insulin IT education on diabetes outcomes, drug prescription and healthcare costs. METHODS: We conducted a literature review on diabetes IT. The impact of IT education on adherence, adverse event monitoring and healthcare costs were assessed using claims data (SAP) and context (i) Proper device selection; ii) Education, application, and adherence to IT best practices; and; iii) adverse event monitoring. Potential healthcare savings from a UK NHS perspective were estimated using probabilistic patient simulations based on risk equations from the UKFDS study. RESULTS: Evidence suggests the clinical benefits of IT best practices include 1) better patient acceptability via overall preference and lower injection pain (VAS significantly less with shorter needle, sharper edges, and less pain not related to injection site) 2) increased prevalence of lipohypertrophy, >30% higher insulin consumption and worse glycaemic control (HbA1c 0.5% higher in patients with lipohypertrophy (p<0.05) 3) lower risk of treatment discontinuation 4) device selection (0.4% - 1.8% for 4 and 5mm needles). Another prospective non-controlled study, investigating the impact of individualized IT education including site rotation (0.4%) and worse adherence to proper injection technique (IT) 1. This case study illustrates the positive impact of insulin IT education on diabetes outcomes, drug prescription, and healthcare costs.

PMD115 HEALTHCARE ASSOCIATED INFECTIONS, IMPACT AND COSTS OF DIAGNOSIS AND MANAGEMENT OF CLOSTRIDIUM DIFFICILE INFECTIONS (CDI). THE EXPERIENCE OF A UNIVERSITY HOSPITAL IN ROME Capozzi C1, Fontana C2, Volpi A1, Lombardi G3, Lisena FP1, Paulon L1, Maurici M1, Visconti G2
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OBJECTIVES: The diagnosis and treatment of Healthcare Associated Infections (HAI) have a significant impact on the care pathways and hospital costs; one of the most diffused HAI is Clostridium Difficile (CDI). The study aimed to assess the CDI distri-

PMD116 MEDICAL DEVICE/DIAGNOSTICS – Health Care Use & Policy Studies