

OBJECTIVES: Limited evidence exists on the risk of falls/fractures with use of anticholinergic medications in the elderly. This study examined the risk of falls/fractures associated with anticholinergic medication use. **METHODS:** A nested case-control design was conducted using regional Medicare Advantage Plan database. The base population included individuals aged >65 years, who survived during the entire study period (2009-2010), had at least one institutional and one outpatient claim in first 6 months (January-June 2009) and no event of falls/fractures during the first 6 months (Base Period). Cases were identified as patients who experienced incident diagnosis of falls/fractures following the base period. For each case, 4 age and sex-matched controls were selected using incidence density sampling (incidence density 1:4). The primary outcome was an event of incident falls/hip fracture, between July 1, 2009 and December 31, 2010. The primary exposure was prescription of any anticholinergic medication 30 days preceding the event date. Anticholinergic exposure was defined based on the Anticholinergic Drug Scale (ADS). Conditional logistic regression model stratified on matched case-control sets was used, with exposure to anticholinergic levels 1, 2 or 3 as the independent variable, falls/fractures as the outcome variable and other covariates associated with the outcome. **RESULTS:** The study sample consisted of 449 cases diagnosed with falls/fractures and 1,796 controls. After adjusting for other covariates, anticholinergic use was not associated with a statistically significant risk of falls/fractures (Relative Risk, RR 1.03; 95% CI, 0.82-1.31) compared to no use. The study findings remained consistent when high-level anticholinergic drugs (level 2/3) were considered (RR 1.19; 0.85-1.65). **CONCLUSIONS:** Use of anticholinergic medications was not associated with a higher risk of falls/fractures compared to no use, among patients with no history of falls/fractures. Future studies are needed to address the role of dose and concomitant use of anticholinergics to evaluate falls risk in the elderly.

PIH5

USE OF ANTICHOLINERGIC MEDICATIONS AND RISK OF ALL-CAUSE HOSPITALIZATION IN THE ELDERLY

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OBJECTIVES: Anticholinergic medications are frequently prescribed in the elderly, and have been associated with potential central and peripheral adverse events. The current study examined the risk of all-cause hospitalization associated with anticholinergic use in the elderly. **METHODS:** The study used a case-control design nested within a cohort of elderly individuals enrolled in a regional Medicare Advantage Prescription Drug Plan. The base population consisted of individuals aged >65 years, who survived during the entire study period, had at least one institutional and one outpatient claim in first 6 months (January-June 2009) and no event of hospitalization during the first 6 months (Base Period). Cases for the study experienced incident inpatient hospitalization anytime following the base period. For each case, 4 age- and sex-matched controls were selected using incidence density sampling (incidence density 1:4). The primary outcome measure was all-cause inpatient hospitalization. Prescription of any anticholinergic medication 30 days before the hospitalization date formed the primary exposure, and was defined using the Anticholinergic Drug Scale (ADS). Conditional logistic regression stratified on matched case-control sets was used to model the hospitalization risk, after controlling for additional risk factors predictive of the outcome. **RESULTS:** There were 295 cases that experienced incident hospitalization, and 1,180 age and sex-matched controls. After controlling for other covariates, use of anticholinergic medications was not associated with a significantly higher risk of hospitalization (Relative Risk, RR 0.85; 95% CI, 0.62-1.17) compared to no use. The findings remained unchanged after considering higher level (Level 2/3) anticholinergic use (RR 0.97; 0.61-1.54). **CONCLUSIONS:** The study found that anticholinergic medication use was not associated with a significantly higher risk of hospitalization compared to no use, among the elderly with no history of hospitalization. Future studies with diverse samples are required to address the role of dose and concomitant use of anticholinergic agents in the elderly.

PIH6

VITAMIN B12 STATUS IN FRAIL OLDER ADULTS ADMITTED IN A GERIATRIC ASSESSMENT UNIT: CAN THE USE OF CERTAIN DRUGS BE DETERMINANT?

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BACKGROUND: Use of proton pump inhibitors (PPIs) and metformin have emerged as potential risk factors of vitamin B12 (VB12) deficiency. Conversely, calcium supplements were shown to counteract the detrimental effect of metformin on VB12 absorption. These drugs are commonly prescribed to frail older adults in whom, VB12 deficiency is prevalent and has serious consequences. **OBJECTIVES:** To examine proportions of PPI, metformin, and calcium supplement users according to vitamin B12 status in frail older adults upon their admission to a Geriatric Assessment Unit (GAU). **METHODS:** This cross-sectional study was based on 172 medical chart reviews of patients discharged from the GAU between 2008 and 2012. VB12 status at admission was categorized as follows: ongoing treatment for VB12 deficiency, low (<148pmol/L), low-normal (148-221pmol/L), and normal (>221pmol/L) serum VB12 concentration. Use of PPIs, metformin and calcium supplements was determined from the pharmacist report. Proportions of PPI, metformin, and calcium supplement users were compared between VB12 status categories using χ^2 statistics. **RESULTS:** Most patients were women (67%), ≥ 75 years old (78%), and community-living (90%). Serum VB12 concentration was low and low-normal in 19% and 25% of patients, respectively; 19% had ongoing VB12 treatment. Prevalence of PPI and metformin users was 47% and 17%, respectively; these proportions did not vary significantly according to VB12 status. The use of calcium supplements was also prevalent (56%). Interestingly, proportions of calcium supplement users was found to vary significantly between categories of VB12 status ($P < 0.001$), being of 21%, 35% and 62% in those with low, low-normal and normal status, respectively, and of 54% in those

ongoing VB12 treatment. **CONCLUSIONS:** PPI and metformin use did not appear as determinants of VB12 status in GAU patients whereas calcium supplements seem promoting better VB12 status. Whether calcium has counteracting effect on PPIs and metformin should be further examined using adjusted-analyses in a larger sample.

PIH7

ADVERSE DRUG EVENTS IN THE ELDERLY OCCURRING IN EMERGENCY, INPATIENT, AND OUTPATIENT DEPARTMENTS IN AN ADMINISTRATIVE CLAIMS DATABASE

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OBJECTIVES: Adverse drug events (ADE) in the elderly are important sequelae of drug treatment playing a role in non-adherence and increased hospitalizations and emergency visits. This study sought to describe the rate of ADEs in an elderly population and to compare the characteristics of those who experienced ADEs to those who did not. **METHODS:** This study was a retrospective cross-sectional analysis that used a 10% random sample of the IMS LifeLink Health Plans commercial claims data during the period January 1, 2001 through December 31, 2009. Subjects had to be at least 65 years of age and have had at least one year of continuous medical coverage. ADEs were defined based on previously published schema using ICD-9-CM codes that mention drug therapy or "due to drug" or "drug induced". ADEs occurring in hospitalizations, emergency department visits, and outpatient physician visits are reported. Demographics, comorbidity, and health resource use were compared between persons with one or more ADEs compared to those without an ADE. **RESULTS:** 402,078 persons were eligible with 2.1% having at least one ADE. The ADE exposed group was older (77.5 vs 74.9, $p < 0.001$), included more females (59.4% vs 54.5%, $p < 0.001$), had higher CGI scores (2.27 vs 1.53, $p < 0.001$) and incurred nearly three times the average health care cost per person (\$9,386 vs \$2,962, $p < 0.001$). The most common ADEs experienced were mental disorders (0.30%) and dermatitis (0.24%) with anticoagulants (0.15%) and chemotherapy (0.13%) being the most prevalent associated drug groups. Nearly half (48.8%) of ADEs occurred in ED departments. **CONCLUSIONS:** Approximately 2% of persons age 65 and older experienced at least one ADE. ADEs frequently required ED care underscoring the severity of many ADEs and the need to develop interventions that can reduce ADE occurrences in the elderly.

PIH8

COMPARING THE EFFECT OF SEQUENTIAL THERAPY WITH TRIPLE DRUG THERAPY FOR HELICOBACTER PYLORI ERADICATION IN CHILDREN: A SYSTEMIC REVIEW AND META-ANALYSIS

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OBJECTIVES: Previous meta-analysis on adults confirmed the superiority of sequential therapy (ST) over standard triple drug therapy (STT) for *Helicobacter pylori* eradication. The evidence of demonstrating the efficacy of using ST is still lacking. The aim of this study was to conduct a systemic review and meta-analysis comparing the efficacy of ST versus STT for the treatment of *Helicobacter pylori* infection in children. **METHODS:** We used the keywords such as "*Helicobacter pylori*", "*H. pylori*", "infection", "sequential therapy", "triple drug therapy" "children" and searched Cochrane library, PubMed and Google Scholar for all the relevant randomized controlled trials (RCTs), comparing the efficacy of two treatments (ST: proton pump inhibitor (PPI) + 1 antibiotic for 5 days followed by PPI + 2 antibiotics for another 5 days; STT: PPI + 2 antibiotics for 7-10 days). The eradication rates were abstracted from included RCTs and Review Manager was used to estimate the pooled risk ratio (RR). **RESULTS:** Five full text studies were included in the meta-analysis. They were published from 2005 to 2013. Three out of the five studies were of good quality (Jadad score ≥ 3). The superiority of ST over STT on the effect of *Helicobacter pylori* eradication was demonstrated, RR 1.24 (95% CI 1.14, 1.36). No heterogeneity ($I^2 = 0$) and publication bias (funnel plot was symmetrical). In the subgroup analyses, ST remained superior to STT regardless of the length of the STT (7 days or 10 days) (RR 1.24, RR 1.21) as well as the type of antibiotics used as a part of ST (metronidazole or tinidazole) (RR 1.24, RR 1.26). **CONCLUSIONS:** The study indicated sequential therapy is superior to standard triple drug therapy for the eradication of *Helicobacter pylori* infection in children. More large RCTs are warranted to further confirm the efficacy due to the limited number of published studies.

PIH9

FOLLOW-UP OF PSYCHOACTIVE DRUG USE IN NEWLY DIAGNOSED PATIENTS WITH AUTISM SPECTRUM DISORDER (ASD) IN QUEBEC (CANADA)

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OBJECTIVES: To characterize the temporal course of psychoactive drug utilization in a cohort of newly diagnosed autistic individuals. **METHODS:** A cohort was built using the provincial public health care insurance program (RAMQ) databases. Newly diagnosed subjects with ASD were selected (≥ 2 diagnoses (separate dates) with ICD-9 codes: 299.X, excluding 299.2) between January 1998 and December 2010. Cohort entry was the date of first diagnosis confirmed by the absence of ASD diagnosis in previous 5 years. Participants aged ≥ 26 years or those not covered by the RAMQ drug plan in the year preceding cohort entry were excluded. Demographic and clinical patient characteristics were assessed at cohort entry. Drug use profiles (anticonvulsants, antipsychotics, antidepressants, anxiolytics, ADHD drugs) were evaluated for 5 years of follow-up. Impact of age groups on drug use profiles and variations over time were analyzed using generalized estimating equations (GEE) methods. **RESULTS:** A cohort of 2,989 subjects was identified (male: 80.2%; median age: 6 years). Prior to ASD diagnosis, 35.8% received at least 1 psychoactive drug. At 1-year of follow-up, 44.9% of participants were receiving at least 1 psychoactive med-

ication, which increased to 53.2% by 5 years. Overall, ADHD drug use was most common in patients aged 1-5 and 6-12 years whereas antipsychotics were most common in adolescents (13-17 years) and young adults (18-25 years). The effects of age group on the use of the different drug classes were statistically significant ($p < 0.0001$). We observed significant changes in drug use over time for all psychoactive drug classes (either increase or decrease), except for anxiolytics. **CONCLUSIONS:** Psychoactive medication use increased over the 5-year period among newly diagnosed ASD people, whatever the age group. Optimal use of these medications in the context of limited access to other types of support modalities is discussed.

PIH10

PRIOR USE OF LONG-ACTING REVERSIBLE CONTRACEPTION METHODS AND HEALTH PLAN TYPE PREDICTS GREATER LIKELIHOOD OF HAVING AN INTENDED PREGNANCY

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OBJECTIVES: The objective of this study was to determine if long-acting reversible contraception (LARC) use prior to pregnancy and health plan type were associated with greater likelihood of having an intended pregnancy (IP). **METHODS:** Women members of the Kaiser Permanente, Northern California (KPNC) integrated health plan aged 15-44 years who became pregnant between 1/1/2010 and 12/31/2012 were identified from KPNC databases. The last contraceptive method used within 2 years preceding pregnancy was determined. Key characteristics were compared among women with IPs vs. those with unintended pregnancies (UPs—unwanted or mistimed). Logistic regression analyses were conducted to determine if health plan type, copays or prior LARC use were predictive of IP, controlling for age, race/ethnicity, marital status, education/income, parity, and select comorbidities. **RESULTS:** Among women included in the study, 27,498 (61%) had IPs and 17,853 (39%) had UPs. Higher education (47.9% vs. 17.2%), an income \geq \$60,000 (55.0% vs. 21.0%), and already having one child (39.0% vs. 21.3%) were significantly ($p < 0.0001$) more common among women with IPs. In comparison to women with UPs, significantly ($p < 0.0001$) larger proportions of women with UPs were \leq 24 years old (33.7% vs. 6.5%), single (39.8% vs. 5.5%), and had evidence of comorbidities (7.72% vs. 7.12%). When controlling for key characteristics, women who used LARC methods prior to pregnancy vs. women using non-LARC methods were 2.3-fold ($p < 0.0001$) more likely to have an IP. Women with deductible plans with health savings accounts (HSA) vs. those with non-deductible plans had greater odds of having an IP (1.16, $p = 0.01$). Upon further stratified analysis, prior use of LARC methods was associated with significantly greater likelihoods of having an IP across all evaluated race/ethnicities and education/incomes levels. **CONCLUSIONS:** Women KPNC members who used LARC methods prior to pregnancy and those who had a HSA were more likely to have an IP than an UP.

PIH11

AUTISM PREVALENCE IN CHILDREN AMONG THE UNITED STATES MEDICAID POPULATION

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OBJECTIVES: The current study examined patient age, gender, race, geographic variation as well as the prevalence of autism in children using U.S. Medicaid data. **METHODS:** A retrospective study was performed among the Medicaid fee-for-service (FFS) population from January 1, 2008 through December 31, 2009. Children under age 17 years and diagnosed with autism were identified using International Classification of Disease, 9th Revision, Clinical Modification (ICD-9-CM) diagnosis code 299.0x. A 2-year period of continuous Medicaid FFS enrollment during the study period was required. Disease prevalence was stratified by region, state, age, gender and race for all patients, and measured by number and percentage in each category. Patients with managed care enrollment in any month of 2008 or 2009 were excluded from the study. **RESULTS:** A total of 23,589 children diagnosed with autism were analyzed. Children age 6-10 years had the highest autism prevalence level (4.59%), followed by those age 11-17 (3.62%) and 0-5 years (1.50%). Prevalence results according to race are as follows: Asian (6.33%), White (4.06%), Hispanic (3.29%) and Black (2.75%). Autism was more likely to be diagnosed among boys (5.01%) than girls (1.62%). Geographic variation analysis showed the highest autism prevalence in Idaho (34.06%), followed by Oklahoma (17.14%), Connecticut (14.05%), Minnesota (13.44%) and Rhode Island (11.33%). The Southern region of the United States was found to have the highest autism prevalence for children under age 17 (4.35%), compared to the Midwest (4.03%), Northeast (3.43%) and West (0.82%). **CONCLUSIONS:** Children age 6-10 years had a higher probability of being diagnosed with autism, with Asian patients most likely to be diagnosed with autism compared to other races. Children residing in the Midwestern region of the United States were shown to be at a higher risk for an autism diagnosis.

PIH12

PREVALENCE OF TASTE DYSFUNCTION IN THE ADULT UNITED STATES POPULATION: A STUDY OF THE NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY

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OBJECTIVES: There are no current nationally representative estimates on taste dysfunction for the US population; the last estimates based on the 1994 National Health Interview Study indicated population prevalence reports of taste problems of 0.6%. The purpose of this study is to provide current estimates of the prevalence of taste dysfunction and identify the relationship between taste dysfunction and health perception in the US population. **METHODS:** Data from the 2011-2012 National Health and Nutrition Examination Survey (NHANES) was used to assess the prevalence of self-reported taste dysfunction as assessed by the Taste and Smell

Questionnaire; completed by participants ages 40 – 80. After exclusion of persons with negative sample weights and missing data, the final sample was 3437. Chi-square and ANOVA were used to make statistical comparisons and all analyses were weighted to account for the sampling design. **RESULTS:** The prevalence of taste dysfunction was 5.3% (95% CI 4.6, 6.1). Taste dysfunction was higher in older adults compared to younger adults (6.9% and 4.2%, respectively, $p < .01$), and in those reporting problems with smell compared to those with no problem (21.2% and 3.4%, respectively, $p < .0001$). Persons with taste dysfunction reported significantly more days of poor physical health (mean = 6.4, SE = 1.1) and mental health (mean = 6.2, SE = 1.1) than those without problems with taste (mean = 3.9, SE = .24, $p = .04$; mean = 3.7, SE = 0.24, $p = .03$, respectively). **CONCLUSIONS:** Based on self-reported data, taste dysfunction affects 5% of the weighted sample. Discrepancies between reported prevalence from 1994 are likely due to differences in the operationalization of taste dysfunction. The association of problems with taste and the increase in reported days of poor physical and mental health should be investigated further.

PIH14

INAPPROPRIATE ANTICHOLINERGIC MEDICATION USE IN THE ELDERLY

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OBJECTIVES: Drugs with anticholinergic properties are associated with central and peripheral adverse effects in the elderly. The purpose of this study was to determine the prevalence and predictors of inappropriate anticholinergic medication use among the elderly as per 2012 American Geriatrics Society (AGS) Beers' criteria. **METHODS:** A retrospective cross-sectional study design was conducted using 2009-2010 Medical Expenditure Panel Survey (MEPS). The study sample included individuals aged \geq 65 years. Inappropriate anticholinergic drugs were identified using the MEPS prescription files. Weighted descriptive statistics were used to estimate the prevalence of inappropriate anticholinergic medication use in elderly patients. Multivariable logistic regression within the conceptual framework of Anderson Behavioral Model was used to identify predictors associated with the use of inappropriate anticholinergic medications in the elderly. **RESULTS:** Analysis of the 2009-2010 MEPS data revealed that an estimated 78.6 million members of the US population were elderly. (12.78%) It was estimated that 7.51 million (95% CI: 6.64 to 8.38) of elderly individuals used potentially inappropriate anticholinergic medications, resulting in an overall prevalence of 9.56%. The most frequently used inappropriate anticholinergics were cyclobenzaprine (2.08%), promethazine (1.75%), amitriptyline (1.47%), hydroxyzine (0.95%), and dicyclomine (0.84%). Multivariable analyses revealed that female gender (OR: 1.37; 95% CI: 1.06-1.77), South region (OR: 1.88; 95% CI: 1.25-2.84) and anxiety disorder (OR: 2.15; 95% CI: 1.57-2.94) increased the likelihood of receiving inappropriate anticholinergic medications; whereas age between 75 to 84 years (OR: 0.64; 95% CI: 0.49-0.85), age $>=$ 85 years (OR: 0.52; 95% CI: 0.33-0.81) and $>$ 15 years of education (OR: 0.54; 95% CI: 0.35-0.84) decreased the likelihood of receiving inappropriate anticholinergic medications. **CONCLUSIONS:** The study found that approximately one in ten elderly patients used inappropriate anticholinergic medications. Several predisposing and need factors were associated with the use of inappropriate anticholinergic medications. Efforts are needed to improve inappropriate prescribing practices to optimize medication use in the elderly.

PIH15

PROMOTING MEDICATION SAFETY IN THE WARDS OF A PUBLIC TEACHING HOSPITAL

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OBJECTIVES: Health care risk epidemiology identifies medication error as the commonest cause of adverse effects on patients. Errors can occur at any phase of the medication process, so incidence rates should be estimated along with their clinical outcomes at each stage. The aim of this study was to assess and analyze the medication errors for determining their nature, types, incidence and clinical significance in an Indian setting. **METHODS:** This prospective observational study was conducted in 3 medical wards of a public teaching hospital. All the information was collected in a standard data collection form. Medication errors were identified and analyzed from patients' records using Current Index of Medical Sciences (CIMS) and Micromedex Drug-Reax database. **RESULTS:** Of the 450 studied, 87 patients were found to have 113 medication errors. The 3 most common errors were drug interactions followed by inappropriate frequency and overdose (35%, 23% and 8%, respectively). Other errors were underdose, incomplete prescription and duplication of therapy. Nitrofurantoin, domperidone & cefixime were common drugs administered at inappropriate frequency. Drugs involved in overdose were enoxaparin, gentamicin, azithromycin & domperidone. The incidence of medication error was 26%. Antimicrobial agents (34%) had contributed maximum to the error followed by GI agents (20%), anticoagulants (11%) and CNS agents (8%). All the errors were category B error (NCC MERP medication error index) **CONCLUSIONS:** The availability of such evidence will help in improving patient safety in Indian setting and to promote medication safety.

PIH16

CAUSALITY ASSESSMENT OF ADVERSE DRUG REACTIONS IN WARDS OF AN INDIAN PUBLIC TEACHING HOSPITAL

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OBJECTIVES: Causality assessment is the evaluation of the likelihood that a particular treatment is the cause of an observed adverse event. The aim of this study was to