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Parkinson's Disease

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1. **Disease progression strikingly differs in research and real-world Parkinson's populations.**

Authors: Beaulieu-Jones, Brett K.;Frau, Francesca;Bozzi, Sylvie;Chandross, Karen J.;Peterschmitt, M. Judith;Cohen, Caroline;Coulovrat, Catherine;Kumar, Dinesh;Kruger, Mark J.;Lipnick, Scott L.;Fitzsimmons, Lane;Kohane, Isaac S. and Scherzer, Clemens R.

Publication Date: 2024

Journal: MedRxiv : The Preprint Server for Health Sciences

Abstract: Characterization of Parkinson's disease (PD) progression using real-world evidence could guide clinical trial design and identify subpopulations. Efforts to curate research populations, the increasing availability of real-world data and recent advances in natural language processing, particularly large language models, allow for a more granular comparison of populations and the methods of data collection describing these populations than previously possible. This study includes two research populations and two real-world data derived (RWD) populations. The research populations are the Harvard Biomarkers Study (HBS, N = 935), a longitudinal biomarkers cohort study with in-person structured study visits; and Fox Insights (N = 36,660), an online self-survey-based research study of the Michael J. Fox Foundation. Real-world cohorts are the Optum Integrated Claims-electronic health records (N = 157,475), representing wide-scale linked medical and claims data and de-identified data from Mass General Brigham (MGB, N = 22,949), an academic hospital system. Structured, de-identified electronic health records data at MGB are supplemented using natural language processing with a large language model to extract measurements of PD progression. This extraction process is manually validated for accuracy. Motor and cognitive progression scores change more rapidly in MGB than HBS (median survival until H&Y 3: 5.6 years vs. >10, p<0.001; mini-mental state exam median decline 0.28 vs. 0.11, p<0.001; and clinically recognized cognitive decline, p=0.001). In the real-world populations, patients are diagnosed more than eleven years later (RWD mean of 72.2 vs. research mean of 60.4, p<0.001). After diagnosis, in real-world cohorts, treatment with PD medications is initiated 2.3 years later on average (95% CI: [2.1-2.4]; p<0.001). This study provides a detailed characterization of Parkinson's progression in diverse populations. It delineates systemic divergences in the patient populations enrolled in research settings vs. patients in the real world. These divergences are likely due to a combination of selection bias and real population differences, but exact attribution of the causes is challenging using existing data. This study emphasizes a need to utilize multiple data sources and to diligently consider potential biases when planning, choosing data sources, and performing downstream tasks and analyses.

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2. **Long-Term Longitudinal Course of Cognitive and Motor Symptoms in Patients With Cerebral Small Vessel Disease.**

Authors: Bergkamp, Mayra I.;Jacob, Mina A.;Cai, Mengfei;Claassen, Jurgen A.;Kessels, Roy P. C.;Esselink, Rianne;Tuladhar, Anil Man and De Leeuw, Frank-Erik

Publication Date: Mar 12 ,2024

Journal: Neurology 102(5), pp. e209148

Abstract: BACKGROUND AND OBJECTIVES: Patients with cerebral small vessel disease (SVD) show a heterogenous clinical course. The aim of the current study was to investigate the longitudinal course of cognitive and motor function in patients who developed parkinsonism, dementia, both, or none. METHODS: Participants were from the Radboud University Nijmegen Diffusion Tensor and Magnetic Resonance Cohort study, a prospective cohort of patients with SVD. Parkinsonism and dementia were, respectively, diagnosed according to the UK Parkinson's Disease Society brain bank criteria and the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, criteria for major neurocognitive disorder. Linear and generalized linear mixed-effect analyses were used to study the longitudinal course of motor and cognitive tasks. RESULTS: After a median follow-up of 12.8 years (interquartile range 10.2-15.3), 132 of 501 (26.3%) participants developed parkinsonism, dementia, or both. Years before diagnosis of these disorders, participants showed distinct clinical trajectories from

those who developed none: Participant who developed parkinsonism had an annual percentage of 22% (95% CI 18%-27%) increase in motor part of the Unified Parkinson's Disease Rating Scale score. This was significantly higher than the 16% (95% CI 14%-18%) of controls, mainly because of a steep increase in bradykinesia and posture and gait disturbances. When they developed dementia as well, the increase in Timed Up and Go Test time of 0.73 seconds per year (95% CI 0.58-0.87) was significantly higher than the 0.20 seconds per year increase (95% CI 0.16-0.23) of controls. All groups, including the participants who developed parkinsonism without dementia, showed a faster decline in executive function compared with controls: Annual decline in Z-score was -0.07 (95% CI -0.10 to -0.05), -0.09 (95% CI -0.11 to -0.08), and -0.11 (95% CI -0.14 to -0.08) for participants who developed, respectively, parkinsonism, dementia, and both parkinsonism and dementia. These declines were all significantly faster than the annual decline in Z-score of 0.07 (95% CI -0.10 to -0.05) of controls. DISCUSSION: A distinct pattern in deterioration of clinical markers is visible in patients with SVD, years before the diagnosis of parkinsonism and dementia. This knowledge aids early identification of patients with a high risk of developing these disorders.

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3. **Characterization of gait patterns in prodromal Parkinson's disease in free-living conditions using wrist-worn actigraphy**

Item Type: Conference Proceeding

Authors: BrinkKjaer, A., Wickramaratne, S.D., Marwaha, S., Jennum, P., Mignot, E., Parekh, A. and During, E.

Publication Date: 2024

Publication Details: Sleep Medicine. Conference: 17th World Sleep Congress. Rio de Janeiro Brazil. 115(Supplement 1) (pp 302); Elsevier B.V.,

Abstract: Introduction: Motor impairment manifests early in Parkinson's disease (PD) and can often be detected in people with isolated REM sleep behavior disorder (iRBD). However, practical assessment of motor impairment has thus far been limited to clinical settings, utilizing procedures that are not transferable to home environments. These tests have primarily relied on hip-worn smartphones with gyroscopes or invasive sensors attached to the lower back, which are neither practical nor scalable. Free-living, passive actigraphy recording with wrist-only sensor(s) can differentiate patients with PD versus controls; however, no studies have been conducted in patients with iRBD, a population with more subtle motor deficits. In this study, we aimed to detect and characterize ambulation patterns in iRBD using continuous wrist actigraphy over several days in a home setting. Material(s) and Method(s): We first developed a reliable model for detecting ambulation bouts using a triaxial wrist accelerometer (Axivity-6, recording at 25-100Hz) in a sample of 8 healthy volunteers. Participants wore the device for 24-48 hours and marked each walking or running bout. A model was then developed using data from 7 subjects and tested on one. The model provides a walking score in successive 10-second periods based on the autocorrelation of acceleration magnitude. For all detected bouts, the average and within-bout standard deviation of cadence and arm swing amplitudes were derived. Walking and running cadences were defined as 60 - 119 and 120 - 199 steps/min, respectively. We then applied this automated pipeline to a dataset that included >= 5 days of continuous actigraphy in 38 polysomnography-confirmed iRBD patients (68.0 +/- 6.5 years) from the Stanford Sleep Center and 109 age- and sex-matched controls (66.2 +/- 7.0 years) from the UK Biobank. Result(s): In a carefully annotated independent test actigraphy recording, the walking detector achieved 77 % sensitivity and 90 % precision. Patients with iRBD spent on average less time walking (13.5 +/- 15.0 min, 18.2 +/- 15.0 min, p = 0.014) and running (0.7 +/- 1.7 min, 2.5 +/- 4.8 min, p = 0.00013) daily. In the iRBD group, the walking cadence was significantly lower (96.3 +/- 8.7 steps/min, 101.7 +/- 6.4, p = 0.0004), as well as arm swing amplitudes, both during walking (0.82 +/- 0.16 g, 0.92 +/- 0.15 g, p = 6.1e-05) and running (1.07 +/- 0.58 g, 1.29 +/- 0.73 g, p = 0.027). The variation in running cadence was higher in iRBD (26.2 +/- 24.9, 17.3 +/- 14.3, p = 0.034). Conclusion(s): Passive gait monitoring using wrist actigraphy is feasible and can detect subtle motor changes in iRBD that may reflect parkinsonism and early-stage PD. This approach is cost-effective, scalable, and could be used in combination with other actigraphy features or biomarkers to predict neurodegenerative progression. Future studies will evaluate the

validity of this approach by comparing it to gold-standard in-clinic motor/gait testing, and measure sensitivity to changes in longitudinal cohorts. Acknowledgements: This research was supported by U19-AG071754 to E.M and by the Feldman Foundation CA and the Icahn School of Medicine Department of Neurology to E.D.Copyright © 2023

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4. **The impact of psychiatric comorbidity on Parkinson's disease outcomes: a systematic review and meta-analysis.**

Authors: Burchill, Ella;Watson, Cameron James;Fanshawe, Jack B.;Badenoch, James Brunton;Rengasamy, Emma;Ghanem, Dory Anthony;Holle, Constantine;Conti, Isabella;Sadeq, Mohammed Ahmed;Saini, Aman;Lahmar, Abdelilah;Cross, Ben;McGuigan, Gareth;Nandrha, Amar;Kane, Edward J.;Wozniak, Julia;Farouk Ghorab, Reem Mohamed;Song, Jia;Sommerlad, Andrew;Lees, Andrew, et al

Publication Date: Apr ,2024

Journal: The Lancet Regional Health.Europe 39, pp. 100870

Abstract: Background: The burden of psychiatric symptoms in Parkinson's disease includes depression, anxiety, apathy, psychosis, and impulse control disorders. However, the relationship between psychiatric comorbidities and subsequent prognosis and neurological outcomes is not yet well understood. In this systematic review and meta-analysis, in individuals with Parkinson's disease, we aimed to characterise the association between specific psychiatric comorbidities and subsequent prognosis and neurological outcomes: cognitive impairment, death, disability, disease progression, falls or fractures and care home admission. Methods: We searched MEDLINE, Embase, PsycINFO and AMED up to 13th November 2023 for longitudinal observational studies which measured disease outcomes in people with Parkinson's disease, with and without specific psychiatric comorbidities, and a minimum of two authors extracted summary data. Studies of individuals with other parkinsonian conditions and those with outcome measures that had high overlap with psychiatric symptoms were excluded to ensure face validity. For each exposure-outcome pair, a random-effects meta-analysis was conducted based on standardised mean difference, using adjusted effect sizes-where available-in preference to unadjusted effect sizes. Study quality was assessed using the Newcastle-Ottawa Scale. Between-study heterogeneity was assessed using the I2 statistic and publication bias was assessed using funnel plots. PROSPERO Study registration number: CRD42022373072. Findings: There were 55 eligible studies for inclusion in meta-analysis (n = 165,828). Data on participants' sex was available for 164,514, of whom 99,182 (60.3%) were male and 65,460 (39.7%) female. Study quality was mostly high (84%). Significant positive associations were found between psychosis and cognitive impairment (standardised mean difference [SMD] 0.44, [95% confidence interval [CI] 0.23-0.66], I2 30.9), psychosis and disease progression (SMD 0.46, [95% CI 0.12-0.80], I2 70.3%), depression and cognitive impairment (SMD 0.37 [95% CI 0.10-0.65], I2 27.1%), depression and disease progression (SMD 0.46 [95% CI 0.18-0.74], I2 52.2), depression and disability (SMD 0.42 [95% CI 0.25-0.60], I2 7.9%), and apathy and cognitive impairment (SMD 0.60 [95% CI 0.02-1.19], I2 27.9%). Between-study heterogeneity was moderately high. Interpretation: Psychosis, depression, and apathy in Parkinson's disease are all associated with at least one adverse outcome, including cognitive impairment, disease progression and disability. Whether this relationship is causal is not clear, but the mechanisms underlying these associations require exploration. Clinicians should consider these psychiatric comorbidities to be markers of a poorer prognosis in people with Parkinson's disease. Future studies should investigate the underlying mechanisms and which treatments for these comorbidities may affect Parkinson's disease outcomes. Funding: Wellcome Trust, UK National Institute for Health Research (NIHR), National Institute for Health Research (NIHR) Biomedical Research Centre (BRC) at South London and Maudsley NHS Foundation Trust and King's College London, National Institute for Health Research (NIHR) Biomedical Research Centre (BRC) at University College London Hospitals NHS Foundation Trust, National Brain Appeal. Copyright © 2024 Published by Elsevier Ltd.

5. **The Linguistic-Cognitive Profile in an Adult Population with Parkinson's Disease and Deep Brain Stimulation: A Comparative Study.**

Authors: Cano-Villagrasa, Alejandro;Lopez-Zamora, Miguel;Romero-Moreno, Lorena and Valles-Gonzalez, Beatriz

Publication Date: Feb 15 ,2024

Journal: European Journal of Investigation in Health Psychology & Education 14(2), pp. 385-398

Abstract: Introduction. Individuals with Parkinson's disease (PD) exhibit general impairments, particularly non-motor symptoms that are related to language, communication, and cognition processes. People with this disease may undergo a surgical intervention for the placement of a deep brain stimulation device, which improves their motor symptoms. However, this type of intervention leads to a decline in their linguistic and cognitive abilities that becomes increasingly noticeable as the disease progresses. Objective. The objective of this research was to compare the performance and linguistic-cognitive profile of individuals with Parkinson's disease who underwent deep brain stimulation treatment based on the stage of the disease. Method. A total of 60 participants who were diagnosed with PD by their reference hospital were selected. These participants were divided into three groups based on the stage of the disease that they were in, forming three groups: a Stage I group (n = 20), a Stage II group (n = 20), and a Stage III group (n = 20). The linguistic-cognitive profile was assessed using the MoCA, ACE-III, and MetAphas tests. The design of this study was established as a quasi-experimental, cross-sectional investigation, and statistical analysis was performed using MANOVA to compare the scores between the study groups. Results. The results indicate that individuals in Stage I exhibit better linguistic and cognitive performance compared to the other groups of participants in Stage II and Stage III, with statistically significant differences (p Conclusion. In conclusion, the progression of PD leads to significant linguistic and cognitive decline in individuals with this disease who have a deep brain stimulation device, greatly limiting the autonomy and quality of life for people with PD.

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6. **Physical activity and sleep pattern in relation to incident Parkinson's disease: a cohort study.**

Authors: Chen, Li-Hua;Sun, Shi-Yu;Li, Guijie;Gao, Xiang;Luo, Weifeng;Tian, Haili;Zhang, Xuanhao;Yin, Xi;Liu, Ziwei;Chen, Guo-Chong;Xu, Guangfei;Liu, Tong and Li, Fu-Rong

Publication Date: Feb 14 ,2024

Journal: International Journal of Behavioral Nutrition & Physical Activity 21(1), pp. 17

Abstract: BACKGROUND: How physical activity (PA) and different sleep traits and overall sleep pattern interact in the development of Parkinson's disease (PD) remain unknown. OBJECTIVE: To prospectively investigate the joint associations of PA and sleep pattern with risk of PD. METHODS: Included were 339,666 PD-free participants from the UK Biobank. Baseline PA levels were grouped into low (: Included were 339,666 PD-free participants from the UK Biobank. Baseline PA levels were grouped into low (= 3000 MET-mins/week) according to the instructions of the UK Biobank. Healthy sleep traits (chronotype, sleep duration, insomnia, snoring, and daytime sleepiness) were scored from 0 to 5 and were categorized into "ideal sleep pattern" (>= 3 sleep scores) and "poor sleep pattern" (0-2 sleep scores). Hazard ratios (HRs) and 95% confidence intervals (CIs) of PD were estimated by Cox proportional hazards models. RESULTS: During a median of 11.8 years of follow-up, 1,966 PD events were identified. The PD risk was lower in participants with high PA (HR = 0.73; 95% CI: 0.64, 0.84), compared to those with low PA; and participants with ideal sleep pattern also had a lower risk of PD (HR = 0.78; 95% CI: 0.69, 0.87), compared to those with poor sleep pattern. When jointly investigating the combined effect, participants with both high PA and ideal sleep pattern had the lowest risk of incident PD (HR = 0.55; 95% CI: 0.44, 0.69), compared to those with low PA and poor sleep pattern; notably, participants with high PA but poor sleep pattern also gained benefit on PD risk reduction (HR = 0.74; 95% CI: 0.55, 0.99). CONCLUSIONS: Both high PA and ideal sleep pattern were independently associated with lower risk of developing PD, and those with both high PA level and ideal sleep pattern

had the lowest risk. Our results suggest that improving PA levels and sleep quality may be promising intervention targets for the prevention of PD.

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7. **Continuous subcutaneous foslevodopa/foscarbidopa infusion for the treatment of motor fluctuations in Parkinson's disease: Considerations for initiation and maintenance**

Authors: Fung, Victor S. C.;Aldred, Jason;Arroyo, Martha P.;Bergquist, Filip;Boon, Agnita J. W.;Bouchard, Manon;Bray, Sarah;Dhanani, Sara;Facheris, Maurizio F.;Fisseha, Nahome;Freire-Alvarez, Eric;Hauser, Robert A.;Jeong, Anna;Jia, Jia;Kukreja, Pavnit;Soileau, Michael J.;Spiegel, Amy M.;Talapala, Saritha;Tarakad, Arjun;Urrea-Mendoza, Enrique, et al

Publication Date: 2024

Journal: Clinical Parkinsonism & Related Disorders 10, pp. 100239

Abstract: Background: As Parkinson's disease (PD) advances, management is challenged by an increasingly variable and inconsistent response to oral dopaminergic therapy, requiring special considerations by the provider. Continuous 24 h/day subcutaneous infusion of foslevodopa/foscarbidopa (LDp/CDp) provides steady dopaminergic stimulation that can reduce symptom fluctuation. Objective: Our aim is to review the initiation, optimization, and maintenance of LDp/CDp therapy, identify possible challenges, and share potential mitigations. Methods: Review available LDp/CDp clinical trial data for practical considerations regarding the management of patients during LDp/CDp therapy initiation, optimization, and maintenance based on investigator clinical trial experience. Results: LDp/CDp initiation, optimization, and maintenance can be done without hospitalization in the clinic setting. Continuous 24 h/day LDp/CDp infusion can offer more precise symptom control than oral medications, showing improvements in motor fluctuations during both daytime and nighttime hours. Challenges include infusion-site adverse events for which early detection and prompt management may be required, as well as systemic adverse events (eg, hallucinations) that may require adjustment of the infusion rate or other interventions. A learning curve should be anticipated with initiation of therapy, and expectation setting with patients and care partners is key to successful initiation and maintenance of therapy. Conclusion: Continuous subcutaneous infusion of LDp/CDp represents a promising therapeutic option for individuals with PD. Individualized dose optimization during both daytime and nighttime hours, coupled with patient education, and early recognition of certain adverse events (plus their appropriate management) are required for the success of this minimally invasive and highly efficacious therapy. Copyright © 2024 AbbVie Inc.

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8. **Alleviating Stress in Parkinson's Disease: Symptomatic Treatment, Disease Modification, or Both?.**

Authors: Goltz, F.;van der Heide, A. and Helmich, R. C.

Publication Date: 2024

Journal: Journal of Parkinson's Disease (pagination), pp. Date of Publication: 15 Feb 2024

Abstract: Psychological stress, a state of mental strain caused by mentally or physically threatening situations, plays a significant role in Parkinson's disease (PD). Motor symptoms worsen during acute stress and common non-motor symptoms in PD, such as anxiety and depression, are linked to chronic stress. Although evidence in humans is lacking, animal models of PD suggest that chronic stress can accelerate dopaminergic cell death. This suggests that stress-reducing interventions have not only symptomatic, but perhaps also disease-modifying effects. Our objective was to identify the most promising strategies for stress-reduction in PD and to analyze their potential value for disease-modification. An unstructured literature search was performed, primarily focusing on papers published between 2020-2023. Several large clinical trials have tested the efficacy of aerobic exercise and mindfulness-based interventions on PD symptoms. The evidence is promising, but not definitive yet: some exercise trials found a reduction in stress-related symptoms, whereas others did not or did not

report it. In the majority of trials, biological measures of stress and of disease progression are missing. Furthermore, follow-up periods were generally too short to measure disease-modifying effects. Hence, mechanisms underlying the intervention effects remain largely unclear. These effects may consist of attenuating progressive neurodegeneration (measured with MRI-markers of substantia nigra integrity or cortical thickness), or a strengthening of compensatory cerebral mechanisms (measured with functional neuroimaging), or both. Lifestyle interventions are effective for alleviating stress-related symptoms in PD. They hold potential for exerting disease-modifying effects, but new evidence in humans is necessary to fulfill that promise.

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9. **DRD3 Predicts Cognitive Impairment and Anxiety in Parkinson's Disease: Susceptibility and Protective Effects.**

Authors: Goncalves, Alexandra;Mendes, Alexandre;Damasio, Joana;Vila-Cha, Nuno;Boleixa, Daniela;Leal, Barbara and Cavaco, Sara

Publication Date: 2024

Journal: Journal of Parkinsons Disease Print 14(2), pp. 313-324

Abstract: Background: A possible genetic contribution of dopamine D3 receptor (DRD3) to cognitive impairment in Parkinson's disease (PD) has yet to be investigated. Objective: To explore the effects of rs6280 (Ser9Gly) genotype on PD patients' cognitive performance and to clarify possible interactions with psychopathology. Methods: Two hundred and fifty-three consecutive PD patients underwent neurological and neuropsychological evaluations, which included: Unified Parkinson's Disease Rating Scale (UPDRS), Hoehn & Yahr scale (H&Y), Dementia Rating Scale-2 (DRS-2), and Hospital Anxiety and Depression Scale (HADS). rs6280 polymorphism was genotyped for all PD patients and for 270 ethnically matched healthy volunteers (HC). Non-parametric group comparisons and logistic regressions were used for data analyses. Results: rs6280 genotype did not differ between PD and HC groups. PD patients with rs6280 CC genotype had more impaired cognitive performance (i.e., =11) than those with TT (p = 0.012). This association was also independent of other covariates. Conclusions: Study findings suggest that rs6280 CC genotype predisposes to executive dysfunction and visuoconstructional deficits, whereas the heterozygous genotype protects from anxiety in PD. These effects do not appear to be dependent of one another. rs6280 is not a genotypic susceptibility factor for PD.

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10. **Association of 24-h rest-activity rhythms and future risk of Parkinson's disease in middle-aged to older adults: results from the UK Biobank**

Item Type: Conference Proceeding

Authors: Haghayegh, S., Zheng, X., Gaykova, N., Gao, L., Lei, P. and Hu, K.

Publication Date: 2024

Publication Details: Sleep Medicine. Conference: 17th World Sleep Congress. Rio de Janeiro Brazil. 115(Supplement 1) (pp 1-2); Elsevier B.V.,
Abstract: Introduction: Rest-activity rhythms (RAR) play a crucial role in maintaining the synchronization of various physiological processes, such as motor activity, which exhibit approximately 24-hour rhythms. Disturbances in these rhythms can compromise overall well-being. Studies have shown that Parkinson's disease (PD) patients often experience alterations in their rest-activity patterns. In this study, we investigated the potential association between 24-hour RAR and the risk of PD in middle-aged to older adults. Material(s) and Method(s): Actigraphy recordings (up to 7 days) were collected from more than 100,000 participants in the UK Biobank between 2013-2015, the baseline for this study. Participants were followed after actigraphy assessment for up to 7.5 years (median: 5 years). Actigraphy data were used to obtain the following RAR measures: (1) activity counts of the most active 10 hours across the 24-h cycle (M10); (2) activity counts of the least active 5 hours across the

24-h cycle (L5); (3) relative amplitude, indicating the robustness of 24-h rhythmicity; (4) interdaily stability (IS), an estimate of the consistency of activity rhythms across days; (5) intradaily variability (IV), an estimate of the fragmentation of activity rhythms within a day; (6) midline estimated statistic of rhythm (MESOR), representing mean activity count of the 24-hour rhythm pattern; and (7) amplitude, half of the difference between the model fit peak and trough. Cox proportional hazard models were performed to determine the associations of each RAR measure with the events of PD during the follow-up. All the models were adjusted for age, sex, ethnicity, education, obesity, sleep apnea, alcohol intake, smoking status, morbidity burden, circulatory system disorder, and Townsend deprivation index. Result(s): After eliminating the data of participants with PD at the baseline or those with low-quality actigraphy data, our analyses comprised a total of 94,071 participants (baseline age: between 43.5-79 years old with an average of 62.5; 56.4% female). Over the course of the follow-up period, 290 participants developed PD. The risk for PD was higher in participants with lower RA (Hazard Ratio [HR] per 1-SD decrease: 1.21, 95% CI: 1.11-1.30; lowest quartile [Q1] vs. highest quartile [Q4]: HR: 1.49; 95% CI: 1.07-2.06), lower M10 (HR per 1-SD decrease: 2.84, 95% CI: 2.32-3.47; Q1 vs. Q4: HR: 5.13; 95% CI: 3.35-7.86), lower MESOR (HR per 1-SD decrease: 2.96, 95% CI: 2.44-3.61; Q1 vs. Q4: HR: 5.14; 95% CI: 3.27-8.10), lower amplitude (HR per 1-SD decrease: 2.86, 95% CI: 2.31-3.55; Q1 vs. Q4: HR: 4.76; 95% CI: 3.14-7.21), lower IS (HR per 1-SD decrease: 1.18, 95% CI: 1.05-1.34; Q1 vs. Q4: HR: 1.44; 95% CI: 1.02-2.03), and higher IV (HR per 1-SD increase: 1.17, 95% CI: 1.04-1.30; Q4 vs. Q1: HR: 1.64; 95% CI: 1.16-2.34). However, there was no significant association between the L5 (HR per 1-SD increase: 0.98, 95% CI: 0.84-1.14) and risk of PD. Conclusion(s): Reduced rest-activity rhythmicity may be a risk factor for PD. The mechanisms underlying the association of RAR measures and risk of PD are to be determined. Acknowledgements: National Institutes of Health (RF1AG059867, RF1AG064312, and R03AG067985), BrightFocus Foundation (A2020886S).

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11. **Clinical progression of Parkinson's disease in the early 21st century: Insights from AMP-PD dataset.**

Authors: Lewis, M. M.;Cheng, X. V.;Du, G.;Zhang, L.;Li, C.;De Jesus, S.;Tabbal, S. D.;Mailman, R.;Li, R. and Huang, X.

Publication Date: 2024

Journal: medRxiv (pagination), pp. Date of Publication: 30 Jan 2024

Abstract: Background: Parkinson's disease (PD) therapeutic strategies have evolved since the introduction of levodopa in the 1960s, but there is limited data on their impact on disease progression markers. Objective(s): Delineate the current landscape of PD progression at tertiary subspecialty care and research centers. Method(s): Using Accelerating Medicine Partnership-PD (AMP-PD) data harmonized from seven biomarker discovery studies (2010-2020), we extracted: overall [Schwab and England (S&E), PD Questionnaire (PDQ-39)]; motor [Movement Disorders Society Unified PD Rating Scale (MDS-UPDRS)-II and -III and Hoehn & Yahr (HY)]; and non-motor [MDS-UPDRS-I, University of Pennsylvania Smell Identification Test (UPSIT), Montreal Cognitive Assessment (MoCA), and Epworth Sleepiness Scale (ESS)] scores. Age at diagnosis was set as 0 years, and data were tracked for 15 subsequent years. Result(s): Subjects' (3,001 PD cases: 2,838 white, 1,843 males) mean age at diagnosis was 60.2+/-10.3 years and disease duration was 9.9+/-6.0 years at the baseline evaluation. Participants largely reported independence (S&E, 5y: 86.6+/-12.3; 10y: 78.9+/-19.3; 15y: 78.5+/-17.0) and good quality of life (PDQ-39, 5y: 15.5+/-12.3; 10y: 22.1+/-15.8; 15y: 24.3+/-14.4). Motor scores displayed a linear progression, whereas non-motor scores plateaued ~10-15 years. Younger onset age correlated with slower overall (S&E), motor (MDS-UPDRS-III), and non-motor (UPSIT/MoCA) progression, and females had better overall motor (MDS-UPDRS-II-III) and non-motor (UPSIT) scores than males. Conclusion(s): Twenty-first century PD patients remain largely independent in the first decade of disease. Female and young age of diagnosis were associated with better clinical outcomes. There are data gaps for non-whites and metrics that gauge non-motor progression for >10 years after diagnosis.

12. **Systemic inflammation and risk of Parkinson's disease: A prospective cohort study and genetic analysis.**

Authors: Li, Chunyu;Ke, Bin;Chen, Jianhai;Xiao, Yi;Wang, Shichan;Jiang, Rirui;Zheng, Xiaoting;Lin, Junyu;Huang, Jingxuan and Shang, Huifang

Publication Date: 2024

Journal: Brain, Behavior, & Immunity 117, pp. 447-455

Abstract: BACKGROUND: Multiple evidence has suggested the complex interplay between Parkinson's disease (PD) and systemic inflammation marked by C-reactive protein (CRP) and interleukin 6 (IL-6). Nevertheless, the findings across studies have shown inconsistency, and the direction of the effect remains controversial. Here, we aimed to explore the link between CRP and IL-6 and the risk of PD. METHODS: Based on data from the UK Biobank, we investigated the association between baseline CRP and IL-6 and the risk of incident PD with Cox proportional hazards regression analysis. We further performed extensive genetic analyses including genetic correlation, polygenic risk score (PRS), and pleiotropic enrichment based on summary statistics from previous genome-wide association studies. RESULTS: A higher level of CRP at baseline was associated with a lower risk of PD (HR = 0.85, 95 % CI: 0.79-0.90, P = 4.23E-07). The results remained consistent in the subgroup analyses stratified by sex, age and body mass index. From the genetic perspective, a significant negative genetic correlation was identified between CRP and PD risk (correlation: -0.14, P = 6.31E-05). Higher PRS of CRP was associated with a lower risk of PD (P = 0.015, beta = -0.04, SE = 0.017). Moreover, we observed significant pleiotropic enrichment for PD conditional on CRP, and identified 13 risk loci for PD, some of which are implicated in immune functionality and have been linked to PD, including CTSB, HNF4A, PPM1G, ACMSD, and NCOR1. In contrast, no significant association was identified between IL-6 and PD. CONCLUSIONS: Systemic inflammation at baseline measured by CRP level is associated with decreased future risk of PD. These discoveries contribute to a deeper comprehension of the role of inflammation in the risk of PD, and hold implications for the design of therapeutic interventions in clinical trials.

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13. **Comparison of Prognosis and Cognitive Function of Holistic Neurological Disease: Tochigi Neurological Disease Cohort Study.**

Authors: Matsuzono, Kosuke;Mashiko, Takafumi;Koide, Reiji;Yoshizumi, Hiroaki and Fujimoto, Shigeru

Publication Date: 2024

Journal: Journal of Alzheimer's Disease 98(1), pp. 275-285

Abstract: Background: While many studies focus on the prognosis of individual neurological diseases, very few comprehensively compare and analyze real-world data of these diseases. Objective: To address this gap in knowledge, in this study, we comprehensively analyzed the real-life data of patients with neurological diseases. Methods: We prospectively enrolled patients with neurological diseases at three hospitals from December 1, 2016 to September 30, 2020. Neurological diseases were classified into nine groups: Dementia, Cerebrovascular disease, Parkinson's and related, Functional, Spinocerebellar degeneration, Neuroimmune, Epilepsy, Muscle dystrophy disease, and Hypertension. Patients were followed up for three years, and their prognosis and evaluation of their cognitive function served as the endpoint. Results: A total of 426 patients were finally enrolled. Both mortality and cognitive function differed among the neurological disease categories. After 3 years, mortality was highest in the Dementia (25.5%), Parkinson's and related (21.6%), and Spinocerebellar degeneration (35.3%) groups while the cognitive function of patients in these three groups was significantly lowest. Conclusions: When the neurological diseases were holistically observed, both mortality and cognitive function of the Dementia, Parkinson's and related, and Spinocerebellar degeneration groups were significantly worse than the remaining diseases.

14. **High-frequency rTMS over bilateral primary motor cortex improves freezing of gait and emotion regulation in patients with Parkinson's disease: a randomized controlled trial.**

Authors: Song, Wenjing;Zhang, Zixuan;Lv, Bingchen;Li, Jinyu;Chen, Hao;Zhang, Shenyang;Zu, Jie;Dong, Liguo;Xu, Chuanying;Zhou, Manli;Zhang, Tao;Xu, Ran;Zhu, Jienan;Shen, Tong;Zhou, Su;Cui, Chenchen;Huang, Shuming;Wang, Xi;Nie, Yujing;Aftab, Kainat, et al

Publication Date: 2024

Journal: Frontiers in Aging Neuroscience 16, pp. 1354455

Abstract: Background: Freezing of gait (FOG) is a common and disabling phenomenon in patients with Parkinson's disease (PD), but effective treatment approach remains inconclusive. Dysfunctional emotional factors play a key role in FOG. Since primary motor cortex (M1) connects with prefrontal areas via the frontal longitudinal system, where are responsible for emotional regulation, we hypothesized M1 may be a potential neuromodulation target for FOG therapy. The purpose of this study is to explore whether high-frequency rTMS over bilateral M1 could relieve FOG and emotional dysregulation in patients with PD. Methods: This study is a single-center, randomized double-blind clinical trial. Forty-eight patients with PD and FOG from the Affiliated Hospital of Xuzhou Medical University were randomly assigned to receive 10 sessions of either active (N = 24) or sham (N = 24) 10 Hz rTMS over the bilateral M1. Patients were evaluated at baseline (T0), after the last session of treatment (T1) and 30 days after the last session (T2). The primary outcomes were Freezing of Gait Questionnaire (FOGQ) scores, with Timed Up and Go Test (TUG) time, Standing-Start 180degree Turn (SS-180) time, SS-180 steps, United Parkinson Disease Rating Scales (UPDRS) III, Hamilton Depression scale (HAMD)-24 and Hamilton Anxiety scale (HAMA)-14 as secondary outcomes. Results: Two patients in each group dropped out at T2 and no serious adverse events were reported by any subject. Two-way repeated ANOVAs revealed significant group x time interactions in FOGQ, TUG, SS-180 turn time, SS-180 turning steps, UPDRS III, HAMD-24 and HAMA-14. Post-hoc analyses showed that compared to T0, the active group exhibited remarkable improvements in FOGQ, TUG, SS-180 turn time, SS-180 turning steps, UPDRS III, HAMD-24 and HAMA-14 at T1 and T2. No significant improvement was found in the sham group. The Spearman correlation analysis revealed a significantly positive association between the changes in HAMD-24 and HAMA-14 scores and FOGQ scores at T1. Conclusion: High-frequency rTMS over bilateral M1 can improve FOG and reduce depression and anxiety in patients with PD.

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15. **Impulse Control Disorders in Parkinson's Disease and Atypical Parkinsonian Syndromes-Is There a Difference?.**

Authors: Tos, Mateusz;Grazynska, Anna;Antoniuk, Sofija and Siuda, Joanna

Publication Date: Feb 16 ,2024

Journal: Brain Sciences 14(2)

Abstract: BACKGROUND AND OBJECTIVES: Impulse control disorders (ICDs) are characterized by potentially harmful actions resulting from disturbances in the self-control of emotions and behavior. ICDs include disorders such as gambling, hypersexuality, binge eating, and compulsive buying. ICDs are known non-motor symptoms in Parkinson's disease (PD) and are associated primarily with the use of dopaminergic treatment (DRT) and especially dopamine agonists (DA). However, in atypical parkinsonism (APS), such as progressive supranuclear palsy (PSP) or multiple system atrophy (MSA), there are only single case reports of ICDs without attempts to determine the risk factors for their occurrence. Moreover, numerous reports in the literature indicate increased impulsivity in PSP. Our study aimed to determine the frequency of individual ICDs in APS compared to PD and identify potential factors for developing ICDs in APS. MATERIALS AND METHODS: Our prospective study included 185 patients with PD and 35 with APS (27 patients with PSP and 9 with MSA) hospitalized between 2020 and 2023 at the Neurological Department of University Central Hospital in Katowice.

Each patient was examined using the Questionnaire for Impulsive-Compulsive Disorders in Parkinson's Disease (QUIP) to assess ICDs. Additionally, other scales were used to assess the advancement of the disease, the severity of depression, and cognitive impairment. Information on age, gender, age of onset, disease duration, and treatment used were collected from medical records and patient interviews. RESULTS: ICDs were detected in 23.39% of patients with PD (including binge eating in 11.54%, compulsive buying in 10.44%, hypersexuality in 8.79%, and pathological gambling in 4.40%), in one patient with MSA (hypersexuality and pathological gambling), and in 18.52% of patients with PSP (binge eating in 3.70%, compulsive buying in 7.41%, and hypersexuality in 11.11%). We found no differences in the frequency of ICDs between individual diseases (p = 0.4696). We confirmed that the use of higher doses of DA and L-dopa in patients with PD, as well as a longer disease duration and the presence of motor complications, were associated with a higher incidence of ICDs. However, we did not find any treatment effect on the incidence of ICDs in APS. CONCLUSIONS: ICDs are common and occur with a similar frequency in PD and APS. Well-described risk factors for ICDs in PD, such as the use of DRT or longer disease duration, are not fully reflected in the risk factors for ICDs in APS. This applies especially to PSP, which, unlike PD and MSA, is a tauopathy in which, in addition to the use of DRT, other mechanisms related to the disease, such as disorders in neuronal loops and neurotransmitter deficits, may influence the development of ICDs. Further prospective multicenter studies recruiting larger groups of patients are needed to fully determine the risk factors and mechanisms of ICD development in APS.

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16. **Deep learning predicts prevalent and incident Parkinson's disease from UK Biobank fundus imaging.**

Authors: Tran, Charlie;Shen, Kai;Liu, Kang;Ashok, Akshay;Ramirez-Zamora, Adolfo;Chen, Jinghua;Li, Yulin and Fang, Ruogu

Publication Date: 02 13 ,2024

Journal: Scientific Reports 14(1), pp. 3637

Abstract: Parkinson's disease is the world's fastest-growing neurological disorder. Research to elucidate the mechanisms of Parkinson's disease and automate diagnostics would greatly improve the treatment of patients with Parkinson's disease. Current diagnostic methods are expensive and have limited availability. Considering the insidious and preclinical onset and progression of the disease, a desirable screening should be diagnostically accurate even before the onset of symptoms to allow medical interventions. We highlight retinal fundus imaging, often termed a window to the brain, as a diagnostic screening modality for Parkinson's disease. We conducted a systematic evaluation of conventional machine learning and deep learning techniques to classify Parkinson's disease from UK Biobank fundus imaging. Our results suggest Parkinson's disease individuals can be differentiated from age and gender-matched healthy subjects with 68% accuracy. This accuracy is maintained when predicting either prevalent or incident Parkinson's disease. Explainability and trustworthiness are enhanced by visual attribution maps of localized biomarkers and quantified metrics of model robustness to data perturbations. Copyright © 2024. The Author(s).

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17. **Hypotensive episodes at 24-h Ambulatory Blood Pressure Monitoring predict adverse outcomes in Parkinson's Disease.**

Authors: Vallelonga, Fabrizio;Valente, Matteo;Tangari, Marta Maria;Covolo, Anna;Milazzo, Valeria;Di Stefano, Cristina;Sobrero, Gabriele;Giudici, Marta;Milan, Alberto;Veglio, Franco;Lopiano, Leonardo;Maule, Simona and Romagnolo, Alberto

Publication Date: 2024

Journal: Research Square

Abstract: Purpose: Neurogenic orthostatic hypotension (nOH) is a frequent non-motor feature of

Parkinson's disease (PD), associated with adverse outcomes. Recently, 24-hour ambulatory BP monitoring (ABPM) has been shown to diagnose nOH with good accuracy (in the presence of at least 2 episodes of systolic BP drop >= 15 mmHg compared to the average 24-h). This study aims at evaluating the prognostic role of ABPM-hypotensive episodes in predicting PD disability milestones and mortality and comparing it to well-defined prognostic role of nOH. Methods: PD patients who underwent ABPM from January 2012 to December 2014 were retrospectively enrolled and assessed for the development of falls, fractures, dementia, bed/wheelchair confinement, hospitalization, mortality, during an up-to-10-year follow-up. Results: Ninety-nine patients (male 74%; age: 64.0 +/- 10.1 years; PD duration: 6.4 +/- 4.0 years) were enrolled. At baseline, 38.4% of patients had ABPM-hypotensive episodes and 46.5% had bedside nOH.At Kaplan-Meier analysis patients with ABPM-hypotensive episodes had an earlier onset of falls (p = 0.001), fractures (p = 0.004), hospitalizations (p = 0.009), bed/wheelchair confinement (p = 0.032), dementia (p = 0.001), and showed a shorter survival (8.0vs9.5 years; p = 0.009). At Cox regression analysis (adjusted for age, disease duration, Charlson Comorbidity Index, and H&Y stage at baseline) a significant association was confirmed between ABPM-hypotensive episodes and falls (OR:3.626; p = 0.001), hospitalizations (OR:2.016; p = 0.038), and dementia (OR:2.926; p = 0.008), while bedside nOH was only associated with falls (OR 2.022; p = 0.039) and dementia (OR:1.908; p = 0.048). Conclusion: The presence of at least two ABPM-hypotensive episodes independently predicted the development of falls, dementia, and hospitalization, showing a stronger prognostic value than the simple bedside assessment.

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18. **Impaired 24-h activity patterns are associated with an increased risk of Alzheimer's disease, Parkinson's disease, and cognitive decline.**

Authors: Winer, Joseph R.;Lok, Renske;Weed, Lara;He, Zihuai;Poston, Kathleen L.;Mormino, Elizabeth C. and Zeitzer, Jamie M.

Publication Date: Feb 14 ,2024

Journal: Alzheimer's Research & Therapy 16(1), pp. 35

Abstract: BACKGROUND: Sleep-wake regulating circuits are affected during prodromal stages in the pathological progression of both Alzheimer's disease (AD) and Parkinson's disease (PD), and this disturbance can be measured passively using wearable devices. Our objective was to determine whether accelerometer-based measures of 24-h activity are associated with subsequent development of AD, PD, and cognitive decline. METHODS: This study obtained UK Biobank data from 82,829 individuals with wrist-worn accelerometer data aged 40 to 79 years with a mean (+/- SD) follow-up of 6.8 (+/- 0.9) years. Outcomes were accelerometer-derived measures of 24-h activity (derived by cosinor, nonparametric, and functional principal component methods), incident AD and PD diagnosis (obtained through hospitalization or primary care records), and prospective longitudinal cognitive testing. RESULTS: One hundred eighty-seven individuals progressed to AD and 265 to PD. Interdaily stability (a measure of regularity, hazard ratio [HR] per SD increase 1.25, 95% confidence interval [CI] 1.05-1.48), diurnal amplitude (HR 0.79, CI 0.65-0.96), mesor (mean activity; HR 0.77, CI 0.59-0.998), and activity during most active 10 h (HR 0.75, CI 0.61-0.94), were associated with risk of AD. Diurnal amplitude (HR 0.28, CI 0.23-0.34), mesor (HR 0.13, CI 0.10-0.16), activity during least active 5 h (HR 0.24, CI 0.08-0.69), and activity during most active 10 h (HR 0.20, CI 0.16-0.25) were associated with risk of PD. Several measures were additionally predictive of longitudinal cognitive test performance. CONCLUSIONS: In this community-based longitudinal study, accelerometer-derived metrics were associated with elevated risk of AD, PD, and accelerated cognitive decline. These findings suggest 24-h rhythm integrity, as measured by affordable, non-invasive wearable devices, may serve as a scalable early marker of neurodegenerative disease.

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19. **The simultaneous presence of demoralization, apathy, and depression has a detrimental impact on both cognitive function and motor symptoms in Parkinson's disease patients.**

Authors: Zhu, Xiaobo;Gan, Jing;Wu, Na;Zhang, Yu and Liu, Zhenguo

Publication Date: 2024

Journal: Frontiers in Psychiatry Frontiers Research Foundation 15, pp. 1345280

Abstract: Objective: Parkinson's disease (PD) is marked not only by motor symptoms but also by neuropsychiatric manifestations, including demoralization, apathy, and depression. Understanding the clinical distribution and characteristics of these co-occurring symptoms is crucial for improving quality of life of PD patients. Methods: This study enrolled 195 Chinese PD patients from Xinhua Hospital affiliated to Shanghai Jiao Tong University School of Medicine. The study involved analyzing the clinical characteristics related to the simultaneous presence of demoralization, apathy, and depression in PD patients. Linear regression was employed to elucidate the linear trend between the quantity of negative neuropsychiatric symptoms and cognitive function, as well as motor symptoms and motor complications. SPSS mediation models were utilized to investigate whether the severity of cognitive function mediated the connection between multiple negative neuropsychiatric symptoms and motor symptoms. Results: Among PD patients, a notable 57.5% experience the presence of multiple concurrent negative neuropsychiatric symptoms. Our investigation unveiled a correlation where patients with more negative neuropsychiatric symptoms displayed heightened cognitive impairment (P=0.048) and more severe motor symptoms (P=0.024), following a linear trend with increasing symptom numbers. Additionally, cognitive impairment played a partial mediating role in the impact of multiple negative neuropsychiatric symptoms on motor symptoms (beta=0.747; 95% bootstrap confidence interval: 0.195 to 1.532). Conclusions: The co-occurrence of these negative neuropsychiatric symptoms has the potential to worsen cognitive function and motor symptoms in PD patients. Moreover, cognitive impairment was identified as playing a partial mediating role in the relationship between multiple negative neuropsychiatric symptoms and motor symptoms.

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20. **Utilizing the Nursing Professional Development Model to create and sustain nursing education aimed at improving the care of patients with Parkinson's Disease in the hospital.**

Authors: Bobek, Mary;Pascarelli, Pamela;Cocoziello, Lisa and Azmi, Hooman

Publication Date: 2023

Journal: Frontiers in Medicine 10, pp. 1275970

Abstract: The Nurse Professional Development Model (NPD) has been utilized to improve quality of care for several conditions. Patients with Parkinson's Disease (PD) are susceptible to higher risks while in the hospital. Educational efforts for this patient population are challenged by the small, disbursed number of patients as well as increased turn-over and reliance on temporary nursing staff. To properly care for this patient group, any education has to be hospital wide and ongoing for maintenance of competency. We have used the NPD Model to initiate education for new incoming nurses as well as for continued education for a program that requires hospital-wide reach. Our utilization of the NPD Model for this high risk, low volume patient population has helped us improve the safety of this patient population in the hospital. With this manuscript we detail the need and the educational platform with the hope of it serving as a reference for other institutions facing similar challenges.

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21. **Fish oil supplementation, physical activity and risk of incident Parkinson's disease: results of longitudinal analysis from the UK Biobank.**

Authors: Lin, Fabin;Shi, Yisen;Zheng, Jiayi;Li, Yueping;Chen, Xuanjie;Zou, Xinyang;Hong, Yi;Chen, Ke;Zeng, Yuqi;Ye, Qinyong;Chen, Xiaochun;Chen, Xinyan;Wang, Yingqing and Cai, Guoen

Publication Date: 2023

Journal: Frontiers in Aging Neuroscience 15, pp. 1304629

Abstract: Objective: Evidence on the individual and combined relationship of physical activity (PA) and fish oil supplement use on the incidence of Parkinson's disease (PD) risk remains lacking. Materials and methods: This UK population-based prospective cohort study, involving 385,275 UK Biobank participants, collected PA and fish oil supplement data via touchscreen questionnaires. Using Cox proportional hazards models and restricted cubic splines to examined the associations between use of fish oil supplements, PA and PD risk. Results: During a median 12.52-year follow-up, 2,131 participants incident PD. Analysis showed that fish oil supplement users had a lower PD risk [hazard ratio (HR), 0.89; 95% confidence interval (CI), 0.82-0.98]. The adjusted HRs for the PD incidence were 0.96 (95% CI, 0.95-0.98) for total PA; 0.93 (95% CI, 0.90-0.96) for moderate PA; 0.95 (95% CI, 0.91-0.99) for vigorous PA and 0.93 (95% CI, 0.89-0.98) for walking activity. Significant interactions were found between fish oil supplement use and total PA (P for interaction = 0.011), moderate PA (P for interaction = 0.015), and walking activity (P for interaction = 0.029) in relation to PD incidence. Conclusion: Both fish oil supplement use and PA were associated with a reduced risk of PD, and the effect of PA in reducing the risk of PD was more pronounced when fish oil supplement was used.

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22. **Standardizing default electronic health record tools to improve safety for hospitalized patients with Parkinson's disease.**

Authors: Wu, Allan D.;Walter, Benjamin L.;Brooks, Anne;Buetow, Emily;Amodeo, Katherine;Richard, Irene;Mundth, Kelly and Azmi, Hooman

Publication Date: 2023

Journal: Frontiers in Aging Neuroscience 15, pp. 1278322

Abstract: Electronic Health Record (EHR) systems are often configured to address challenges and improve patient safety for persons with Parkinson's disease (PWP). For example, EHR systems can help identify Parkinson's disease (PD) patients across the hospital by flagging a patient's diagnosis in their chart, preventing errors in medication and dosing through the use of clinical decision support, and supplementing staff education through care plans that provide step-by-step road maps for disease-based care of a specific patient population. However, most EHR-based solutions are locally developed and, thus, difficult to scale widely or apply uniformly across hospital systems. In 2020, the Parkinson's Foundation, a national and international leader in PD research, education, and advocacy, and Epic, a leading EHR vendor with more than 35% market share in the United States, launched a partnership to reduce risks to hospitalized PWP using standardized EHR-based solutions. This article discusses that project which included leadership from physician informaticists, movement disorders specialists, hospital quality officers, the Parkinson's Foundation and members of the Parkinson's community. We describe the best practice solutions developed through this project. We highlight those that are currently available as standard defaults or options within the Epic EHR, discuss the successes and limitations of these solutions, and consider opportunities for scalability in environments beyond a single EHR vendor. The Parkinson's Foundation and Epic launched a partnership to develop best practice solutions in the Epic EHR system to improve safety for PWP in the hospital. The goal of the partnership was to create the EHR tools that will have the greatest impact on outcomes for hospitalized PWP.

Sources Used:

The following databases are used in the creation of this bulletin: EMBASE and Medline.