

# **The indirect impact of COVID-19 on major clinical outcomes of people with Parkinson's disease or parkinsonism: a cohort study**

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**Background:** The indirect impact of the COVID-19 epidemic on Major Clinical Outcomes (MCO) of people with Parkinson's disease (PD) or other parkinsonism is unknown.

**Objectives:** The study aimed to (1) describe changes in Health Care Services (HCS) during the first epidemic wave in people with PD or parkinsonism; (2) compare the occurrence of hospitalization for any PD-related MCO in 2020 with 2019; (3) investigate the factors, including changes in HCS, associated with MCO and death.

**Methods:** All HCS of the province of Bologna and MCO were assessed through a record linkage study (ParkLink Bologna). The same analyses were performed in a cohort of controls matched for age, sex, district of residence, and comorbidities (ratio 1:10).

**Results:** A cohort of subjects with PD (759) or parkinsonism (192) was included together with a cohort of controls (9,226). All indicators of HCS dropped at least below 50% during the lockdown period in all cohorts, mostly impacting physiotherapy in people with PD (−93%, 95% CI 88–96%). Compared to 2019, a three-fold risk of major injuries (RR 3.0, 95% CI 1.5–6.2) and infections (RR 3.3, 95% CI 1.5–7.2), excluding COVID-19, was observed in people with PD in 2020. Furthermore, in people with PD decreased physiotherapy was associated with the occurrence of at least one MCO (OR 3.3, 95% CI 1.1–9.8) and the experience of at least one MCO was the strongest risk factor for death (OR 30.4, 95% CI 11.1–83.4).

**Conclusions:** During the first COVID-19 epidemic wave, HCS were drastically reduced in a province of northern Italy, regardless of the disease condition. However, compared to 2019, in 2020, only people with PD had a higher risk of MCO, which were associated with higher mortality. Strategies to maintain physical activity in people with PD should be implemented in possible future health emergencies.