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Do sudden air pressure changes impact hospital admissions for cardiovascular diseases in Prague?

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Sudden weather changes have long been supposed to be associated with negative impacts on human health. Previous analyses reported that cardiovascular diseases (CVD), which are the leading cause of morbidity and mortality in developed countries, are most closely related to weather conditions. Better understanding of their relationships with weather changes may enhance our understanding of physiological mechanisms and enable implementation of results in biometeorological forecasting. We use a database of daily hospital admissions for CVD in the city of Prague (population of 1.2 million) over a 16-year period, 1994-2009, and compare it with events of large atmospheric pressure changes on a 6-hour scale. Winter and summer seasons and positive and negative pressure changes are analyzed separately.

We find that sudden pressure decreases in winter are associated with significant increases in the number of hospital admissions. The excess morbidity associated with sudden pressure drops in winter is significant at p=0.05 not only in the population as a whole but also in the elderly (65+ yrs) and males. On the day after the pressure drops, there is a significant excess CVD mortality, too. Analysis of basic meteorological variables suggests that sudden pressure drops in winter are characterized by unstable weather conditions, rapidly moving low pressure systems (with centres over Northern Europe) with inflow of relatively warm and moist air masses from the Atlantic Ocean. Several of the largest pressure decreases were associated with infamous winter storms which caused major damages in Western and Central Europe due to high winds and flooding.

No significant increases in morbidity are observed for pressure drops in summer, nor pressure increases in any season. Analysis of links between passages of strong atmospheric fronts and hospital admissions shows that the links are much weaker if weather changes are characterized by frontal passages.