



## **Effects of sudden air pressure changes on 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. However, relatively few studies attempted to quantify these relationships. In this study, we use large 6-hour changes of atmospheric sea level pressure as proxy for sudden weather changes, and evaluate their association with hospital admissions for cardiovascular diseases. Winter and summer seasons and positive and negative pressure changes are analyzed separately, using data for the city of Prague (population of 1.2 million) over 16-year period (1994-2009). We find that sudden pressure drops in winter are associated with significant increases in the number of hospital admissions. Increases in morbidity are not observed for pressure drops in summer, nor pressure increases in any season. Analysis of synoptic weather maps shows that the large pressure drops in winter are associated with strong zonal (westerly) flow and rapidly moving low pressure systems with centres over Northern Europe and atmospheric fronts affecting the area of Western and Central Europe. Several of the largest pressure decreases were associated with infamous winter storms (such as Lothar on December 25, 1999 and Kyrill on January 18, 2007). 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. Since climate models project strengthening of the zonal circulation in winter and increased frequency of winter storms, the negative effects of such weather phenomena and their possible changes in a warmer climate of the 21st century need to be better understood, particularly as their importance in inducing excess morbidity and mortality in winter may increase compared to cold spells.