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Health-relevant influences of air constituents and meteorological conditions

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The aim of this project is to investigate the influence of health-relevant air-hygienic and climatological parameters on emergency room visits at the University Hospital of Augsburg. This is achieved by quantifying the effects of increased exposure to air substances and weather extremes.

The emergency admission data from 2017 and 2018 are available as medical data basis. Among the air constituents, ozone, nitrogen dioxide and particulate matter values are used, measured by several stations in Augsburg. The meteorological database contains the daily mean and daily maximum values of several parameters such as air temperature, humidity, and wind. In addition, a catalog of different weather conditions was created. For this purpose, five Principal Component Analyzes were performed, one for each season and one for the entire year.

The medical data set was broken down according to the seasons and days with specific meteorological conditions (e. g. heat days) or days that exceeded the WHO recommendations for air pollutants. These sub-divisions were undertaken in order to identify differences of the number of admissions under the occurrence of extreme days. To account for the possible delay between exposure and emergency cases, a lead time of up to seven days was included.

The results so far show that in almost all subgroups of the ICD-10 classification there are highly significant correlations between the weather and air conditions and the number of emergency admissions. These occur almost exclusively on meteorological extreme days or when the WHO air pollution guideline values are exceeded. The strength of the correlations between the individual diagnoses and subgroups differs significantly. The proportion of age, gender and place of residence-specific differences can be classified as low. However, there are individual diseases in almost every main group that are showing very clear differences, sometimes even opposite correlations, between men and women or urban and suburban residents.

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