

12.D. Oral session: Urban Health Impacts

Forecasting emergency admissions in the city of Milan to predict overflow: a 2-day warning system

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Background:

The emergency department (ED) is one of the most critical area in any hospitals. In Italy, the mean waiting time is increasing causing potentially ED overflow and a detrimental effect on quality of care.

Methods:

We collected total daily ED visits between 2014 and 2019 in the five major hospitals of Milan. To predict daily volumes, we used a regression model with ARIMA errors. Predictors included were weekly and yearly periodicity, meteorological and environmental variables, information on influenza epidemics and festivities. Parameters have been calibrated on training datasets (2014-2018) and successively validated on 2019, accuracy of prediction have been evaluated with the Mean Absolute Percentage Error (MAPE). Finally, we evaluated the impact of the COVID-19 outbreak calculating

the proportion of ED accesses by triage levels, before and after the outbreak.

Results:

Between 2014 and 2019 there have been 2 million of ED visits in the hospitals of Milan. We found different patterns of ED visits across age and days: children (0-14 years) tended to visit ED more likely on weekends while adults and senior people on Mondays. Results confirmed the role of meteorological and environmental variables, and the presence of yearly and weekly pattern. We found high correlation between observed and predicted value with a MAPE globally smaller than 8.1%. During the COVID-19 outbreak, the number of white triage ED accesses was reduced up to 71%.

Conclusions:

Results permitted to develop a 2-day ED warning system combining forecast data provided by ARPA Lombardia. This is crucial in a system where inappropriate emergency admissions are still high where the analysis conducted during the COVID-19 pandemic period suggested a dramatic reduction in the number of daily ED access of lower triages.

Key messages:

- The ability to forecast future demands would be a valuable support in a system of limited resources, which must therefore be used in the best way.
- Environmental and meteorological variable have a moderate effect on emergency admissions.