

15 SUMMARY

Aim

The aim of this study was a multivariate analysis of the clinical functioning of the Radiology Department for the purposes of the Hospital Emergency Department, and thus the development of a model to estimate the number of patients referred for imaging examinations depending on various factors.

Material and method

89,652 imaging examinations were analyzed, including 58,355 X-rays and 31297 CTs performed by means of the Discovery 656XR (GE) X-ray machine and the 64-row Discovery 750 HD (GE) CT scanner. Retrospective data on the weather in Rzeszów was obtained from the freemeteo.pl website. The collected numerical material was analyzed using selected methods of descriptive statistics and verification of statistical hypotheses. The analysis was performed with the use of the Statistica 13.3 package.

The analysis took into account the variability of the number of examinations in individual years and the variability of the share of X-ray and CT examinations. The dependence of the daily number of tests on: month, season, time of day, type of days (holidays - normal), moon phase, wind direction and speed, concentration of dust suspended in the air, average air temperature during the day and night, atmospheric pressure and amount of precipitation was calculated.

Results

1. In the analyzed period (2017-2019), 65.1% of examinations were X-rays and 34.9% CTs. There was an increase in the number of tests in the analyzed period by 14%, with particular regard to X-ray examinations (increase by 20%). The number of CT examinations remained relatively constant (an increase of only 3%).

2. In the analyzed period (2017-2019), it was found that X-ray and CT examinations in total - 44.3% revealed no changes, 40.1% were non-traumatic, and 15.6% were traumatic. Similarly, for X-ray examinations the respective percentages were 52.4%, 30.0% and 17.6%, and for CT examinations 36.2%, 50.3% and 13.5%.

3. The daily number of X-ray and CT examinations fluctuated in individual months of the year.

- in the case of X-ray examinations - the fewest examinations were performed in the periods January - February and September - December, while most of them in July and August; the differences were statistically significant.

- in the case of CT examinations - the least examinations were performed in January, February, September, November and December, and the most in May, June and July; statistically significant differences.

4. The daily number of X-ray and CT examinations fluctuated depending on the season.

- both in the case of X-ray and CT examinations statistically significantly lower number was performed in autumn and winter than in spring and summer.

5. The daily number of X-ray and CT examinations fluctuated depending on the day of the week.

- the least X-ray examinations were performed on Sundays and most on Mondays, Tuesdays, Wednesdays and Thursdays; differences were statistically significant.

- the least CT examinations were performed on Saturdays and Sundays, and most on Mondays and Wednesdays; differences were statistically significant.

6. The daily number of X-ray and CT examinations fluctuated depending on the time of day.

- the least X-ray examinations were performed at night and most in the afternoon and evening hours; differences were statistically significant.

- the least CT examinations were performed at night and most in the afternoon; differences were statistically significant.

7. The daily number of X-ray and CT examinations fluctuated depending on the type of day (public holidays - other days) - statistically significantly fewer X-ray and CT examinations were performed on holidays than on other days.

8. The phases of the moon did not affect the daily number of X-ray and CT examinations.

9. The wind direction affected the daily number of X-ray examinations and not the number of CT examinations.

- Statistically significantly lower daily number of X-ray examinations (in total) occurred on days when the wind was blowing from the west, north, south-east or north-east direction than from other directions.

10. The daily number of X-ray and CT examinations fluctuated depending on the wind speed

- statistically significantly fewer X-ray and CT tests were performed at wind speeds above 15 km / h than below this value.

11. The concentration of airborne dust did not affect the daily number of X-ray and CT examinations.

12. The daily number of X-ray and CT examinations fluctuated depending on the air temperature during the day.

- the number of X-ray examinations was statistically significantly lower in the case of temperature below 0°C and above 30°C. In the rest of the range, this number increased.

- the number of CT examinations was statistically significantly lower for temperatures up to 15°C. An upward trend in the number of tests was found for higher temperatures.

13. The daily number of X-ray and CT examinations fluctuated depending on the air temperature at night

- statistically significantly fewer X-ray and CT examinations during the day were performed at an average night temperature of up to +5°C. An upward trend in the number of tests was found for higher temperatures.

14. The daily number of X-ray and CT examinations did not depend on the atmospheric pressure.

15. The daily number of examinations fluctuated depending on the occurrence of rainfall only for X-ray examinations

- the daily number of X-ray examinations was statistically significantly higher on days without rainfall.

- the daily number of CT examinations did not depend on the occurrence of precipitation.

Conclusions

In the case of the Department of Radiology under analysis, a model was established, on the basis of which the daily number of patients can be predicted depending on selected external factors. Taking this into account, it is advisable that individual radiological laboratories carry out appropriate statistical studies, which may allow for the optimization of work organization.