Abstract

Purpose:

The aim of the first part of this work was to evaluate the trend of the number of head CT examinations in patients with minor head injury in emergency service and to find out whether it has objective causes.

The aim of the second part was to assess patients' knowledge regarding the CT examination, its risks, the source of their information and to evaluate the effect of providing information about the CT examination in a printed form.

Method:

In the first part of the work, we extracted data from the radiological module of the hospital information system. We searched for head CT scans in patients with minor head injury and their input characteristics and findings on CT. Further data were obtained from the hospital, the Institute of Health Information and Statistics and the Czech Statistical Office. Trends of regression curves were compared by F-test, correlation of trends was expressed using Spearman's coefficient.

The second part of the work was based on a questionnaire for patients scheduled for CT scan of the body. The questionnaire included demographic data as well as items assessing patients' awareness of the risks of radiation exposure, intravenous contrast media, their sources of information and their fear of the examination. On the second page, Zung's Anxiety Scale was printed. On the third page, patients were presented with information about the examination, including its risks, in a text form. The last page evaluated how awareness of the radiation burden and CT related risks changed, and whether it increased anxiety in patients. The final questions were related to the patient's preferences for communicating the outcome of the examination. From the data we calculated the correlations of individual parameters using Kendall tau-b (τ). We used the $\chi 2$ test for contingency tables and the Mann-Whitney test to compare data between two groups.

Results:

Between 2000 and 2015 there was a more than five-fold increase in the number of selected emergency head CT examinations from 124 to 679 ($p < 0.0001$). GCS increased from 13.2 ± 2.7 to 14.9 ± 0.5 ($p < 0.0001$), the proportion of CT scans fulfilling the NICE 2014 criteria decreased from 72% to 20% ($p < 0.0001$) and the number of potentially significant findings decreased from 28% to 10% ($p = 0.0035$). The proportion of drunk patients significantly increased from 18% to 62% ($p < 0.0001$). The number of hospital beds decreased from 1886 to 1490 (21% reduction, $p < 0.0001$). The number of the assessed emergency head CT examinations showed a negative correlation with the number of hospital beds ($r = -0.88$, $p < 0.0001$), the number of patients with a negative CT finding ($r = -0.74$, $p = 0.0010$) and the number of patients meeting the recommendations of the NICE 2014 criteria ($r = -0.90$, $p < 0.0001$). There was a positive correlation with the number of intensive care beds ($r = 0.94$, $p < 0.0001$), with the total number of CT examinations ($r = 0.98$, $p < 0.0001$), the number of drunk patients ($r = 0.94$, $p < 0.0001$), and with the mean GCS score ($r = 0.92$, $p < 0.0001$). In the questionnaire part, a total of 25 (10%) patients underestimated the risk of radiation exposure, 121 (46%) underestimated the increased risk of secondary tumor development, 110 (42%) underestimated the risk of functional renal impairment. The most common source of information was the referring physician (67% of patients). The vast majority of patients (n = 227, 86%) were not informed that they could maintain fluid intake up to 1 hour before the scheduled examination. Patients reported much greater concern about the outcome of the examination than the CT examination alone or the injection of contrast agent ($p < 0.0001$). Fear of the CT examination was more pronounced in younger patients ($\tau = -0.22$, $p = 0.0003$) and women ($\tau = -0.17$, $p = 0.0009$). After reading the fact sheet, 195 (74%) patients were more worried about the examination ($p < 0.0001$). The average anxiety score rated by Zung's anxiety scale was 34 points (interquartile range, 7 points). Most patients admitted that waiting for the examination result was unpleasant for them.

Conclusions:

In the first part of our work, we showed that a significant increase in the number of emergency head CT examinations cannot be attributed to their actual need by the patient, which should be the main motivation for performing them. We believe that apart from the lack of hospital beds for patient observation, other factors play an important role in requesting this examination including a greater sense of security or protection against possible litigation in the atmosphere of unpredictable court decisions.

In the second part of our work, we showed that more than half of the patients have poor knowledge about the radiation burden and the overall risks associated with CT scan. We have found that providing patients with printed information about CT scan and its risks would improve their knowledge but also increase their fear of the examination. The vast majority of patients did not receive instructions that they could receive fluids prior to examination. Overall, patients are more concerned about the outcome of the examination than its associated risks. Probably that is why waiting for the result is filled with anxiety.

Keywords: *radiation burden, questionnaire, anxiety, computed tomography, CT*