

### E65 A Killer in the Hospital Wards: Murders Committed by the Criminal Administration of Heparin

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**Learning Overview:** The goal of this presentation is to highlight the importance of a multidisciplinary approach in the police investigation of a complex case of murders in a hospital due to criminal heparin administration. Autoptic examination, histopathological, immunohistochemical, and toxicological analysis together with a meticulous analysis of the clinical reports and Postmortem Computed Tomography (PMCT) revealed 12 cases of “natural death” to be murders due to the voluntary administration of heparin.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by showing the great importance of a multidisciplinary investigation in a nearly unique case of multiple murders due to the criminal administration of heparin by a health care worker.

In May 2015, investigations began from a confidential report to the police, related to the suspicious death of two patients admitted to the intensive care unit of a small-town public hospital. Both cases presented with sudden and unexplained hemorrhagic episodes associated with the evidence of very high levels of heparinemia.

Following this report, a police investigation began. At first, police identified ten cases of similar sudden deaths, all occurring between 2014 and 2015. In all of these cases, sudden death followed hemorrhagic events and was associated with a complete alteration of the coagulation parameters. All the hemorrhagic events were not related to pathologies, either of the therapy administered at home or during the hospital stay.

After May 2015, two further deaths occurred. The last, similar to the other deaths, was characterized by hemorrhagic events and very high levels of heparin in the blood immediately after a surgical procedure for femoral fracture and occurred in September 2015. Inspection of the hospital room revealed an empty bottle of heparin in the garbage bin. Then, another case was discovered: a patient who was in the same room as the first patient of the series. He survived but showed an unexplained alteration of coagulation values. Investigations revealed 13 suspicious cases, 12 deaths, and 1 survivor.

In March 2016, a nurse who worked in that hospital was implicated for heparin administration. The forensic investigation began in March 2016, with a team comprised of a forensic medicine expert, a hematologist, and an anesthetist. Autopsies were performed on eight exhumed cadavers; the other six patients had been cremated. Analyses included a total body-computed tomography and toxicological and histological examinations. The latter was performed using traditional staining with trichrome. The samples of major interest were further examined with an immunohistochemistry analysis based on a glycophorin-test, which is recognized as a reliable test to reveal erythrocytes and the precursors in decomposed tissues.

Despite the advanced state of decomposition, autoptic examination confirmed macroscopic findings of hemorrhagic events described in medical records, while immunohistochemical analysis confirmed the presence of blood in the tissues. The forensic analysis of the case was also based on the thorough examination of the clinical reports, in order to assess the coagulation parameters and therapies.

Further investigation regarding all the patients deceased in that unit from 2014 to 2017 pointed to ten other suspected cases; among these, two were strongly suggestive of voluntary heparin administration and, in one case, the death was related to the combination of heparin and insulin administration.

Worldwide, there is only one other known case of multiple murders due to voluntary administration of heparin, which occurred in the Czech Republic with seven deaths, while in this case, forensic analysis performed with the accurate examination of clinical reports, PMCT, autoptic examination, and histopathological and toxicological evaluation helped reveal the violent death of 12 patients and the death threat of another. The nurse is now on trial, charged with first degree murder. The scientific proof will be fundamental in court.

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#### Heparin, Coagulation, Homicide