



Pathology Biology Section – 2007

G88 Probability and Pathological Findings in Suicidal Versus Homicidal Hanging Deaths: A Case Study in Forensic Epidemiology

Michael D. Freeman, PhD, Oregon Health and Science University School of Medicine, 205 Liberty Street, Northeast, Suite B, Salem, OR 97301*

After attending this presentation, attendees will be introduced to the application of weighted probabilities to pertinent pathological or other evidence to forensic decision making in a criminal matter; in the presented case study, the determination in a hanging death of suicide versus homicide.

This presentation will impact the forensic community and/or humanity by demonstrating how probability plays an important yet frequently unrecognized and/or improperly applied role in forensic decision making. This and other concepts of Forensic Epidemiology will be introduced in this presentation, raising awareness for forensic pathologists and others who rely upon population-based data from which to draw conclusions.

Probability is in constant use in forensic settings as a means of weighing the accuracy of specific conclusions, and it is used nearly as often to give weight to conclusions. Opinions that include the terms "risk" or "likelihood," or the expressions "most often" or "would be expected (or not expected)" are all variations of probabilistic assessments. Such opinions imply both an underlying basis in population-based data as well as a methodologically sound synthesis of such data. When probabilistic opinions are proffered in a forensic setting they should be scrutinized carefully for their basis in epidemiologic data, as well as how the data has been interpreted to apply to the case in hand.

A case study is presented in which a 26-year-old Aboriginal man was found hanging from a sheet in a jail cell in Darwin, Australia in February of 1986. The postmortem examination revealed evidence of unilateral neck organ fracture (thyroid cartilage) and was ruled a suicide. The decedent's widow believed that the death was a homicide, and brought forth collateral evidence supporting the charge. An international panel of eight forensic scientists was convened to re-examine the evidence, and it was concluded that there was sufficient evidence to justify a disinterment of the decedent, in part due to the fact that the neck organ injury was thought to be unlikely given the circumstances of the hanging.

In 2004 a civil case was brought against several defendants, including the forensic pathologist who conducted the postmortem examination, charging them with a conspiracy to obscure the murder. One of the theories raised by the defense was that neck organ fractures were common in suicides resembling the circumstances of the death, a probabilistic determination. For this reason, a forensic epidemiologic review of the case was conducted, including a review and analysis of the relevant literature.

A comprehensive review of the published literature on observational studies of hanging deaths in which neck organ injury was the independent variable revealed four validated predictors for the presence of neck organ injury of varying strength (in nine studies describing 1342 cases): Age greater than 30 (strong), duration of suspension (moderate to strong), ligature width of 1-2 cm or less (moderate), and suspension type (weak to moderate support for full versus partial suspension).

Based on the findings in the literature, the features of the this hanging (age 26, brief suspension duration [45 minutes], >4 cm ligature width, partial suspension [feet in contact with the ground]) it was determined that the neck organ injuries observed in the postmortem examination were unlikely to have arisen from the observed circumstances of the hanging. Further, out of 1342 cases in the literature, ~180 were in males <30 years of age, and among these there were only ten cases of neck organ fracture.

Although the ten cases did not describe the presence of the other three risk factors, approximately 75% of suicidal hangings in which ligature width is described involve a narrow (<2 cm) ligature, and 25-50% are complete suspensions. It was reasonable conclude that no more than 10, and likely five or less of all of the hangings described in the literature review could have produced the same type of injuries as those seen in this hanging, given the risk factors present. The prevalence of potentially similar cases in the database ranged from 0-0.7%.

Based on the forensic epidemiologic review, it was opined that 1) contrary to the assertion by the defense, the neck organ injuries observed in the decedent do not commonly occur in similar circumstances, and 2) such injuries are rare in suicidal hangings with the predictive variables present in the subject case, as a reasonable scientific certainty. A Bayesian analysis of the evidence will be presented.

Hanging, Probability, Homicide