



A139 Evaluating the Application of Multiple Postmortem Interval (PMI) Estimation Methods in Louisiana

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Learning Overview: After attending this presentation, attendees will better understand various methods used to estimate the PMI.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing how evaluating the viability of the PMI estimation formulae as they are applied in Louisiana will benefit future PMI estimations in that region.

Forensic anthropologists are often called upon to provide an estimate of the period of time from death until discovery of human remains (i.e., the PMI). PMI estimates are often based on the condition of remains upon discovery (i.e., the observed stage of decomposition); however, since many factors affect the pattern and progression of taphonomic processes, interpretation of the PMI can prove to be difficult. Various formulae have been developed that allow quantitative assessment of PMI; two examples of such formulae are the Total Body Score (TBS) method and the Universal Post-Mortem Interval Formula.^{1,2} The process of each method entails associating the stage of decomposition of an individual with a numerical score. For the TBS method, a body was separated into three regions (head and neck, torso, and limbs) that are scored individually, then summed before being entered into an equation.¹ The Universal Post-Mortem Interval Formula requires a numerical decomposition score for the entire body, which is also entered into an equation.² Ultimately, an output of PMI in days can be obtained from each formula. Theoretically, formulae of this type would provide methods of PMI estimation that were both standardized and statistically sound.

The goal of the present study was to evaluate the application of these two methods in Louisiana. Both formulae were applied on past casework spanning the years 2006 to 2017 from the Louisiana State University Forensic Anthropology and Computer Enhancement Services (LSU FACES) Laboratory. These analyses were performed in concert with the assessment of qualitative PMI estimation in past casework from Louisiana. Using cases with known PMIs, it was determined how frequently an actual PMI fell within the range of the provided estimate range. Both the quantitative and qualitative methods were evaluated in order to determine the best approach to estimating PMI in Louisiana in the future. Only individuals with both known PMIs and available photographs were considered for the study, and the resulting sample size was $n=79$. When testing each formula, cases were excluded based on the requirements of each method. Ultimately, the sample sizes were $n=49$ for the TBS method and $n=16$ for the Universal Post-Mortem Interval Formula.^{1,2} The formulae had varying degrees of success based on the strength of the correlations. When applying the Universal Post-Mortem Interval Formula, statistically significant results were not observed using Spearman's rho ($p=0.384$ [$p<0.1214$; $\alpha=0.05$]).² However, the TBS method produced a strong correlation ($p=0.7529$ [$p<0.001$; $\alpha=0.05$]) when retrospectively applied to the casework.¹ When considering the qualitative PMI estimation methods applied at the LSU FACES Lab, the actual PMIs of 69/79 individuals (87%) fell within the range of the PMI estimate provided by the anthropologists. While the TBS method may have the potential for future use in forensic casework, qualitative PMI assessment has also been successful in Louisiana.¹

Reference(s):

1. Mary S. Megyesi, Stephen P. Nawrocki, and Neal H. Haskell. Using Accumulated Degree-Days to Estimate the Postmortem Interval from Decomposed Human Remains. *Journal of Forensic Science* 50, no. 3 (May 2005): 1-9.
2. Arpad A. Vass. The elusive post-mortem interval formula. *Forensic Science International* 204, (2011): 34-40.

Postmortem Interval, Decomposition, Taphonomy