



A19 The Application of Textile Biodeterioration Rates to Postmortem Interval (PMI) Estimation

Randi Marie Depp, BS, Mercyhurst University, Erie, PA 16546; Kellie Jones, BA*, Las Vegas, NV 89130; Jennifer L. Webb, BS*, Mercyhurst University, Erie, PA 16546; Jessica T. Novak, BA*, Erie, PA 16504*

Learning Overview: The goals of this presentation are to provide a literature review of all studies regarding rates of clothing deterioration as well as a test of the concept using forensic cases from Mercyhurst University.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by improving data collection for textiles on a forensic scene and potentially improving PMI estimates.

Most attempts at estimating PMI rely on the physical condition of the human remains; however, the rate of decomposition is altered by many contributing factors, such as weather and season of the year. This greatly complicates PMI estimates. Given that the clothing an individual is wearing at the time of deposition is subject to the same elements as the remains, it is hypothesized that clothing will also exhibit a progressive rate of decomposition that could improve PMI estimates. In theory, textiles of the same composition should degrade along a predictable timeline, thus providing a way to estimate PMI. To date, very little has been produced in the way of textile research within the forensic sciences. Most studies that reference clothing do so only anecdotally, with a majority of the published research focusing on how the presence or absence of clothing affects the decomposition rate of remains.

The goal of this study is to provide a comprehensive literature review of all studies that discuss rates of clothing deterioration. As the studies are scattered across multiple journals and multiple fields, it is necessary that all relevant literature be synthesized in one place. This study also tests the concept on 19 forensic cases from 2006 to 2018 from Mercyhurst University to determine whether a significant correlation exists between the known or estimated PMI and the state of clothing deterioration. This test is twofold: first, it will apply textile degradation as an estimate of PMI to actual forensic cases, and, second, it will create reliable protocols and best practice guidelines for the documentation and assessment of clothing at forensic scenes.

As inconsistent scoring methods and a lack of well-defined procedures were the leading issues in most studies reviewed in the literature, well-defined protocols and a centralized source of comparative data will improve future endeavors. Mercyhurst cases were selected based on scene type and availability of textile information via photographs. The textiles were assessed based on amount of deterioration observed from photographs taken on scene or in the laboratory. Each type of material present was scored ordinally from 1-4, with 1 being 100% remaining, 2 being 99%-50% remaining, 3 being 49%-1% remaining, and 4 being 0% remaining (where the presence of a tag or zipper indicated that specific textiles had been present at one time). The data was then subjected to statistical analyses to determine if there was a correlation between the known or estimated PMI and the rate of biodeterioration.

Spearman's Rank Correlations were calculated utilizing Past 3.20 software to test the relationships between the minimum, maximum, and average PMI and biodeterioration rate. Power analysis was conducted with G*Power software to determine the target sample size. Four separate Spearman's Rank Correlation tests were conducted with α set to 0.05. Unfortunately, no conclusions can be drawn about the relationship between textile biodeterioration rates and PMI with the current limited sample size. However, a potential pattern was observed for the blended textiles category. The p -value for this material was 0.47143 and r was 0.34718. While this result is also not significant, it suggests that given a larger sample size, a relationship may exist. Many cases were available for analyses that fit this study's parameters; however, cases or textiles excluded from this analysis were lacking in at least one of two areas: (1) documentation of textile composition (typically found on a tag); and (2) clear overall photographs of the textiles spread out to determine the amount of deterioration. It is anticipated that textile biodeterioration rates and PMI will be significantly related given more scorable data and improved documentation and assessment protocols.

Biodeterioration, Textiles, Postmortem Interval