B26 A Comparison of Area of Origin Determination of Impact Spatter From Vertical and Horizontal Surfaces

Alexis P. Johnson, BA, Stockton, CA 95207; Michael J. Van Stratton, BS, Kansas Bureau of Investigation, Topeka, KS 66604; Melissa M. Bailey, PhD, Emporia State University, Emporia, KS 66801*

Learning Overview: After attending this presentation, attendees will understand the value of using spatter stains on both horizontal and vertical surface stains when determining the area of origin from an impact event.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by expanding the amount of evidence that can be utilized in the field, as well as defining limitations of the method when applied to stains on a horizontal surface.

Traditionally, determining the area of origin of an impact event has utilized stains deposited on vertical surfaces. Recent research has determined that impact stains found on a horizontal surface in front of an event may be useful in the determination of area of origin, but its use is more limited.[1] To date, there has been no direct comparison of the calculations of the area of origin made from stains on both the vertical and horizontal surfaces surrounding the same event.

This experiment compares the area of origin determination from stains on vertical and horizontal targets, from the same event, to determine whether including measurements calculated from both surfaces provides similar results. To produce a consistent impact pattern, a ring stand was attached to a leveled horizontal surface and a five-pound weight was used to strike a 1.2 milliliters (mL) pool of defibrinated sheep's blood from a height of six inches. "Walls" were constructed from uncoated butcher paper and placed ten inches from the center of the blood pool. A butcher paper "floor" extended approximately ten feet in front of the blood pool. Impact events were conducted at four heights representative of four body positions: standing (5 foot 8.8 inches), sitting (3 feet 6 and a half inches), kneeling (1 foot 6 and a half inches), and lying prone (6 and a half inches). A total of 120 patterns were created with ten events per height. Individual stains on each wall and floor pattern were selected to be measured. Only well-defined ellipses that indicated the appropriate directionality from the impact site were selected. Based on previous research, elliptical stains that were only within one meter of the impact site on the horizontal surface were used for area of convergence and area of origin determination.[1] The length and width of each was measured using a digital microscope. A Leica® Bosch GLM 35 laser measuring device was used to measure from the leading edge of each stain to the chosen area of convergence. The area of origin was calculated using a trigonometric formula. Results from a previous study, as well as this experiment suggest that current methods of impact determination used on vertical surfaces can be applied to horizontal surfaces within limitations.[1] The area of origin calculated from horizontal surfaces is similar when subjects that are in a lying prone position or kneeling on all fours to that calculated from vertical surfaces. However, as height increases (sitting or standing), finding suitable stains becomes increasingly more difficult and results are less accurate. Thus, calculating the area of origin from both horizontal and vertical surfaces may be useful in some cases, but caution should be used if a sufficient number of suitable bloodstains are not present.

Reference(s):

1. Rindom, Kristin Jenifer. *Measurement Determination of Blood Spatter on a Horizontal Surface.* Master's thesis, Emporia State University, 2019. Unpublished.

BPA, Horizontal, Vertical

*Presenting Author