G115 The Temporal Dynamics of Autopsies and Their Impact on System Efficiency: Do Autopsies Really Come in Threes?

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After attending this presentation, attendees will understand the temporal fluctuations in the rate of autopsies, the accordion effect as it applies to pipeline processes, and how these impact efficiencies in the practice of pathology, both forensic and hospital-based.

This presentation will impact the forensic science community by: (1) providing insight into the forces internal and external to a laboratory which affect its processes and systems; and, (2) providing a framework for developing strategies to mitigate those effects and increase departmental productivity.

Barring mass disasters or epidemics, patients for autopsy generally arrive in both forensic and hospital-based pathology departments randomly over time. Within this random framework, however, there is a definite propensity for temporal clustering of autopsies, lending credence to informal observations by pathology residents that "autopsies seem to come in threes."

This temporal clustering provides a practical example of the "accordion effect." The accordion effect is well known in traffic science, foot marching, and bicycle racing, and it can affect processes in a pipeline in general. Similar to fluid dynamics in physics, the accordion effect creates fluctuations in sequential or pipeline work processes, creating disruptions in the flow of processes following it. Using traffic as an example, say a driver changes lanes suddenly. This sudden interruption in flow, followed by many cars applying brakes, creates a so-called "stop wave," which can travel backward to delay all the cars that follow.

Autopsy pathology is generally conducted as a series of processes in a pipeline fashion, making it susceptible to the accordion effect. A typical autopsy pipeline looks like this: the autopsy is performed, tissues are submitted to a single department for histology, microscopic slides are returned to the same pathologist, who provides information to clerical personnel, who return the work to the pathologist for final revision, culminating in the issuance of a completed report. A slowdown anywhere in the system has a direct "downstream" effect on every process that follows it, similar to the backward traveling wave of delay on the highway.

When the federal government mandated prospective payment systems for Medicare reimbursement in 1983, medicine began to experience a cultural shift. Facing serious fiscal cutbacks, hospitals needed to find ways operate more efficiently to survive. For the first time, health care delivery systems began to assess efficiency and quality in medical care using tools traditionally used in industry, such as time-motion studies and total quality management techniques. Although not the recipients of Medicare funding, most forensic pathology departments are government-based and operate with limited fiscal resources and staffing. Both hospitals and forensic laboratories face substantial challenges to system efficiency, cost-effectiveness, and quality.

A historical prospective study of autopsy frequency in a university hospital pathology department between the years 2001 – 2010 was conducted. The number of autopsies varied from 63 to 107 per year. The average number of autopsies performed each month within a given year ranged from six to eight, with a range of zero to nineteen per month.

An empirical analysis of autopsy clustering, factors potentially creating ebbs and flows in the autopsy process, and how the information may help guide institutional strategies for process improvement will be presented.

Autopsies, Accordion Effect, Efficiency

 ** Presenting Author*