

The Effect of Closure of a Rural Hospital on EMS Agency Operations in Southwest Virginia

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Introduction: The closure or threatened closure of hospitals has become a significant concern in rural areas of the country. Many hospitals that have closed included an emergency department (ED) used by local emergency medical services (EMS) agencies as a transport destination. At midnight on September 30th, 2013, Lee County Regional Medical Center in Pennington Gap, Virginia closed its ED to patients. While closure of a rural hospital has the potential to affect many aspects of health care, the residents of affected areas and the EMS agencies involved fear substantially increased transport times and total run times that could negatively impact the availability of EMS resources. Little has been described objectively about the direct effects of the closure of a rural hospital ED on local EMS agency operations.

Objectives: To examine the effect of the closure of a rural hospital ED on EMS agency operations including response times, transport times, and total run times.

Methods: EMS agencies that transported patients to Lee County Regional Medical Center (LCRMC) were identified using data submitted by EMS agencies to the Virginia Pre-Hospital Information Bridge (VPHIB) (Image Trend, Inc., Lakeville, MN). EMS agencies with at least 50 transports to LRCM in calendar year 2012 were included in the analysis. Pre-closure data was obtained from July 1st 2010 through September 30th, 2013. Post-closure data was obtained from October 1st 2013 through December 31st 2016. All “911” calls for the selected agencies were included in the analysis. Total run time was calculated by subtracting the “Unit Enroute” time from the “Unit Back in Service” time. “Response Time” was calculated by subtracting the “Unit Enroute” time from the “Arrived at Patient” time. “Transport Time” was calculated by subtracting the “Unit Left Scene” time from the “Patient Arrived at Destination” time. Mean, median, and standard deviation (SD) were calculated for each of the three time intervals and the Wilcoxon rank-sum test was used to compare pre- and post-closure time intervals in aggregate and for each agency individually. (R statistical software language, version 3.5.1) Boxplots were constructed to allow better visualization of pre- and post-closure data. Volume of responses for each agency were reported individually by year and by quarter for the time intervals included in the analysis.

Results: There were a total of 32,894 EMS calls included in the pre-closure timeframe and 28,767 calls included in the post-closure timeframe. The mean response time pre-closure was 12.1 minutes (median 9 minutes, SD 12.2) and the mean response time post-closure was 12.7 minutes (median 10 minutes, SD 11.6). The mean transport time pre-closure was 20.5 minutes (median 15 minutes, SD 20.6) and the mean transport time post-closure was 26.5 minutes (median 24 minutes, SD 18.6) The mean total run time pre-closure was 73.03 minutes (median 64 minutes, SD 39.47) and the mean total run time post-closure was 78.44 minutes (median 72 minutes, SD 38.75). In aggregate, there was a 6 minute increase in total run time post-closure ($p < 0.01$, 95% CI 5.9 – 6.9). The effect on individual EMS agencies differed significantly, from a decrease in mean total run time of 5 minutes at the lowest to an increase of 30 minutes at the greatest. Aggregate transport time increased by 7 minutes on average ($p < 0.01$, 95% CI 6.9 – 7.0). Aggregate response time increased by just less than one minute (0.99 minutes, $p < 0.01$, 95% CI 0.99 – 1.0).

Conclusions: Analysis of EMS agency data submitted to the Virginia Pre-Hospital Information Bridge demonstrated statistically significant increases in response time, transport time, and total run time for EMS agencies that had historically transported patients to Lee County Regional Medical Center in Lee County, Virginia prior to its closure in September, 2013. However the magnitude of the differences, 7 minutes in transport time and 6 minutes in total run time, are of questionable significance operationally. The effects on individual EMS agencies varied significantly. Objectively, the impact on EMS operations seemed less than anticipated by residents of the community and the EMS agencies involved. Whether or not the differences in time could impact patient care would require further investigation.