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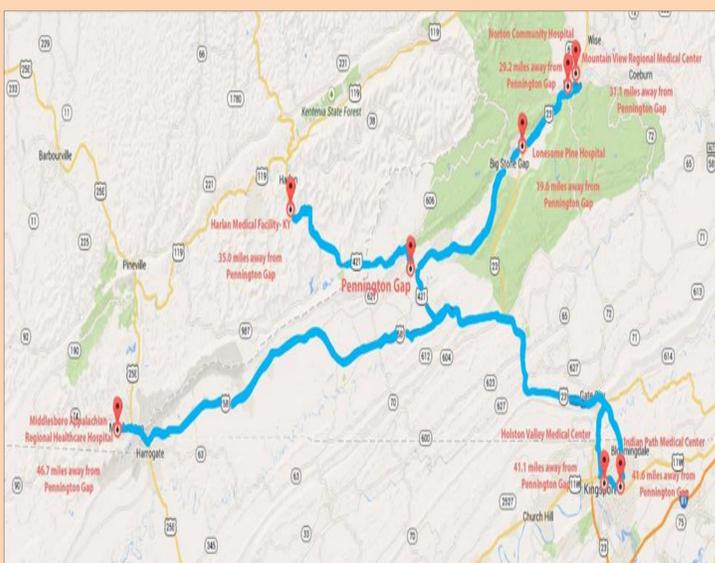


## Background

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 30<sup>th</sup>, 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

- This study compares different time intervals to analyze the impact of hospital closure on EMS agencies.
- Three time intervals compared were: 1) Total run time, 2) Response time, and 3) Transport time, before and after the hospital closure.
- Data was obtained from July 1<sup>st</sup> 2010 through September 30<sup>th</sup> 2013 for pre-closure information, and from October 1<sup>st</sup> 2013 through December 31<sup>st</sup> 2016 for post-closure information.
- Wilcoxon rank-sum test was used to compare the pre- and post-closure time intervals, both in aggregate and for each agency individually.

## Results

Table 1. Difference in Total Run Times by EMS Agency

EMS Agencies	Change in Median Time	Confidence Interval	P-value
Abingdon Ambulance Service	7	(6, 8)	<0.01
Duffield Volunteer	-5	(-4, -7)	<0.01
Friendship Ambulance Service	5	(3, 8)	<0.01
Jonesville Rescue Squad	19	(18, 21)	<0.01
Keokee Volunteer Fire and Rescue	11	(5, 18)	<0.01
Lee County Rescue Squad	16	(14, 19)	<0.01
St. Charles Volunteer Rescue Squad	30	(24, 36)	<0.01
Thomas Walker Rescue Squad	-	-	0.1

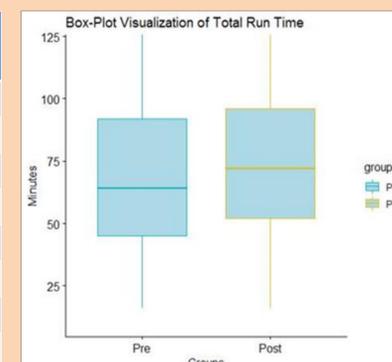
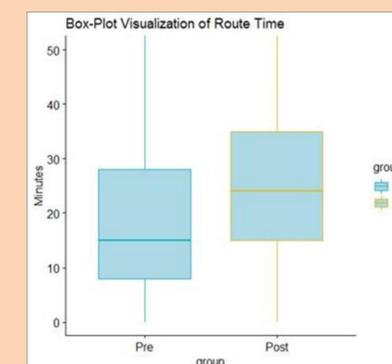


Table 2. Difference in Response Times by EMS Agency

EMS Agencies	Difference in Median	Confidence Interval	P-value
Abingdon Ambulance Service	0.9	(0.9, 1)	<0.01
Duffield Volunteer	-	-	0.69
Friendship Ambulance Service	4.0	(3, 5)	<0.01
Jonesville Rescue Squad	1.9	(1, 2)	<0.01
Keokee Volunteer Fire and Rescue	-	-	0.67
Lee County Rescue Squad	1.9	(1, 2)	<0.01
St. Charles Volunteer Rescue Squad	3.9	(2, 6)	<0.01
Thomas Walker Rescue Squad	-	-	0.12



## 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.
- Aggregate total run time increased by 6 minutes post-closure ( $p < 0.01$ , 95% CI 5.9 – 6.9).
- 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).
- The effect on individual EMS agencies differed among the agencies (Tables 1 & 2).

Table 3. Descriptive Statistics on the Time Intervals Pre- and Post-Closure of the Hospital

	Pre-Closure		Post-Closure	
	Mean (SD) Minutes	Median Minutes	Mean (SD) Minutes	Median Minutes
<b>Total Run Time</b>	73.0 (39.5)	64	78.4 (38.8)	72
<b>Response Time</b>	12.1 (12.2)	9	12.7 (11.6)	10
<b>Transport Time</b>	20.5 (20.6)	15	26.5 (18.6)	24

## 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 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 (e.g, 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.

