

Pre-Hospital Ambulance Patient Care Reports, 2009

Emergency medical services (EMS) in New Mexico are delivered by 348 EMS and fire systems, and over 8,000 licensed medical technicians, who respond to approximately 430,000 emergency encounters each year. This system has an impact on medical care in New Mexico since many of the most seriously injured and ill patients enter the system through an EMS encounter. Monitoring the utilization of these resources can provide information to guide policy and track disease and injury trends.

New Mexico regulations require submission of pre-hospital patient encounter data to the Department of Health. These data are used to generate reports to address system and statewide quality control issues. These include documenting the services provided, assessing the financial resources needed to operate EMS agencies, supporting surveillance for health conditions requiring EMS services, and identifying and evaluating injury prevention activities. The long-term expectation is that pre-hospital patient care reports can be linked with other clinical databases to generate aggregate reports that will identify patient outcomes and associated costs. The data collection system is called the New Mexico Emergency Medical Services Tracking and Reporting System (NM EMSTARS) and a public web site is available for general information¹.

Pre-hospital data collection started in May 2007, but is still in a start-up phase and data quality has not been assessed. Approximately 75% of the state's EMS services are now submitting data. Over 350,000 encounters have been reported and some initial trends and analyses have been conducted. Many issues related to a population's health and the delivery of EMS are related to population density. Initial analyses of this data system examine some of the differences between EMS agencies that serve primarily urban or rural localities. In 2010, program efforts are being directed toward data quality improvement.

Stuart Castle, MPH, EMT-B, Data Manager
Epidemiology and Response Division
New Mexico Department of Health

Methods

New Mexico has adopted a national data standard for the collection of patient specific EMS data. That standard is the National Emergency Medical Services Information System (NEMSIS)² and was developed with the National Highway Traffic Safety Administration (NHTSA), Health Resources Service Administration (HRSA) and the Centers for Disease Control (CDC). There are 420 data elements described and defined within the national data set. New Mexico is requiring EMS services to submit 59 of these data elements; 17 describe the service and 42 are patient-specific.

EMS responses can be grouped into several categories, including "911 responses"; "stand by"; and "inter-facility transfers". For this analysis, an EMS "run" was counted when a service reported that an ambulance responded to a 911 call for assistance and reported an incident date and a unique incident or call number.

Runs from 22 EMS transport services were analyzed for this report. These services reported data for at least 11 months in 2009 and did not include air ambulance services. They operated in eighteen counties, and were classified as being either "urban" or "rural". Urban services were defined as those located in a Metropolitan Statistical Area (MSA) (50K+ population) or a Micropolitan Statistical Area (urban cluster of 10K to < 50K population)^{3,4}. Rural services were those located elsewhere in New Mexico.

Data analyses was limited to calculating percentages. Rates were not presented because population converge has not been assessed. Null values, including unknown, not known, and not available were grouped together under the heading of "unknown".

Results

Eight EMS services were classified as “urban” and reported 88,688 emergency runs in 2009, 14 other services were classified as “rural” and reported 13,568 emergent runs. The 22 services were located in 18 of the state’s 33 counties, and their service areas were not contiguous.

Both the urban and rural services had a nearly equal percentage of male and female patients. Urban services transported females 49.5% of the time, and rural services transported females 51.4% of the time. The rural services had older patients, 27.7 % over the age of 64 years, compared to urban settings (21.4%). Race was commonly missing, for 67.4% of urban service runs and 56.1% of rural service runs. Similarly, ethnicity was missing for 70.0% of urban service runs and 64.6% of rural service runs.

The most common “dispatch reasons” reported for urban and rural runs were breathing problems, falls and chest pain. Motor vehicle traffic crashes accounted for similar percentages of EMS runs for urban (6.3%) and rural (6.6%) services (Table).

The most frequently reported “causes of injury” were falls and motor vehicle crashes (Table). However, motor vehicle pedestrian crashes and firearm assaults were more commonly reported by urban services. Assaults made up a greater percentage of runs for rural services (8.1%) than for urban services (0.8%). Even when the provider impression for a run was “traumatic injury”, there were large percentages of unknown values for cause of injury for both urban (18.9%) and rural (17.2%) services.

Multiple date and time stamps are collected during the course of an EMS response. Response time is the time from unit notification until arrival on the scene. Urban and rural services had an identical median response time of 8:00 minutes. However, the urban services had an average response time of 9:14 minutes, whereas the rural services took an average of 10:29 minutes. In addition, rural services reported over twice the percentage of runs taking more than 15 minutes (19.4 %), compared to urban services (8.4%).

Runs with a dispatch reason of “breathing problem” were counted as a percentage of all 911 runs for each month. In the urban settings the highest percentage was

in March (7.4%), followed by October (7.4%) and February (7.1%). For rural services the highest months were February (10.8%) and March (8.3%) (Figure).

Discussion

Pre-hospital patient care reports are part of a comprehensive medical record. When those reports are accessible for review by the service medical director, they can be used to evaluate adherence to protocols and timeliness of care and transport. Data is also needed to evaluate EMS delivery in New Mexico and to tailor pre-hospital emergency care education to the actual field needs. The information can also be used to demonstrate the need for EMS resources to the State Legislature and other funding bodies. Because New Mexico uses the national NEMSIS data dictionary, New Mexico data can be compared to that of other states and the country.

Service participation in data collection can be attributed to a number of factors. EMS Fund Act monies are being directly tied to reporting and a percentage of the distribution is dependent on the number of runs submitted to the state. Additionally, many services are finding the immediate reporting capacity helpful to their daily operations. Data access is an advantage as quality assurance reports are readily accessible. Medical directors are reporting benefits from being able to review charts from any location, at any time. Lastly, if a system chooses to use the web for data entry, there is no cost to the system for use of the software. However, most data elements have large percentages of missing or unknown data. This severely compromises the data usefulness and must be addressed by the entire EMS community. Ongoing data analyses and use will lead to improved quality.

This article has focused on some of the differences between urban and rural EMS services. Some patterns are starting to emerge, such as the longer response times in the rural areas and the clustering of runs for certain causes of injury in the urban services.

EMS pre-hospital data is frequently used to identify high risk areas and causes of injury. These data can be analyzed to determine injury circumstances and further identify areas in need of preventive interventions. It was noted that several “cause of injury” classifications differed between the urban and rural services. These differences may reflect true injury patterns, but first the data quality and completeness should be investigated

and improved.

EMS personnel are in a unique position to collect data on time and locations associated with urgent medical conditions. However, the “incident location” field is open text containing a physical address or description, making mapping difficult. There are fields to collect longitude and latitude, but they are seldom submitted in the run report data.

Certain variables, like “dispatch reason”, tend to be relatively stable over time. In this article “breathing problem” only varied from 5.5% to 10.8% per month in 2009. These patterns can be monitored over time as indicators of diseases like influenza. Other indicators, such as influenza deaths and hospitalizations, showed a marked increase in response to the H1N1 outbreak in the fall of 2009⁵. Data presented in this article would probably not suffice for syndromic surveillance purposes, but others have suggested that pre-hospital data could be used for this purpose, if the data could be further analyzed⁶.

Challenges include obtaining run reports for all EMS dispatches and ensuring a high level of data accuracy and completeness. These issues are being addressed with continuing education classes on data collection at statewide EMS conferences and by providing data reports to the various EMS advisory committees and partners including the DOH Office of Injury Prevention and the NM Department of Transportation.

Recommendations

1. EMS system and medical directors should routinely examine pre-hospital data to review individual records for quality control. Aggregate data can be used by regional and state policy makers to allocate resources, develop policy and direct educational programs.
2. When 5% or more of data for a particular variables unknown or not available the data should be examined for appropriateness and/or efforts to collect those data should be enhanced .
3. Injury prevention advocates can monitor pre-hospital data to help identify high risk groups for prevention programs. Because EMS personnel are medically trained staff at the injury location, they are in a unique position to document times, locations and circumstances of the injury. EMS personnel should receive ongoing education demonstrating the utility of

accurate and timely reports in supporting injury prevention programs and evaluations.

4. Investigate geocoding of response location for implementation feasibility and utility. This capability would allow mapping to be rapidly accomplished for numerous variables.

References

1. New Mexico Emergency Medical Services Tracking and Reporting System. Public training site can be accessed with the username: *provider*; password: *provider*. <http://www.nmemstarts.org>. Questions can be addressed to Stuart Castle, EMS Bureau data manager, ph. 505-476-8219 or stuart.castle@state.nm.us
2. National EMS Information System. <http://www.nemsis.org>
3. US Office of Management and Budget. http://www.gadata.org/information_services/Census_Info/Standards%20for%20Defining%20MSA.htm
4. US Census. <http://www.census.gov/population/www/metroareas/metrodef.html>
5. DOH report on influenza activity. http://www.health.state.nm.us/H1N1/situation_update.shtml
6. Coory MD, Kelly H, Tippett V. Assessment of ambulance dispatch data for surveillance of influenza-like illness in Melbourne, Australia. *Public Health* 2009; 123: 163-168.

Table. Urban and Rural EMS Dispatch Reason and Cause of Injury⁺ New Mexico, 2009

| Dispatch Reason | Urban | | Rural | |
|------------------------------------|--------------|------|------------|------|
| | Number | % | Number | % |
| Breathing Problem | 6,174 | 7 | 1153 | 8.5 |
| Fall Victim | 6,325 | 7.1 | 1,064 | 7.8 |
| Chest pain | 5,079 | 5.7 | 1,256 | 9.3 |
| Ingestion/Poisoning | 4,228 | 4.8 | 72 | 0.5 |
| Motor Vehicle Crash | 5,624 | 6.3 | 900 | 6.6 |
| Other | 60,705 | 68.5 | 8,976 | 66.2 |
| Unknown | <u>553</u> | 0.6 | <u>147</u> | 1.1 |
| Total | 88,688 | | 13,568 | |
| Cause of Injury⁺ | | | | |
| Fall | 3,374 | 31.1 | 636 | 30.7 |
| Motor Vehicle Crash | 2,063 | 19 | 415 | 20 |
| MV Pedestrian | 138 | 1.3 | 23 | 1.1 |
| Bicycle crash | 133 | 1.2 | 8 | 0.4 |
| Firearm assault | 138 | 1.3 | 7 | 0.3 |
| Firearm unintentional | 25 | 0.2 | 4 | 0.2 |
| Firearm Self Inflicted | 22 | 0.2 | 3 | 0.1 |
| Assault | 87 | 0.8 | 168 | 8.1 |
| Other | 2,827 | 26 | 451 | 21.8 |
| Unknown/not applicable | <u>2,056</u> | 18.9 | <u>357</u> | 17.2 |
| Total | 10,863 | | 2,072 | |

⁺ 911 transport calls with Provider Impression listed as “traumatic injury”

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C. Mack Sewell, Dr.P.H., M.S.
State Epidemiologist

Michael G. Landen, M.D., M.P.H.
Deputy State Epidemiologist & Editor

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Epidemiology and Response Division
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1190 St. Francis Dr.

P.O. Box 26110, Santa Fe, NM 87502

Toll-Free Reporting Number:
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Figure. Percent of 911 Responses Reported as "Breathing Problem", New Mexico, 2009

