Executive Summary
Kentucky Trauma System Evaluation 2016

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Overview

Kentucky counties have a wide range in fatalities, as depicted in the map below, which focuses on motor vehicle crashes. While access to definitive trauma care is not the only factor behind the four-fold disparity in motor vehicle crash death rates by county, the rates are far lower in areas near Level I and II trauma centers.

Map 1:
Rate of Fatal Crashes Per 100 Million Vehicle--Miles (2010-2014)

A June 2016 National Academies of Science (NAS) study found that one-fifth of deaths from traumatic injuries are preventable, and that a comprehensive trauma system has the potential to reduce the proportion of preventable deaths.¹ This finding updates longstanding evidence that trauma systems can save lives, as set out in the NAS report: treating severe injuries in Level I or Level II trauma centers has well-documented benefits for survival, quality of life, and cost-effectiveness.²,³

The Kentucky trauma system was established in 2008 by state law (KRS 211.490 et seq.; 902 KAR 28:040. A Trauma Advisory Committee (TAC), the membership of which is set out in KRS 211.494(3), directs the trauma system. All trauma centers designated by the Commissioner for Public Health maintain trauma registries that are compatible with the National Trauma Data Bank (NTDB) standards established in the National Trauma Data Standard Data Dictionary. The number of trauma registry cases increased
from 6,643 in 2008 to 13,159 in 2014, as seen in Figure 1. A large proportion (58% in 2014) of these cases came from Level I facilities, but trauma patients also receive care at other verified trauma facilities in the Kentucky trauma system.

The increase in cases recorded in the trauma registry reflects the increase in reporting hospitals, not an increase in the number of injured Kentucky patients. The following map presents the current coverage (defined by 30/60 minute drive time) of verified and pending-verification facilities. In comparison, the hash-marked area represents the original coverage from 2008.

Map 2: 2015 Trauma Registry Facilities for Kentucky with 30/60 Minute Drive-Time Coverage and 2008 Coverage Area
The following map depicts the rate of trauma registry cases per 10,000 population based on the patients’ counties of residence. The county of residence is not necessarily the site of injury, although the majority of injuries occur within 10 miles of home. The low rates in the southwest portion of the state are in large part due to the absence of verified Kentucky trauma centers in that region. Trauma patients in those areas are commonly taken to Tennessee hospitals.

**Map 3:**
2014 Kentucky Trauma Registry Encounter Rate by County

Quality metrics

Using data from the comprehensive statewide dataset maintained by the Kentucky Hospital Association, we find that since 2008, there has been a consistent increase in the proportion of injury patients being seen at trauma centers (Fig. 2).

![Quality metrics graph](image-url)
State trauma experts also developed a set of ICD-9 codes to identify injuries warranting care at a Level I facility. The distribution of severe injuries in relation to Level I trauma center utilization is depicted in Fig. 3. In more recent years, about 50% of severe injuries have been seen at Level I trauma centers.

The following graph shows changes in age-adjusted death rates for any-injury inpatients with 95% confidence intervals calculated following the CDC WONDER methodology. The increase in age-adjusted death rate for the Level I centers during the 2000-2006 period may be a function of the increasing proportion of severely injured patients being cared for in Kentucky trauma centers rather than out of state during the early years of system development.
Figure 5 compares observed to expected death ratios using the risk adjustment methods developed by the American College of Surgeons (ACS). The trend shows an overall decrease in risk-adjusted death ratios over time. The death ratio in 2012-2014 is statistically significantly lower than the 2008 ratio, indicating real improvement in the state trauma system’s ability to provide life-saving care.

![Fig. 5 - 2008-2014 Risk Adjusted Death Ratio](image)

**Strategic challenges**

Kentucky’s trauma system is under the administrative oversight of the Kentucky Department for Public Health (DPH), although it also has a relationship with the Kentucky Board of Emergency Medical Services (KBEMS), which is part of the Kentucky Community and Technical College System (KCTCS). This administrative home was the result of several historical factors that are no longer relevant, and the question of an appropriate home for the trauma system deserves further consideration. Because the trauma system has little common ground with KCTCS, its administrative parent cannot be relied upon to advocate for critically needed system funding.

While the trauma system enabling legislation includes a provision addressing the use of funds, the system itself has no reliable funding source. Funding for the trauma registry has been available for the past six years through the Kentucky Transportation Cabinet’s Office of Highway Safety, using federal awards from the National Highway Traffic Safety Administration. The TAC leadership has demonstrated initiative and creativity in its attempts to identify potential funding sources. Other states fund their trauma systems from general fund appropriations, assessments on speeding drivers, insurance surcharges, foundation and corporate donations, and fees from participating hospitals. In the 2016 fiscal year, the state Department for Public Health provided one-time support for enhanced education and outreach.
Current resources fall far short of addressing basic trauma system funding needs. A proposal to the 2016 Kentucky General Assembly for minimal funding was unsuccessful. The lack of funding seems to signal legislative undervaluation of the enormous effort by TAC leadership, past and present. The sustainability of the system's dependence on volunteers' effort must be called into question.

Large geographic areas in Kentucky still lack timely access to definitive trauma care. Limiting analysis to the state borders is somewhat misleading because there are Level I centers in Cincinnati OH, Huntington WV, Evansville IN, and Nashville TN that are closer to some Kentucky regions than in-state facilities. However, there are clearly some gaps in the state’s coverage, particularly in the southwest part of the state. Efforts are ongoing to support interested hospitals in their explorations of participation.

Many states' trauma systems are administratively co-located with state EMS organizations. This topic may deserve closer attention, particularly with regard to the prospect of integrating EMS data more completely with trauma registry reporting. Some 92% of state EMS providers now report electronically. Access to these data would help answer longstanding questions, e.g., the number of motor vehicle crashes that are undetected for hours, problematic recoveries and extractions, and quality metrics.

### Conclusion and next steps

Kentucky’s trauma system has made significant progress since the enabling legislation was enacted, yet it cannot achieve its full potential until major obstacles are overcome. Among these are lack of funding to support core activities, geographically inconsistent participation, and integration of EMS data. The ability of Kentuckians to survive traumatic injury should not depend on where they are injured, yet motor vehicle fatality rates across counties continue to vary almost four-fold. Finding the political will to support a comprehensive system that provides both excellent and equitable care is a longstanding challenge. Until Kentucky overcomes that challenge, it falls to a small and dedicated group of clinicians and laypersons to press forward towards the trauma system’s goal of providing the right care at the right time in the right place.

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