

---

# Are Statewide Trauma Registries Comparable? Reaching for a National Trauma Dataset

N. Clay Mann, PhD, MS, Karen Guice, MD, MPP, Laura Cassidy, PhD, Dagan Wright, MSPH, Julie Koury, BS, RHIT

---

## Abstract

**Background:** Statewide trauma registries have proliferated in the last decade, suggesting that information could be aggregated to provide an accurate depiction of serious injury in the United States.

**Objectives:** To determine whether variability exists in the composition and content of statewide trauma registries, specifically addressing case-acquisition, case-definition (inclusion criteria), and registry-coding conventions.

**Methods:** A cross-sectional, two-part survey was administered to managers of all statewide trauma registries. State trauma registrars also provided inclusion and exclusion criteria from their state registry and abstracted a clinical vignette designed to identify coding inconsistencies.

**Results:** Thirty-two states maintain a centralized registry, but requirements for data submission vary significantly. Inclusion and exclusion criteria also vary, particularly for nontraumatic injuries. Coding conventions adopted by states for vague or missing information are dissimilar. When abstractions of the clinical vignette are compared, only 19% and 47% of states provided similar quantity or content for injury e-coding and diagnostic coding, respectively. Injury severity scores (based on diagnostic coding) demonstrated a range from 2 to 18.

**Conclusions:** Statewide trauma registries are prevalent but vary significantly in composition and content. Standardizing inclusion criteria, variable definitions, and coding conventions would greatly enhance the usability of an aggregated, national trauma registry.

ACADEMIC EMERGENCY MEDICINE 2006; 13:946-953 © 2006 by the Society for Academic Emergency Medicine

**Keywords:** trauma, data collection, information systems, registries, population

---

The notion of cataloguing human afflictions to better understand the epidemiology of a disease began in the 16th century.<sup>1</sup> In the 1950s, hospital-based registries developed from the idea that aggregating data from similar cases may reveal variations in care and ultimately result in a better understanding of the underlying disease and its treatment. In 1966, the publication of *Accidental Death and Disability: The Neglected Disease of Modern Society* brought profound attention to the growing

epidemic of trauma in the United States.<sup>2</sup> In 1969, the first prototype trauma registry was developed at Cook County Hospital in Chicago, which expanded into the first statewide trauma registry in 1971.<sup>3</sup>

Since 1971, statewide trauma registries have proliferated, using an amalgamation of data provided by stand-alone, hospital-based registries.<sup>4-6</sup> This approach has proven to be an effective method of monitoring and evaluating an individual state's trauma system and

---

From the Department of Pediatrics, Intermountain Injury Control Research Center, University of Utah, School of Medicine (NCM, DW, JK), Salt Lake City, UT; the Department of Surgery, The Medical College of Wisconsin (KG), Milwaukee, WI; and the Department of Biostatistics, University of Pittsburgh (LC), Pittsburgh, PA. Received January 12, 2006; revisions received January 23, 2006, and April 10, 2006; accepted April 11, 2006.

Supported by grant 1H72 MC 00004 01 and grant 1 H72 MC 00002 01 from the Health Resources Services Administration/Maternal Child Health Bureau (HRSA/MCHB) Emergency

---

Medical Services for Children Program (EMSC) and by grant 240 97 0026 from the Health Resources and Services Administration (HRSA), Trauma-EMS Systems Program.

The investigators are solely responsible for the content of this report, and therefore, the report does not necessarily represent the view of HRSA or of the United States Government.

Address for correspondence and reprints: N. Clay Mann, PhD, MS, Intermountain Injury Control Research Center, 295 Chipeta Way, P.O. Box 581289, Salt Lake City, UT 84158-1289. Fax: 801-581-8686; e-mail: [clay.mann@hsc.utah.edu](mailto:clay.mann@hsc.utah.edu).

associated hospital outcomes.<sup>7</sup> However, data comparability among hospital registries may be suspect, because case abstraction often is not calibrated among hospitals and, therefore, may drift.<sup>8,9</sup> Efforts to standardize hospital registry content have been published,<sup>10,11</sup> yet studies continue to document serious variation and misclassification among hospital-based registries.<sup>12,13</sup>

Recently, federal agencies have displayed renewed interest in fortifying the establishment of a national trauma registry.<sup>14,15</sup> The threat of conventional-weapon terrorism and the current dearth of national data characterizing the societal impact of trauma have bolstered the call for funds to develop such a registry. Because many trauma cases currently are captured in statewide trauma registries, the concept of aggregating these data at a national level is appealing. However, little information exists regarding to what extent variability among statewide registries may impede such an aggregation. The purpose of this study is to characterize the variation among statewide trauma registries, with special attention to case-acquisition, case-definition (i.e., inclusion criteria), and registry-coding conventions.

## MATERIALS AND METHODS

### Study Design and Population

A cross-sectional, two-part survey was administered in March 2004 in all 50 states. An initial phone survey elicited information from each state emergency medical services (EMS) director or state trauma manager regarding the presence, legal requirement, and structure of any centralized (statewide) trauma registry available within the state. If such a registry existed, an additional survey elicited specific information regarding registry data capture ("completeness" of case collection), case identification (inclusion or exclusion criteria), and registry content (variables included). This study was deemed exempt from patient consent requirements by the University of Utah School of Medicine Institutional Review Board.

### Survey Content and Administration

State trauma managers verifying the presence of a statewide trauma registry were asked to "identify an experienced trauma registrar within the state who is familiar with the statewide registry abstraction process." To evaluate variation in coding conventions, the identified registrar was invited to complete an abstraction exercise. The exercise required the registrar to abstract information from a short clinical vignette (Appendix 1, available as an online Data Supplement at <http://www.aemj.org/cgi/content/full/j.aem.2006.04.019/DC1>), including key data variables commonly included in trauma registries. The vignette was designed specifically by two of the authors (N.C.M., J.K.) to evaluate abstraction and coding conventions for registry variables that are reported in the published literature to vary across hospital-based trauma registries.<sup>12</sup>

The trauma registrar was asked to abstract injury and clinical information from the clinical vignette by using the same day-to-day methods used to code hospital trauma-care data into the state trauma registry. Abstracted information was coded into their current registry software, and a paper copy of the resulting information (or electronic

screen shots of the abstracted data) was faxed to the study investigators. The assessment of inconsistencies in coding conventions was limited to states with centralized registries because of the sheer number of independent registry efforts that are present in states that do not attempt to systematize trauma data collection and reporting at the state level.

### Data Analysis

Survey responses were independently reviewed by two authors (D.W., J.K.) and were categorized by using a framework derived from grounded theory methods.<sup>16</sup> To evaluate commonalities among statewide trauma registry inclusion and exclusion criteria, each criterion was mapped onto a tree diagram by using Atlas 5.0 (Scientific Software Development, Berlin, Germany). The tree diagram quantified registry inclusion and exclusion criteria, with attention given to qualifiers indicating whether a criterion was dependent ("AND") or independent ("OR") of other criteria. Regarding the clinical vignette, injury severity scores (ISS) were calculated on the basis of *International Classification of Diseases, 9th Revision, Clinical Modification* (ICD-9-CM) codes<sup>17</sup> provided in the narrative by using ICDMAP-90 software (Tri-Analytics, Inc., Baltimore, MD).

To generate a national estimate of the proportion of registry-eligible trauma patients captured in existing registries, each state trauma manager was asked to estimate the proportion of trauma victims with injuries satisfying registry inclusion criteria that actually are captured within any available trauma registry in his or her state. Because inclusion criteria vary greatly across local and state registries, the term *registry-eligible trauma patients* remains indefinable in this instance. State estimates were weighted by the proportion of the national population represented by each state and then were summed to provide a national estimate of the proportion of trauma victims, meeting local inclusion criteria, that currently are captured in existing registries.

## RESULTS

### Variability in Case Acquisition among Statewide Trauma Registries

Survey findings suggest that 32 states currently maintain some form of a centralized trauma registry (Table 1). The majority of state data-collection efforts require hospitals to report data (27 states [84%; 95% confidence interval = 71.8% to 96.9%]). However, wide variability exists in the type of hospital required to submit data to the centralized registry. Thirteen states require data submission from only designated and accredited trauma centers. Another 11 states collect injury data from all acute-care facilities. States that request, rather than require, submission of trauma data combine information from a subset of trauma centers with existing registries.

Figure 1 documents all state trauma managers' responses when asked to estimate the percentage of trauma victims with injuries satisfying registry inclusion criteria that actually are captured within any available trauma registry within their state. This map suggests that the coverage of trauma registries that is available within individual states varies dramatically. It is, however, interesting

Table 1  
States with Statewide Trauma Registries, Submission Requirements, and Contributors

State	Submission	Contributing Centers
Alabama	Voluntary	All acute-care hospitals
Alaska	Mandatory	All acute-care hospitals
Arizona	Mandatory	Only designated trauma centers
Arkansas	Voluntary	Only designated trauma centers
Colorado	Mandatory	All acute-care hospitals
Connecticut	Mandatory	All acute-care hospitals
Delaware	Mandatory	All acute-care hospitals
Florida	Mandatory	Only designated trauma centers
Georgia	Mandatory	Only designated trauma centers
Illinois	Mandatory	Only designated trauma centers
Iowa	Mandatory	Resource regional and area trauma centers
Kansas	Mandatory	Hospitals caring for trauma patients
Maryland	Mandatory	Only designated trauma centers
Minnesota	Voluntary	Designated trauma centers plus
Mississippi	Mandatory	Participating hospitals
Missouri	Mandatory	Only designated trauma centers
Montana	Voluntary	Nine trauma centers with registries
Nebraska	Mandatory	Only designated trauma centers
Nevada	Mandatory	All acute-care hospitals
New York	Mandatory	Only designated trauma centers
North Carolina	Mandatory	Only designated trauma centers
North Dakota	Mandatory	All acute-care hospitals
Ohio	Mandatory	All acute-care and rehabilitation facilities
Oklahoma	Mandatory	Only designated trauma centers
Oregon	Mandatory	Only designated trauma centers
Pennsylvania	Mandatory	Only accredited trauma centers
South Dakota	Voluntary	Five trauma centers with registries
Texas	Mandatory	All acute-care hospitals
Utah	Mandatory	All acute-care hospitals
Virginia	Mandatory	All acute-care hospitals
Washington	Mandatory	Only designated trauma centers
Wyoming	Mandatory	All acute-care hospitals

to note that a significant proportion of the hospitalized trauma occurring in the United States currently is believed to be captured in a trauma registry at the hospital or state level. Using individual state estimates, we calculate that approximately 66% of registry-eligible trauma occurring in the country is captured in a state, regional, or hospital-specific trauma registry.

### Variability among Statewide Trauma Registry Inclusion and Exclusion Criteria

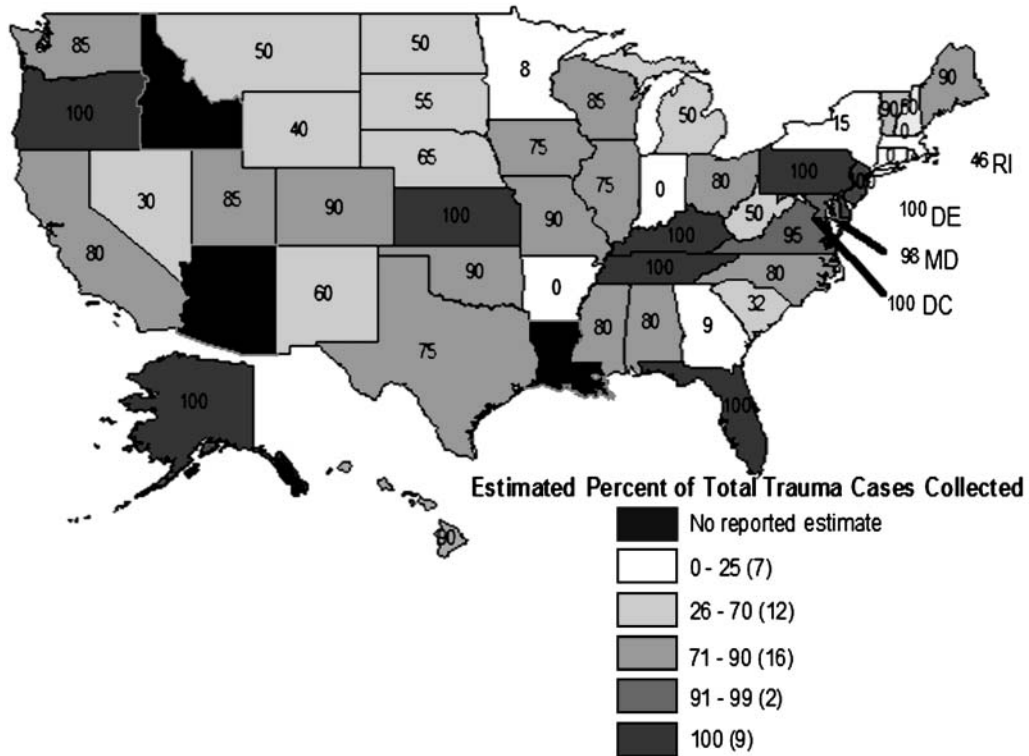
Aggregating explicitly stated inclusion and exclusion criteria for statewide trauma registries identified significant variation, particularly among types of injury not necessarily resulting from blunt or penetrating-force trauma (e.g., drowning or suffocation, electrocution, burns). Table 2 provides classifications of injury explicitly listed as inclusion (or exclusion) criteria that, when considered among all reporting states, were in direct conflict with each other. For example, criteria provided by 13 states indicate that drowning victims (or near drowning victims) are to be included in the state's registry, whereas 15 states explicitly exclude these cases. Other case eligibility criteria demonstrating significant variability among the states' registries include the following: duration and type of emergency department (ED) or hospital admission, interfacility transfer status, and timing and location of death. For example, when comparing inclusion criteria specific to hospital admission, differing state registries explicitly include injured patients who are admitted to the hospital for varying lengths of time (e.g., 24 or 48 hours) or specify admission to specific hospital units (e.g., intensive care unit [ICU], operating room, step-down) or some combination (e.g., ICU admission within 24 hours of hospital arrival).

Interestingly, specific characteristics used to define the parameters of a single trauma-registry inclusion or exclusion criterion also vary dramatically among states. For example, 18 states define specific conditions for which a patient suffering a same-level fall would be excluded from entry into the trauma registry. The conditions used to define this same-level fall exclusion vary considerably. Table 3 illustrates the variability in criteria used to exclude patients with same-level falls when age is (or is not) used by states as a condition for exclusion.

Aggregating inclusion and exclusion criteria does, however, suggest some level of commonality. Figure 2 compares trauma registry inclusion and exclusion categories among states with statewide trauma registries. Also included are states with regionally aggregated trauma registry data not considered to represent a statewide registry collection effort. The preponderance of gray cells in Figure 2 suggests that state (and regional) registries collect some configuration of patients who are admitted to, transferred to, or died in the hospital with a recorded ICD-9-CM code between 800 and 959.9 as a foundation for registry composition. Other types of inclusion criteria characterize injury not resulting from mechanical force and demonstrate much more variability when comparing among states.

### Variability in Trauma Registry Coding Conventions

Experienced trauma registrars associated with statewide trauma registries were asked to abstract a clinical vignette specifically designed to address variability in coding. All 32 states with centralized trauma registries responded to our request. Findings suggest that coding conventions used by different statewide trauma registries also demonstrate significant variability when compared. As an example, most statewide registries collect the date and the time that injury occurred. Yet the exact time of injury rarely is available from the out-of-hospital



**Figure 1.** Estimated proportion of hospitalized trauma cases meeting inclusion criteria that were captured by existing trauma registries.

or hospital records. Table 4 lists different conventions that states use when time of injury is not recorded in the associated medical records. Two thirds of states request that abstractors estimate the time of injury by using proxy information. A second variable commonly documented in statewide trauma registries is the Glasgow Coma Score (GCS) that is recorded during ED care. Results from the survey indicate that 19 states abstract the initial GCS that is documented upon ED arrival. An additional nine states record both the initial GCS and the last one before discharge from the ED. Additional states collect only the worst GCS (one state), best GCS (one state), or initial and worst GCS (two states) documented during ED care.

Registrars associated with each state trauma registry also were given an additional cryptic injury scenario, from which they were to provide the appropriate ICD-9-CM external cause of injury code (e-code).<sup>17</sup> The injury

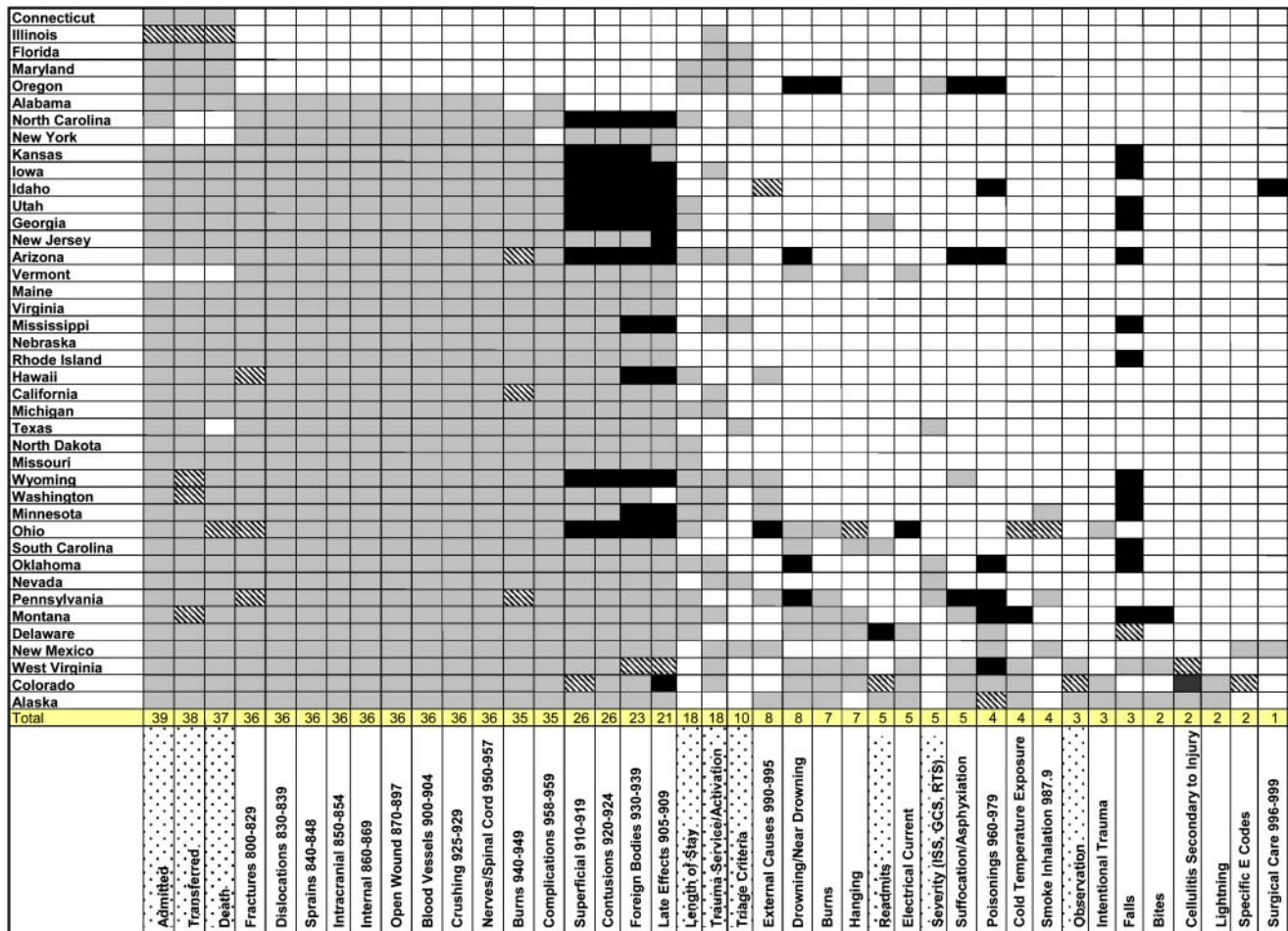
scenario was designed to replicate the short note that often is included on an EMS run sheet or medical-record narrative describing the injury event. As listed in Appendix 1 (available as an online Data Supplement at <http://www.aemj.org/cgi/content/full/j.aem.2006.04.019/DC1>), the scenario reads:

**Table 2**  
Conflicting Explicit Inclusion and Exclusion Criteria among State Trauma Registries

Criteria	Inclusion (Number of States)	Exclusion (Number of States)
Abuse	4	3
Blisters, contusions, abrasions, insect bites	3	11
Drowning	13	15
Foreign bodies	5	17
High-altitude sickness	0	1
Lightning	5	0
Poisoning	2	13
Same-level fall	2	18
Smoke inhalation	7	2

**Table 3**  
Variation in the Definition of the Same-level Fall Exclusion Criteria among 18 State Trauma Registries That Do (and Do Not) Specify Age as a Condition of Exclusion\*

State criteria that use age as a condition of exclusion
Same-level fall AND > 55 years old
Same-level fall AND > 55 years old AND ICD-9-CM 820 or 820.2
Same-level fall AND > 65 years old AND hospital length of stay < 3 days
Same-level fall AND > 65 years old AND/OR extremity fractures AND/OR hip fractures
Same-level fall AND > 65 years old AND ICD-9-CM 820-820.9
Same-level fall AND ≥ 65 years old AND ICD-9-CM 820.0 or 820.9 or 808.20 or 805 or 910-924
State criteria that do not use age as a condition of exclusion
Same-level fall (all falls)
Same-level fall AND/OR unspecified fall (ICD-9-CM E885 or E888)
Same-level fall AND isolated orthopedic injury
Same-level fall AND isolated hip or neck fractures
Same-level fall AND isolated hip fracture (ICD-9-CM 820-820.9, 808.0, 808.1)
Same-level fall AND unilateral pubic rami fracture
Same-level fall AND syncope, admitted but CT normal
* Five additional states use exclusion criteria similar to those listed.



**Figure 2.** Trauma registry inclusion or exclusion criteria for selected states with statewide (or aggregated regional) registries. Forty-one state and regional trauma registries are represented. States without an aggregated registry include the following: AR, DC, IN, KY, LA, MA, NH, SD, TN, WI. Gray cells are inclusion criteria; black cells are exclusion criteria; and hashed cells are both inclusion and exclusion criteria. Patterned criteria (x axis) include “and” qualifier; nonpatterned criteria include “or” qualifier.

**Table 4**  
Variation among States Providing Explicit Coding Conventions When Time of Injury Is Not Documented in the Out-of-hospital or Hospital Medical Record\*

Coding Convention	Number of States
Report “not documented”	10
Report EMS dispatch time	9
Report 5 min before EMS dispatch time	2
Report 10 min before EMS dispatch time	2
Report 15 min before EMS dispatch time	1
Report 5 to 20 min before EMS dispatch time depending on call location and general scene info	1
Report EMS dispatch time only if MVC†	1
Report EMS arrival time	1
Report in categories by hour (<1, 1–6, 7–12, 13–24, or >24)	1
Report out-of-hospital assessment time	1
Report information from bystanders	1

\* Two states did not indicate how “time of injury” is to be coded.  
† Motor vehicle crash.

A 24-year-old FedEx driver was involved in a motor vehicle crash while working. Impact of crash was on driver’s side; patient was unrestrained.

A total of 19 state trauma registrars provided a primary e-code of 812 (812.0 or 812.1), which assumes a traffic collision involving two motor vehicles. An additional nine registrars provided an e-code of 819 (819.0 or 819.1), defined as “motor vehicle traffic accident of unspecified nature,” or of 825, describing a “non-traffic accident of unspecified nature.” One additional state registrar considered the information in the scenario insufficient to code, and two registrars were unfamiliar with the process of e-code assignment. To characterize the location of injury, fewer than half of the registrars provided a second e-code listing “street and highway” (849.5 [n = 11]), “industrial place or premises” (849.3 [n = 1]), or “unspecified place” (849.9 [n = 2]). If one assumes that this cryptic injury narrative should be coded as an unspecific motor vehicle traffic crash (819.0)

Table 5  
Variation among States in the Frequency and Characterization of Injury by Using ICD-9-CM Diagnosis Codes\*

Diagnosis 1	Diagnosis 2	Diagnosis 3	Diagnosis 4	Diagnosis 5	Diagnosis 6	Diagnosis 7	ISS†
801.03	822.1	821.1					18
801.02	910	920	912	922.1	493.9		10
801.00	910.0	920	922.1				10
854.02	922.1	919					10
801.4							9
924.8	919.8	801.4					10
800.42	922.2	910	913				5
801.4	920	910	922.1				10
801.46							9
922.1	910	912	921.9	801.4	493.9		10
801.42	982.0	910	922.2				10
801.46	922.1	920	910	912	921.9	871.4	11
801.13	920	922.1					10
801.42	920	911					10
922.1	920	910	493.9	348.8			2
800.02	910	922.1	920				5
801	348.8	853	920	910	922.1		10
801.4	920	910	922.1	801.4			10
801.32	920	910	922.1	912	921		10
921.9	801.42	920	910	922.1			10
801.06	922.1	920	910	921	913		10
801.2	920	922.1					10
801.32	922.1	920	493.9				10
801	920	910	922.1				10
801.00	910.0	920	922.1				10

\* Four states coded injuries in patterns listed above, and three states did not provide ICD-9-CM diagnosis codes.  
† Injury severity scores, on the basis of ICD-9-CM diagnosis coding.

occurring on a street or highway (849.5), only 19% of statewide registries provided this combination of codes.

Several survey questions associated with the larger clinical vignette scenario allowed us to assess for variation in ICD-9-CM coding. The number of ICD-9-CM codes used to characterize the clinical vignette case ranged from one to seven (Table 5). All but one registrar coded for a type of closed-head injury (800.x, 801.x, 854.0), with half of the 32 abstractors specifying a level of consciousness, which varied from an "unspecified state of consciousness" to a "moderate (1–24 h) loss of consciousness." Assuming that all three base ICD-9-CM codes, 801, 910, and 922 (ignoring extensions), would be required to adequately describe the clinical vignette, 15 states (47%) would have fulfilled this criterion. Calculating ISS scores on the basis of the provided ICD-9-CM codes demonstrated some consistency but had a significant range (2 to 18). Only four registrars coded for "asthma" as a pre-morbid condition. Other variables demonstrating notable variation included ED pulse rate and respiratory rate, hospital disposition, and the characterization of payment source.

## DISCUSSION

Findings from this study suggest that many states make a concerted effort to aggregate trauma registry information from various hospital and/or regional registries. However, wide variability exists in the case composition of each state registry. Specifically, statewide registries demonstrate wide variability (and important contradictions) in criteria used to identify patients for inclusion into each registry. In addition, statewide registries may require or only request trauma data from associated

hospitals. Other state registries include only trauma-designated hospitals in the state registry data collection effort. By not mandating (or excluding) registry data from nondesignated hospitals, it is impossible to assess the effectiveness of a trauma system, because failures in the system (i.e., severe injuries treated in non-designated hospitals) remain undiscovered.

This study also demonstrates that state registries vary considerably when comparing common variable definitions, coding conventions, and abstraction practices. As constructed, state registries probably are effective when considering local hospital and state-level needs. Yet, at the regional or national level, these inconsistencies greatly restrict our ability to aggregate rare events, evaluate various treatment modalities, benchmark hospital performance, assess epidemiological trends, or evaluate the effectiveness of trauma systems.

Several important steps will be necessary to allow individual registry data to be compared among states and regions. First, development of a uniform list of data variables with standard data definitions could represent a minimal national data set, with states designating other variables of interest. In addition, designating a uniform set of inclusion and exclusion criteria would allow for aggregation of comparable cases for comparison among registries. Because of the wide variability among registry-inclusion criteria, a least-common-denominator approach may be necessary.

Variability in coding associated with the characterization of injuries represents a host of more complex issues. Individual hospital registries may (or may not) require that trauma registrars receive specialized training to code injuries.<sup>18</sup> Dated research suggests that nearly a third

may not receive adequate training.<sup>19</sup> Thus, in many instances, ISSs are derived with little uniformity or may be based on diagnostic codes that are abstracted primarily for billing purposes. Research comparing injury coding provided by trained trauma registrars vs. codes derived for billing purposes demonstrates subtle but important differences.<sup>20,21</sup> Moreover, registry software packages claiming to provide ISS scoring are not uniform and calculate scores differently.<sup>22</sup>

Progress is, however, being made to standardize the collection of key variables commonly found in existing trauma registries. The National Trauma Data Bank (NTDB) represents a concerted and sustained effort by the American College of Surgeons Committee on Trauma (ACSCOT) to provide an extensive collection of trauma-registry patients that is provided primarily by accredited or designated trauma centers across the United States.<sup>23</sup> Members of ACSCOT and staff associated with the NTDB have long recognized that the NTDB inherits the individual deficiencies of each contributing registry.<sup>24</sup> Currently, the ACSCOT Subcommittee on Trauma Registry Programs is supported by the U.S. Health Resources and Services Administration (HRSA) to devise a uniform set of trauma registry variables and associated variable definitions. This uniform set of registry variables could be collected by all registries and represent the contents of a standardized national trauma registry.<sup>15</sup> The ACSCOT Subcommittee also is working to characterize a core set of trauma-registry inclusion criteria that would maximize participation by all state, regional, and local registries. Institutionalizing these basic standards would greatly increase the likelihood that a national trauma registry would provide clinical information characterizing traumatic injury that would enhance our ability to instigate strategies to improve trauma care in the United States.

A second effort, funded by the Emergency Medical Services for Children program within HRSA, has focused on the development, design, and plan for a National Trauma Registry for Children (NTRC).<sup>14</sup> The goal of the NTRC project is to develop a blueprint and business plan for a pediatric trauma information system that will provide reliable data for use in injury prevention, quality assessment, and research studies.

## LIMITATIONS

There are several limitations associated with our study that should be mentioned. As with any survey methodology, our study findings are susceptible to bias because of inaccurate or incomplete (or both) reporting. For example, it is possible that information contained within the clinical vignette was too cryptic and general, not allowing abstractors to consider carefully the most appropriate codes for abstracting the case. Nevertheless, our experience suggests that pertinent injury-related information found in medical (and EMS) records often is vague, and our vignette exercise was designed to determine the reliability and validity of abstracted registry data under these circumstances. Nevertheless, our findings may not be representative of situations in which medical records provide additional (and supportive) information.

Second, we did not collect information regarding the experience or educational background of abstractors completing the clinical vignette. State trauma managers were asked to identify an "experienced abstractor" to complete the vignette, which undoubtedly resulted in variability in experience and education. Our purpose, however, was to assess the consistency with which data are abstracted among a cross-section of abstractors who are working daily, entering data into state trauma registries. Finally, our national estimate of hospitalized trauma captured in existing registries is limited by the accuracy of state estimated-capture rates and variability in case acquisition and registry composition particular to each registry. In addition, our weighting scheme that was used to approximate the completeness of a national aggregation of trauma data from existing registries is limited by the assumption that the number of patients with registry-eligible trauma is, in general, similar among states. The prevalence of registry-eligible (serious) trauma may vary among states on the basis of, for example, state laws (e.g., the presence of a primary seat belt law). Nevertheless, this crude methodology provides at least a gross approximation of the potential capacity of a national data repository if trauma data submission was universal and data collection was standardized.

## CONCLUSIONS

Our findings suggest that without a uniform set of variables, definitions, value codes, and coding instructions, statewide trauma registries demonstrate significant variation in the composition and content of each registry. Uniformly accepted and applied recommendations for trauma registry composition and content would greatly enhance the usability of aggregated, national trauma registry data.

## References

1. Sartwell PE. Preventive Medicine and Public Health, 10th ed. New York: Appleton-Century-Crofts, 1973.
2. National Academy of Sciences/National Research Council, Division of Medical Sciences. Accidental Death and Disability: The Neglected Disease of Modern Society. Washington DC: National Academy of Sciences/National Research Council, 1968.
3. Goldberg J, Gelfand HM, Levy PS, Mullner R. An evaluation of the Illinois Trauma Registry. *Med Care*. 1980; 18:520-31.
4. Centers for Disease Control (CDC). National survey of trauma registries, United States, 1987. *MMWR Morb Mortal Wkly Rep*. 1989; 38:857-9.
5. Pollock DA, McClain PW. Trauma registries: current status and future prospects. *JAMA*. 1989; 262:2280-3.
6. Shapiro MJ, Cole KE Jr, Keegan M, Prasad CN, Thompson RJ. National survey of state trauma registries, 1992. *J Trauma*. 1994; 37:835-40.
7. Vestrup JA, Phang PT, Vertesi L, Wing PC, Hamilton NE. The utility of a multicenter regional trauma registry. *J Trauma*. 1994; 37:375-8.
8. Kung HC, Hanzlick R, Spittler JF. Abstracting data from medical examiner/coroner reports: concordance

- among abstractors and implications for data reporting. *J Forensic Sci.* 2001; 46:1126–31.
9. Herrmann N, Cayten CG, Senior J, Staroscik R, Walsh S, Woll M. Interobserver and intraobserver reliability in the collection of emergency medical services data. *Health Serv Res.* 1980; 15:127–43.
  10. Pollock DA, McClain PW. Report from the 1988 Trauma Registry Workshop, including recommendations for hospital-based trauma registries. *J Trauma.* 1989; 29:827–34.
  11. American College of Surgeons Committee on Trauma. Hospital Resources for Optimal Care of the Injured Patient. Chicago, IL: American College of Surgeons, 1979.
  12. Owen JL, Bolenbaucher RM, Moore ML. Trauma registry databases: a comparison of data abstraction, interpretation, and entry at two level 1 trauma centers. *J Trauma.* 1999; 46:1100–4.
  13. Garthe E. Overview of trauma registries in the United States. *J AHIMA.* 1997; 68:28–32.
  14. The Health and Human Services Administration. Maternal Child Health Bureau. Emergency Medical Services for Children Program. National Trauma Registry for Children Planning Grants (Grants 1H72 MC00004 01 and 1H72 MC00002 01). Washington, DC: Emergency Medical Services for Children. 2002.
  15. The Health and Human Services Administration. Health Resources and Services Administration. Trauma-Emergency Medical Services Systems Program. National Trauma Data Bank (NTDB): Data Element Identification. (03-MCHB-93B [DLC]). Washington, DC: Emergency Medical Services for Children. 2003.
  16. Silverman D. Analyzing talk and text. In: Denzin LY, editor. *The Handbook of Qualitative Research.* Thousand Oaks, CA: Sage, 2001, p 821–34.
  17. International Classification of Diseases, 9th Revision, Clinical Modification. Washington, DC: U.S. Department of Health and Human Services Publication No. (PHS) 80–1260. Government Printing Office, 1980.
  18. Association for the Advancement of Automotive Medicine. The Abbreviated Injury Scale, 1990 Revision. Des Plaines, IL: Association for the Advancement of Automotive Medicine, 1990.
  19. Gantt DI, Price JP, Pollock DA. The status of the trauma coordinator position: a national survey. *J Trauma.* 1996; 40:816–9.
  20. Mullins RJ, Veum-Stone J, Hedges JR, Zimmer-Gembeck M, Mann NC, Helfand M. An analysis of hospital discharge index as a trauma data base. *J Trauma.* 1995; 39:941–8.
  21. McCarthy ML, Shore AD, Serpi T, Gertner M, Demeter L. Comparison of Maryland hospital discharge and trauma registry data. *J Trauma.* 2005; 58:154–61.
  22. Lucas CE, Buechter KJ, Coscia RL, et al. The effect of trauma program registry on reported mortality rates. *J Trauma.* 2001; 51:1122–6.
  23. National Trauma Data Bank Report 2004. American College of Surgeons Web site. Available at: <http://www.facs.org/trauma/ntdbpediatric2004.pdf>. Accessed Mar 25, 2005.
  24. Subcommittee on Trauma Registry Programs, American College of Surgeons Committee on Trauma. National Trauma Data Bank Reference Manual: Background, Caveats, and Resources. October, 2004. Available at: <http://www.facs.org/trauma/ntdbmanual.pdf>. Accessed Mar 25, 2005.

## Where to Find AEM Instructions for Authors

For complete instructions for authors, see the January or July issue of *Academic Emergency Medicine*; visit <http://ees.elsevier.com/acaeme/default.asp> and click on "Guide for Authors"; or contact SAEM via e-mail at [aem@saem.org](mailto:aem@saem.org), via phone at 517-485-5484, or via fax at 517-485-0801.