Work-related injury hospitalization trends in Kentucky, 2012-2017

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Work-related injury hospitalization trends in Kentucky, 2012-2017

Study Aims:

To evaluate Kentucky work-related injury hospitalization trends, 2012-2017, and possible changes associated with the transition from ICD-9-CM to ICD-10-CM coding of health claims.
Why transition from ICD-9-CM to ICD-10-CM?

• ICD-9-CM:
  - in use since 1979
  - content is no longer clinically accurate
  - limited data about patients’ medical conditions

• U.S. mortality data coded in ICD-10 since 1999; direct comparison between mortality and morbidity data is not possible/easy

• Most developed countries implemented ICD-10-based versions of morbidity data; U.S. cannot compare directly U.S. morbidity data with international data
What is this “transition to ICD-10-CM”?

- Transition from ICD-9-CM to ICD-10-CM to code health information in administrative datasets
- ICD-10-CM is more complex than ICD-9-CM
  - Injury diagnosis codes
    2,600 in ICD-9-CM; 43,000 in ICD-10-CM
  - External cause codes
    1,300 in ICD-9-CM; 7,500 in ICD-10-CM
- Standard case definitions, reporting frameworks, analytic software programs, etc. need to be updated for ICD-10-CM

Slide borrowed from:
External Cause of Injury (ECOI) Codes

• Intended to provide information for injury research
• Capture: cause, intent, place, and activity of an injury

Principal Diagnosis: S02.2XXA-Fracture of nasal bones, initial encounter for closed fracture
ECOI 1: Y04.8XXA- Assault by other bodily force, initial encounter
ECOI 2: Y92.219- Unspecified school as the place of occurrence of the external cause
ECOI 3: Y93.389- Activity, other specified

Principal Diagnosis: S72.302A- Unspecified fracture of shaft of left femur, initial encounter for closed fracture
External Causes of Injuries (ECOI)

“There is no national requirement for mandatory ICD-10-CM external cause code reporting. Unless a provider is a subject to a state-based external cause code reporting mandate or these codes are required by a particular payer, reporting of ICD-10-CM codes in Chapter 20, External Causes of Morbidity, is not required. In the absence of a mandatory reporting requirement, providers are encouraged to voluntary report external cause codes, as they provide valuable data for injury research and evaluation of injury prevention strategies.”

(ICD-10-CM Guideline for Coding and Reporting)
External-cause-of-injury Code Completeness in Kentucky Inpatient Hospitalization Data
Frameworks for Presenting Injury Data by Mechanism and Intent of Injury

Table 1. Recommended framework of E-code groupings for presenting injury data

<table>
<thead>
<tr>
<th>Mechanism/Cause</th>
<th>Unintentional</th>
<th>Self-inflicted</th>
<th>Assail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cut/pierce</td>
<td>E920.0-9</td>
<td>E956</td>
<td>E966</td>
</tr>
<tr>
<td>Drowning/submersion</td>
<td>E830.0-9, E832.0-9</td>
<td>E954</td>
<td>E964</td>
</tr>
<tr>
<td>Fall</td>
<td>E880.0-9, E886.9, E888</td>
<td>E957.0-9</td>
<td>E968</td>
</tr>
<tr>
<td>Fire/burn</td>
<td>E990.0, E999, E924.0-9</td>
<td>E958.1, 2.7</td>
<td>E961</td>
</tr>
<tr>
<td>Fire/fire</td>
<td>E990.0, E999</td>
<td>E958.1</td>
<td>E968</td>
</tr>
<tr>
<td>Hot object/substance</td>
<td>E924.0-9</td>
<td>E958.2, 7</td>
<td>E961</td>
</tr>
<tr>
<td>Fumes</td>
<td>E922.0-3.8, 9</td>
<td>E955.0-4</td>
<td>E965</td>
</tr>
<tr>
<td>Machinery</td>
<td>E919.0-9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motor vehicle/traffic</td>
<td>E810-E819.0-9</td>
<td>E958.5</td>
<td>E968.5</td>
</tr>
<tr>
<td>Occupant</td>
<td>E810-E819.0-9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motorcyclist</td>
<td>E810-E819.2-3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adapted from Injury Source</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The transition from ICD-9-CM to ICD-10-CM coding has the potential to affect epidemiological analysis of injury morbidity trends due to:

1) key structural and conceptual differences between ICD-9-CM and ICD-10-CM
2) new ICD-10-CM-specific coding guidelines
3) structural differences between the external-cause-of-injury matrices for reporting of injuries in ICD-9-CM and ICD-10-CM
4) concerns with data quality and coding productivity during the transition period
Example: Coding rule introduced in ICD-10-CM Official Guidelines for Coding and Reporting:

Chapter 20: External Causes of Morbidity (V00-Y99); Section h: Unknown and Undetermined Intent Guidelines:

“If the intent (accident, self-harm, assault) of the cause of an injury or other condition is unknown or unspecified, code the intent as accidental intent. All transport accident categories assume accidental intent. External cause codes for events of undetermined intent are only for use if the documentation in the record specifies that the intent cannot be determined”.

Example: Conceptual Change

- In the ICD-9-CM coding system, an injury due to suffocation mechanism was identified by an ECOI code (ICD-9-CM codes in the range E911-E913.9, E953.0-.9, E963, E983.0-.9, or E995.3)

- In ICD-10-CM, injuries due to suffocation mechanism are identified by diagnosis codes only (selected sub-codes of T17 or T71)

- The diagnosis codes are required for reimbursement, while the ECOI codes are not required for reimbursement

- Therefore, it was expected that with the implementation of the ICD-10-CM coding there will be an improved identification/capturing of suffocation injuries
Example:

1) Issue with ICD-10-CM Coding, version 2015
   - Missing code for Overexertion (from Oct 1, 2015 to Sept 30, 2016)
   - X50 (Overexertion and strenuous or repetitive movements) was added in ICD-10-CM version 2016; effective of Oct 1, 2016

2) Issue: the CDC definition for Overexertion includes code W18.4 Slipping, Tripping and stumbling without falling
Results

Kentucky Work-related Hospitalization Rates
Results

Work-related Injury Hospitalization Rate
Traumatic Brain Injury Work-related Hospitalization Rate
Results

• The new code Y99.0, Civilian activity done for income or pay, was listed in less than 3% of the injury hospitalizations billed to WC

• The codes for activity and place of injury were rarely used (<2%)

• A survey among Kentucky medical coders on issues related to the ICD-10-CM transition found that the biggest obstacle for coding activity and place of injury was the insufficient documentation of injury circumstances in the medical record
Conclusions

• The CDC-proposed ICD-10-CM external-cause-of-injury matrix provided reasonable transition from the ICD-9-CM-based definitions utilized by injury surveillance programs

• A major benefit of ICD-10-CM system is the increased coding level of detail for traumatic injuries

• Our preliminary results showed that medical records often do not contain enough detail to support accurate and complete external-cause-of-injury coding

• Possible solutions include continuing education and engagement of physician leadership to communicate the need for more detailed documentation in medical records
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• **Questions:**

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Kentucky Work-related Injury Hospitalizations

Study Methodology:

• The analysis used Kentucky inpatient hospital discharge data from the Office of Health Policy, Cabinet for Health and Family Services.

• An injury dataset for each quarter between January 1, 2012 and September 30, 2017 was identified based on a principal diagnosis of injury.

• The selection of injury diagnoses was based on:
  1) the CDC’s *State Injury Indicators Report: Instructions for Preparing* for ICD-9-CM-coded data\(^1\)
  2) the CDC *Proposed Framework for Presenting Injury Data using ICD-10-CM External Cause of Injury Codes* for ICD-10-CM-coded data\(^2\)

• A claim was considered work-related if workers’ compensation (WC) was listed as an expected payer.

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Study Methodology:

• Quarterly census of employment data from the Bureau of Labor Statistics were used in rate denominators

• Segmented regression analysis for interrupted time series\(^3\) with autocorrelation correction\(^4\) across time was used to evaluate the immediate effect of the coding transition on injury hospitalization trends and significant changes in the trends after the transition

• SAS proc AUTOREG with nlag=5 and BACKSTEP option was used to select the correct order of the autoregressive error

\(^3\)Wagner AK, Soumerai SB, Zhang F, Ross-Degnan pharmacy and therapeutics. 2002;27(4):299-309

The general form of the autoregressive error model of order \( k \) would be

\[
Y_t = \beta_0 + \beta_1 \cdot \text{time}_t + \beta_2 \cdot ICD10CM_t + \beta_3 \cdot \text{time-after-ICD10CM}_t + \nu_t,
\]

\[
\nu_t = -\gamma_1 \nu_{t-1} - \gamma_2 \nu_{t-2} - \cdots - \gamma_k \nu_{t-k} + \epsilon_t,
\]

where \( \epsilon_t \) are independently normally distributed with mean zero and variance \( \sigma^2 \).

Proc AUTOREG with a BACKSTEP option was used to select the correct order of the autoregressive error model. The initial full high-order model specified 4 lags (nlag=4) to account for potential seasonal trends in the quarterly time series.
Results

- On average, about 92% of the injury records were supplemented with an external cause of injury (ECOI) code.

- A significant drop of about 7% in the ECOI codes in the first months after the transition to ICD-10-CM coding.

- The trend (slope) after the transition was not significantly different from the trend before the transition.

ECOI Completeness

![Graph showing ECOI Completeness over time](image-url)