

## **Nature of Injury by Site Diagnostic Matrix: Differences Between the Israeli and the U.S. Versions**

V. Barell, R.J. Heruti ,\* MD, L. Daniel-Aharonson, A Ziv, A. Abargel, MD\*  
Health Services Research Unit, Ministry of Health, Israel  
\*Trauma Branch, Medical Corps, Israel Defense Forces

The concept of the Israeli and the U.S. injury diagnostic matrices are similar as both are ICD-9 CM based and are bi-axial, with the nature of injury on one axis and indication of the body region injured on the other.

Most of the differences result from the greater classification of injury site regions in the Israeli matrix (22 sites), designed for five ICD-9 positions (XXX.XX) as recorded in the Israeli National Trauma Registry. The U.S. matrix, with 9 injury sites, has been developed for a wider range of databases and is appropriate for 3 and 4 digit hospital discharge data, but with considerable loss of detail. As a result, in the Israeli matrix, developed by Barell, Heruti et al, there are 128 diagnostic cell groups, based on a clinical rationale allowing identification of specific severe injuries and surgical specialties, as compared with 74 diagnostic groups in the U.S. matrix, developed by MacKenzie, Champion and Cox.

Neither the U.S. nor the Israeli matrices classify a number of external causes by site. Many of these are non-traumatic, systemic injuries, such as poisonings (960-979), toxic effects (980-989), and other and unspecified effects of external causes (990-995). The late effects of injuries (905-909), early complications of trauma (958) and complications of surgical and medical care (996-999) were also not classified by site. The rest of the 12 nature of injury categories are similar in both classifications. Two subset classifications are accessed separately in the U.S. matrix: amputations are a separate, independent nature of injury and hip fracture is an independent site. In the Israeli version, amputations are a subset of open wound and can be accessed separately or as part of the open wound group. Hip fracture is a subset of lower limb fractures.

The Israeli body region classification is subdivided into more detailed sites than is the U.S. matrix. As many of the subdivisions are based on the fourth and fifth digit of the ICD code, some of the site distinctions are lost in redefining the diagnostic cell classification to three and four digit codes. When regrouped, these become quite similar to those in the U.S. matrix. In the expanded Israeli version, they enable more specific questions to be asked. For example, head injuries are subdivided into 3 groups and facial injuries in 2 groups, as follows: Traumatic brain injury (further classified into definite and possible or mild brain injury) was defined in accordance with the CDC definition of central nervous system injuries\*: other head injuries were categorized separately. These can all be collapsed into one group of head injuries. Eye injuries have been separated from those in the rest of the face.

---

\*Thurman D.J., Sneizak J.E., et al. Guidelines for Surveillance of Central Nervous System Injury. Atlanta: Centers for Disease Control and Prevention, 1995

Differentiation between cervical, thoracic, and lumbo-sacral injuries to the spinal cord is an integral distinction of the Israeli matrix, while the U.S. version combines all the CNS spinal cord regions. Injury to spinal vertebra is also subdivided by regions.

The abdomen and pelvis are defined separately in the Israeli matrix: the pelvic ring (without the pelvic vertebrae), pelvic contents and genital organs are a separate site group. The U.S. matrix includes the pelvic ring in with the lower extremities and abdominal and pelvic injuries are jointly defined.

Body region is specified for burns, nerve injuries and effects of foreign bodies entering through orifice in the Israeli matrix: the U.S. matrix assigns burns for all sites in *other* and all nerve injuries to *other* body region except for those which belong to the spine, head or face. All foreign body injuries have been grouped together in the U.S. matrix. In the Israeli matrix, foreign body is assigned according to the body region of the affected orifice (not shown).

The most important conceptual difference lies in the way the matrices are used. The U.S. example presented at the ICE meeting accesses only the first recorded or primary injury diagnosis, while the Israeli proposal accesses all diagnoses recorded on the injury report. The Israeli analytic approach enables a more complete and accurate profile of the nature and type of injuries for individual patients, as multiple diagnoses reflect the actual injury pattern in the individual. Multiple injuries are generally associated with greater severity, as is shown when using the Injury Severity Score (ISS). All cases with a specific injury are never included when using only the first recorded or principal diagnosis, as any specific injury diagnosis may appear in any position in the discharge data record. In addition, guidelines may not exist for definition of first recorded or principal diagnosis, and in practice, considerable variation exists. It is also difficult to assign one principal diagnosis: what is the major injury in an injured person who has both a brain laceration and a ruptured aorta? In any case, only one of these would be counted should only first recorded diagnosis is used.

Work remains to be done to present a joint nature by site of injury diagnostic matrix which is suitable for all levels of ICD classification, as well as ICD-10 as the matrix is used in selection of different patient groups or casualty types, or in response to different analytical tasks. We believe that it will become a basic tool in clinical or epidemiological research, and promote comparability of data in widely differing settings.