

Supplement Figure S1. Study methodology. The goal of the study is to provide, identify, and quantify problematic ICD-9-CM to ICD-10-CM mapping motifs because these may affect the management of clinical practice. As shown on the top of the figure, two CMS General Equivalent Mapping (GEM) files provided by the Center for Medicaid and Medicare Services (CMS) correspond to the mapping of ICD-9-CM to ICD-10-CM and the converse. These are integrated in a network (**Figure 2A**) that is further abstracted as an assemblage of mapping motifs (**Figure 1**). These mapping motifs describe in detail the relationships between one ICD-9-CM code, their mapping into ICD-10-CM, and their direct mapping back to ICD-9-CM. These mapping motifs are synthesized into five mapping categories (from the simplest to the most convoluted mapping categories, **Figure 2B**), from which all statistics are determined, such as the number of mappings in each category per clinical specialty (**Figure 3**). The labeled ICD-9-CM and the respective mapping categories are applied to a statewide emergency department billing data (ED-IHC). The number of ICD-9-CM codes, patient encounters, and cost for the 5 mapping categories is then calculated in the ED (**Figure 4A**). From the cost calculation, identification of high cost convoluted codes revealed two challenging mapping to ICD-10-CM. For example, the concept of “Accidental poisoning by unspecified drug” does not exist anymore in ICD-10-CM, where emergency department physicians will be required to specify the drug category that requires a certainty not reflecting clinical practice.

ICD-9-CM to ICD-10-CM forward and backward



Visualize joint network

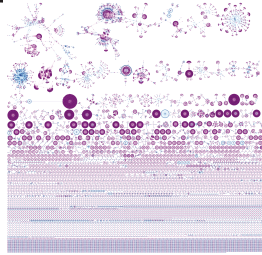


Fig. 2 A

Analysis of network motifs

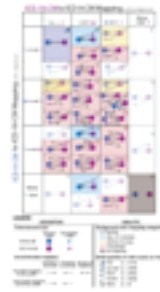


Fig. 1

Network motifs synthesized as categories

Mapping Category	Percentage	Mapping Motif Example	Mean Category (R10.10)	Mean Category (R10.10)
Identity	24%	Mapping relation of acute post-infectious colitis to Mapping relation of acute gastroenteritis	100	100
Class-to-Subclass	22%	Mapping relation of acute gastroenteritis to Mapping relation of acute gastroenteritis	100	100
Subclass-to-Class	11%	Mapping relation of acute gastroenteritis to Mapping relation of acute gastroenteritis	100	100
Convolutated	14%	Mapping relation of acute gastroenteritis to Mapping relation of acute gastroenteritis	100	100
No mapping	11%	Mapping relation of acute gastroenteritis to Mapping relation of acute gastroenteritis	100	100

Fig. 2 B & Table 3

Discrimination by clinical specialty

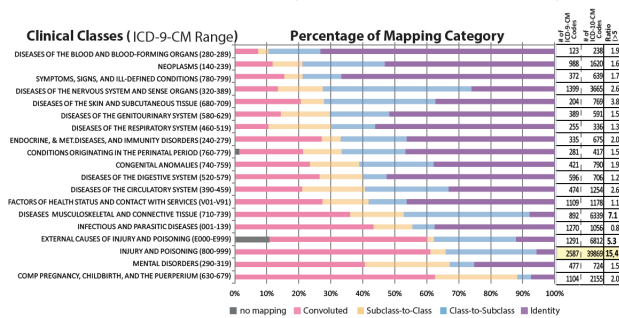


Fig. 3

ED-IHC Data
217 Facilities
14,472 patients
24,000 Encounters

Emergency Dept. coding stats

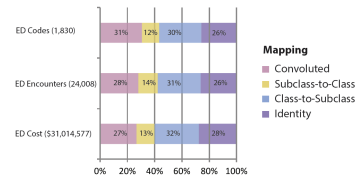


Fig. 4 A

Convolutated coding cost impact

Fig. 4 B-C

