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I am a general internist and Professor of Medicine at Yale School of Medicine. One of the research areas I have focused on is the study of complications of care, with the view that if we can accurately identify the factors and circumstances that account for complications then we will be able to reduce their occurrence. Indeed, several states such as Maryland are now adjusting hospital payments based on this research.

The usefulness and reliability of this kind of research depends very much on how precisely we can identify the specifics of the complication and exactly how it was treated. Although considerable progress has been made in the past several years, complication rates remain unacceptably high. The ICD-9 coding system fails to provide the level of detail needed to expand these efforts. I have been frustrated many times at ICD-9's inability to specify the exact nature of a complication, its extent, its location, and how it was treated.

As an example of the differences between ICD-9 and ICD-10, consider a 74-year-old man who fell, sustaining a puncture wound that severed his left femoral artery. He was rushed to surgery, where the damaged portion of the artery was replaced with a synthetic graft. These events are coded in ICD-9 as a diagnosis of “Injury to the common femoral artery”, and a procedure of “Resection of vessel with replacement”. There is no mention that the injury was a major laceration on the left side, or that the *type* of replacement was a synthetic graft, all of which is included in the ICD-10 coding.

The lack of detail is even more obvious when it comes to complications. The same man developed bleeding at the site of the graft on the day after surgery. He returned to the OR, his incision was reopened and the graft repaired at the site of the leak. ICD-9 codes this as “Mechanical complication of other vascular device or implant or graft” and the procedure code is “Revision of vascular procedure”. So all we know is that there has been some type of complication that required some type

of surgery, but that's about it. The ICD-10 code provides a much more complete picture, telling us that the complication was a hemorrhage, exactly where it occurred, and that the "revision" was a re-suture of the graft using an open approach.

Another major flaw in ICD-9 is that it does not have the capacity to expand to provide new codes describing new treatments and technologies. This means that new techniques such as minimally invasive surgery, which have been increasingly and successfully used in cardiac surgery, and are rapidly expanding into other surgical fields, cannot not be adequately described using the simplistic four digit structure of ICD-9. Minimally invasive surgeries use smaller incisions, which results in fewer complications, less discomfort, more rapid healing and shorter hospital stays. If we continue to use ICD-9, these new procedures will have to be described in general terms or included in codes that contain open surgical approaches, resulting in insufficient detail to track their increasing use.

The structure of ICD-10 allows this important information to be captured in a systematic manner, and can be readily expanded to incorporate descriptions of new discoveries and treatments when they become available. Such capacity is critical to track and assess the efficacy of these new technologies.