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Medical coders' use of the ICD-10-CM "unspecified" codes for head and brain injury in emergency department settings

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Abstract

Context: In the emergency department (ED) setting, prioritizing triage and patient care may lead to challenges in capturing detailed documentation necessary for specific International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM) coding in medical records. Consequently, the prevalent use of the "unspecified head injury" code poses concerns about the precision of ED-based administrative billing claims data when analyzed for public health surveillance of nonfatal traumatic brain injuries (TBIs). Understanding the perspective of medical coders can illuminate coding processes and opportunities to enhance coding accuracy for TBI and other head injuries in the ED.

Objective: This evaluation explores medical coders' perspectives and challenges when assigning ICD-10-CM codes to head injuries in the ED.

Design: This qualitative evaluation utilized a phenomenological approach, which employed semi-structured interviews to understand medical coders' perspectives, processes, and coding determinations for head injuries in the ED.

Setting: Interviews were conducted using a HIPAA-compliant video-based platform between July 2022 and January 2023.

Participants: Seventeen medical coders with ED coding experience were interviewed. Their backgrounds were diverse, though most had more than 15 years of experience.

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Main Outcomes: Four qualitative themes emerged, which highlighted challenges with lack of detailed documentation, defaulting to unspecified codes, time and productivity pressure, and additional insights into coders' assumptions and code determination processes.

Results: Medical coders expressed challenges assigning ICD-10-CM codes to the highest level of specificity, citing issues including insufficient documentation by ED providers and terminology variations. Workplace time constraints and pressure for expedited claims also led to defaulting to unspecified codes.

Conclusions: This evaluation highlights the need for improved documentation consistency and detail in ED records to facilitate accurate ICD-10-CM coding. Alleviating time pressures, improving algorithms, and offering specialized training opportunities to medical coders could be helpful steps to improve coding specificity and data accuracy for head injuries in the ED.

Keywords

ICD-10-CM; emergency department; head injuries; documentation; data accuracy

In the fast-paced environment of the emergency department (ED), healthcare providers prioritize immediate patient care in an environment with documented overcrowding and staffing challenges.[1,2] In this context, healthcare providers may include concise histories of presenting issues, while leaving out information medical coders (MC) may need to accurately and reliably assign International Classification of Diseases (ICD) Clinical Modification (CM) coding used in healthcare administrative billing claims data.[3] Although not intended for this use, ICD coding input into healthcare billing claims data is invaluable for public health surveillance, and the Centers for Disease Control and Prevention (CDC) uses ICD codes to develop surveillance definitions. These definitions are in turn used by researchers, as well as state and federal agencies, to assess the prevalence of diseases and injuries, including nonfatal traumatic brain injuries (TBIs).

In 2016, as part of the transition from ICD-9-CM to 10-CM coding, CDC developed a new surveillance definition for nonfatal TBIs.[4] CDC's updated TBI surveillance definition excluded the "unspecified injury of head" (S09.90) ICD code due to concerns about its validity.[4,5] While removed from use in CDC's ICD-based surveillance, the "unspecified injury of head" code is still widely used in administrative billing claims data. Further, a review of medical records in four states found that 36–52% of records coded as "unspecified injury of head" contained medium or high evidence of TBI symptomatology.[5] Thus, the use of "unspecified injury of head" versus more specific codes in claims data likely results in undercounting nonfatal TBI cases seen in EDs in the United States.[2–4]

Despite their critical role in bridging the gap between ICD coding in the ED and public health surveillance, little is known about the perspective of MCs and their ability to accurately and reliably apply ICD codes to TBI and other head injury encounters. The primary objective of this study was to explore MCs' views and use of the "unspecified injury of head" (S09.90) code in the ED setting, and evaluate the challenges and facilitators that may affect MCs' overall coding decisions, as well as opportunities for action to improve ICD-10-CM coding for head injuries in the ED. This examination highlights an important

intersection for public health, where surveillance that underscores preventative initiatives intersects the implementation of clinical medical practice.

Methods

This evaluation used a phenomenological approach to examine usage of "unspecified" ICD-10-CM codes (S09.90) for head injury.[6] A qualitative approach was selected that incorporated semi-structured interviews, approximately 30–45-minutes in length, using a video-based platform compliant with the U.S. Health Insurance Privacy and Accountability Act (HIPAA) to accommodate the geographic dispersion of the sample. Interviews were conducted between July 2022 and January 2023. The Consolidated Criteria for Reporting Qualitative Research checklist (COREQ) and Standards for Quality Improvement Reporting Excellence (SQUIRE) guidelines were used to ensure quality of reporting for this evaluation.[7,8] The Michigan Public Health Institute Institutional Review Board (IRB) designated this a Non-Human Subjects project (N-18088). Although not required by IRB, the interviewer provided all participants with information regarding their rights to ensure informed consent. The evaluation team developed an interview guide to provide consistency in queries, while allowing for flexibility to discuss other points that participants might raise. In addition to queries regarding their work environment, facilitators and challenges, participants were given two vignettes and asked to provide ICD-10-CM coding determinations.

The team purchased contact lists containing job title, employer, and location for MCs across the United States. Organizations that train MCs were contacted to assist with outreach through their networks. Team members searched LinkedIn and MC bloggers were invited to share recruitment information. Leaders in professional organizations shared recruitment information with their networks, particularly after their own participation in the interviews, engaging a snowball approach. Respondents received a $50 gift card in recognition of their time.

Data analysis

Participant data were stored separately from recordings and transcripts in a firewall-protected drive. Transcripts were deidentified for analysis. Data analysis used the RADaR method.[9] Qualitative codes were initially identified through in-vivo coding, with concepts emerging from the participants' own words. In qualitative research, saturation is the point where information presented in the data tend to be redundant to already collected information, implying that nothing new will likely emerge by continuing to collect data.[10] In this case, interviews were collected prior to initiating analysis, with a goal of 12–15 interviews, making saturation very likely. Upon reaching saturation (at 7 transcripts), a preliminary codebook was created, which was then used to code 10 additional transcripts. Two members of the team reviewed the codes, and through random selection of coded transcripts (n=5), double coded to verify interrater reliability. Thematic clusters were identified from the reduction tables and the codebook was finalized. The team used the finalized codebook and reduction tables to summarize data and identify supporting quotations. Themes and codes were collapsed through consultation with the full team for

clarification and description in manuscript writing. While the team was unable to conduct member-checking interviews due to time constraints, emerging concepts were supported through the substantial number of interviews completed, well surpassing saturation.

Results

A total of 17 MC participants were interviewed. Most participants (n=12) had more than 15 years of experience and few (n=5) had previous experience or training in the medical or allied field (one had some nursing school, three had been medical assistants or EMTs, and one had been a high school science teacher). Analysis identified four qualitative themes and eight qualitative subcodes (See Table 1). Additionally, participants offered a range of opportunities for action for improving ICD-10-CM coding of these types of injuries.

Theme1: Lack of detail for ICD-10-CM coding

The most significant challenge that MCs identified consistently across interviews was lack of sufficient detail to identify the most appropriate and specific ICD-10-CM code. This included issues related to variations in terminology used by healthcare providers and a lack of thoroughness in the documentation available to them.

Terminology.—Participants raised the issue that terminology about head injury used by healthcare providers varies across the country. Additionally, clinical jargon used in patient documentation may not be consistent with ICD-10-CM coding guides, even if providers are using terminology that matches metrics or assessments, including those in hospital standardized metrics. When terminology does not match what MCs are searching for in the documentation, errors in coding may be introduced.

Thoroughness of documentation.—MCs stated that they want healthcare providers to use specific ICD-10-CM codes that include three-digit level numbering. Participants described how they use an encoder or a guide to identify the ICD code path (trauma versus non-trauma, for example). They then select a code based on specific terminology or indicators. Respondents consistently mentioned three items they search for in the documentation (diagnosis or in the narrative of a record) of patients with a head injury: (1) loss of consciousness (LOC) and its duration, (2) use of the word “trauma,” and (3) location of the injury (on the head). Participants highlighted the ease with which MCs can be misdirected towards a non-trauma set of ICD-10-CM codes without the right cues in the documentation. One respondent explained:

> Use the word ‘trauma’ so I can easily pick it out… That’s one major thing that’s missing when providers do their documentation. So, if a coder is not being very attentive, it’s very easy to code the I63.9 [non-trauma code] instead of a traumatic brain injury code.
>
> – MC07

The need for specificity influences the ability to apply an ICD-10-CM code for an entire episode of care. While ED providers may indicate the mechanism of injury in their narrative, important details are frequently missing. One respondent explained:

> You're going to look at the whole note and you want to know it wasn't an auto accident, was a ski accident … And those are different ICD 10 codes that you can add in addition to the injury. So, you have the injury code and then you can have all of your external codes listed below …Then they have … method … brain bleed. They hit a tree. …. So, you would have all those codes to identify if and only if you get that information from the provider.
>
> – MC16

Theme 2: Use of the ICD-10-CM code for Unspecified Head Injury

Participants indicated that although they try to avoid it, they default to applying an "unspecified head injury" ICD-10-CM code for four main reasons: (1) LOC greater than 30 minutes not documented, (2) documentation of "closed head injury," (3) use of "probable" or "suspicion of…" in the notes, and (4) use of the unspecified code (S06.9) anywhere in the electronic medical record (EMR). MCs stated that LOC is a necessary component of assigning an ICD code for a head injury. Participants indicated that the coding requirements are for more or less than 30 minutes, but healthcare providers may write "brief LOC." As "brief" is a subjective term, MCs said this could be interpreted as 2 minutes or 30 minutes. If there is no specific documentation of duration of LOC, MCs may default to the "unspecified head injury" code.

ED providers may use terms such as "closed head injury" in their documentation, for which there is no direct ICD-10-CM parallel. They may also choose "unspecified head injury" as an option for diagnosis even when additional information is available. Additionally, use of terms that qualify potential injury, such as "probable" or "suspicion" are not definitive diagnoses. So even if more specificity exists in other documentation, MCs will default to the use of the unspecified identifier. The authors spoke with a physician who trains providers about coding documentation, and this provider explained:

> The rules are different for the emergency department and for inpatient … A coder may not code something that says probable, likely, suspect, etc. They have to code the signs and symptoms…. So if I use the words "probable brain injury" … in the emergency department, it can't be coded at all… the probable eliminates it. … So immediately you have what the doctor may think of as a diagnosis … being eliminated by the coder because of the coding rules about uncertainty.

MCs shared that physicians frequently do not provide enough detail to identify an ICD-10-CM code. One respondent described an example where the provider indicated TBI as a diagnosis:

> The EMR told me TBI is S06.9 … that's actually the nonspecific code. And in ICD-10-CM, when you say unspecified, you're saying you don't know. But the documentation actually says that you do know.
>
> – MC03

Theme 3: Time and billing pressures

Time and billing pressures are omnipresent in the work of MCs. Respondents reported feeling pressure to get claims processed and submitted as soon as possible, prioritizing speed over specificity. One respondent (MC06) noted that, *"You can't afford to have things hanging around, just because you would like a more specific (ICD-10-CM) code."* This participant described the tension between querying the provider for additional documentation versus processing it with an unspecified identifier code:

> They like to use as few words as possible… physicians don't necessarily understand that we really would like to have that information. But we also need to make sure that we get that claim out the door. So, you know, you can ask physicians questions about their documentation, but it delays the claim.
>
> – MC06

Additionally, multiple respondents highlighted the culture of productivity, noting that "*Pressure to meet high productivity standards… affects how a person codes. … Hospital systems, clinics, systems are paying vendors top dollars so they expect high productivity and high accuracy."* – MC17

Theme 4: Subjectivity in coding

There were several observations from these interviews that elevated issues about participants' potential bias and clinical interpretation beyond their role as an MC. While some MCs receive continuing education and adhere to all guidelines and structures within their role, these individuals are not themselves healthcare providers. In some instances, respondents described times when they interpreted what they thought was intended in documentation to achieve the best ICD-10-CM coding assignment.

There were instances of MCs making significant assumptions based on their own potential biases that would influence coding decisions and patient billing or insurance coverage. In one example, an MC stated that when they see a record for someone in their 80s who has fallen, they assume the fall was due to a dementia-related issue, gait problems, or osteoporosis. Another MC indicated that injuries among boys are more likely to be serious, so they code those injuries at a higher level than those of girls. The MCs interviewed clearly expressed these as assumptions rather than data, and in some cases, MCs explained that their assessments strayed into diagnostic interpretation. For example, one MC indicated that *"history of fall"* in a note indicates that the patient likely has a chronic condition that has included falling. This is inconsistent with the clinical use of the term, which can simply mean an incident prior to the current moment. Another respondent questioned the seriousness of a patient's injury, stating, "*maybe she should have come to the hospital a little bit sooner if she was so concerned about it"* (MC14).

Additionally, many MCs assumed that there should be imaging for patients with a head injury and looked for that in order to apply a more specific ICD code, although such imaging is not recommended for most patients with a head injury. One respondent explained:

> If it's probable or suspicion of, it's not a definitive diagnosis …I would just code it as unspecified head injury … until there's a definitive diagnosis, or a CT or MRI or something, imaging that was done that was able to give me a definitive diagnosis.
>
> – MC02

Vignettes

Respondents were presented with two vignettes containing narrative descriptions of a 20-year-old female patient who comes to the ED after slipping in the bathroom and hitting her head. In the first vignette, four hours passed and she had not taken any medications for the headache she developed, no LOC or photosensitivity, and all other exam findings normal. The second vignette changed the same patient to 12 hours post injury, she had taken a non-opioid analgesic with no relief for the headache, presented some photosensitivity and dizziness, but still all other findings normal. The vignettes did not provide either a procedure code or ICD code of any kind, nor did they use the words concussion, trauma, or TBI. The same vignettes were presented to twenty-six ED physicians, seeking to explore discrepancies between their interpretations of the presentation with the MCs' interpretations.

ED physicians identified a range of potential diagnostics for both scenarios (see Tables 2 and 3). MCs, however, were unable to identify much to apply an ICD-10-CM code in these narratives, with many requesting more information such as an impression or diagnosis from the provider. For vignette #1, while physicians assigned things like "post-traumatic headache," "closed head injury," or "head injury with secondary concussion," MCs remained mostly within the bounds of language used in the narrative. In the absence of a physician-assigned diagnosis, MCs primarily assigned codes including headache and fall, or at most, nonspecific head injury (see Table 2). MCs noted during the interviews that there was little for them to use in their process:

> I can't give a diagnosis code…. I can code the fall part. I can code the symptoms that she came with. But definitely need more information to finish coding this one….. we need the doctor's impression.
>
> – MC07

> I would call this injury to the head. And slipped on the floor while in the bathroom… the headache was caused by the fall, which is an injury. …so it's an injury. So this would just be a head injury… unspecified head injury.
>
> – MC17

MC09 provided an explanation of why they code symptoms, noting that it adds specificity to an otherwise unspecified code.

Similarly, vignette #2 demonstrated most ED physicians identifying "concussion," (n=25 of 26) while the majority of MCs again coded "headache" in addition to "photosensitivity," "fall," and "dizziness." Three-quarters of the MCs indicated that more information is needed (see Table 3). None of the physicians identified the fall as something that would potentially be part of the diagnosis or ICD-10-CM code.

The vignettes demonstrate that MCs code for information that is directly presented. They are neither trained nor encouraged to speculate regarding diagnostics, and require specific terminology and qualifiers (i.e., concussion without LOC) in order to accurately identify ICD-10-CM codes for encounters. Although some discussion about overreach, as mentioned previously, arose during the interviews, the vignettes demonstrate only minimal overreach, in a context where they were prompted and given an opportunity to do so.

Opportunities for Action

MCs had suggestions to improve ICD coding for head injuries in the ED setting. These fell into three categories: (1) facilitating better documentation, (2) training and education, and (3) understanding the importance of accurate ICD-10-CM coding (See Table 4). Participants shared their awareness of the importance of specificity in their work and their reliance on documentation. One respondent described that, "*the better documentation, the better it is for us to pick up the code that signifies the greatest specificity*" (MC05). Suggestions included engaging provider champions to promote understanding of the importance of detailed documentation and better awareness of the type of information MCs need for head injury coding (e.g., LOC, location on head, trauma). Further suggestions included templates in EMRs that prompt healthcare providers to include complete documentation.

The amount of training that MCs receive and have access to varies widely. One participant shared that there are limited training opportunities available, especially on specific injuries. Additionally, MCs were aware that the data that they input are used for public health surveillance and research. They felt that better awareness among healthcare providers of the importance of this could help improve the documentation that they provide.

> "I wish that everybody knew just how far-reaching the data is (sic). So that it's not just what got sent to the insurance company. … if it was as specific as possible, that would really help in research and improving health."
>
> – MC06

Implications for Policy & Practice

- This evaluation highlights several opportunities to improve the accuracy and specificity of coding practices in the ED. These improvements may not only benefit the TBI field but may also lead to overall improvements in data used by public health professionals in the United States.
- To decrease use of the "head injury unspecified" codes in hospital administrative claims data, EDs should place a greater focus on the quality of documentation by healthcare providers (e.g., better alignment of MC and healthcare provider needs in documentation, prompts in EMRs to obtain key items, consistent use of terminology) and strategies to address time and billing pressures (e.g., allowance for time to communicate with healthcare providers regarding coding).
- Development of free or low-cost continuing education opportunities for MCs on best practices related to TBI and other head injuries is needed to set the foundation for improving ICD-10-CM coding practices for this injury in the

ED setting. Professional organizations are best placed to offer such trainings, either at in-person meetings or virtually, and development could be done by experienced coders with input from ED providers.

- Improvement of accuracy and specificity of coding practices in the ED has significant implications for TBI surveillance, specifically for preventing undercounting.

Discussion

MCs play a critical role in the healthcare system by linking clinical documentation regarding a patient's care to diagnostic and procedural codes. However, findings from this qualitative evaluation indicate that there are several factors that may negatively influence MCs' coding practices. These include unclear or incomplete documentation by healthcare providers, variance in terminology used in medical records, and time and billing pressures. These factors are consistent with findings from prior studies and point to the need for system-wide improvements.[11,12] To address these concerns, and consistent with prior recommendations,[13] participants indicated that increased efforts to improve documentation by healthcare providers through the use of EMR prompts and healthcare champions, more access to training and education, and greater awareness of the uses of medical coding data in research and public health surveillance among healthcare providers are warranted.

As evidenced in prior studies, "head injury unspecified" was commonly used by MCs in this evaluation, especially when participants felt the documentation was vague or lacked key information.[4,14] To make more specific coding decisions, MCs reported relying on information about LOC, imaging, and mechanism of injury (MOI) in the medical record. While MOI is important for head injury diagnoses and external cause code assignment, healthcare providers may not be able to provide this information if the patient had post-traumatic amnesia or is unconscious, or there was no witness to the event.[15] LOC and imaging are not routinely used for diagnosis of mild TBI and concussions.[16] Clinical definitions and guidelines for mild TBI state that LOC may or may not be present following this injury and is not required for the diagnosis.[17,18] Similarly, clinical guidelines from CDC and the American College of Emergency Physicians state that imaging should not be routinely used to diagnose mild TBI.[19,20] Instead, healthcare providers should use head injury decision rules to determine the need for imaging based on risk for intracranial injury.[21–24] Taken together, there appears to be a disconnect between what the MCs in this evaluation expected to see in documentation for a head injury and what is needed by healthcare providers to make a diagnosis.

Limitations

This evaluation has several potential limitations. First, participants were recruited through a convenience sample, and results may not represent the larger population of MCs in the United States. Specifically, diversity in career level may not have been adequately represented. Second, interviews could be subject to response bias, where the questions asked could have affected the study participants' responses. Finally, assessment of ICD-10-CM

coding by MCs was conducted with hypothetical vignettes that may not reflect the type of information that MCs receive in the course of their work.

In the absence of detailed information and due to time pressures to get claims processed, many MCs in this evaluation said they may default to an "unspecified" code. Some also noted that they may unintentionally use the wrong coding path (non-trauma versus trauma) or may attempt to interpret or make assumptions about a diagnosis based on available patient characteristics to inform their coding decisions. Inadequate access to training was indicated as one key contributing factor for unreliable or inconsistent coding practices.[25–27] Currently, training opportunities for MCs are limited or require resources (e.g., cost to participate), and when available, may be insufficient.[28,29] To our knowledge, there is currently no training available to MCs specific to coding head injuries. To this end, development of no or low-cost education and training opportunities for MCs is warranted to address current information gaps and improve coding practices in the ED for head injuries.

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Table 1:

Qualitative themes and subcodes

Theme	Subcodes
Lack of detail for ICD-10-CM coding	Terminology
	Thoroughness
Use of Unspecified ICD-10-CM code for head injury	Defaulting to “unspecified injury of head”
Time/billing pressures	Pressure to be productive
	Pressure to get the claim sent
Subjectivity in coding	Potential bias
	Clinical interpretation
	Assumptions about imaging

Table 2:

Medical Coder and Physician Assessment of Vignette 1 *

Medical Coder ICD-10-CM coding designations for Vignette 1 **	**(N=17)**
Headache	8
Fall	12
Unspecified head injury	7
Need more info to determine a code	6
Physician diagnosis for Vignette 1 **	**(N=26)**
Concussion (includes Concussion w/o LOC, Mild concussion, Mild concussion w/o LOC, Head injury with mild concussion, or Head injury with secondary concussion)	9
Traumatic brain injury (includes mild TBI)	2
Headache (includes mild headache, or post-traumatic headache)	4
Fall	5
Unspecified head injury (includes closed head injury, closed head injury with headache, or Acute minor head injury, Head injury without LOC)	14
Need more info to determine a code (includes additional testing needed)	5

* 20yo female came to ED after slipping in bathroom and hitting head 4 hours ago. No medications taken for headache, no LOC or photosensitivity, all other exam findings normal.

** Responses were not mutually exclusive and respondents could choose more than one option

Table 3:

Medical Coder and Physician Assessment of Vignette 2 *

Medical Coder ICD-10-CM coding designations for Vignette 2 **	**(N=17)**
Headache, Photosensitivity, Dizziness	5
Fall	4
Unspecified head injury	6
Need more info to determine a code (physician diagnosis, radiology report, final impression from doctor, query)	13
Physician diagnosis for Vignette 2 **	**(N=26)**
Concussion (includes Concussion w/o LOC, Mild or moderate concussion, Mild concussion w/o LOC, Moderate head injury with moderate concussion, Concussion with secondary head trauma, Closed head injury with concussion)	25
Traumatic brain injury (includes Mild TBI)	3
Subarachnoid Hemorrhage	1
Traumatic Vertigo	1
Headache	3
Unspecified head injury (includes Closed head injury)	1
Need more info to determine a code (includes additional testing needed)	8

* 20yo female came to ED after slipping in bathroom and hitting head 12 hours ago. Non analgesic taken with no relief for headache, Some photosensitivity and dizziness, all other exam findings normal.

** Responses were not mutually exclusive and respondents could choose more than one option

Table 4:

Opportunities for action provided by medical coder (MC) respondents

Category	Specific suggestions	
Facilitating better documentation	**1**	Enlist healthcare provider champions to promote understanding of the importance of detailed documentation for coding among other healthcare providers.
	2	Build prompts into the electronic medical records that encourage healthcare providers to use more specificity in their documentation.
Training and education for Medical Coders	**3**	Provide low cost and widely accessible education and training opportunities to MCs.
Understanding importance of accuracy for research and public health	**4**	Increase awareness of the need for accurate ICD coding for surveillance and research among healthcare providers.