Improving ICD coding in the emergency department: Factors related to use of "unspecified" codes for head and brain injury

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Abstract

Context: International Classification of Diseases (ICD) codes are used for billing, but also for surveillance for injuries such as traumatic brain injuries (TBI). While specificity is possible in the ICD-10-CM scheme, use of the code for unspecified injury of head (SO9.9) remains high.

Objectives: This process evaluation sought to understand medical ICD-10-CM coding behaviors for TBI in emergency department (ED) settings.

Design: Semi-structured interviews explored the processes that facilitate or hinder ED physicians from selecting specific ICD codes for TBI, and potential points of intervention for increased coding specificity and reducing the use of unspecified codes.

Setting: Video interviews were conducted with a nationwide sample in the United States.

Participants: A purposive snowball sampling strategy was used to recruit 26 ED physicians with experience diagnosing TBI.

Intervention: Semi-structured interviews identified factors related to selection of specific ICD codes for head injury.

Main Outcome Measure: Thematic analysis of transcribed data.

Results: Four main themes emerged from the data: the impact of training and expertise, factors related to diagnosis, unclear connections with medical coders, and actionable recommendations. Interviews underscored the context surrounding "unspecified" codes for TBI, including demands from patient care, time pressures, issues around how a diagnosis may impact patient management decisions, and considerations related to mapping within the electronic medical record (EMR) where options may default to an unspecified code.

Conclusions: Findings from this analysis indicate that ED providers may benefit from more robust training on how documentation can better support ICD-10-CM coding for this type of trauma. Revised EMR structures could support efficient coding specificity and clarity.

Keywords

ED physicians; head injury; diagnosis; medical coding

While primarily used for billing, Evaluation and Management Current Procedural Terminology (CPT) codes and International Classification of Diseases (ICD) codes are also relied upon by public health professionals to collect epidemiological data on injuries, such as traumatic brain injuries (TBI). Medical codes are designed to provide specific classification and diagnostic criteria. In the setting of an emergency department, diagnostic coding is done in the record by the physician at the time of exam, although the specific timing of this varies widely, depending on workflow, presence of a scribe, and timing of closing records, among other factors. While data entry may be done by a nurse, scribe, or resident physician, it is generally the responsibility of the provider in charge of the care of a particular patient to assign a diagnosis and sign the record. Recognizing the wide variance across settings, this paper approaches the disconnect between physicians and medical coders who determine billing codes, and the use of unspecified codes. Physicians and medical coders can assign an "unspecified" medical code when a condition is unknown at the time of documentation or there is insufficient information to assign a more specific ICD code.[1] While designed with a specific intent, there is concern about misuse of "unspecified" ICD codes and variations of their use related to TBI across healthcare systems.[2,3] In 2016, the Centers for Disease Control and Prevention (CDC) proposed an ICD-10-Clinical Modification (ICD-10-CM) surveillance definition for nonfatal TBI cases that excluded the diagnosis code SO9.90 ("Unspecified Injury of Head").[4] To assess the effect of this change on surveillance estimates, Peterson and colleagues conducted a multisite medical record review of emergency department (ED) visits that assigned the "Unspecified Injury of Head" code, without other TBI codes, and found 36–52% of sampled records contained medium or high certainty evidence of TBI, while 48–64% of records contained low or no evidence of TBI.[3] The authors concluded that national estimates based on the 2016 surveillance definition could be influenced by missed TBI cases and may lead to inadequate allocation of public health resources. TBI is one of the leading causes of disability and mortality in the United States, with estimates of 80–90,000 individuals each year experiencing longterm

disability and thousands of TBI-related deaths.[5,6] Public health measures can reduce the prevalence of TBIs, so accurate surveillance is critical.

This qualitative evaluation sought to understand medical ICD-10-CM coding behaviors for TBI, with a focus on the use of "Unspecified Injury of Head" by a sample of ED physicians. Factors that influence ED physicians' selections of ICD codes, the processes that facilitate or hinder them from selecting specific ICD codes for head injury, and potential points of intervention for increased coding specificity and reduced use of "unspecified" codes for TBI were explored.

Methods

COnsolidated criteria for REporting Qualitative research (COREQ) and Standards for QUality Improvement Reporting Excellence (SQUIRE) guidelines were used to ensure the quality of reporting for this study.[7,8] This project was not intended as an intervention and the investigators had no authority to change the procedures used by participants. While surveillance data can describe frequency of head injury presentation in the ED, these data are not designed to document reasons for high rates of unspecified head injury notation. For this reason, a qualitative evaluation of the knowledge and abilities of a sample of ED providers who select ICD codes for their patients was performed.

The evaluation team included two PhD-level researchers), one physician, two masters-level public health analysts, and two program assistants who were responsible for notetaking during interviews. Recruiting and interviewing was done by the physician and a public health analyst. Data analysis of the transcripts and notes was conducted by an experienced master's level analyst and a PhD-level clinical social worker with experience in hospital settings. Dual coding and resolution of themes were done by these two data analysts. This project was supported by the Centers for Disease Control and Prevention (CDC) as part of a financial assistance cooperative agreement award. The funding recipient developed the interview framework together, although CDC partners were not involved in recruitment, data collection, or analysis and exerted no influence over interpretation or analysis. Review and synthesis of analyses for the manuscript were done in equal partnership.

The evaluation team conducted recruitment via email outreach to professional organizations and personal networks, seeking to interview up to 32 ED physicians representing a variety of geographical areas, demographics and experience levels. Due to recruitment challenges (low engagement, resource constraints, COVID-19 pandemic), participants and champions were asked to refer colleagues and share information via listservs, direct emails, and social media posts, employing a purposive snowball approach.[9] Online video interviews using a HIPAA-compliant platform were used due to geographic dispersion of the participants and for the flexibility this approach offered. Interviews took 30–45 minutes each and were completed between June 2022 and January 2023. Respondents were given a $50 gift card in recognition of their time. The study was submitted for IRB review and was determined not to be human subjects research. Although not required, the evaluation team provided participants with information regarding their rights to ensure informed consent.

The interviews were semi-structured, allowing for consistency in topic introduction while providing flexibility for discussion of other points that a participant might raise. Interviews were conducted by two members of the team, one facilitating the discussion and the other taking notes. Opening questions were open-ended prompts about current position and title, length of time in profession and specialties, and training in evaluating or treating head injuries. Key questions explored familiarity with ICD-10-CM codes for head injuries, and processes and systems for assigning ICD-10-CM codes in their work setting (e.g., drop down menus, list selection, free entry). Participants were asked what they believe to impact a provider's decision to use the ICD-10-CM code for "Unspecified Injury of Head," what would be helpful to be able to be more specific, what factors impact diagnostic decision making, what relationship they have or do not have with medical coders, and what challenges, if any, have been experienced when assigning the diagnosis for head or brain injuries presenting at the ED.

Interviews were recorded and transcribed verbatim. Raw data were held in protected storage to guard anonymity of the participants. Participant identifying information was kept separate from transcripts, and data were deidentified to the extent possible for analysis.

Outcomes

Saturation for conceptual linkages was reached after the initial 10 interviews.[10] Member checking was not possible due to the time imposition this posed for participants, but the completion of interviews beyond data saturation bolstered trustworthiness in the data. Four main themes with 9 sub-codes were identified from this phenomenological analysis.

Analysis

Data analysis used the RADaR method, which uses progressively reduced tables to focus and organize thematic content.[11] Qualitative coding initially used *in-vivo* coding, with concepts emerging from the data using the participants' own words and following a constant comparative analysis process.[12] Qualitative codes were reviewed after the first 10 transcripts. A random selection (n=5) from the remaining transcripts were double coded by two members of the evaluation team to verify interrater agreement. Agreement was high and no new codes were identified in this phase. Codes were grouped into categories and renamed for clarity, then categories of codes were grouped into themes. A codebook was created for the transcripts once saturation was reached. That codebook was then used for qualitative coding of the remaining transcripts, with an allowance for additional codes to emerge from the data, if appropriate. The codebook and reduced data tables were used as a guide for summarizing data and identifying supporting quotations.

Results

A total of 26 participants were interviewed (see Table 1). Two-thirds of the participants were higher level career providers. The sample included physicians who treat both children and adults, and was 58% female. Four main themes emerged from the interviews, with several underlying qualitative sub-codes.

Theme 1: Participant experience and training as factors in documentation

There was a link between experience and training of providers and their fluency in identifying specific ICD-10-CM codes from documentation in the electronic medical record (EMR) rapidly (Table 2). Thirty-eight percent (n=10) noted that job experience was central to head injury diagnostics and 58% (n=15) indicated that a fellowship or additional training or research had provided the majority of their expertise (Table 3). Specifier codes and nuances of ICD-10-CM code selection were described as something learned through experience, rather than during early career training. Wide variance in training on EMR navigation can lead to documentation that inaccurately represents encounters. One respondent elaborated on how this may unfold.

> Doctors don't know how to choose the (ICD-10-CM) codes. It's not taught in medical school. If they have learned anything about coding, it's usually [Current Procedural Terminology] CPT coding, which until this year has had little to do with ICD-10 at all.

Theme 2: Factors related to assigning an ICD-10-CM code

Participants were asked about barriers and facilitators that influenced their decision-making for assigning a diagnosis. They identified the need to prioritize patient care and competing priorities when faced with entering data into the EMR (n=16; 62%) and time pressures (n=8; 31%), and the potential impact of diagnosis assignment in the ED (n=14; 54%) (see Table 2).

Prioritizing patient care.—Participants described how factors related to prioritizing patient care (e.g., workflow pressure and capacity, waiting on imaging or test findings, resource availability for referral) impacted their diagnostic and documentation practices. They also highlighted the difficulties experienced when diagnosing a head or brain injury without longitudinal observation. As the ED is not a context in which observation is easily facilitated, participants noted that head and brain injuries (often evolving injuries) may be challenging to diagnose. Additionally, with increasingly complex ICD-10-CM codes, respondents questioned how closely the range of specific codes reflected the real-time treatment needs of patients with a head or brain injury, including ruling out intracranial injury and managing patients with polytrauma.

Time pressure and competing priorities related to EMR.—Respondents (n=18) noted that the structures and prompts of EMRs affect their documentation decisions. While EMRs attempt to facilitate assignment of ICD-10-CM codes, one respondent highlighted the need to balance detailed documentation in the EMR versus patient care needs.

> Frankly, if I put a really general [ICD] code on someone, I'm pretty confident that they're going to get the care that they need and that's not going to affect me. So, there's those selfish and less selfish reasons. But, neither of those things have a motivation for me to sit there and code.

Participants recognized a need to enter data into the EMR along with appropriate activity (CPT) codes. However, in a time-pressured environment, many participants reported an

incentive to identify the first ICD code in a drop down menu that relates to the diagnosis, rather than scanning long lists of detailed options to find the most specific option. Further, several participants shared that EMR prompts include many options, including those unrelated to the clinical presentation and different inpatient and outpatient ICD codes. They described having to balance EMR processes with time pressures and other competing priorities. One respondent stated:

> If they pop up in a drop-down list, and head injury, comma, unspecified comes up first on my list, I'm not gonna lie, that's the one that's gonna get picked first.

> Because when we're busy, and it looks like it fits, they're not going to keep scrolling to find the one that fits most closely.

Participants noted often relying on EMR prompts, key words, or other search options to quickly assign an ICD code. This then impacts how the ICD-10-CM codes are mapped to the diagnosis, a process that happens either in the setup of the system itself, or through the medical coding done at the system level. One respondent described the challenges of documentation with the specificity that is possible in the system.

> It might be that we say a head injury. Now what do we have? We have a whole group of [ICD] codes. Then we would have to go and look to see what we need for specificity. Do we need acuity? Do we need laterality? Do we need the site? If it's a sub arachnoid hemorrhage, do we need a site? If we get more and more specific, we get more of the terminology that we need. The etiology, the laterality linkage to other things than we could give this a code. There's no way I can code this.

To counter these barriers, respondents described facilitators to assigning an ICD-10-CM code. They described typically using default terms such as "concussion" or "closed head injury," while rarely intentionally using the "unspecified code." It was unclear, however, whether their EMR coding and billing processes somehow mapped such choices to the "unspecified" ICD-10-CM code.

The complex process for ICD coding is compounded by the reality that multiple people, such as nurse scribes or residents, may be entering data into the record. One respondent noted:

> One of the biggest challenges is when you work in an academic center your residents and fellows are actually doing the discharging. So, they'll often be the ones that choose the diagnosis code at discharge. Oh, in theory, I can always change it … Do I do that often? No. … it's not a great use of my time.

The potential impact of diagnosis coding in the ED.—Several participants discussed concerns about the relationship between the ICD-10-CM coding and patient management. For example, participants noted concerns about assigning a diagnosis that could trigger restrictive rules (e.g., removal from sports). One respondent shared that, "*If we diagnose somebody with concussion in this state, that means they cannot return to sport until they're quote unquote cleared. That's the law."* This legal restriction can require additional medical appointments, medical and transportation costs, and time off from work and school, which can cause significant problems for some families. Another participant noted:

> If I say concussion and she's an athlete and we're not sure it's a concussion, I tend to give them the concussion information on paper, but not necessarily put it in their chart because it might change things. And I don't know if that's the right or wrong thing, but part of it is building a therapeutic alliance with the family.

Participants noted the use of broad or vague ICD-10-CM diagnostic codes in the ED is appropriate to limit risks related to liability for physicians and to allow for further diagnostic tests in the inpatient setting. One respondent stated:

> We like to go with the lowest common denominator … That doesn't get too specific, it doesn't get us into too much trouble. Because sometimes we don't have all the information …the true nature of the injury may not have completely declared itself yet. … So the tendency of an emergency clinician is always going to be to hedge our bet just a little bit. Because however it looks right now may not be how it's gonna look tomorrow.

Theme 3: Medical coders & billing

When asked about their understanding of medical coding, billing processes, and relationships with medical coders, participants' indicated they knew little about billing processes and integration of medical coders to the system. Most participants (n=16; 62%) recognized appropriate documentation is necessary for billing. However, they noted that nuances of payment structures were outside of their scope of work and expertise. Further, they stated contact with medical coders is rare and usually only occurs when there are issues with incomplete charts or activity codes. Participants were unclear on what kind of terminology medical coders are looking for in the notes and how final decisions on billing are made. One participant shared:

> To be honest with you, it's unclear to me what ends up as the principal diagnosis code for patients who are discharged, whether it's the first one that I click, or whether the [medical] coders then review it and decide which one is going to get higher reimbursement or something. I really don't know to what extent they make decisions about the coding.

Theme 4: Opportunities for Action

Participants were asked about opportunities for action. Suggestions included increasing access to training, resource needs, and potential facilitators for improvements (Tables 2 and 4).

Increasing access to education and training.—Although education and training specific to head injury diagnostics appears to facilitate more specific diagnostics and resultant ICD-10-CM coding, access to training was inconsistent among participants in this study, with most participants indicating that they received most information from on-the-job experience and through literature and Continuing Medical Education (CMEs) (Table 3).

Resource needs.—Decision-making tools, links to clear guidelines, and risk calculators that assist in defining the need for further testing or treatment embedded in the EMR would improve their processes.

Potential facilitators for improvements.—(1) Streamline the EMR ICD-10-CM selection options, (2) include feedback from providers at design and formatting stages of implementation, and (3) provide timely and brief evidence updates as guidelines change related to ICD-10-CM coding for appropriate TBI diagnostics. See Table 4 for representative quotes and examples on these points.

Implications for Policy & Practice

National estimates of brain injury incidence may be influenced by missed TBI cases due coding variance, leading to inadequate allocation of public health resources.

- A disconnect exists between how "unspecified" ICD-10-CM codes for head and brain injury are intended to be used and how they are used in clinical practice.

- Physicians experience time and patient load pressure to document rapidly, and often prefer to code more broadly due to limited observation time of the patient.

- Streamlining EMR prompts, implementing templating and decision making tools such as risk calculators, along with ongoing training could improve efficiency and accuracy of coding and ensure mapping to specific TBI codes in the system.

- Training and familiarity with system requirements can offset pressures of time and competing priorities in the environment.

Discussion

The Centers for Medicare and Medicaid Services recommends avoiding unspecified ICD-10-CM codes whenever documentation supports a more detailed identifier.[13] However, findings from this analysis demonstrate that "unspecified" codes for head or brain injury are often assigned due to several contextual factors, such as demands related to patient care, time pressures, how a diagnosis may impact patient management decisions, and internal mapping within the EMR where some options may default to a final assignment of an unspecified ICD-10-CM code. Taken together, these findings may highlight a disconnect between how "unspecified" ICD-10-CM codes for head or brain injury are intended to be used and how they are used in clinical practice.

Qualitative themes indicated a potential impact of career level and prior training on documenting "unspecified" head injuries by ED physicians. Participants reflected on their careers and the stage at which they had felt fluent in diagnostics and assigning ICD codes, noting that this was not taught in school, but rather developed as a skill during their career. This finding is supported by results from a retrospective, cross-sectional study that found medical charts documented by emergency medicine residents were more likely to include insufficient documentation than charts documented primarily by physician assistants (PA) and attending physicians.[14] Within an EMR system, documentation submitted by providers may be more thorough than an initial scan of ICD-10-CM codes may imply. Another retrospective, cross-sectional study at an academic medical center found attending physician documentation of the history of the present illness, review of systems, physical exam, and medical decisions prevented down-coding (assigning billing and documentation that

indicates less intensity, risk, or fewer procedures) for cases initially documented by residents and PAs.[15] Selecting an ICD-10-CM code in the EMR involves several factors, including a clinical assessment, training in use of the EMR to rapidly select the right option, and understanding, skill, and ability to identify an ICD-10-CM code with specificity. The impact of training and familiarity appeared to be substantial among this group, although pressures of time and priorities in the environment may outweigh this.

The study has several potential limitations. Study participants were recruited through a convenience sample, and thus, the results may not represent the larger population of ED providers in the United States. Additionally, diversity in career level and medical settings served by the participants may not have been as adequately reflected as possible, and no early career physicians participated in this study. While retrospective reflection from experienced ED providers is valuable for this topic, the insights of earlier career providers may have informed this paper in unanticipated ways. Interviews could have been subject to response bias, where the questions asked could have affected the study participants' responses.

In summary, ED physicians may benefit from greater education and training on ICD-10-CM coding for head and brain injuries through seminars, Grand Rounds, and online CME opportunities, particularly as ICD-11 coding is implemented and new technologies such as AI assisted documentation arrive in clinical settings. This could include information on how to construct documentation to assist medical coders with assigning more specific ICD codes. Further, future studies could explore how EMR systems may unintentionally influence medical documentation due to how lists appear in drop down menus or prompts, and how medical coders may interpret available information to assign codes. Opportunities to improve communication between MCs and physicians, include decision-making tools and better streamlining and prioritization of ICD codes for head and brain injuries in EMR systems may also be worth exploration. Finally, the role of medical coders in assigning unspecified codes for head and brain injuries remains an area in need of further study. Insight into this part of the process from that point of view could provide valuable insight for management and systems design.

Acknowledgements-

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Table 1:

Demographics of respondents

Career level	Total (N=26)	Female (N=15)	Patient population: >80% pediatrics (N=15)	Patient population: primarily adults aged 18 and older (N=11)
Mid-career providers$_1$	9 (35%)	8 (53%)	5 (33%)	4 (36%)
Higher level of career providers$_2$	17 (65%)	7 (47%)	10 (66%)	7 (64%)

Table 2:

Overview of qualitative themes and sub-codes

Theme	Sub-codes
Participant experience and training as factors in documentation	Background and training Experience and expertise
Factors related to assigning an ICD-10-CM code	Prioritizing patient care • Needing additional information, challenges of diagnosis • Unclear or minor injury and polytrauma contexts Time pressure and competing priorities related to the electronic medical record (EMR) • Finding the right code- pull down menus, prompts, volume of options, terminology and key words • Multiple people entering data in the EMR Impacts of specific diagnosis in emergency department • Appropriateness of vague codes for context reasons related to limited observation, liability concerns, or potential for unintended impacts
Medical coders and billing	Unclear connections for providers between coding and billing
Opportunities for action	Increasing access to education and training Resource needs • Clinical decision support making tools and calculators • Hyperlinks and icons Potential facilitators for improvements • Streamlined EMR codes • Feedback from providers at the design and formatting stages of EMR updates • Timely and brief evidence updates related to changes in guidelines for appropriate TBI diagnostics and ICD-10-CM coding

Table 3:

Physician training for head injury diagnoses

Where are physicians receiving the majority of their training in diagnosing head injuries? (N=26)1	
Keeps up only through research literature and continuing medical education credits	11 (42%)
On the job experience	10 (38%)
This information was a large focus of residency	8 (31%)
Fellowship or additional training on head injury	8 (31%)
Specific research or area of interest	7 (27%)

Table 4:

Opportunities for action

Needs	Suggestions	Representative quotes or provided examples
Training	Training for critical language use to trigger the right coding	"There was no training honestly, for any of us in our group about coding… They're like, just put your diagnosis… the one that you think is most relevant." *"They need to get out there in the medical schools and they need to teach this simple thing … It's not valued … we got to teach the doctor what to say."* *"To be perfectly honest, because … we're not incentivized to get it right… and we're not trained to get it right. And we don't know what right is. And so for that reason, we don't know the importance of right, either no one's ever told us why (the right code) matters or how to do it right."* *"There's a whole bunch of different verbiage that will get you two different ICD 10 codes. … I might have not written down terminology that actually has codes going with it, and there's a whole list of things that have no code that we use commonly. … The guidelines tell them they're not allowed to ask me, Hey, instead of that, did you maybe mean brain compression, or did you mean brainstem herniation rather than Mass Effect? Are those the same? Well, they are the same, but they're not allowed to ask me."*
	Training in differentials for head trauma codes and best practices in head trauma evaluation	• Suggest live and interactive seminars- CME or Grand Rounds • Suggest short videos with consolidated guidelines • Suggest available reviews of recent research • Suggest rotations through concussion clinic • Suggest specific focus on non-emergency residency-trained physicians
	Training covering the importance of surveillance and research for patient care	*"It's important for researchers on the back end that are using the data. But you know, at the end of the day, it may not be so important for the patient that's in front of you. … I think it's kind of confusing and there are probably too many codes that don't have clinically important differences."*
Resources	Decision making tools and better guidelines and risk calculators	"The best way you could do it for an ER doc is algorithmize it … *like nausea, headache, dizziness and at the end is like the Plinko chip lands on concussion… because then it just streamlines it for everybody and you're doing it the right way. The trigger words dictate a diagnosis at the end, because right now it's just an ocean of… [waves hand] Hmm… I guess minor head injury."*
	Evidence hyperlinked in the EMR and icons in alerts	*"You know, if you're completely low risk, everyone knows what to do. If you're completely high risk, everyone knows what to do. But in that middle range, it is sort of about what you, as a clinician…want to do."*
Facilitators	Streamline the EMR codes that are provided as options	*"It's a hurry thing, it's a mis-click thing. … So I think that the question would be how can we better construct the choices?"* *"I don't even know … what differences there are in terms of different diagnoses of head injuries. I mean, I'm not trained in coding head injury. What choices I have are what difference it makes."* *"We are not interested in going to those lists… I really don't care about the ICD 10 code. If I see someone with a distal ulnar radius fracture, angulated, closed - I can find an ICD code for all that or I can type in "Fractured arm." What do you think I'm going to do? … I want to move on."*
	Include feedback from providers	"The hard part is our coders do our coding off of the diagnosis *code that I put in, but maybe we should have them work with us to try to come up with the best diagnosis codes."*
	Evidence updates	Newsletters and brief evidence updates for providers that are easy and quick to read and absorb.