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Review Article

A survey of concussion diagnosis and documentation

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More Information

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Introduction

Concussion diagnosis is a clinical categorization that often rests primarily on symptom reporting. However, diagnostic criteria require certain signs and symptoms to be either ruled in or ruled out. Without an accepted biomarker the variability in clinical practices can influence the quality of diagnoses. The quality and completeness of documentation through the course of injury are important factors for driving appropriate treatment and care. It is not unusual for an athlete to be diagnosed in an emergency department, seen by their primary care physician or specialty concussion clinic and then followed more closely by a school athletic trainer, primary care physician, or outpatient clinic; thus, continuity of care is a critical need in concussion diagnosis and management and documentation become the link to create the continuity needed. Further, because the natural course of the injury can be on the order of a week or two, timeliness is important. Yet documentation practices for diagnosis and care are not standardized and are variable. Making matters more challenging is that patients do not always present on time while circumstances can interfere with best practices and time can alter the course of injury significantly.

This survey of clinical diagnostic reports was undertaken to demonstrate the utility of quantifying guideline adherence in concussion diagnosis. The focus of the exercise was on the clinical documentation that was related to published guidelines for the diagnosis of sport-related concussions. Sport-related guidelines include the use of specific tools that are not found in guidelines for diagnosing general mTBI. In sports medicine, the use of the Sports Concussion Assessment Tool (SCAT-5 [1]) is recommended as the diagnostic tool of choice. This tool is a compendium of standardized tools and clinical procedures. The standardized tools (Standardized Assessment of Concussion – SAC [2,3] and modified Balance Error Scoring System [4,5] – mBESS) extend the standard neurological examination and have become recommended diagnostic examination procedures in sports medicine.

Methods

A scoping review of guidelines and standards for the diagnosis of concussion was undertaken to identify the best diagnostic practices based on evidence and expert consensus. Multiple expert panel reports, consensus conferences and professional guidelines have been published and were used to survey a sample of existing diagnostic reports for completeness of documentation (**Appendix**). The review identified 16 best-practice principles with seven specific diagnostic criteria. Within the 16 guidelines, the criteria for diagnosis are represented.

The diagnosis of concussion relies on seven items: a likely mechanism of injury, an alteration of consciousness, symptom presentation that is consistent with a concussion, a Glasgow Coma scale of greater than 12, no loss of consciousness greater than 30 minutes, no post-traumatic amnesia for more than 24 hours and a rule-out of confounding factors that could explain the presentation*.

The sample consisted of 62 case reports generated by 10 athletic trainers in their standard clinical practice. The athletic trainers were all certified (ATC), supervised by appropriate medical personnel, and permitted by State law to render diagnoses. They were employed by a large athletic training service and worked at several high schools. The reports were randomly selected from cases from the 2020 - 2022 school years. Although the reports were generated during the

*There are slight differences in specific diagnostic criteria depending on the organization or framework. Probably the most used standard is the International Classification of Diseases (ICD-10: World Health Organization, 2004) used in this exercise.

pandemic period, cases were felt to be assessed as per usual. All materials were deidentified prior to review other than the date of injury and the date of the report. One independent reviewer reviewed each of the reports for documentation and utilized the Qmetis CQx [6] diagnostic clinical support tool algorithm based on the 16 guidelines. The algorithm tallies the number of items addressed.

A matrix Table was created that identified the report with a system-generated identification number by each of the 16 items. A sum of represented items was calculated for each report and for each item. The percent of completeness per report and percent of representation of each item were also calculated.

Results

While there was considerable variability in the completeness of the documentation, across the sample the overall rate of criteria representation was 52% with an average of 8 items per case (range of 1-13 items). No report met all 16 guidelines (Table 1 for summary data).

The guidelines most frequently reported were: providing recommendations (97%), completing symptom examinations (89%), identifying the likely mechanism of injury (84%), administering the Standardized Assessment of Concussion (SAC 81%) and the modified Balance Error Scoring System. In this sample, diagnoses were more often made within 48 hours than not, with the average time under 2-days. Less complete documentation was identified for rule-outs of loss of consciousness greater than 30 minutes (13%) and post-traumatic amnesia greater than 24 hours (5%). Documenting cervical spine examinations (29%) and head trauma examinations (24%), together with the lack of reporting of the Glasgow Coma Scale (10%) represented important gaps in documentation.

Table 1: Guidelines and Results from 62 Diagnostic Reports.

	Guideline	Sum	Avg
1	Warnings/ Red Flags acknowledged	23	0.37
2	Glasgow Coma Scale	6	0.10
3	Head Physical Examination	15	0.24
4	Likely Mechanism of Injury	52	0.84
5	Alteration of Consciousness	20	0.32
6	LOC ruled out	8	0.13
7	PTA ruled out	3	0.05
8	Cervical Spine Examination	18	0.29
9	Health History	43	0.69
10	Symptom Examination	55	0.89
11	Neurological Examination	41	0.66
12	Confounding Factors	25	0.4
13	Recommendations	60	0.97
14	SAC	59	0.81
15	mBESS	44	0.71
16	Dx <49 hours	51	0.82

Notes. LOC: Loss Of Consciousness; PTA: Post-Traumatic Amnesia; SAC: Standardized Assessment of Concussion; mBESS: modified Balance Error Scoring System; Dx: Diagnosis.

Conclusion

This project intended to identify specific strengths and weaknesses in the documentation of best-practice diagnostic guidelines. In this convenience sample of diagnostic reports, many best-practice guidelines were regularly reported in the documentation. However, multiple gaps existed throughout these case reports. It is important to note that in some, gaps may not be due to clinical oversight, but due to typical challenges in clinical care or failure to document procedures completely. This exercise highlights several items that were routinely missing from reports that could call a specific diagnosis into question.

There are several important caveats to these data. First, only one reviewer reviewed the reports. Although that work was checked, multiple raters would have been better. Further, this was data from only one athletic training service and may not represent others. The cases were examined during the pandemic; however, it was surprising that confounding factors such as COVID were not explicitly ruled out. Finally, and importantly, items may have been addressed and simply not reported. Thus, the findings do not suggest poor practice per se.

Complete documentation of diagnosis is important for both continuity and quality of clinical care. Based on multiple published papers, this survey provided a structured framework for identifying gaps in diagnostic procedures and demonstrated the value of reviewing documentation in concussion diagnostic procedures. The ability to identify strengths and gaps in the documentation about clinical concussion practice can help improve both the continuity of care and the quality of care that in turn should lead to more certain diagnoses and better outcomes. At an organizational level, such a procedure can identify systematic omissions and potential policy needs.

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