

## Reliability of a Novel Concussion Documentation Audit Tool

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**Context:** Previous research reports deficiencies in documentation of initial concussion evaluations by athletic trainers. We are unaware of a comprehensive tool to audit the completeness of concussion documentation compared to best practice recommendations. Therefore, we developed a tool that assesses evidence-based criteria required for complete documentation of initial concussion evaluations. Face, content and concurrent validity were established; however, establishing reliability of the tool is necessary. The purpose of this study was to assess intra- and interrater reliability of the Concussion Documentation Audit Tool (CDAT) for auditing the completeness of initial concussion evaluation documentation.

**Methods:** Three certified athletic trainers (2-35 years' experience) used the CDAT to audit a convenience sample of 53 deidentified initial concussion evaluation notes from 2 clinical sites (1 high school, 1 college) in random order on 2 occasions separated by at least 1 week (Audit 1, Audit 2). The CDAT assesses 36 critical components of initial concussion evaluations on a 3-point scale, where 2 points indicates the criterion was fully met and 1 and 0 points indicate partial or no compliance, respectively. The 36 items of the CDAT were divided into subsections: History (9 items); Presentation (10 items); Physical Exam (10 items); Assessment & Plan (7 items). Two-way random intraclass correlation analyses (ICC<sub>2,1</sub>,  $p < .05$ ) were used to assess for intra- and interrater reliability of CDAT overall score (maximum=72 points) and subsection scores. ICC values were interpreted conservatively: Poor:<0.6, Fair:0.6-0.7, Acceptable:0.7-0.8, Good:0.8-0.9, Excellent:>0.9. Bland-Altman analyses were used to assess interrater agreement (Rater 1-Rater 2, Rater 2-Rater 3, Rater 1-Rater 3) for individual items from Audit 1.

**Results:** Intrarater ICCs for overall CDAT scores demonstrated excellent reliability (Table). Intrarater ICCs for CDAT subsections ranged from good to excellent. Interrater ICCs for overall CDAT scores indicated excellent reliability. Interrater ICCs for CDAT subsections demonstrated acceptable to good agreement indicating moderate reliability. Agreement analyses for 2 of 36 items on the CDAT showed statistically significant differences across all three comparisons, indicating consistently poor agreement for items regarding injury date ( $p < 0.02$ ) and neurocognitive assessment ( $p < 0.04$ ). For the remaining 34 items, 11 had moderate agreement and 23 had good agreement.

**Conclusions:** The CDAT is a reliable instrument to audit the completeness of initial concussion evaluation documentation. Future efforts should aim to further solidify the measurement properties of the CDAT across more raters and specifically for the two items that had poor agreement across raters. The CDAT is a promising tool that may be able to inform targeted interventions to improve initial concussion evaluation documentation for students and clinicians. Additionally, the CDAT inherently provides an outline for complete documentation that clinicians can refer whenever documenting concussions.

**Table.** Inter- and intrarater reliability (95% CI\*) of CDAT subsection and overall scores.

	<b>History</b>	<b>Presentation</b>	<b>Physical Exam</b>	<b>Assessment &amp; Plan</b>	<b>Overall</b>
<b>Intrarater Reliability (Rater 1)</b>	.79 (.67, .87)	.81 (.70, .89)	.96 (.93, .97)	.93 (.88, .95)	.91 (.85, .95)
<b>Intrarater Reliability (Rater 2)</b>	.85 (.75, .91)	.83 (.72, .90)	.94 (.90, .96)	.86 (.77, .91)	.93 (.89, .96)
<b>Intrarater Reliability (Rater 3)</b>	.82 (.72, .89)	.84 (.74, .90)	.91 (.85, .95)	.89 (.82, .93)	.95 (.92, .97)
<b>Interrater Reliability</b>	.77 (.67, .85)	.76 (.66, .84)	.88 (.82, .92)	.70 (.57, .80)	.90 (.85, .94)

\*Confidence Interval