

agreement was achieved for 554 (75.0%) patients pre-eCTAS, compared to 429 (93.0%) patients triaged with eCTAS. Using the auditors CTAS score as the reference standard, eCTAS significantly reduced the number of patients over-triaged (12.1% vs. 3.2%; 8.9, 95% CI: 5.7, 11.7) and under-triaged (12.9% vs. 3.9%; 9.0, 95% CI: 5.9, 12.0). Interrater agreement was higher with eCTAS (unweighted kappa 0.90 vs. 0.63; quadratic-weighted kappa 0.79 vs. 0.94). Research assistants captured triage time for 4403 patients pre-eCTAS and 1849 post implementation of eCTAS. Median triage time was 304 seconds pre-eCTAS and 329 seconds with eCTAS (25 seconds, 95% CI: 18, 32 seconds).

Conclusion: A standardized, electronic approach to performing CTAS assessments improves both clinical decision making and administrative data accuracy without substantially increasing triage time.

Keywords: triage, electronic Canadian Triage and Acuity Scale, interrater agreement

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Implementation strategies to promote provider behaviour change in emergency departments

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Introduction: Translating research evidence into routine clinical practice in emergency departments (EDs) often requires changing the behavior(s) of one or more member of the healthcare team. Changing strongly entrenched behavior patterns or occasional behaviors that are impacted by psychological, social or environmental factors can be challenging. We conducted a systematic review of the literature to identify implementation strategies that have been evaluated to change ED provider behavior and promote the uptake of evidence in emergency practice settings. **Methods:** The following databases were systematically searched from inception to 2017 with the support of a library scientist: MEDLINE, CINAHL, Embase and Cochrane CENTRAL. We also manually searched the last 5 years of Annals of Emergency Medicine, Canadian Journal of Emergency Medicine, and Implementation Science. Studies were assessed by two independent reviewers and retained if they included one or more of the implementation strategies listed in the Cochrane Effective Practice and Organization of Care (EPOC) Taxonomy, targeted any health care provider working in any type of emergency department. The Cochrane Risk of Bias tool was used to assess study quality. **Results:** Following review of 13,000 title and abstracts, 33 studies met the inclusion criteria. The majority of included studies were randomized control trials (N=32) and 50% were published in the last seven years. Although poorly described, interventions targeted either physicians (n=12), nurses (n=8), pharmacists (n=1) or multi-disciplinary teams (n=12). Common behavioral targets included compliance with practice guidelines, test ordering and prescribing. According to the EPOC Taxonomy most implementation strategies were multi-component and could be categorized as either educational materials/meetings and/or reminders. Only one study author reported using evidence to inform the design of the implementation strategy. Effect sizes varied across relevant study outcomes but the direction of effect was positive in 22/33 included studies. Heterogeneity of study interventions and outcomes precluded meta-analysis. **Conclusion:** To strengthen the evidence base regarding implementation strategies that promote provider behavior change across different ED contexts, there is a critical need to improve both the design and reporting of implementation strategies in ED research.

Keywords: implementation science, healthcare provider behaviours, evidence-based practice

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A randomized controlled trial of electronic clinical decision support to reduce unnecessary CT imaging for patients with mild traumatic brain injury

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Introduction: Utilization of CT imaging has risen dramatically with increases in availability, but without corresponding improvements in patient outcomes for many clinical scenarios. Previous attempts to improve imaging appropriateness have met with limited success, with commonly cited barriers including a lack of confidence in patient outcomes, medicolegal risk, and patient expectations. The objective of this study was to assess the impact of an electronic clinical decision support (CDS) intervention to reduce CT utilization for emergency department (ED) patients with mild traumatic brain injury (MTBI). **Methods:** This was a cluster-randomized, controlled trial with physicians as the unit of randomization. All emergency physicians (EPs) at 4 urban adult EDs and 1 urgent care center were randomly assigned to receive evidence-based imaging CDS (intervention) or no CDS (control) for patients with MTBI over a 1-year study period. CDS was launched in an external web browser whenever an intervention EP ordered a non-enhanced head CT from the computerized physician order entry (CPOE) system for ED patients CTAS 2-5 with a CEDIS chief complaint of head injury; however, interaction with CDS was voluntary. The CDS tool provided detailed information to physicians about the Canadian CT Head Rule, including patient eligibility, exclusion criteria, risk factors and probability of serious injury, as well as an imaging recommendation (yes/no). CDS recommendations could be printed for the medical record as could educational patient handouts to support physician decision making. The primary outcome was CT utilization for patients with MTBI on the index visit. Secondary outcomes included ED length of stay (LOS), and return visits, CT use, hospital admission and traumatic head injury diagnoses over the next 30-days. This study was REB approved. **Results:** Physician demographics and baseline CT utilization for MTBI patients were similar among intervention and control EPs during a 2-year pre-intervention period. In the first 8-months following CDS implementation, 102 intervention EPs saw 2,189 eligible patients while 100 control EPs saw 1,707 patients. Intervention EPs voluntarily interacted with CDS on 36.2% of eligible encounters. Head CT utilization was lower among intervention EPs than controls (38.5% vs. 45.1%, $p < 0.0001$) as was ED LOS (201 vs. 218.5 minutes, $p < 0.001$). There was no difference in 30-day ED return visits, head CT utilization, hospital admission or traumatic head injury diagnoses. **Conclusion:** In one of the largest RCTs of CDS to date, exposure to CDS was associated with decreased head CT utilization and shorter LOS on the index visit, and no difference in 30-day head CT use, return ED visits or hospital admission. These results suggest that a comprehensive CDS implementation may be able to overcome several barriers to use of decision rules and may contribute to improved clinical decision making and decreased CT utilization.

Keywords: clinical decision support, diagnostic imaging, mild traumatic brain injury

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A randomized controlled trial of electronic clinical decision support to reduce unnecessary CT imaging for patients with suspected pulmonary embolism

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