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Characteristics of clinical decision support tools that impact physician behaviour: a systematic review and meta-analysis

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Introduction: Clinical decision support (CDS) has been implemented in many clinical settings in order to improve decision-making. Their potential to improve diagnostic accuracy and reduce unnecessary testing is well documented; however, their effectiveness in impacting physician practice in real world implementations has been limited by poor physician adherence. The objective of this systematic review and meta-regression was to establish the effectiveness of CDS tools on adherence and identify which characteristics of CDS tools increase physician use of and adherence. **Methods:** A systematic review and meta-analysis was conducted. MEDLINE, EMBASE, PsychINFO, the Cochrane Central Register of Controlled Trials and Cochrane Database of Systematic Reviews were searched from inception to June 2017. Included studies examined CDS in a hospital setting, reported on physician adherence to or use of CDS, utilized a comparative study design, and reported primary data. All tool type was classified based on the Cochrane Effective Practice and Organization of Care (EPOC) classifications. Studies were stratified based on study design (RCT vs. observational). Meta-regression was completed to assess the different effect of characteristics of the tool (e.g. whether the tool was mandatory or voluntary, EPOC classifications). **Results:** A total of 3,359 candidate articles were identified. Seventy-two met inclusion criteria, of which 46 reported outcomes appropriate for meta-regression (5 RCTs and 41 observational studies). Overall, a trend of increased CDS use was found (pooled RCT OR: 1.36 [95% CI: 0.97-1.89]; pooled observational OR: 2.12 [95% CI: 1.75-2.56]).When type of tool is considered, clinical practice guidelines were superior compared to other interventions ($p = .150$). Reminders ($p = .473$) and educational interventions ($p = .489$) were less successful than other interventions. Multi-modal tools were not more successful that single interventions ($p = .810$). Lastly, voluntary tools may be supperior to than mandatory tools ($p = .148$). None of these results are statistically significant. **Conclusion:** CDS tools accompanied by a planned intervention increases physician utilization and adherence to the tool. Meta-regression found that clinical practice guidelines had the biggest impact on physician adherence although not statistically significant. Further research is required to understand the most effective intervention to maximize physician utilization of CDS tools.

Keywords: clinical decision support tools, emergency medicine technology

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Do doctors cherry pick?

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Introduction: Physician access to presenting complaint information may lead to cherry picking if some patients are seen as more attractive than others. Our objective was to determine whether chief complaint CC descriptors are associated with differing wait time to MD, hence whether physicians preferentially see patients with selected presenting complaints. **Methods:** We collated administrative data on all Calgary ED patients from 2016. Those in CTAS categories 1 and 5 were excluded, as well as fast track patients (because of single coverage). We described most common chief complaint (CC) categories and their median wait time to MD, adjusted for ED arrival site, patient sex, triage acuity, and need for admission. **Results:** We studied 128,812 subjects (54% CTAS2, 46% CTAS34) with 56,243 males and 72,569 females. Mean age was 50.6 years ($sd = 20$), and most common CC categories (%) were abdominal pain (22%), chest pain (14.6%), musculoskeletal problems (7.2%), flank pain (5.2%), URI/Fever (4.7%), dyspnea (4.6%), headache (4.6%), and back pain (4.0%). Median TTMD was 84 min and admission rate in the study cohort was 30.4%. Multiple linear regression modeling showed that, in addition to CC category and ED arrival site, CTAS level, female sex, and need for admission changed TTMD by 18.6 min (per CTAS level), 6.6 min, -19.2 min respectively. Based on adjusted TTMD, the least attractive CC categories (adjusted median TTMD) were constipation (104 min), back pain (103), Depression/anxiety (103), abdominal pain (102), and dizziness/sensory disturbance (98); while the most attractive were trauma (44 min), allergic reaction (46), stroke symptoms (49), palpitations (61), and overdoses (66). **Conclusion:** There is a larger than expected difference in waiting times associated with specific chief complaint categories. This has implications for the way that patients are assigned to physicians or perhaps the way that chief complaint data is transmitted.

Keywords: quality improvement and patient safety, wait times, triage

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Validity of the Canadian CT head rule age criterion for mild traumatic brain injury

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Introduction: With a Canadian aging population, the prevalence of mild traumatic brain injury (mTBI) among elderly is increasing and the age criterion of the Canadian CT head rule (CCHR) is challenged by many emergency physicians. We evaluated if increasing the age criterion of the CCHR would maintain its validity. **Methods:** We conducted an historical cohort study using the medical charts of all patients 65 years old or more who consulted at a Level One Trauma Centre emergency department (ED) for a mTBI between 2010 and 2014. The main outcome measures were clinically important brain injury (CIBI) on Computed Tomography (CT) and the presence of the CCHR criteria. The clinical and radiological data collection was standardized. Univariate analysis was performed to measure the predictive capacities of modified age cut-offs at 70 and 75 years old. **Results:** Out of the 104 confirmed mTBI in this study, 32 (30,8%) had CIBI on CT scan. Sensitivity and specificity [C.I. 95%] of the CCHR were 100% [89.1 - 100] and 0% [0.0 5.0] for an age criterion of 65 years old and above; 100% [89.1 - 100] and 4,2% [0.9 11.7] for a modified criterion of 70 years old; 100% [89.1 - 100] and 13,9% [6.9 24.1] for 75 years old. Furthermore, for an age criterion of 80 and 85 years old, sensitivity was respectively 90,6% [75.0 98.0] and 75,0% [56.6 88.5]. **Conclusion:** In our cohort, increasing the age criterion of the CCHR for minor head injury to 75 years old would benefit ED by further reducing CT scans without missing CIBI. A larger prospective study is indicated to confirm the proposed modification.

Keywords: mild traumatic brain injury, computed tomography, Canadian CT head rule

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Validation of the Stoplight Pain Scale tool in the Canadian emergency setting

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