

# The Impact of Standardized Use of Head CT Decision Rules on Computed Tomography Imaging Utilization in Adult Minor Head Trauma

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## PURPOSE

This Quality Improvement (QI) project aimed to evaluate if implementing clinical decision aides, specifically the Canadian Head CT Rule, in the setting of adult patients presenting to the Emergency Department (ED) with a minor head injury could decrease overall CT utilization and costs of care.

## DESIGN

This project used a before and after design to evaluate Head CT utilization and appropriate use trends for ED patients aged 18 years and older who presented with a low-risk head or facial injury as defined by the Michigan Emergency Department Improvement Collaborative (MEDIC) Measure Definition for CT Utilization in Minor Head Injury. Data were securely stored and extracted from Arbor Research in Tableau and further processed in Excel.

## SETTING & SAMPLE

Data were analyzed from January 2021 through June 2022. Ten EDs from a single, integrated health system were included in the study population, with settings in both urban and rural locations with a combined annual visit volume of 302,763 in 2021. All sites included in the analysis are staffed by physicians and advanced practice providers employed by Emergency Care Specialists, a physician-owned medical practice. Emergency Care Specialists participates in the MEDIC program as an independent physician group with support from the affiliated hospital system.

## METHODS & IMPLEMENTATION

Emergency Care Specialist joined MEDIC in January of 2021. In October of 2021, the clinical quality improvement team formally launched an education campaign focused on implementing the MEDIC Adult Minor Head Injury Toolkit and increasing provider application of the Canadian Head CT Rules in the setting of minor head trauma. Interventions used included developing an internal expert QI team, establishing regular workgroup meetings, adoption of standardized pathways, execution of a robust education plan, individualized provider performance feedback, and data transparency to track groupwide metrics.

## RESULTS

From January 2021-October 2021, the average appropriate head CT utilization rate in minor adult head trauma as defined by MEDIC was 40%. From November 2021-June 2022, the average appropriate head CT utilization in minor adult head trauma was 63% (Figure 1). This represents a 57.5% increase in appropriate CT Utilization Rates.

## RESULTS (continued)

In addition to improving appropriate CT utilization rates, the project team aimed to evaluate the number of ED patients who experienced a head injury (as defined by the MEDIC data dictionary) and received CT imaging during the ED visit. From January 2021-Oct 2021, 2,634 Head Injury patients presented for care, and 1,522 CT scans were ordered (58% head CT utilization rate). During the intervention period of November 2021-June 2022, 2,385 patients presented to the ED for a minor head injury and 1,128 scans were ordered as seen Figure 2 (48% head CT utilization rate). A Pearson Correlation was calculated and demonstrated a strong negative correlation (Pearson, -0.75) between the appropriate head CT utilization as defined by MEDIC and the overall head CT utilization rate.

Figure 1.  
% Appropriate Head CT Utilization Rates in Adult Minor Head Trauma.



Figure 2.  
% Adult Minor Head Injury Cases That Received a CT Scan.



Note: Data pulled from Tableau on September 9, 2022, by Terry Saunders. Data set includes adult minor head injury patients that received a head CT. Adult minor head injury is defined by ICD 10 codes and chief complaint for MEDIC and then exclusion criteria is applied to exclude high risk patients. "Eligible Minor Head Injury Cases," are the cases that are left after exclusion criteria. "Count of Adult CT Scans," is the amount of eligible minor head injury cases that received a CT scan.

## CONCLUSIONS & DISCUSSION

Over 18 months, providers gained familiarity with the Canadian Head Injury CT rules and subsequently improved group performance in the MEDIC Adult Minor Head Injury measure by increasing the number of appropriate CT scans. In addition, the group also demonstrated a reduction in overall CT utilization rates for adults aged 18 years and older presenting to the ED with minor head trauma. The outcomes of this QI intervention can also be translated into cost savings for patients and payors.

Considering the baseline overall Head CT Utilization rate of 58% in January 2021-October 2021, the expected overall Head CT count during November 2021-June 2022 would have been 1,383 scans. As a result of the education and best practices that were implemented, there was a 17% reduction in CT utilization rates which resulted in a potential avoidance of 255 scans. At the MEDIC estimated Head CT cost of \$933 per scan, this translates into a potential cost savings of \$237,915 (Table 1.) Although more definitive research is warranted on the overall cost implications of QI interventions, this project serves as a valuable example of the potential monetary impact of quality on health care costs.

Table 1.  
Projected Cost Savings.

Timeframe	Number of Scans	CT Cost
January 2021-October 2021	1522	\$1,420,026
Projected November 2021-June 2022 (2021 baseline 58%)	1383	\$1,290,339
Actual November 2021-June 2022 (achieved 48% scan rate)	1128	\$1,052,424
<b>Projected Costs Savings</b>		<b>\$237,915</b>

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## REFERENCES

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