Implementing a Quality Improvement Program for the City of Hudson Emergency Medical Services

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Background and Aims

Using data from the Hudson EMS Patient Care Report (PCR) charting software HealthEMS, a chart review was conducted to determine how closely Hudson EMS providers adhere to the University Hospitals (UH) EMS Protocol. Two call types were chosen for the initial assessment: strokes and ST-elevated myocardial infarctions (STEMIs), commonly known as "heart attacks." The goals of this project are as follows:

- **Aim 1**: Evaluate STEMI and Stroke calls from 2023-2024 to assess protocol compliance and identify common mistakes or inconsistencies in documentation
- **Aim 2**: Recommend areas for targeted continuing education to close identified gaps between current performance and the standard of care
- **Aim 3**: Develop a reference guide to improve consistency in providers' documentation, offer a standardized expectation for charting, and outline common errors to correct prior to PCR submission

STEMI Calls: Protocol Adherence and Statistics

STEMIs were identified using three queries within HealthEMS Manager: STEMI pre-arrival alert, provider impression of a STEMI, and documentation that a STEMI was present on a 12-lead EKG. Each chart was reviewed for confirmation of anatomically contiguous ST-elevation and compared to the UH EMS Protocol for Acute Coronary Syndrome (ACS). Charts were removed if they were mistakenly recorded as a STEMI or progressed such that they could no longer be compared to the ACS protocol (ex. cardiac arrest). Of the three HealthEMS queries, STEMI pre-arrival alert offered the most accurate capture of true STEMI calls. Additional QA notes:

- 100% of calls in which ST-elevated leads were documented in the narrative, they contradicted the attached EKG (n=2)
- Male to Female ratio = 12:1
- Average Age: 67 years (Min: 46, Max: 88)
- The most common dispatch reason was Chest Pain with No Injury (n=7), with one occurrence each for Unconscious/Fainting, Diabetic Problems, Respiratory Distress, Hypotension, Cardiac Problems (Not Chest Pain), and GI Problems
- The most common anatomical MI location was Inferior (38%)

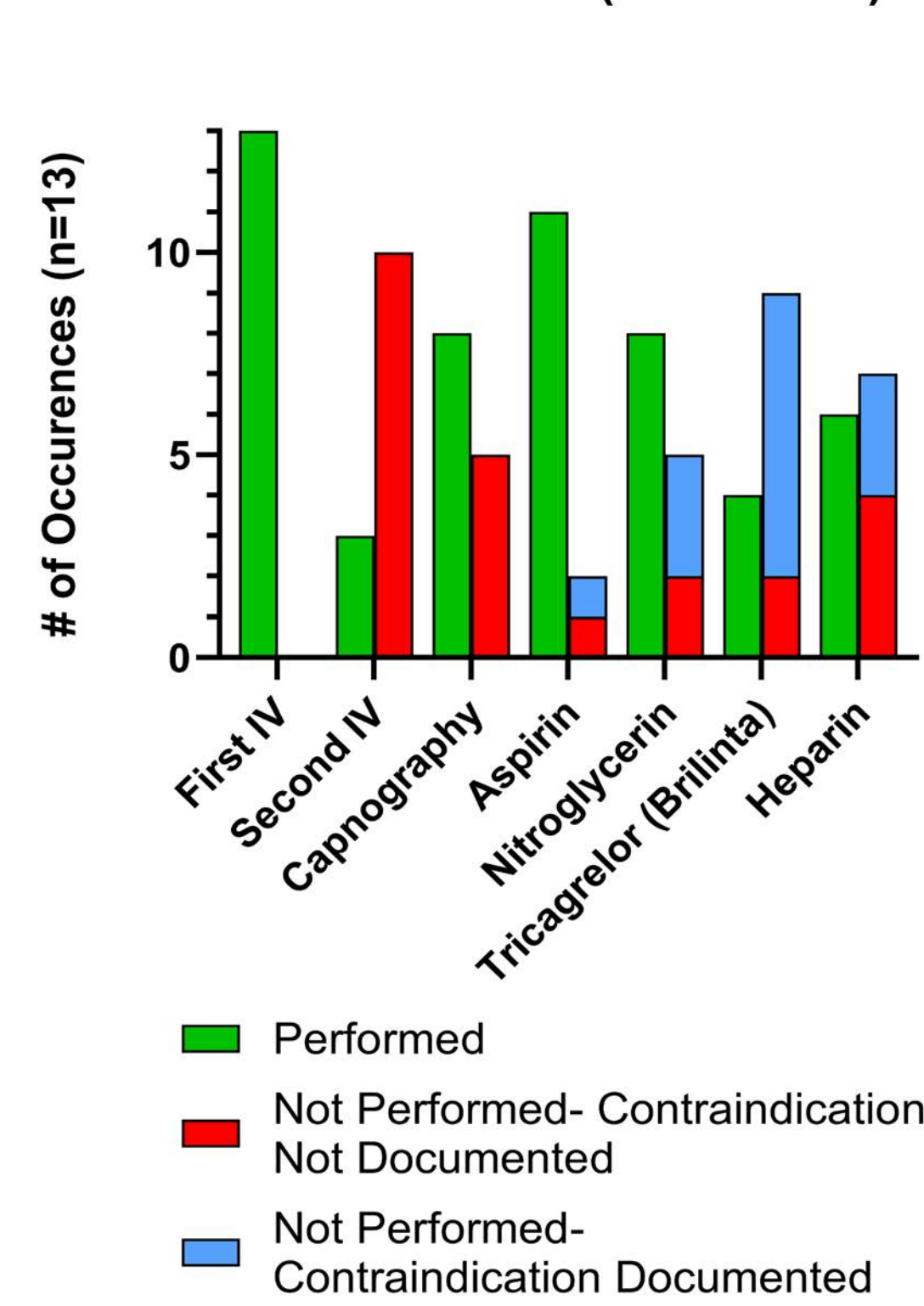**Protocol Adherence for STEMI Interventions (2023-2024)**
Legend: Performed; Not Performed- Contraindication Not Documented; Not Performed- Contraindication Documented

Figure 1: Number of occurrences for each intervention included in the UH EMS Protocol for a confirmed STEMI

2023-2024 STEMI Call Time Intervals
Legend: Total Time On-Scene; Patient Contact to EKG; Patient Contact to STEMI Alert*; STEMI Alert to Hospital Arrival
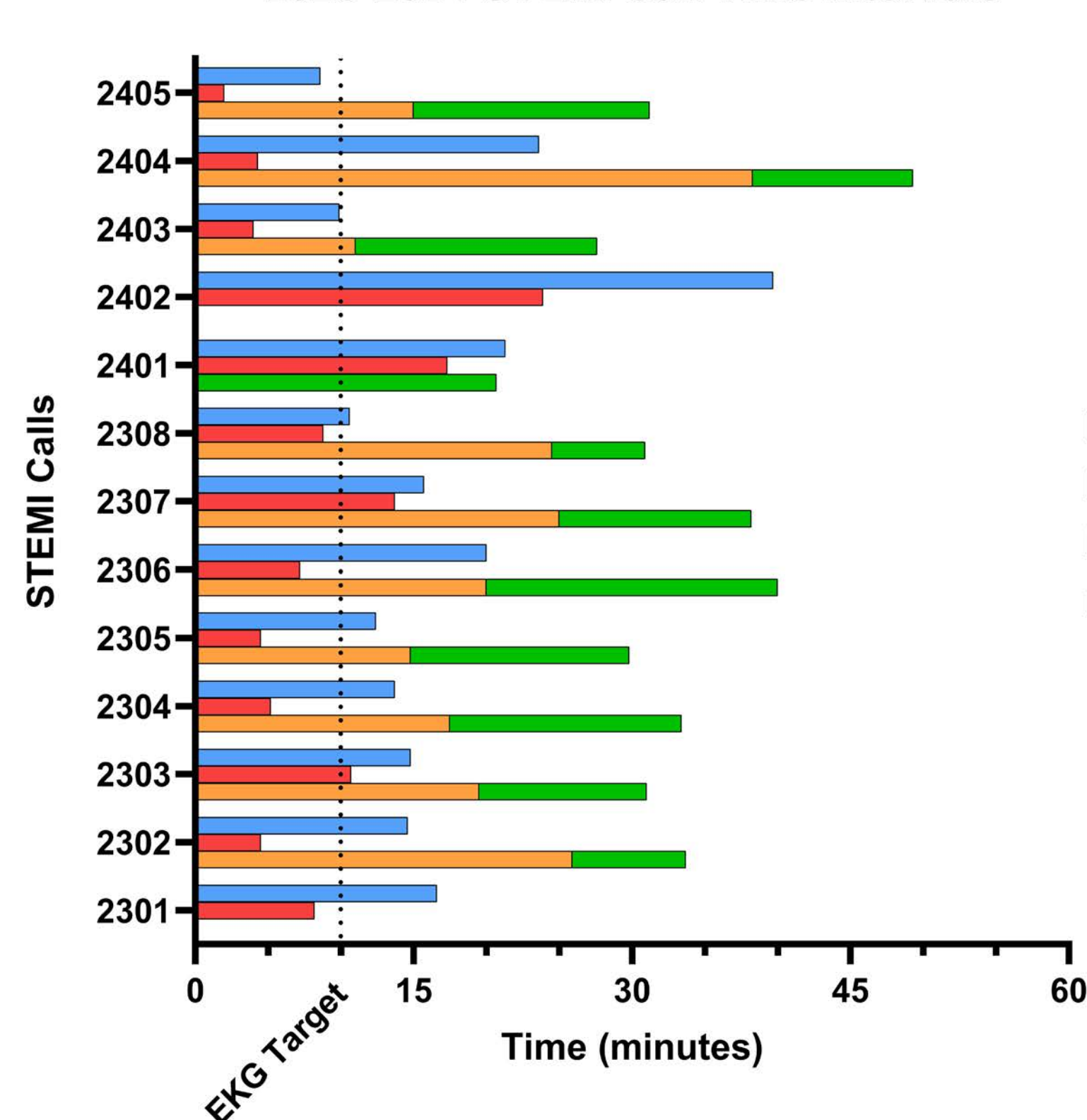
*Figure 2: This graph demonstrates the intervals of time-sensitive steps within the STEMI treatment guide. Each grouping corresponds to one call. "Total Time On-Scene" is calculated as the interval between provider contact with the patient and initiation of transport to the hospital. "Patient Contact to EKG" represents the amount of time it took providers to perform a 12-lead EKG, the field diagnostic test for a STEMI (Goal <10 minutes). "Patient Contact to STEMI Alert" represents the interval between patient contact and EMS notifying the receiving hospital of an incoming STEMI patient (*absence of this time indicates a failure to document STEMI Alert time). "STEMI Alert to Hospital Arrival" is the interval between notification and arrival of the patient. With the exception of "STEMI Alert to Hospital Arrival," providers should aim to minimize these intervals.*

Stroke Calls: Protocol Adherence and Statistics

Stroke calls were identified by PCRs documenting a Stroke pre-arrival alert and were evaluated against the corresponding protocol. Additional Stroke QA Notes:

- Sex: 46.1% Male; 53.9% Female
- Average Age: 76 years (Min: 22, Max: 98)
- CVA/Stroke was included as a provider impression in 58% of charts
- The VAN assessment is included in the UH EMS Protocol for stroke patients but was recorded in zero Hudson EMS charts. This is in part due to a lack of availability of the VAN assessment as a pre-loaded event which can be followed and documented in real time. This feature is expected to be released in the near future.

Stroke Calls by Dispatch Reason
Legend: Change in Mental Status/AMS (20); CVA/Stroke (35); Fall (5); General Medical (7); Unconscious/Fainting (3); Other (6)
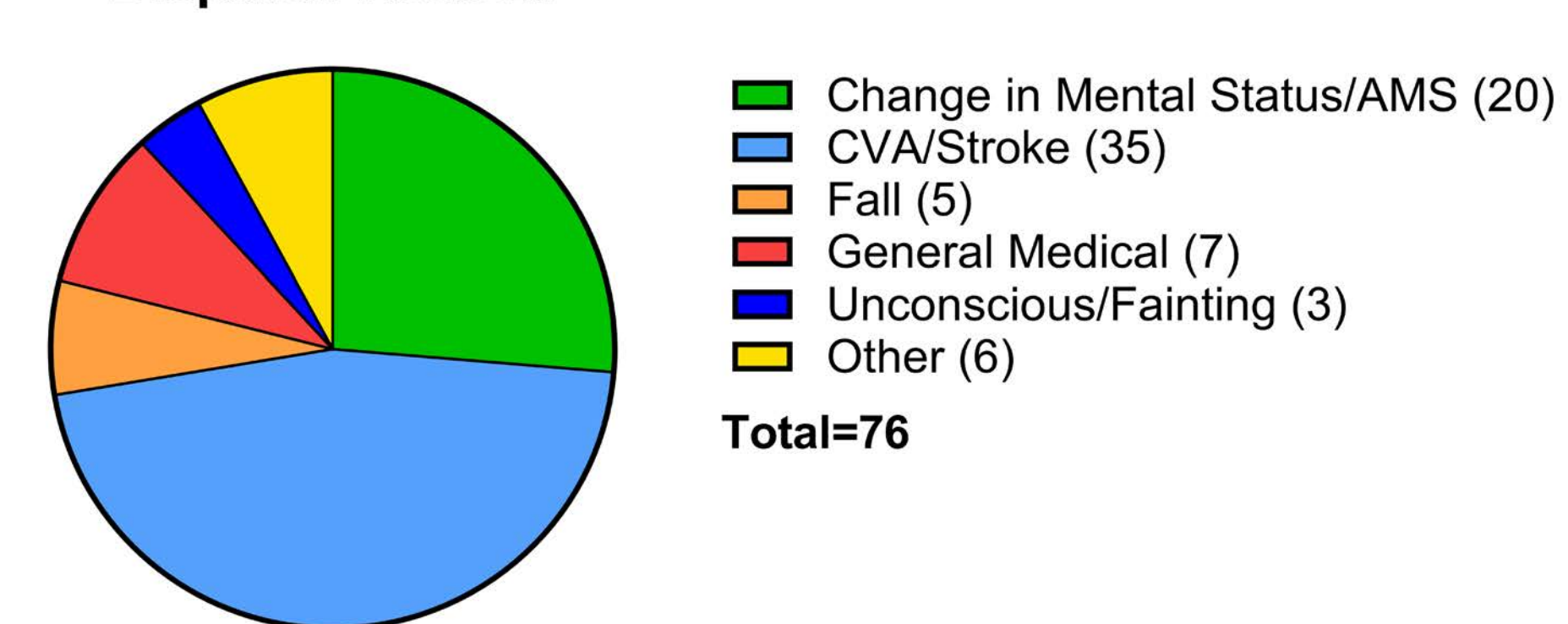Total=76

Figure 3: Stroke calls by recorded dispatch reason. Call types in the "other" category include once incidence each of Pain (Non-Injury), Hypertension, Respiratory Distress/Breathing Problem, Diabetic Problems, Chest Pain (No Injury), and General Weakness. The category for "Fall" includes calls recorded as Fall (No-Injury) (2) and Fall (Injury) (3).

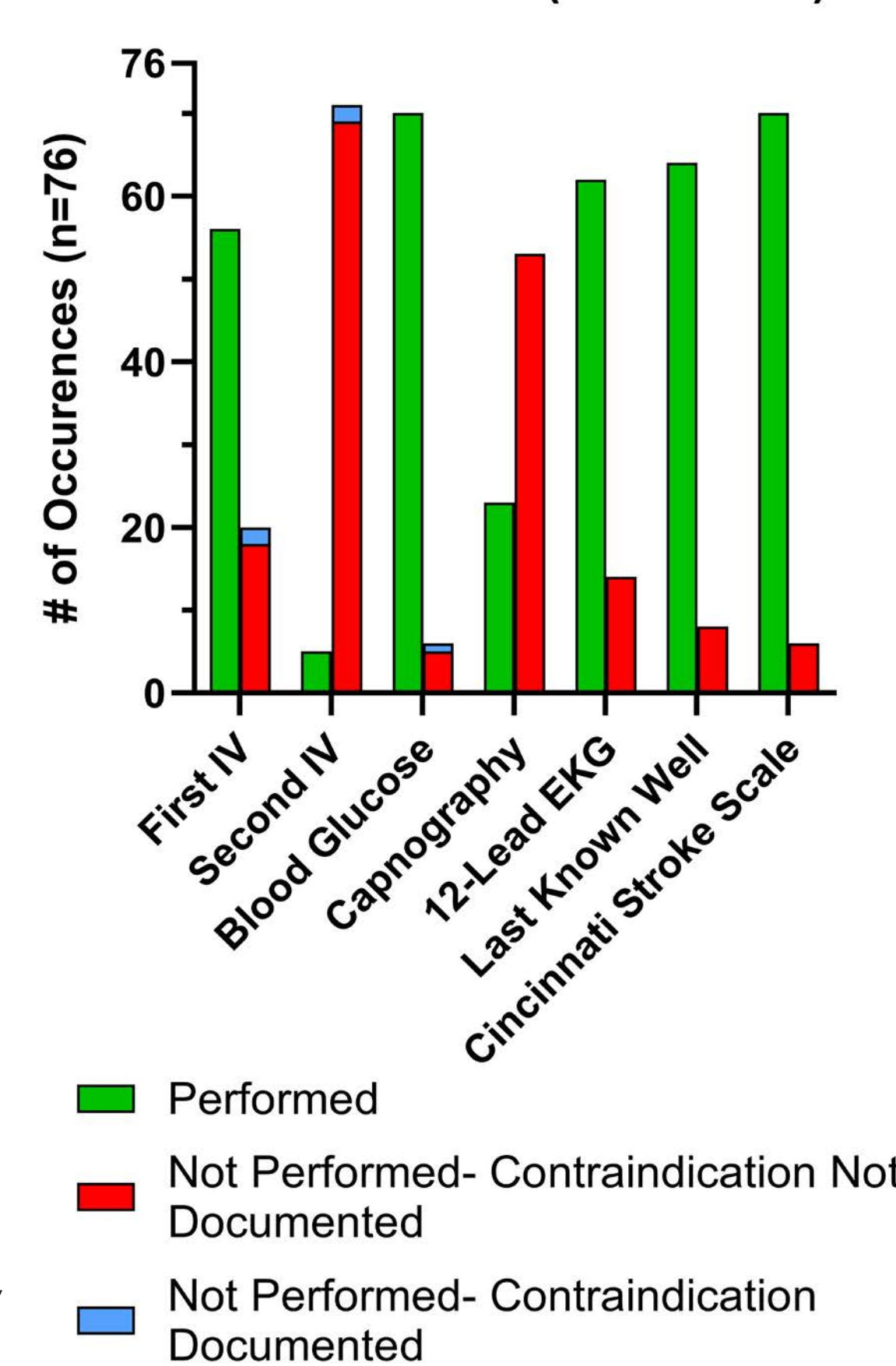**Protocol Adherence for Stroke Interventions (2023-2024)**
Legend: Performed; Not Performed- Contraindication Not Documented; Not Performed- Contraindication Documented

Figure 4: Number of occurrences for each intervention included in the UH EMS Protocol for Stroke.

2023-2024 Stroke Call Time Intervals
Legend: Patient Contact to Stroke Alert; Stroke Alert to Hospital Arrival; Left Scene
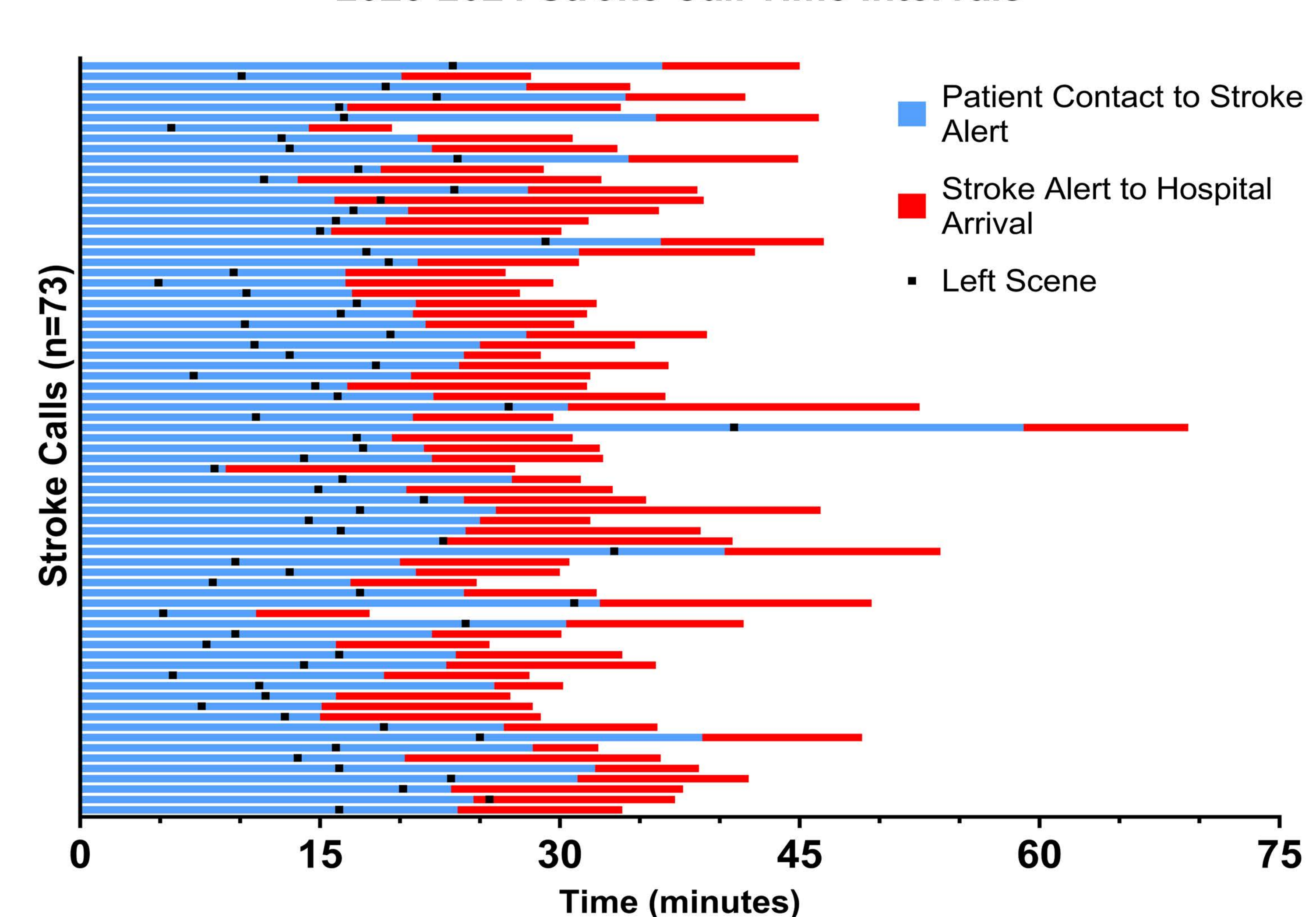
Figure 5: This graph represents the intervals of time-sensitive steps within the Stroke treatment guide. Each bar represents one stroke call. Three of the 76 total recorded strokes were removed due to inconsistencies in time documentation. "Patient Contact to Stroke Alert" is calculated as the interval between providers making patient contact and calling a pre-arrival alert for a stroke patient to the hospital. "Stroke Alert to Hospital Arrival" is the time from hospital notification of an incoming stroke patient to arrival at the hospital, representing the amount of time available for the Emergency Department to prepare a Stroke Team. "Left Scene" is shown as a black dot for each call and shows the time when EMS initiated transport to the Emergency Department. While no specific time goal exists within the UH EMS Protocol for Strokes, the time between onset of a stroke and treatment is crucial to neurological function, survival, and recovery. EMS goals are to reduce total call time, On-Scene time, and Stroke alert time.

General Areas for Improvement

Over the course of this project, over 300 charts have been evaluated for protocol compliance, consistency, and to identify areas of overall improvement. **The following list includes common and/or critical errors found in PCRs:**

- Documentation of vital signs outside of normal limits without intervention to correct or confirm the reading (SpO_2 <94%, HR>120BPM without EKG)
- Including a single erroneous vital sign inconsistent with other documentation trends without intervention or verification
- Including interventions in the chart narrative only (BGL, IV, medication) without supporting documentation in the Event Log. In some cases, this affects Hudson EMS's ability to be reimbursed for care rendered
- Spelling mistakes
- GCS inconsistent with recorded exam findings
- Heart rhythm interpretation that does not match the attached 4- or 12-lead EKG
- Conflicting documentation between the narrative and Event Log not supported by a change in the patient's condition
- Incorrect times (eg. STEMI alert recorded as occurring before performing a 4- or 12-lead EKG)

Considerations and Future Steps

When performing QA/QI of Patient Care Reports (PCRs), it is important to note that an error in documentation does not necessarily reflect an error in care rendered. However, a PCR is the legally binding record of what occurred over the course of the call and should be sufficiently detailed and accurate to reflect actual patient assessment/treatment. It should also be noted that many extraneous factors can affect the timeliness of care in EMS due to the inherently uncontrolled environment for patient care. **Based on the findings of this initial quality assessment, the following is a list of recommendations for Hudson EMS to improve protocol compliance and chart accuracy:**

1. Review of the documenting provider's chart by their partner prior to submission
2. Review PCRs in a regular, timely manner and utilize the option to "send back" charts for correction
3. Recommend providers refer to the relevant protocol while charting
4. Create a reference guide outlining the above "General Areas for Improvement" accessible to all new and current providers
5. Develop or participate in continuing education which outlines the reasons behind commonly missed protocol interventions (VAN Assessment, Capnography, Brilinta/Heparin, etc.)

Challenges that may arise as a result of the above suggestions include delaying submission of completed PCRs (target of <24 hours after the call), particularly due to the primarily part-time makeup of Hudson EMS, and increasing workload expectations on personnel reviewing PCRs. This project has offered an initial review of PCRs and has successfully identified previously unknown areas for improvement. Following the release of the findings, a continuous evaluation of Stroke and STEMI PCRs to measure the effect of awareness on charting accuracy may offer a low-resistance method for quality improvement that can be easily expanded to other call types.

Effect on Public Health and Acknowledgments

The effect of this project on public health begins with an understanding that Emergency Services personnel are uniquely poised to connect with members of their community. As one of the only provider types to deliver healthcare in the patient's primary living environment, EMS gains a unique view into the challenges of the individual patient in a way large scale community or hospital-based projects cannot. The primary goal of emergency treatment is to intervene at the earliest possible moment to preserve life and prevent mortality, contributing to prolonged independence with improved quality of life. On non-emergency calls, EMS providers have the opportunity to identify community members' needs and connect them to available resources while accounting for tangible living conditions in real time. EMS is a vital cornerstone of public health, but to utilize our position to the greatest advantage, we first hold the duty to strive for care of the highest quality through continuous self-evaluation and improvement.