

**DNP Executive Summary**

**Improving Troponin Turnaround Time to Enhance Early Cardiac Event Detection: A  
Quality Improvement Project**

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## **Improving Troponin Turnaround Time to Enhance Early Cardiac Event Detection: A Quality Improvement Project**

- Patients seeking care for chest pain and other associated symptoms require timely diagnosis to rule out a potential life-threatening cardiac condition.
- Staff working in healthcare environments who have the ability to perform multiple skills or tasks will typically do so when given the opportunity to (cluster care for one patient before moving to the next patient).
- Through close monitoring of a quality improvement project evaluating the effectiveness of specific changes implemented, the QI project team realized that singular roles had a more positive impact on lab turnaround times.
- When the right team members with the right skills perform specific tasks as assigned, movement through a multi-step workflow is smoother and has fewer delays, resulting in improved turnaround times (TAT).

### **Background and Purpose**

Patients who arrive at the Emergency Department (ED) seeking treatment for chest pain require expedited care to diagnose a potentially deadly cardiac condition. Timely diagnosis requires a troponin lab draw upon arrival, with a result expected within a 60-minute window from arrival (and a follow-up lab for comparison drawn an hour after the first). This American College of Cardiology (ACC) benchmark is set based on evidence that proves timely diagnosis and treatment lead to better patient outcomes (Kontos et al., 2022).

Data from the project site indicated a median TAT of 95 minutes, well over the goal of less than 60 minutes from arrival, putting patients at risk for further cardiac injury. The site was

meeting the benchmark approximately 12 – 14% of the time. Specific aims of the project were as follows:

- Create standardized workflows that streamline the process from arrival to lab draw
- Set smaller goals for each phase of the workflow to help meet the overall goal
- Meet the door-to-troponin result time (less than 60 minutes) at least 50% of the time

The findings from this project aim to equip healthcare leaders with practical guidance to advance improvement efforts within their organizations. Results from this project will be used to request additional necessary resources and strengthen workflows for multi-disciplinary teams.

### **Methodology**

This project used a Plan-Do-Study-Act (PDSA) methodology. Any patient arriving at the ED with chest pain (or equivalent) as the chief complaint was included in the project workflow and the data. All ED staff were provided with the same information regarding the project, and staff who were eligible to work in lobby roles were randomly assigned to those roles. Additional staff who were later included in education were support staff, such as registration, EKG techs, and phlebotomists. A report of troponin TAT for each phase of the workflow had already been created and was used to gather weekly data during the implementation period.

Each week, the project team would assess the data and determine the next steps during the implementation period. Data was assessed in the following parts of the workflow:

- Arrival-to-order (in minutes)
- Order-to-collect (in minutes)

- Collected-to-received in lab (in minutes)
- Received in lab-to-resulted (in minutes)
- Overall arrival-to-result (in minutes)

During the 12-week implementation period, there were different focal points. For example, during the first two weeks, the first change that was added was a front desk charge nurse who would oversee the workflow and ensure that orders got entered for the appropriate patients. See Table 1 for additional information on the changes that were made throughout the process.

Data was analyzed weekly by members of the project team and combined with observations made and feedback gathered from staff working during that week. Once the data was gathered and assessed, the project team would determine the best next steps for the project. No statistical analysis was completed, but an overall comparison of the percentage of lab results that met the benchmark was conducted. This data was collected and divided into day and night shifts for comparison. The primary outcome measured was the overall troponin TAT in minutes. Each phase of the workflow also served as a process measure to guide additional changes throughout the 12-week implementation period.

## **Results**

The project did not meet the overall goal of 50% of results meeting the 60-minute benchmark, but did see several improvements. In total, 20.3% of the troponin lab tests met the benchmark time during the entire 12-week period. During Week 7 (when phlebotomy was added to the workflow), the project team noted consistent results showing at least 20% meeting the benchmark. Figure 1 shows the peak in Week 8 with an overall 27% of results meeting the benchmark.

As shown in Figure 2, the day shift consistently outperformed the night shift throughout the 12-week period, and reduced the median TAT from 97 minutes in Week 1 to 82 minutes in Week 12.

Additional process measures that were analyzed during the project were the different phases of the workflow, such as the arrival-to-order, order-to-collect, collect-to-receive in the lab, and received in the lab-to-result times. Each week, when a new change was added, we focused on a different aspect of the project workflow and process measure. The area of biggest impact was the arrival-to-order phase, which was reduced from a median of 16 minutes to 5 minutes. There was also a noticeable improvement in the order-to-collect time from 22 minutes to 15 minutes.

### **Strengths and Limitations**

Project strengths included a PDSA framework that was easy to follow and change as we progressed through the implementation period. This framework allowed the team to adjust along the way as they assessed the data and the impact of each change. There was no shortage of patients seeking care for chest pain, so the sample size was adequate for this project (1357 samples were included over the 12 weeks).

Limitations included variations in staffing, surges in ED patient volume and acuity that required additional resources, and staff who were not compliant with the workflows presented to them. No biases were identified in the project.

### **Recommendations**

- Request additional phlebotomy FTE for the ED lobby

- Continue to work on improvements to the order-to-collect and collect-to-received in lab phases of the workflow
- Consider point-of-care troponin for the ED

### **Implications and Conclusions**

This project demonstrates that standardized workflows create more consistent results. Staff who have goals to meet in their work typically have better outcomes. Based on the increase in the percentage of results that met the benchmark starting in Week 7, when phlebotomy was added, we can also determine that streamlined workflows with specific tasks outlined for certain roles work better than having one person complete multiple tasks.

The implications for patients from this project are shorter wait times, potentially leading to improved patient outcomes and lives saved. This project also had a positive effect on the staff involved, who now have specific goals to strive for and a simplified workflow to follow. Leaders have created an environment in which quality improvement is not just followed, but expected. Creating an environment where success leads to improved outcomes positively impacts the community by fostering an organization that delivers excellence in care.

### References

Kontos, M., de Lemos, J., Deitelzweig, S., Diercks, D., Gore, M., Hess, E., McCarthy, C., McCord, J., Musey, P., Wright, L., Villines, T. (2022). *American College of Cardiology Solution Set Oversight Committee report: ACC expert consensus decision pathway on the evaluation and disposition of acute chest pain in the emergency department*. Journal of the American College of Cardiology, 80(20).  
<https://doi.org/10.1016/j.jacc.2022.08.750>

**Table 1***Phases of Implementation*

| Week | Phased changes                                                                                | Workflow phases of impact                    |
|------|-----------------------------------------------------------------------------------------------|----------------------------------------------|
| 1    | Using front desk charge as much as possible                                                   | Arrival-to-Order; Order-to-Collect           |
| 2    | Using front desk charge as much as possible                                                   | Arrival-to-Order; Order-to-Collect           |
| 3    | Added signs/reminders for all role's goal times & expectations (on 2/11)                      | All phases of workflow                       |
| 4    | Education shared with EKG tech team; observations done                                        | Order-to-Collect                             |
| 5    | Started discussion w/phlebotomy leaders (can start 3/9)                                       | Order-to-Collect; Collect-to-Received in lab |
| 6    | Requested ED tech to bypass vitals; radiology to not pick up patients until after labs/triage | Order-to-Collect                             |
| 7    | Added phlebotomy to workflow                                                                  | Order-to-Collect; Collect-to-Received in lab |
| 8    | Continued with phlebotomy (no change from previous week)                                      | Order-to-Collect; Collect-to-Received in lab |
| 9    | Continued with phlebotomy (no change from previous week)                                      | Order-to-Collect; Collect-to-Received in lab |
| 10   | Ensure registration is expediting pts with chief complaint of chest pain at the front desk    | Arrival-to-Order                             |
| 11   | Education to registration to reinforce expediting CP patients                                 | Arrival-to-Order                             |
| 12   | Reinforce all previous pieces (no new changes)                                                | All phases of workflow                       |

Figure 1

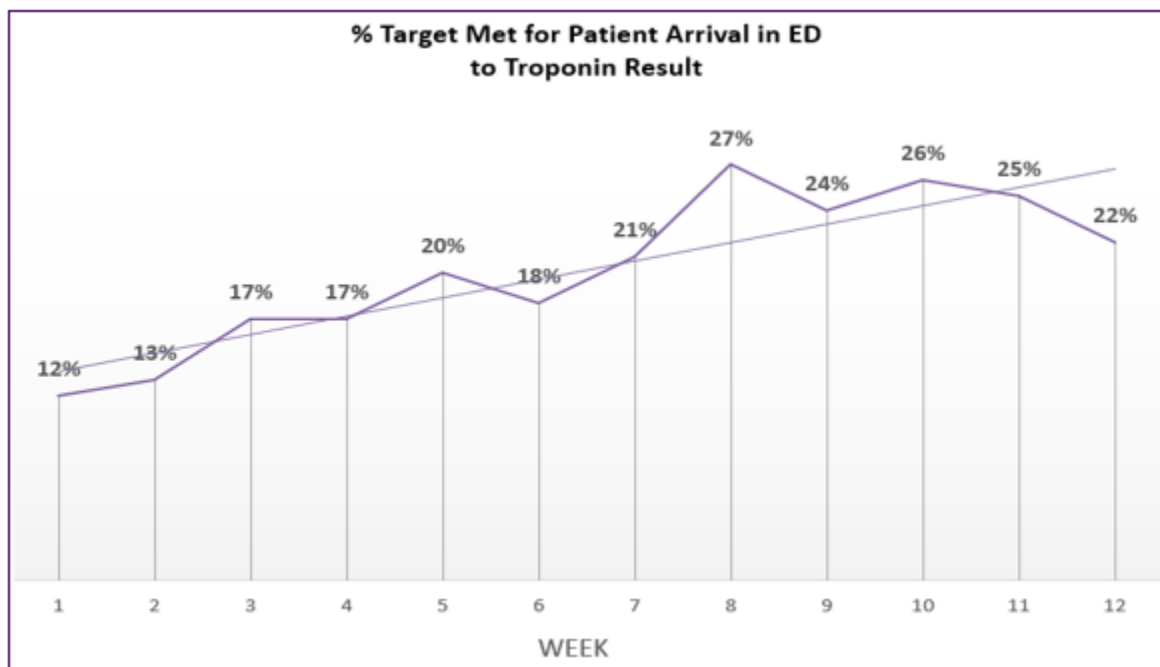


Figure 2

