Improving Appropriate Utilization of Telemetry

Quality Improvement Project

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Background

First introduced in the 1960s continuous cardiac monitoring originally took place in the critical intensive care units and over the past several decades its use has expanded to outside of the intensive care unit without use of a uniformed protocol to stop continuation [1, 2]. The increased availability of this technology has led to over utilization, increased health care costs, and a perceived decrease in medicolegal risk and improvement in patient care [3-5]. Inappropriate use of telemetry poses yet another financial burden to our healthcare system with the increase in costs ultimately incurred by patients [4]. In 2017 the American Heart Association (AHA) commissioned an update on electrocardiographic (ECG) monitoring in hospitalized settings. The published update gives a Class of Recommendation (COR) described as COR I (should be performed), IIa (is reasonable to perform), IIb (may be considered), and III (no benefit; not recommended) to help guide the clinician's decision for continuous ECG monitoring [6].

We conducted a quality improvement project which aimed to help internal medicine residents at Corpus Christi Medical Center improve appropriate utilization of telemetry monitoring in hospitalized patients.

Objective

First, to decrease inappropriate telemetry use in hospitalized patients admitted to Corpus Christi Medical Center Bay Area over a 3-month intervention period in comparison to the pre-intervention period. The project will also assess for sustainability 3-months after the intervention Second, to examine if a decrease in telemetry use lead to a decrease in hospital length of stay.

Methods

The protocol was developed independently by the investigators and submitted to the DATACLEAR Review Committee for review and subsequent approval. Utilizing the Centralized Algorithms of Research Rules on IRB Exemptions (C.A.R.R.I.E.) IRB oversight was not required. The data for this QI project was provided by the HCA Healthcare database. Data analysis was performed by Jeffery Durbin, M.S. who is a research analyst at HCA Healthcare Physician Services Group.

The study sample included patients from 18-75 years-of-age that were admitted to the telemetry unit at Corpus Christi Medical Center Heart Hospital from April 2021 – October 2021. Physician's orders for telemetry were used to capture patients to be enrolled into the QI project. Patients with a diagnosis of COVID-19 (ICD10 Z11.52, Z20.822, M35.81, M35.89 and J12.82) were excluded (figure 1). All data collected was de-identified.

The pre-intervention time frame included April 2021 – June 2021. The intervention period consisted of educating the internal medicine residents to include a brief PowerPoint presentation with an overview of the ECG monitoring guidelines based on the AHA 2017 update, a pocket reference card, and a reminder to review indications for continued telemetry use. This reminder was on a laminated sheet of paper, posted to the patient's door. The washout period included the entire month of July 2021. The post-intervention period was from August 2021 – October 2021.

Mann-Whitney U-Test was utilized for comparing telemetry length-of-stay before and after intervention. A total of 168 Encounters were obtained with twelve patients having dropped out using the IQR-based outlier detection. The Mann-Whitney U-Test was again used to compare total length-of-stay before and after intervention. After 21 patients dropped out using IQR-based outlier detection method, a total of 159 Encounters were obtained. The sample size is different between analyses because the dependent variable is different between the two groups (i.e, telemetry length-of-stay vs overall length-of-stay).

Results

A total of 863 patient encounters were analyzed of which 20 left against medical advice and 663 met exclusion criteria due to hospitalization from COVID-19 (Figure 1). A total of 180 encounters were retrospectively analyzed. Baseline demographics for both groups were similar and are shown in table 1.

Telemetry Length-of-Stay

An additional 12 patients were dropped from the study using IQR-based outlier detection, providing a sample size of 168 encounters. Pre-intervention encounters (n = 139) were compared with post-intervention encounters (n = 41). Among Pre- and Post-Intervention groups of patients, a difference was found in the median LOS in telemetry such that patients in the Post-Intervention time frame had lower LOS in telemetry (U = 2559, p = .032, CI Difference in Location = [.084, .931], figures 2 and 3).

Hospital Length-of-Stay

Prior to analyzing the secondary outcome, a total of 21 encounters were excluded using IQR-based outlier detection thereby providing a sample size of 159 encounters. Results comparing Pre- and Post-Intervention groups found a difference in median total LOS, such that patients in the Post-Intervention time frame had lower total LOS (U = 2803.5, p = .022, CI Difference in Location = [.00005, 1.00007], figures 4 and 5).

Figure 1.

	Pre-Intervention Group ($n = 139$)	Post-Intervention Group ($n = 41$)
Age, *n* (%)		
18-24	2 (1.1)	3 (1.7)
25-34	5 (2.8)	3 (1.7)
35-44	10 (5.5)	4 (2.2)
45-54	25 (13.9)	9 (5.0)
55-64	31 (17.2)	8 (4.4)
65-74	62 (34.4)	14 (7.8)
75-84	4 (2.2)	0 (0)
Sex, *n* (%)		
Male	64 (35.5)	19 (10.5)
Female	75 (41.7)	22 (12.2)
Race, *n* (%)		
White	131 (72.8)	33 (18.3)
African-American/Black	3 (1.7)	5 (2.8)
Asian	1 (0.5)	1 (0.5)
Multiracial/Other	4 (2.2)	2 (1.1)
Ethnicity, *n* (%)		
Hispanic/Latino	64 (35.5)	14 (7.7)
Not Hispanic/Latino	69 (38.3)	22 (12.2)
Unknown	6 (3.3)	5 (2.8)

Table 1. Demographic Information on Telemetry Population

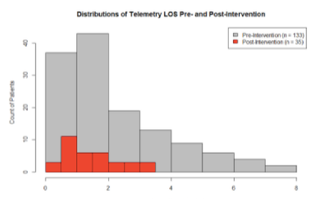

Figure 3. Distributions of Telemetry LOS Pre- and Post-Intervention

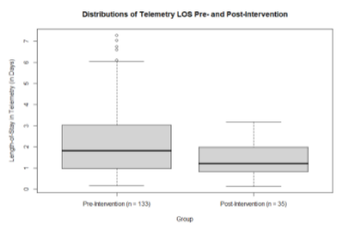

Figure 2. Distributions of Telemetry LOS Pre- and Post-Intervention

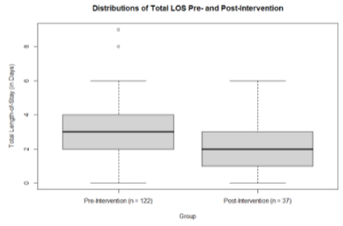

Figure 4. Distributions of Total LOS Pre- and Post-Intervention

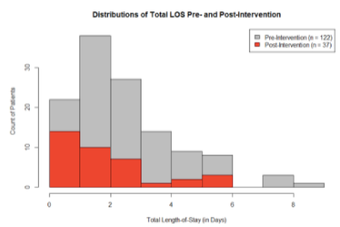

Figure 5. Distributions of Total LOS Pre- and Post-Intervention

Discussion

The study demonstrated that with proper education, hospitals can reduce overutilization of continuous cardiac monitoring and lead to shorter lengths of stay. Education involved a presentation of an overview of the ECG monitoring guidelines, pocket reference cards, and reminder sheets posted on all patient rooms. This proved to be effective by significantly reducing continuous cardiac monitoring. Educating all those involved in patient care, specifically the ordering physicians and nursing staff, was a key element in coordinating a successful change. Educating staff was an uncomplicated and inexpensive form of intervention and can be easily duplicated by other healthcare facilities.

This study resulted in a reduction in the number of monitoring that was initiated as well as a reduction in the LOS on telemetry during the hospitalization. The total LOS of stay appeared to directly correlate with the telemetry LOS. Educational intervention proves to be a key strategy in reducing continuous cardiac monitoring during hospitalization.

Conclusion

Incorporating education on appropriate utilization of telemetry lead to decrease LOS on telemetry and hospitalization. This approach is simple and affordable.

References

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