Quality Improvement

Telemetry Practices Among Physicians and Nurses at an Academic Tertiary Medical Center

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Abstract

Background

Cardiac telemetry is an integral part of inpatient medicine, although it is also costly, labor-intensive, and a limited resource. In this quality improvement initiative, we surveyed nurses, residents, and attending physicians regarding their knowledge and application of the American Heart Association (AHA) guidelines for telemetry usage.

Methods

Our study included developing and implementing a survey among nurses, residents, and attendings in a major academic teaching hospital. Participants' application of the AHA guidelines was also evaluated using a 7-question sample of hypothetical patient scenarios. A total of 73 physicians and 64 nurses were surveyed. Results were analyzed using chi-square test analysis, and a p-value of ≤0.05 was considered statistically significant.

Results

Physicians reported being more comfortable than nurses in discontinuing telemetry ($p<0.001$) although nurses reported being more comfortable with the AHA guidelines compared to physicians ($p<0.001$). 81% of physicians somewhat or strongly agreed that cardiac telemetry was overused versus 48% of nurses ($p<0.001$). Attending physicians were more comfortable than resident physicians with the AHA guidelines, discontinuing telemetry, and daily review of telemetry orders. In four out of seven hypothetical scenarios, nurses reported being more likely to use telemetry compared to physicians when telemetry was not indicated.

Conclusion

There is a notable difference in knowledge and attitudes toward utilization and indications of cardiac telemetry among nurses, resident and attending physicians. An educational program is warranted detailing the AHA cardiac telemetry guidelines and their clinical application.

BACKGROUND

Cardiac telemetry monitoring has become an important part of modern-day medicine and can be an important tool in diagnostics and monitoring. However, telemetry is also costly, labor-intensive, and a limited resource. The American Heart Association has developed guidelines for the use of telemetry in hospital settings (**Table 1**).[1] Despite this, utilization of cardiac telemetry has been a common source of confusion in hospital medicine, resulting in waste and delays at several points within the hospital patient throughput.[2,3]

In the modern health care environment when rising medical costs and overuse have become a national issue, it is important to recognize areas that need improvement. The American Board of Internal Medicine and Society for Hospital Medicine have included judicious use of cardiac telemetry as one of the five recommendations in their Choosing Wisely campaign.[4] In a recent study that surveyed physicians in a tertiary-care center, the majority were unaware of guidelines governing the use of cardiac telemetry and selected inappropriate diagnoses as indications for telemetry.[5] In practice, telemetry is often ordered for non-cardiac indications resulting in increased cost to the institution and the health care system.[3,5] It has been estimated that non-indicated cardiac telemetry costs an average 400-bed hospital $250,000 annually.[2]

Table 1. Summary of 2017 American Heart Association indications for telemetry in non-cardiac patients*

Patient Population/Indication	Arrhythmia Monitoring Recommendations
Hemodynamically unstable, recurrent syncope, increased arrhythmia susceptibility	Until appropriate therapy is delivered (*Class I; Level of Evidence C*)
Meeting admission criteria for syncope, cause of syncope suspected to be cardiac	Monitor ≥24 h; until cause and treatment identified; then follow indications and durations per criteria in these practice standards (*Class I; Level of Evidence B*)
Acute decompensated heart failure	Until precipitating event (eg, volume overload; ischemia; anemia; progressive ventricular, respiratory, or renal failure; hypertension; exacerbation of comorbidities; new-onset AF; or infection) is successfully treated (*Class I; Level of Evidence B*)
Infective endocarditis	Until clinically stable (*Class IIa; Level of Evidence C*)
Postconscious sedation	May be of benefit until patients are breathing per baseline and hemodynamically stable (*Class IIb; Level of Evidence C*)
Noncardiac surgery	Not indicated among asymptomatic postoperative patients (*Class III: No Benefit; Level of Evidence C*)
Noncardiac major thoracic surgery	After noncardiac major thoracic surgery (*Class IIa; Level of Evidence B*)
Stroke	Monitor 24–48 h (*Class I; Level of Evidence B*) Monitor longer to assess for intermittent AF and asymptomatic rapid ventricular response)
Moderate to severe imbalance of potassium or magnesium	Until normalization of electrolytes (*Class I; Level of Evidence B*)
Drug overdose	Monitor until free of the influence of the drug(s) and clinically stable (*Class I; Level of Evidence B*)
Hemodialysis	Efficacy is not well established (*Class IIb; Level of Evidence B*)

*Adapted from: Sandau KE, Funk M, Auerbach A, et al.; American Heart Association Council on Cardiovascular and Stroke Nursing; Council on Clinical Cardiology; and Council on Cardiovascular Disease in the Young. Update to Practice Standards for Electrocardiographic Monitoring in Hospital Settings: A Scientific Statement From the American Heart Association. Circulation. 2017 Nov 7;136(19):e273-e344

Several steps, which have been studied in the literature, can be taken to combat this problem. Requiring specific diagnoses for telemetry orders and incorporating timed expiration of these orders based on diagnosis was shown to reduce both telemetry orders and duration of telemetry use per patients, without any increase in adverse events.[6] Education and implementation of a daily review of telemetry use yielded similar results, including a decrease in inappropriate telemetry orders, as well as decreased overall length of stay and total cost.[7,8] Additionally, a nurse-managed protocol to discontinue inappropriate telemetry use has been shown to reduce the number of hours patients spend on the monitor.[9] In this quality improvement project, we surveyed both nurse and physicians regarding their comfort of the American Heart Association (AHA) guidelines for cardiac telemetry and clinical scenarios of proper telemetry usage to establish current attitudes toward and knowledge of the existing guidelines.

METHODS

Surveys were designed and sent via email to Internal Medicine resident trainees, attending physicians and nurses employed on general medical surgical units at Rhode Island Hospital, an academic tertiary medical center in Providence, RI. The survey included questions on participants' level of comfort with the AHA guidelines for telemetry, their level of comfort in discontinuing telemetry, opinion regarding overuse of telemetry, and how often telemetry orders are reviewed on daily work rounds. All were measured by a five-point Likert scale. Participants' knowledge of the AHA guidelines was ascertained using a 7-question sample of hypothetical patient scenarios, with common inpatient medical diagnoses, to determine which scenarios had appropriate telemetry usage (**Table 2**). Comparisons between physicians and nurses and attendings and resident trainees were analyzed using chi-square comparisons.

RESULTS

73 physicians and 64 nurses responded to the survey. For level of comfort with AHA guidelines, 41% of nurses versus 25% of physicians reported being more or very comfortable with the guidelines ($p<0.001$). For level of comfort in discontinuing telemetry 75% of physicians versus 42% of nurses versus reported being more or very comfortable ($p<0.001$). 81% of physicians somewhat or strongly agreed that cardiac telemetry was overused versus 48% of nurses ($p<0.001$). 67% of nurses reported daily review of telemetry orders versus 19% physicians ($p<0.001$).

There was a statistical difference ($P<0.05$) between attendings and residents for level of comfort with AHA guidelines (75% of attendings versus 11% of residents were more or very comfortable), level of comfort in discontinuing telemetry (94% of attendings versus 70% of residents were more or very comfortable), and telemetry orders reviewed daily (44% of attendings versus 12% of residents often or all the time).

80% of nurses and 36% of physicians ($P<0.001$) indicated they would utilize cardiac telemetry for a patient with symptoms of melena and anemia with a serum hemoglobin of 6.2 g/dL. 67% of nurses and 49% of physicians ($P=0.035$) indicated they would utilize telemetry for a patient with severe sepsis secondary to pneumonia. 88% of nurses and 71% of physicians ($P=0.02$) indicated

Table 2. Assessment of participants' knowledge of the AHA guidelines using a 7-question sample of hypothetical patient scenarios, with common inpatient medical diagnoses

Please select yes or no (Y/N) on whether or not telemetry is indicated for the following scenarios, based on American Heart Association guidelines		
58-year-old female admitted with melena and hemoglobin of 6.2 mg/dL	**Y**	**N**
65-year-old male admitted with severe sepsis due to pneumonia	**Y**	**N**
52-year-old female admitted with undifferentiated syncope	**Y**	**N**
45-year-old female admitted with sub-massive PE on systemic anticoagulation	**Y**	**N**
72-year-old male admitted for acute decompensated heart failure	**Y**	**N**
39-year-old female admitted with angina due to coronary vasospasm	**Y**	**N**
57-year-old male admitted for alcohol withdrawal	**Y**	**N**

they would utilize telemetry for a patient with submassive pulmonary embolism on anticoagulation. 44% of nurses and of 21% physicians (P=0.003) indicated they would utilize telemetry for a patient with alcohol withdrawal.

DISCUSSION

There was a notable difference between nurses and physicians in their reported level of comfort with the AHA guidelines for cardiac telemetry, with nurses reporting being significantly more comfortable with their knowledge of the guidelines. Nurses were also more likely to report reviewing telemetry orders daily compared to physicians, which may be secondary to their daily work protocols to determine which patients need telemetry. Physicians reported being more comfortable discontinuing telemetry. We note that nurses have authority to discontinue telemetry whenever deemed appropriate based upon existing telemetry protocols at our institution. Telemetry was seen as being overused more so by physicians when compared to the nurses.

The differences between attendings and resident trainees for their respective comfort level with the AHA guidelines, reviewing telemetry orders and discontinuing telemetry are most likely secondary to the difference in clinical experience. As residents are staff members still in training, their knowledge and comfort levels are likely to be less than that of attending physicians. Further education on appropriate cardiac telemetry utilization may increase the level of comfort amongst resident trainees.

In the hypothetical clinical scenarios in which the patient did not meet AHA criteria for telemetry monitoring were the ones in which the responses were statistically different between nurses and physicians. Responses to these scenarios showed that a greater proportion of nurses thought that telemetry was indicated as compared with physicians, despite nurses reporting higher comfort with the AHA guidelines for telemetry monitoring. Overall, the responses indicated that notable knowledge gaps about the AHA telemetry guidelines existed amongst the physicians and nursing staff.

It appears likely that both nurses and physicians could benefit from training and education regarding the 2017 AHA cardiac telemetry utilization guidelines. Secondly, supervising attending physicians for the resident trainees should be encouraged to train and educate medical residents on appropriate indications for telemetry utilization. Attending physicians should consider making telemetry evaluation a part of daily workflow on attending rounds. Lastly, nurses should be made to feel empowered to discontinue telemetry for patients when reviewing telemetry as part of their daily workflow, based on appropriate criteria.

In conclusion, there is a notable difference between nurses and physicians' comfort level, knowledge and attitudes toward utilization and indications of cardiac telemetry. A difference in comfort with telemetry utilization between attending physicians and resident trainees was also seen, thereby pointing towards experience and knowledge gained with time as a possible cause. We plan to create an educational program for nurses, residents and attending physicians detailing the AHA guidelines and following it up with online post-tests for all participants. We also plan to introduce daily telemetry review for physicians to make it as part of their daily workflow, in order to reduce telemetry overuse.

Disclosures/Conflicts of Interest

The authors have no conflicts of interest to disclose

Author Contribution

All Authors (BL. HK) have reviewed the final manuscript prior to submission. All the authors have contributed significantly to the manuscript, per the ICJME criteria of authorship.

- Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND
- Drafting the work or revising it critically for important intellectual content; AND
- Final approval of the version to be published; AND
- Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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