

Abstract

This retrospective study assessed the pattern of telemetry usage and rates of AF detection in the six months pre and post implementation of stroke unit monitored telemetry. 122/154 (79%) of patients had telemetry prior to implementation of stroke unit based telemetry and 164/194 (85%) in the five months post ($p=0.31$). The use of stroke unit based telemetry was associated with a small increase of telemetry usage and significant increase in telemetry hours per patient. AF detection was similar during the two study periods.

Introduction

The detection of atrial fibrillation (AF) has important treatment implication in the setting of acute ischemic stroke. Previous studies have consistently shown an outpatient AF detection rate ranging from 12.4 to 16.1%, with higher detection rates associated during longer periods of monitoring.^{1,2} Depending on local practice, inpatient monitoring typically involves either locally monitored telemetry units, remotely monitored telemetry units or Holter monitors.

At our institution, Coronary Care Unit monitored telemetry (CCU-T) has been used within the stroke unit. Since July 2016, dedicated stroke unit monitored telemetry (SU-T) became available. SU-T was entirely managed by stroke unit personnel. We sought to study the pattern of telemetry use and period incidence of new AF detected by telemetry pre and post implementation of SU-T.

Hypothesis

Compared to CCU-T, SU-T is associated with higher telemetry usage, increased mean telemetry hours per patient and increased period incident AF detection rate.

Methods

All patients with the discharge diagnosis of stroke or transient ischemic attack from January to December 2016 were identified from the departmental stroke database. All stroke subtypes were included in the study. The following patients were excluded from analysis: patients with known AF or new diagnosis of AF on presentation of stroke, patients transferred for mechanical thrombectomy, patients not receiving care in the stroke unit and patients who died as an inpatient (Figure 1). Data from the first month of SU-T implementation were excluded whilst the telemetry service was in a transition period. Eastern Health Human Research Ethics Committee approved the study.

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Each telemetry summary generated for all patients during the study period was reviewed for presence or absence of AF. The absence of a telemetry summary in a patient's clinical record was considered as no telemetry received for the purpose of this study. Clinical notes were reviewed for discrepancy between any documented arrhythmias and discharge recommendations by the treating team. Finally, discharge summaries and discharge medications were reviewed to confirm whether AF was diagnosed.

Telemetry was provided by Philips Intellivue transmitters which detected atrial fibrillation using a standardised automated algorithm. A total of 4 units were available for use across all inpatients, with stroke inpatient allocation being determined after triage by cardiology registrars during CCU-T. CCU nurses were responsible for all monitoring of the telemetry alarms during this period. In contrast, SU-T was managed entirely by stroke unit personnel, with the monitoring screen physically located in the stroke unit. Four telemetry transmitters were available as part of SU-T. The sole purpose of the SU-T was for AF detection and the alarms were optimised for this. SU-T alarms were monitored by ward nurses who had received specific training prior to SU-T implementation. A 24 hour summary of each monitored patient was reviewed by the CCU or stroke registrar during the respective periods. Whilst CCU-T was generally limited to 24 hours, SU-T continues for more than 24 hours if the treating neurologist deemed appropriate.

Students t-test was used to compare differences between groups. Multivariate logistic regression analysis was used to explore association between clinical variables with telemetry completion. IBM SPSS 19.0 was used for data analysis.

Results

154 patients were eligible for telemetry during CCU-T and 194 during SU-T. Both groups were comparable with regard to age (mean age 75.1 (SD:12.9) vs. 72.9 (SD:14.4)), sex and vascular risk factors.

122/154 (79%) and 164/194 (85%) of patients had telemetry during the CCU-T and SU-T period respectively ($p=0.31$). Mean duration of monitoring increased from 24 (95% CI 24-26) hours to 38 (95% CI 36-41) hours in the SU-T period ($P<0.01$). The total telemetry hours as a fraction of length of stay was 18% in the CCU-T period and 40% in the SSU-T period. A similar proportion of patients had AF detected by telemetry during the CCU-T and SU-T periods, 4.9% vs 5.4% ($p=0.83$). All patients who were identified as having atrial fibrillation on telemetry were commenced on anticoagulation except for one patient who had a contraindication to treatment.

Average length of stay was 5.6 days in the CCU-T group and 4.0 days in the SU-T group ($p=0.008$). A total of 58 patients received thrombolysis across both groups. On univariate analysis, tPA administration and length of stay <24 hours were associated with telemetry. Only tPA remains significant ($p=0.015$) on multivariate logistic regression analyses as an independent factor associated with telemetry being performed.

Discussion

We compared the utility of telemetry provided by two different inpatient services for the purpose of AF detection in the hyper-acute stroke setting. Arrhythmia detection by continuous cardiac telemetry is highly reliant on automated alarms as well as management of those alarms by the operators. These variables may explain the large range of AF detection rates (0% to 7.7%) by telemetry reported previously.^{3,4} Our results suggest SU-T is feasible and safe, with at least comparable AF detection rates with CCU-T. Given the known limitations of telemetry, all stroke unit personnel received training in cardiac arrhythmia recognition, and interpretation and management of alarms as part of the implementation of SU-T.⁵

Anticoagulation is recommended for most ischemic stroke patients with AF and initiation of an anticoagulant as early as 2-3 days post stroke may be associated with improved outcome.⁶ Further, data from large registries have reported high loss to follow-up of stroke patients and underutilisation of outpatient monitoring.^{7,8} This demonstrates the importance for early opportunistic detection of AF while patients remain in hospital or during inpatient rehabilitation. Additionally, this highlights the importance of determining the optimal AF detection methodology in the hyper-acute stroke setting, and fuels the need for further prospective study.

The percentage of patients who were able to receive any period of telemetry was comparable between CCU-T and SSU-T. Due to lack of historical documentation it was not possible to systematically quantify the factors associated with telemetry non-completion. The reasons for non-completion likely differ between each group, i.e. telemetry not available due to more urgent cardiac cases requiring close monitoring in the CCU-T period, compared to teething issues with a new process in the SSU-T period.

After the commencement of SSU-T at our institution patients received an extra 14 hours of telemetry on average. This was likely driven by the stroke team having complete discretion over which patients were able to continue with prolonged monitoring (the pivotal difference between CCU-T and SSU-T periods). Surprisingly, the total length of stay was shorter after SU-T was introduced. The reasons for this is unclear, and beyond the scope of this study.

In addition to the retrospective design and small sample size, our study has some limitations. Diagnosis of AF was not routinely adjudicated by a cardiologist and outcomes were reliant on telemetry being accurately documented in the patient history. Furthermore, variables such as stroke subtype and severity were not available for analysis.

In conclusion, the use of stroke unit based telemetry was associated with a small increase of telemetry usage and longer average telemetry period. An increase in AF detection was not observed. Prospective, comparative study between different telemetry modalities and duration in the hyper-acute stroke period is needed.

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Abstract

Background

Identification of atrial fibrillation (AF) in acute ischaemic stroke has important treatment implications. The utility of stroke unit monitored telemetry compared to centralised telemetry monitored by cardiology is unknown.

Aims

To study the pattern of telemetry usage and rates of AF detection in the six months pre and post implementation of stroke unit monitored telemetry.

Methods

A retrospective study. All patients discharged with a diagnosis of ischaemic stroke or TIA over 12 months in 2016 from a tertiary, academic stroke unit were included. In the first half of the study period telemetry was provided centrally by the Coronary Care Unit (CCU-T) whilst the second 6 months stroke unit monitored telemetry (SU-T) was used. Data for the month of July was excluded from analysis allowing for transition to new system.

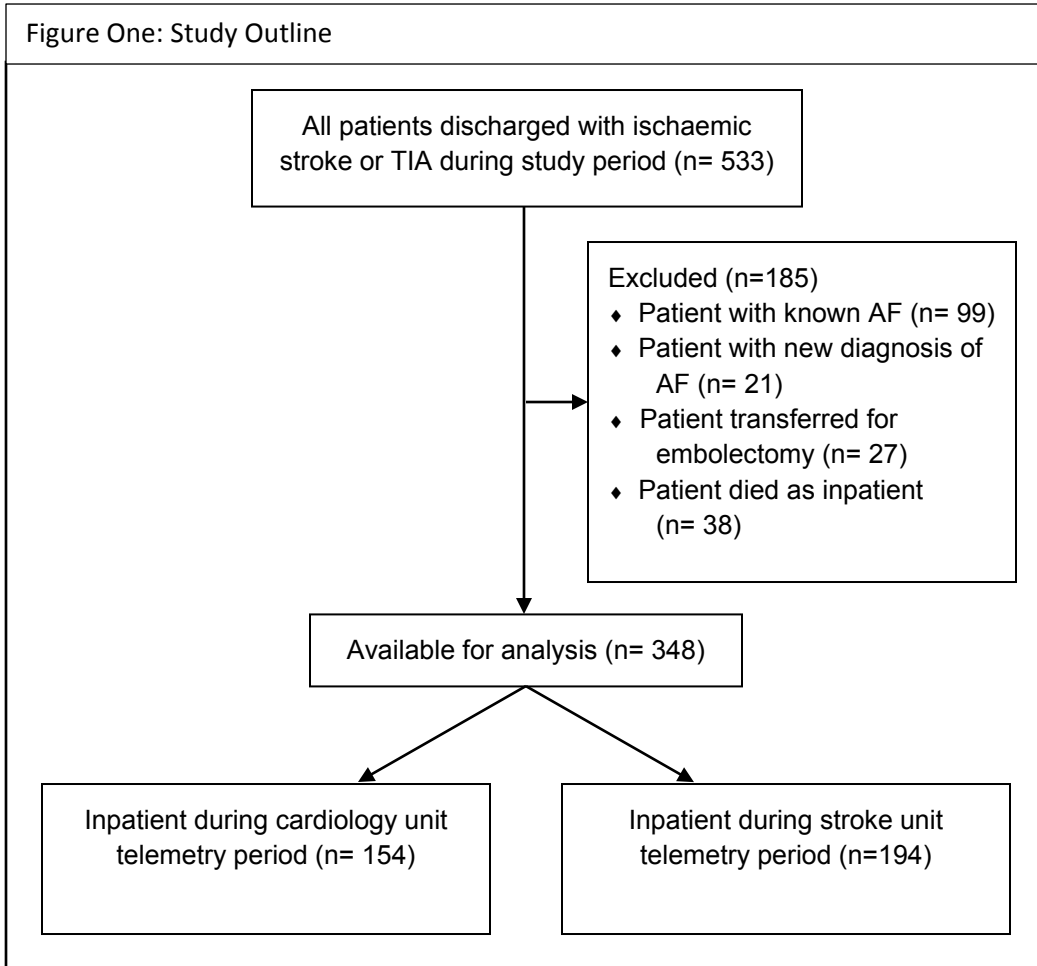
Results

122/154 (79%) of patients had telemetry during the first 6 months compared to 164/194 (85%) in the last 5 months of the study period ($p=0.31$). Mean duration of monitoring increased from 24 (95% CI 24-26) hours to 38 (95% CI 36-41) hours in the SU-T period ($P<0.01$). The proportion of patients with AF in the CCU-T and SU-T periods was comparable, 4.9% vs 5.4% ($p=0.83$) respectively.

Conclusions

The use of stroke unit based telemetry was associated with a small increase of telemetry usage and significant increase in telemetry hours. AF detection was similar during the two study periods.

Figure One: Study Outline



Title:

Inpatient continuous cardiac monitoring in hyperacute stroke – a comparison between telemetry by cardiology and stroke unit

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Figure 1

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