

Health economic assessment of smartphone implementation for atrial fibrillation monitoring in cryptogenic stroke patients

T. Proesmans^a, L. Desteghe^{a,b}, D. Berti^b, D. Nuyens^c, D. De Cock^d, V. Soufflet^d, P Vandervoort^{a,b}, V. Storms^a, P. Dendale^{a,b}, J. Vijgen^b

^a Mobile Health Unit, Faculty of Medicine and Life Sciences, Hasselt University, 3500 Hasselt, Belgium.

^b Department of Cardiology, Jessa hospital, 3500 Hasselt, Belgium.

^c Department of Cardiology, Ziekenhuis Oost-Limburg, 3600 Genk, Belgium.

^d Department of Cardiology, Jan Yperman Hospital, 8900, Ypres, Belgium

Abstract

Objectives

Atrial fibrillation (AF) is associated with a prothrombotic state resulting in a five-fold greater risk for stroke and thromboembolism. Failing to diagnose AF after stroke precludes these particularly high-risk patients to anticoagulation therapy. This is supported by current guidelines recommending the use of cardiac monitoring in patients post-cryptogenic stroke. However, even in this selected high-risk patient group, the use of 12-lead ECG and even extended 24-hour monitoring has limited AF detection rates. Although it is recognized that prolonged monitoring will improve detection of AF, the long-term cost-effectiveness of this strategy is uncertain. This study will address this by implementing a smartphone application for AF monitoring in post-cryptogenic stroke patients and assessing its cost-effectiveness.

Methods

In a multi-center prospective trial, 63 patients experiencing a cryptogenic stroke in the past year since the start of the study were enrolled. Patients were instructed to measure the heart rhythm twice daily with a pulse-deriving smartphone application (FibriCheck) and additionally when experiencing symptoms over a period of 3 months. At time of inclusion and study end, a 12-lead ECG was performed.

In addition, the cost-effectiveness of monitoring in patients after a recent cryptogenic stroke was assessed using a Markov model. The model simulated the health status of 1000 patients over a period of 35 years. Rates of AF detection and anticoagulation therapy from this study and published literature, together with epidemiological data from Belgium, were used to predict lifetime costs and effectiveness. The alternatives being investigated were opportunistic screening, usual care and screening with FibriCheck.

Results

This study reports 3 (5.2%) newly diagnosed AF cases and 1 (1.7%) recurrent AF case. None of these cases were identified with 12-lead ECG, neither at inclusion nor at the end of the study. Only 1 patient detected by FibriCheck during the monitoring period would be monitored by Holter as part of the usual care strategy.

The Markov model indicated that both opportunistic screening and usual care were inferior to FibriCheck in terms of cost-effectiveness. Comparing FibriCheck as screening tool with usual care for patients post-cryptogenic stroke, the implementation of FibriCheck in a population of 1000 patients resulted in 26 quality adjusted life years (QALY) and substantial cost savings of -1.189 €/QALY.

Conclusion

After a cryptogenic stroke, 3-month FibriCheck monitoring proved to be cost-effective for preventing recurrent strokes. These results strengthen the evidence base for prolonged monitoring in secondary stroke prevention.

Keywords

Atrial fibrillation – Post-cryptogenic stroke – Health economic assessment – Cost-effectiveness – Monitoring