'Pre and Post Ablation Pathway UHCW' project

Maria Niespialowska-Steuden MRCP MD(Res)[1,2]; Joseph Mayer MSc CCDS [1,3];Jaffar Al-Sheikhli MBChB MRCP[1,3]; Rafaella Siang MbChB MRCP[1,3]; Ian Patchett BSc[1,3]; Tarvinder Dhanjal PhD FRCP FESC[1,3]

[1]University Hospital Coventry and Warwickshire NHS Trust, Coventry, CV2 2DX, UK. [2]University Hospital Southampton, Tremona Rd, Southampton SO16 6YD [3]Heart Rhythm Research Group, Division of Biomedical Sciences, Warwick Medical School, Clinical Sciences Research Laboratory, Coventry

Background

Atrial Fibrillation (AF) is the most common cardiac arrhythmia, affecting over 59 million people worldwide (1). This condition places a significant burden on healthcare systems, which highlights the need for more effective management strategies. Additionally, AF negatively impacts patients' quality of life, and their perceptions of the condition do not always align with objective measures, even after successful interventions such as ablation (2, 3). Since the COVID-19 pandemic, there has been significant growth in virtual healthcare solutions (4). Platforms like Doccla (Doccla Ltd, London, UK) have become widely available, enabling the collection of health data through wearable electronic devices. In response to the need for improved management strategies for AF, the "Pre and Post Ablation Pathway UHCW" project was developed.
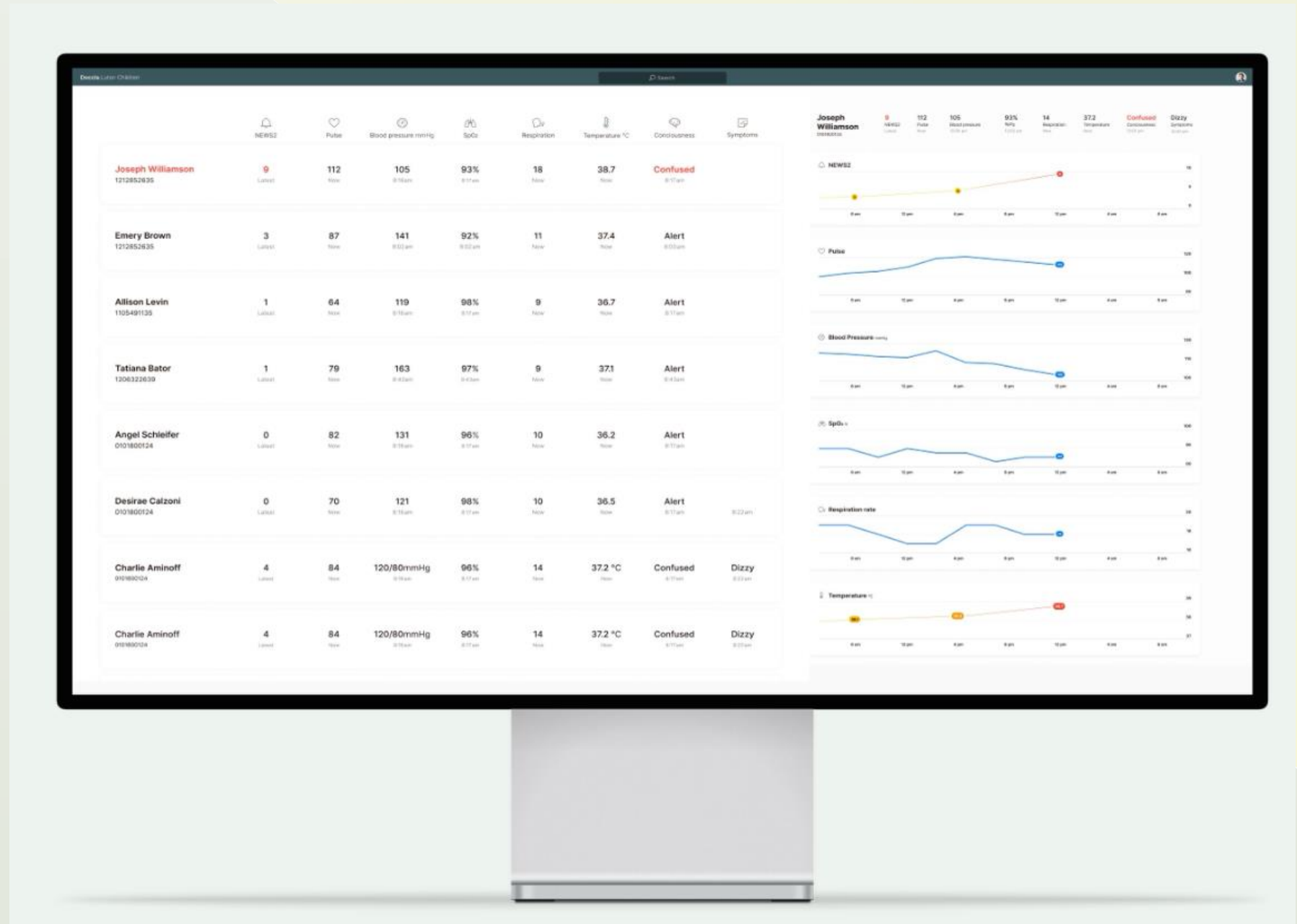
Objectives

This project aimed to improve the care of patients with atrial fibrillation by implementing remote patient monitoring both before and after ablation procedures.

Methods

Fifty patients listed for AF ablation were recruited. Doccla provided them with 1) a pre-configured mobile phone; 2) a Kardia ECG device (AliveCor, Inc., California, USA); a weighing scale and a pedometer. The monitoring plan included: Daily ECG including Pulse, AFib daily questionnaire, Step count and symptom questionnaires - AHA, EQ5D, Health State questionnaires; Weekly: AFib weekly questionnaire. In addition, the patients were encouraged to submit their ECG (with pulse) at any point when they experienced symptoms. System alerts would trigger the physician's response. Statistical analysis compared the patient metrics from before and after ablation. In addition, interventions were analysed during the study.

Results

50 patients were recruited between 12/02/24 and 8/10/2. During the study period 28 patients (56%) underwent AF ablations. However, by three months, seven patients experienced AF recurrence. At 3 months, a significant difference was detected in AF burden, Kardia alarm, symptoms like palpitations, tiredness, light-headedness and effects on mobility between the group that underwent a successful ablation and those who experienced AF recurrence (Table 1). Interestingly, in a successful ablation cohort, the only parameters that differed between before and post ablation were AF burden (Table 2), (Figure 1) and Kardia alarm (Figure 2). The perceived symptoms remained unchanged

In total, 50 interventions were performed during the study, which included medication changes, advice regarding symptoms, and management of post-ablation symptoms

Table 1. Difference in variables between the patients with successful AF ablations and those who experienced AF recurrence

DOCCLA variables	N =21 (no recurrence)	N=7 (recurrence)	P
Pulse	64 +/-7.9	68+/-10.7	0.227
AF burden in %	0	24.7+/-6.7	<0.001
Kardia alarm	1.1+/-0.15	2.26+/-1.19	<0.001
Daily steps	6170+/-3465	5042+/-2654	0.71
Presence palpitations in the past 24 hours	0.06 [0.02;0.19]	0.42 [0.24;0.7]	0.006
Number of palpitations in the past 24 hours	0.03 [0;0.18]	0.64 [0.36;1.31]	0.002
Anxiety associates with palpitations	0.4 [0.01;1]	0.28 [0.06;0.44]	0.626
Presence of shortness of breath during physical activity	0.04 [0.01;1]	0.28 [0.06;0.44]	0.258
How many episodes of shortness of breath during physical activity	0.02 [0;0.35]	0.3 [0.05;0.58]	0.378
Presence of anxiety associated with shortness of breath during exertion	0.07 [0;1]	0.01 [0;0.09]	0.268
Shortness of breath on lying down	0 [0;0]	0.03 [0;0.08]	0.119
Presence of increased tiredness	0.02 [0;0.25]	0.65 [0.24;0.98]	0.015
Presence of light-headedness	0.04 [0;0.18]	0.41 [0.18;0.43]	0.047
Number of light-headed episodes	0.04 [0;0.2]	0.5 [0.22;0.89]	0.047
Effect on mobility	0 [0;0.01]	0.1 [0.08;0.18]	0.022
Effect on self-care	0 [0;0]	0 [0;0]	0.871
Effect on usual activities	0.01 [0;0.91]	0.59 [0.14;0.98]	0.199
Presence of pain/discomfort	0.01 [0;0.15]	0.11 [0.03;0.54]	0.251
Anxiety/Depression	0 [0;0.83]	0 [0;0]	0.28
EQ5D Questionnaire	0.15 [0;2.05]	0.9 [0.31;2.05]	0.251
Health state questionnaire	7.83 [6.68;8.85]	6.59 [5.73;8.16]	0.497
Weight (kg)	90.8 [90.79;103.8]	95.3 [95.3;96.5]	0.734

Table 2. Difference in patients who underwent successful ablation

DOCCLA variables	N =21 (pre ablation)	N=21 (3/12) post ablation)	P
Pulse	66.4 +/-7.95	62.48+/-6.82	0.451
AF burden in %	19.8+/- 34	0	0.009
Kardia alarm	1.68 +/- 0.83	1.1 1;1.13	0.009
Daily steps	6081+/-2025	6211+/-3758	0.108
Presence palpitations in the past 24 hours	0.25 [0.01;0.22]	0.1 [0.01;0.17]	0.339
Number of palpitations in the past 24 hours	0.27 [0.01;0.24]	0.12 [0.01;0.17]	0.289
Anxiety associates with palpitations	0.63 [01;1]	0.62 [0.01;1]	0.712
Presence of shortness of breath during physical activity	0.21 [0; 0.38]	0.16 [0;0.32]	0.824
How many episodes of shortness of breath during physical activity	0.22 [0;0.37]	0.17 [0;0.32]	0.894
Presence of anxiety associated with shortness of breath during exertion	0.36 [0; 0.94]	0.43 [0;1]	0.505
Shortness of breath on lying down	0.04 [0;0.01]	0 [0;0]	0.208
Presence of increased tiredness	0.2 [0;0.17]	0.21 [0;0.22]	0.965
Presence of light-headedness	0.17 [0;0.11]	0.16 [0;0.21]	0.906
Number of light-headed episodes	0.18 [0;0.12]	0.16 [0;0.22]	0.625
Effect on mobility	0.11 [0;0.05]	0.19 [0;0.06]	0.234
Effect on self-care	0.06 [0;0]	0.12 [0;0.01]	0.201
Effect on usual activities	0.22 [0;0.21]	0.38 [0;0.91]	0.041
Presence of pain/discomfort	0.17 [0;0.13]	0.21 [0;0.22]	0.262
Anxiety/Depression	0.22 0[;0.29]	0.23 [0;0.17]	0.894
EQ5D Questionnaire	1.39 [0;1.58]	1.14 [0;2.04]	0.442
Health state questionnaire	7.85 [7.3;8.94]	7.63 [6.76;8.86]	0.164
Weight (kg)	94.98 [78;103]	88.92 [68;103.8]	0.407

Discussion

This project aimed to demonstrate that remote monitoring could enhance patient outcomes by enabling earlier identification and escalation of clinical issues and deterioration. The main observations from our study were as follows: 1. Doccla system can be used to monitor AF burden after ablation. 2. A significant discrepancy was observed between perceived symptoms and the AF burden recorded on KardiaMobile in patients who underwent successful AF ablation. 3. To our knowledge, the "Pre and Post Ablation Pathway UHCW" project is the first study to employ extended-duration KardiaMobile monitoring before and after AF ablation. Previous studies have shown that exposure to Kardia was associated with a higher detection rate of AF recurrence and/or reduced use of cardiac monitors when compared to standard care in patients recruited just before ablation/ cardioversion procedure (5-8). During the study, abnormal parameters and patient-reported symptoms resulted in a total of 50 interventions. These included medical advice and/or changes in medical management, leading to potential savings and/or a reduction in healthcare resource utilization. According to Parliament and The King's Fund data (9, 10) the cost of a standard hospital bed is approximately £400 per day. The potential savings from reduced admissions range from £2,400 to £7,200, assuming an average length of stay of 1 to 3 days. The program also led to the avoidance of seven emergency department presentations, translating to potential savings of £637 to £3,115, considering the average cost of an ED visit is between £91 and £445. Additionally, 25 patients were managed through consultations, preventing unnecessary GP visits or arrhythmia nurse consultations, resulting in NHS savings of around £1,400, assuming a face-to-face GP visit costs about £56. The cost-effectiveness of wearable solutions remains a topic for further discussion.

Conclusion

The study demonstrated that Doccla system can be reliably used to monitor arrhythmia recurrence in patients undergoing AF ablation. Despite a significant difference in AF burden and symptoms reported between a successfully ablated patients and those who failed AF ablation, no significant difference was observed in how individual patients perceived their symptoms before and after ablation. Virtual solutions have got potential to reduce expenditure and use of healthcare resources

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