Establishing a remote monitoring service for patients with pulmonary hypertension

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Pulmonary hypertension is a rare disease that leads to right heart failure. Patients experience significant morbidity and mortality at 5-years is less than 50%.\(^1\) Approved therapies reduce vasoconstriction through modulation of three distinct biological pathways at a cost of £30-150k/patient/year.\(^2,3\) Due the range of investigations required and the high cost of therapies diagnosis, treatment and annual review for the 6,244 patients in the UK are commissioned through seven National Centers.\(^1\) To increase patient contact between annual visits, identify disease worsening early and optimise therapy we established the world’s first remote monitoring service for patients with pulmonary hypertension at the National Centre in Sheffield.

Objectives

Establish a remote monitoring multi-professional team

Embed the use of remote monitoring devices in clinical practice for the purpose of:

- Improved clinical decision making
- Early identification of disease worsening
- Therapeutic optimisation

Methods

A remote monitoring multi-professional team made up of a cardiologist, respiratory physician, nurse consultant and pharmacist was established in January 2020. The team reviewed potential patients to identify the clinical question and match to appropriate monitoring devices. Data was relayed via secure online systems and reviewed twice weekly with therapeutic changes made at the discretion of the responsible physician. Clinical events are reviewed at the monthly multi-professional team meeting.

Table 1: Baseline demographics to the 60 patients managed by the remote monitoring multi-professional team.

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>WHO Functional Class</th>
<th>PA Pressure (mm Hg)</th>
<th>Baseline 12-month Change</th>
<th>Follow-up 12-month Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>50-59</td>
<td>60%</td>
<td>III</td>
<td>30.1</td>
<td>-10</td>
<td>20.9</td>
</tr>
</tbody>
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Device implantation

Patients receiving a pulmonary artery pressure monitor (CardioMEMS, Abbott) were in WHO functional class III with a heart failure hospitalisation in the preceding 12-months and devices were implanted at diagnostic right heart catheterisation undertaken via the right internal jugular or femoral vein.\(^4\) Patients receiving an insertable cardiac monitor (Linq, Medtronic) were at increased risk of cardiac arrhythmias or had experienced transient symptoms that may suggest a cardiac arrhythmia with devices implanted in the clinic setting.\(^5\)

Figure 1: Chest x-ray showing pulmonary artery pressure monitor (PA) and insertable cardiac monitor (ICM) post-implantation.

Results

Between January 20th and December 31st 2020 no device related adverse events were reported. The number of therapeutic changes in the 12-months preceding device implantation was 10 compared with 68 changes in the same period following implantation. The area under the curve of pulmonary artery pressure following device implantation was reduced and the number of disease related hospitalisation events reduced from 21 in the 12-months preceding implantation to 4 in the post-implantation period.

Figure 2: A number of therapeutic changes made before and after device implantation. B: Area under the curve of pulmonary artery pressure following device implantation.

Conclusions

Through the course of the COVID-19 pandemic remote monitoring of high-risk patients with pulmonary arterial hypertension has increased therapeutic changes, improved pulmonary artery pressure, facilitated therapeutic optimisation and early detection of disease worsening from the patient’s home.

References