

depend on time, eg, recurrence of a specific event (such as heart failure or myocardial infarction). The best approach to take into account for these kinds of variables in cardiovascular diseases is multistate models, while other methods have some limitations for time-dependent variables. Despite the importance of cardiovascular diseases and, given the fact that by 2030, the leading causes of death in the high-, middle- and low-income countries will be cardiovascular diseases,<sup>2</sup> there are few studies about the application of multistate models in cardiovascular diseases. Two examples are Ieva et al<sup>7</sup> and Zhang et al.<sup>8</sup>

To sum up, multistate models can lead to early detection, improved disease prognosis, and reduced cost of the disease for families and governments, which are the main concerns of ministries of health and other policymakers. Therefore, it is suggested that this model be more focused on by policymakers to save financial resources and reduce the costs of the health system.

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## About the Micra Transcatheter Pacing System



## Acerca del sistema de marcapasos transcáteter Micra

### To the Editor,

We read in detail the interesting article by Pachón et al<sup>1</sup> on implantation of the Micra transcatheter pacing system. Due to its characteristics, this model could undoubtedly be extremely useful in certain patients.<sup>2</sup> However, it has certain limitations. Regarding the series of 10 patients presented, we would like to make several observations:

Of the 10 patients, 2 (patients 5 and 8) were in sinus rhythm prior to implantation; usually, implantation with a DDD pacemaker would be indicated in this situation. With right ventricular pacing only, atrial fibrillation is likely to develop in the medium- to long-term. This is particularly likely in the case of the patient with a pacing percentage of more than 20%, as measured after implantation. Aside from the clinical deterioration that could result from the loss of atrioventricular synchrony, the patient would require anticoagulation. In the case of the other patient with a baseline sinus rhythm, the R wave amplitude was only 4.7 mV after the first implantation, whereas the manufacturer's recommendation<sup>3</sup> is  $\geq 5$  mV.

Patients 1 and 2 have a pacing threshold of 0.24 ms higher than the manufacturer's recommendation in the technical specifications<sup>3</sup> (1 mV).

Regarding the patient with a QRS of 140 ms and erratic control of atrial fibrillation (patient 4), it is possible that at follow-up she will require a change to cardiac resynchronization therapy (provided the clinical profile indicates and allows this). With this system, such a

change would not be feasible and could even hamper implantation of new electro-catheters in the right ventricle.

In light of these points, this seems to be an interesting and novel pacing system, but with some limitations, especially for patients who are in sinus rhythm or who require a change to cardiac resynchronization at follow-up.

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