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(54) Title: LEFT VENTRICULAR VOLUME AND CARDIAC OUTPUT ESTIMATION USING MACHINE LEARNING MODEL

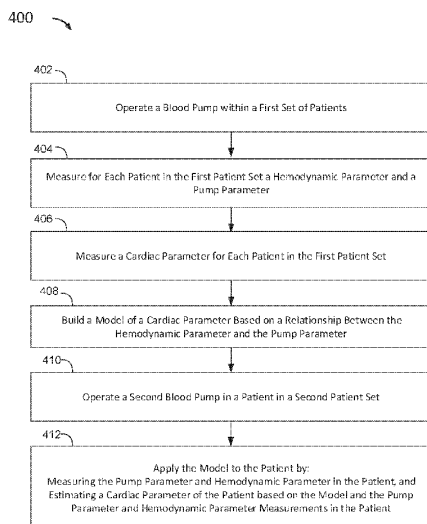


FIG. 4

(57) Abstract: Methods and systems are disclosed for creating and using a neural network model to estimate a cardiac parameter of a patient, and using the estimated parameter in providing blood pump support to improve patient cardiac performance and heart health. Particular adaptations include adjusting blood pump parameters and determining whether and how to increase or decrease support, or wean the patient from the blood pump altogether. The model is created based on neural network processing of data from a first patient set and includes measured hemodynamic and pump parameters compared to a cardiac parameter measured *insitu*, for example the left ventricular volume measured by millar (in animals) or inca (in human) catheter. After development of a model based on the first set of patients, the model is applied to a patient in a second set to estimate the cardiac parameter without use of an additional catheter or direct measurement.

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