The ability of accurate measuring of cardiac output (CO) in clinical medicine is important as it is provided for improved diagnosis of abnormalities, and can be used to guide the appropriate management. Estimation of cardiac output from arterial blood pressure waveforms (ABP) has received considerable attention in recent years. So far, various estimation methods are used for the measurement of CO from (ABP). However, these estimators have several limitations and sometimes dont have good performance. Neural network is usually useful for function approximation and it can improve the performance of estimators. In this study, we evaluate and compare the performance of 3 CO estimation methods with neural network on a large set of clinical data, using the simultaneously available thermodilution CO (TCO) measurements as gold-standard. Clinical ABP waveforms are provided from the Multi-Parameter Intelligent Monitoring for Intensive Care II (MIMICII) database. A total of 80 records of ABP waveforms with 954 TCO measurements are used. For estimation purposes, we applied two neural networks of Multi-Layer Perceptron (MLP) and Radial Basis Function (RBF). Proposed scheme modifies the coefficients of estimators which have been applied to the previous CO estimation methods. The results, comparing with previous methods, show noticeable reduction in the absolute error between TCO and CO estimation.