

Development of 3D Printed Heart Model for Medical Training

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Abstract Three-Dimensional (3D) printing is emerging as an enabling technology for a wide range of new applications. This study focuses on the medical application of 3D printer using basic fundamental 3D printing mechanisms. The objective of this study is to develop a heart model with specific requirements for medical training using Flyingbear P902 3D printer and Flex Thermoplastic Polyurethane (TPU) filaments as the depositing materials. The study involved two trials with the same operation procedure and 3D printer specifications. The first trial utilized non-transparent TPU filament and the second trial utilized transparent TPU filament. The application of this technology in developing a heart model was evaluated based on the requirements fulfilled by both printed heart models in both trials. The problems (such as inflexibility and less transparency), limitations and proposed solutions are discussed. The emergence of cardiovascular diseases such as congenital heart disease, coronary artery disease, surgical and catheter-based structural disease make 3D printing a new tool to design, plan and carry out challenging cardiovascular interventions.

Keywords: 3D printing; Coronary artery; Heart model; Transparent filament; Thermoplastic polyurethane (TPU)