

3D printed heart models are highly anticipated innovation in medical education

*Meyer-Szary J.(1), Sabiniewicz R.(1), Kwiatkowska J.(1), Fijałkowska J.(2), Dorniak K.(3)
Department of Paediatric Cardiology and Congenital Heart Defects (1); 2nd Department of Radiology (2); Department of Noninvasive Cardiac Diagnostics (3) Medical University of Gdansk*

Introduction: The parallel advances in medical imaging, image processing, and 3D printing techniques have led to greater availability of this innovation in medicine. Recognising the difficulties of comprehending complex anatomy of congenital heart defects and the educational potential of the 3D printed anatomical models we have assessed their reception by the medical students.

Methods: Using available software and Zortrax M200 desktop printer we have prepared 18 models of varied congenital heart diseases (ToF, CAT, PA, CoA, IAA, HAA, DAA, VR) pre- and post-operatively. They were introduced to the curriculum of the course for medical students in our department. Each model played a double role – first as a riddle to engage the students and see if they can give the correct diagnosis. Secondly as an illustration to the detailed case description each model represents. At the end, we circulated a questionnaire to assess the participants opinions.

Results: We have assessed a group of 45 students, 57% males, median age 24 (22-29) years, 66% fifth and 33% sixth year of the studies. All fully agreed that 3D printed models are helpful educational aid.

Almost all (98%) fully, and the rest rather agreed that they help understand complex anatomy of congenital heart diseases. Similarly, 93% fully, and 7% rather agreed that they help understand the principles of cardiosurgical corrections of the defects. Regarding aiding understanding physiology of the defects 76% fully agreed, and 24% rather agreed. Students would also like to interact with the models if they allowed simulated interventional procedures – 71% definitely, 24% rather and only 4% had no opinion. Interestingly, 80% (definitely and rather in equal proportions) would like to participate in extracurricular course on the technical aspects of 3D printing in medicine, living only 18% undecided and 2% rather not interested. Ninety eight percent of students claimed that such models should also be used in other classes naming 17 specialties in an opened question. Finally, 98% would definitely, and 2% would rather recommend other students to attend classes featuring such models.

Conclusion: The results unequivocally display that 3D printed heart models are highly anticipated innovation in medical education.