

INTISARI

PENGEMBANGAN DESAIN MEDIA AJAR KANULASI ARTERI KORONER PADA TINDAKAN ANGIOGRAFI KORONER BERBASIS 3D PRINTING

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Latar Belakang : Tindakan intervensi endovaskular perkutan meningkat dengan cepat. Keterampilan untuk menguasai teknologi terbaru ini memerlukan Latihan. Penggunaan cadaver dan hewan untuk latihan tidak merepresentasikan anatomi tubuh, mahal, dan perawatan yang susah. Latihan langsung ke pasien memiliki isu keselamatan medis. Simulasi menyediakan pelatihan yang aman dan sesuai dengan kondisi realistis, termasuk intervensi kardiologi. 3D *printing* diketahui dapat digunakan untuk pembuatan simulator.

Tujuan : Membuat dan memvalidasi desain validator untuk pelatihan kanulasi arteri koroner pada tindakan angiografi koroner.

Metode : Desain simulator diambil dari data CT scan dan akan dicetak dengan 3D *printing* dengan bahan resin dan vakum mika untuk model jantung. Kemudian, cetakan 3D akan disusun menjadi simulator. Dua belas validator diwawancarai terkait dengan opini ahli, kuesioner dengan penilaian skala Likert 4 poin juga diberikan kepada validator. Metode kualitatif digunakan untuk menganalisis hasil wawancara, penghitungan kuesioner menentukan kelayakan simulator.

Hasil : Dari 21 pasien, 5 data CT *scan* pasien dengan anatomi normal diambil untuk mendesain aorta, arteri koroner, dan model jantung. Data desain dicetak 3D dengan bahan campuran resin 75% resin jernih dan 25% resin fleksibel. Simulator disusun dengan kamera di atas simulator dengan sudut LAO 30°/0°, meja *display*, dan kotak akrilik. Validator terdiri dari ahli anatomi (n=2), ahli teknik (n=2), dokter ahli kardiologi intervensi (n=2), *fellow* intervensi jantung (n=1), perawat intervensi (n=3), dan radiografer intervensi (n=2). Skor penilaian seluruh aspek masuk dalam kategori sangat layak (85.8%). Aspek keterkaitan kurikulum (92%), nilai pendidikan (94%), efisiensi (78%), keakuratan (83%), estetika (80.7%), ketahanan (81.2%), keamanan (87.5%), penyimpanan dan portabilitas (85.4%), harga (93.7%).

Kesimpulan : Simulator berbasis 3D *printing* untuk kanulasi arteri koroner memiliki nilai yang mengagumkan dari pendidikan, keakuratan, efisiensi, keamanan, mobilitas, estetika, penyimpanan, dan harga. Anatomi dan susunan pendukung simulator memperoleh validitas sangat sesuai dan valid untuk dijadikan simulator dengan beberapa perbaikan.

Kata Kunci : 3D *printing*, intervensi koroner, pendidikan, simulasi, simulator.

ABSTRACT

3D PRINTED CORONARY CANNULATION MODEL FOR SIMULATION

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Background: Percutaneous endovascular intervention increases fast. The skills to master the newest technology need to practice. Cadaver and animal uses do not represent the anatomical body, and the care is expensive and difficult to maintain. However, practicing with the patient has medical safety issues. Simulation offers safe and realistic conditions for training, including cardiology intervention. 3D printing is known to be useful for simulator making for educational purposes.

Aims: To make and validate a simulator design for coronary cannulation in coronary angiography training.

Research Methods: The simulator design was made with CT scan data. The design was printed by 3D printing with resin materials and a pressurized vacuum of mica for the heart model. Then the 3D printing was constructed into a simulator. Twelve validators were interviewed for the expert opinions, also given the score of simulator suitability by 4 points Likert scale questionnaire. A qualitative method was used to analyze the interviews, and questionnaire scoring calculation defined the appropriateness of the simulator.

Results: From the total of 21 patients, 5 anatomically normal CT scan subjects were taken to design the aorta, coronary, and heart model. The data were 3D printed with resin consisting of 75% clear resin and 25% flexible resin. The simulator was constructed with a camera above the simulator with a degree of LAO 30/0, a display table, and an acrylic box. Feedback from 12 validators who answered a series of questions is Validator consist of anatomy expert (n=2), engineering expert (n=2), cardiology intervensionist (n=2), cardiology intervensionist fellow (n=1), intervension nurse (n=3), and intervention radiographer (n=2). All-aspect average score was categorized very worthy (85.8%). Eacsh aspect : curricullum relevance (92%), training value (94%), efficiency (78%), accuracy (83%), esthetic (80.7%), endurance (81.2%), safety (87.5%), storage and portability (85.4%), cost (93.7%).

Conclusions: 3D printed simulator for coronary artery cannulation has admirable values of education, accuracy, efficiency, safety, mobility, aesthetics, storage, and price. Anatomy and support tools have met validity with minor suggestion for improvement.

Keywords: 3D printing, coronary intervention, education, simulation, simulator