complications (trainees 71.1% [n=32/45], PDs 88.9% [n=8/9]) and (2) the ability to perform the procedure independently (trainees 62.2% [n=28/45], PDs 88.9% [n=8/9]) (Figure). The most favored methods of evaluation were direct observation (median 1, interquartile range [IQR] 1-2 and 1, IQR 1-1 for trainees and PDs, respectively), in-training examination (median 3, IQR 2-4 and 3.5, IQR 2.75-4.25), and multisource evaluations (median 3, IQR 2-5 and 3, IQR 2-4) (Table). Across the surveyed CICU-specific skills, the procedural quantity performed that is necessary to achieve competence was similar between both groups. Trainees are considering a range of cardiology sub-specialities. Despite only five trainees (11.1%) pursuing cardiac intensive care, most trainees (n=29/33, 87.9%) and PDs (n=7/8, 88%) consider the listed skills important for future cardiology practice. Eight of 34 (30.1%) trainees surveyed feel that will not achieve competence in the Royal College-defined cardiology skills by the completion of their training.

CONCLUSION: There is consensus between trainees and PDs regarding how to best define competence and evaluate trainees, as well as what quantity of procedures are required to achieve competence. There is strong agreement regarding the importance of CICU skills. Despite this, an important number of trainees surveyed do not feel that they will be adequately prepared for independent practice, which should be addressed in the incoming CBD curriculum.

Figure: Methods for assessment of competence among trainees and program directors

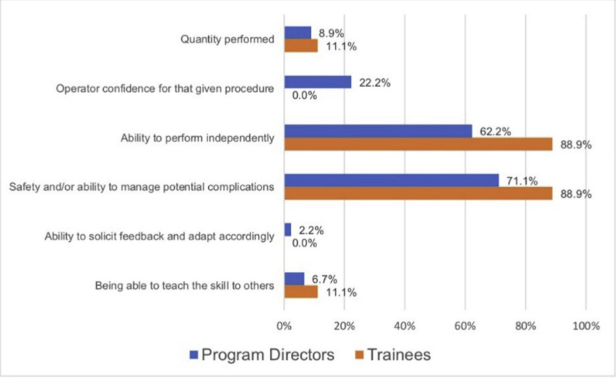

Table: Trainee and program director ranking of evaluation modalities

RANK	TRAINEES (MEDIAN, IQR)	PROGRAM DIRECTORS (MEDIAN, IQR)
1	Direct observation (1, 1 to 2)	Direct observation (1, 1 to 1)
2	In-training examination (3, 2 to 4)	Multisource evaluations (3, 2 to 4)
3	Multisource evaluations (3, 2 to 5)	In-training examination (3.5, 2.75 to 4.25)
4	Case logbooks (4, 3 to 5)	Case logbooks (4.5, 3.75 to 5)
5	Trainee self-evaluation (5, 3 to 7)	Trainee self-evaluation (5.5, 3.5 to 5.5)
6	Trainee portfolios (6, 4 to 6)	Trainee portfolios (5.5, 4.5 to 6)
7	Conference or case presentations (6, 4 to 7)	Conference or case presentations (6.5, 6 to 7)

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INTEGRATING CARDIAC SCIENCES AND TOY DESIGN TO CREATE EDUCATIONAL RESOURCES FOR PEDIATRIC PATIENTS: PLAY, LEARN, TEACH!

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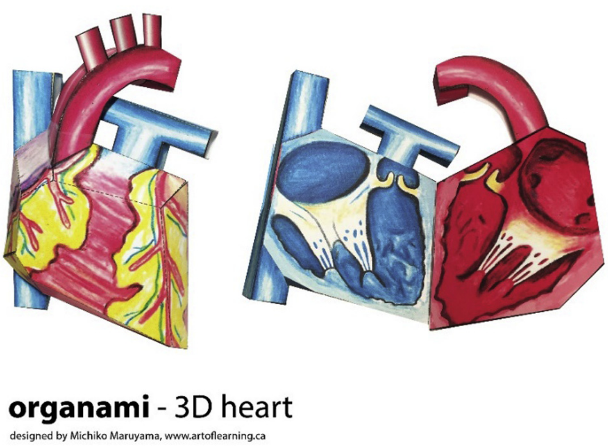
BACKGROUND: Play, Learn, Teach! is an educational program consisting of several projects that target the topics of cardiovascular health and congenital heart defects in the pediatric population. Currently, there are many health education programs that educate the adult population on cardiovascular disease and living a cardiac healthy lifestyle; however, few programs have been targeted to educate the pediatric population. In addition, few educational resources for children with congenital heart defects exist. Most educational resources are intended for parents or guardians, rather than the child.

OBJECTIVES: To build educational toys that will teach cardiac anatomy, including anatomy of congenital heart defects, introduce medical terminology, discuss the importance of cardiac health and encourage a cardiac healthy lifestyle. In addition, for children undergoing open heart surgery for congenital heart defects, educational toys were designed to teach children about their unique anatomy and what to expect during their hospital stay. The second objective is to enhance the doctor-patient relationship using innovative ideas and creativity through the integration of art, humanities and medicine.

METHODS: Background research was conducted on pre-existing educational toys followed by brainstorming new concepts and designs. Prototypes of selected toy ideas were created and tested in a workshop style session. Two groups of 20 children were given the toys to construct using paper, glue and scissors. After construction, children played with the toys with volunteers and used them to discuss the cardiovascular system.

RESULTS: The final toy design concept involved creating anatomical models by folding pieces of paper, which we termed “Organami”. Children were able to cut, fold, create, colour and label the different anatomical structures using a simple set of instructions. Multiple versions have been created to demonstrate congenital heart defects, including Tetralogy of Fallot, Transposition of Great Arteries and Hypoplastic Left Heart Syndrome, as well as pathophysiology of diseases, including coronary artery disease and infective endocarditis.

CONCLUSION: The goal of Play, Learn, Teach! is to enhance the doctor-patient relationship using innovative ideas and creativity and to promote the integration of art, design and medicine. By introducing the importance of cardiac health at an early age, a possible long term outcome is a decrease in the incidence of cardiac disease among the adult population.



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PULMONARY CONGESTION IDENTIFIED BY LUNG ULTRASOUND B-LINES READINGS BY MEDICAL RESIDENTS OF UNIVERSITY HOSPITALS: THE NEED OF TRAINING AND QUALITY CONTROL.

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BACKGROUND: Lung ultrasound B-Lines (LUS) identification is presently an evolving method for identification and follow up of extravascular lung water accumulation. Although it had been increasingly used, its limitation relates to the dependency of the reading skills of the operators, necessary to levelling their report, that can impact on its diagnostic accuracy. We sought to determine the accuracy of an in-training group of medical residents (MDR) of various specialties that routinely use LUS everyday in bedside practice to determine presence and grading of pulmonary congestion.

METHODS: Ten MDR in three University hospitals read a set of 20 video-clips of LUS of different patients. For each set they gave an answer of number of B-Lines varying from 0 (black lung, only A-Lines) to 10 (white lung, coalescent B-lines). Diagnostic reference pattern (gold standard) was considered the concordant answer of two experts in this setting and very experienced readers. The answer was considered correct if equals to gold standard ± 1 (e.g. gold-standard 5 B-lines; correct answer 4, 5 and 6). Sixty naive cardiologists qualified for B-lines reading working in 52 centers (16 countries) of a network of studies of stress echocardiography that also read the set of videos after taking an obligatory online course of two-hours duration, also read the same set of 20-video-clips and served as the reference group for comparison of the readings of the group of MDR. Comparison between percentages of correct answers of MDR and the controls was done with t test (program WINPEPI, software version 11.65).

RESULTS: Mean diagnostic accuracy of readings of the MDR readers (group A) and 60 quality controlled cardiologists (group B) was, respectively, 81.5% ± 0.085 and 95% ± 0.05 as compared to gold standard. Differences between mean values (group A - group B) was -13.500 ($p < 0.001$). Another comparison, now made only between group of residents vs gold standard readings, showed that the most disagreement evidenced by higher dispersion among readers in zones with more accentuated fluid accumulation, and was smaller in regions with normal patterns of A-lines as demonstrated in balloon graph (see Figure).

CONCLUSION: Asessment of B-lines inlung ultrasound is simple but a standardized training, specific certification and audit are warranted to harmonize reading criteria and optimize the potentially important clinical impact of the technique.