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RESEARCH ARTICLE

Is mastering creative thinking skills a mandatory competency for interventional cardiologists?

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Abstract

Introduction: Dealing with difficult situations in the pediatric cardiac catheterization and cardiac intervention laboratory, not only needs mastering knowledge and skills, but also demands capability to create new solutions for unpredicted complications that suddenly arise. Mastering creative thinking by the operator can be life-saving for patients in these setting. The aim of this study is to evaluate the views of interventional cardiologists on the importance of mastering creative thinking skills in their career success. We also sought the necessity of teaching this skill to the trainees in interventional cardiology and undergraduate medical education.

Materials and Methods: A short 5-item questionnaire on "Creative thinking skills and success in medical career "was distributed among interventional cardiologist through Congenital Cardiovascular Interventional Study Consortium (CCISC). We also sent the survey by email to other interventional cardiologists that we had their email address. Twenty-three interventional cardiologists answered the survey.

Results: Fifty-seven percent of respondents had a working experience of equal to more than 20 years. Sixty-one percent of the respondents used creative thinking during their cardiac catheterization and intervention procedures. Eight-seven percent of interventional cardiologists voted for teaching creative thinking skills to fellows of interventional cardiology as either "must learn (52%)" or " better to learn (35%)".

Conclusion: This study shows creative thinking is used frequently by successful interventional cardiologists. Most of the respondents considered teaching creative thinking skills as "must learn" in the curriculum of interventional cardiology and "better to learn" in curriculum of undergraduate medical education.

Keywords: Is mastering creative thinking skills a mandatory competency for Interventional Cardiologists?

Introduction

While knowledge, skills and expertise are mandatory prerequisites for a good outcome in catheterization laboratories dealing with pediatric cardiac interventions, they are not adequate to ensure an optimal result when an urgent, complex and unpredictable problem arises. In these critical moments, a smarter mode of thinking of the operator is needed to generate instant new solutions. This higher-order mode of thinking may be already present in some operators as a talent, or they can learn and improve it as a skill. In other words, our brain, as a powerful pattern recognition machine can handle familiar situations but on dealing with completely unfamiliar patterns, it needs to use higher-order thinking skills such as creative thinking to timely tackle the urgently arisen problem/s that may arise in the catheterization laboratory [1-3].

Several definitions have been described for creative or out-of-box thinking [4]. Creative thinking, has three principle characteristics. New ideas generated through creative thinking are both original and effective in solving problems. Thus, "novelty"," originality" and "effectiveness" in solving the problems, are the three main features of creative thinking [5]. Being able to connect diverse ideas in a divergent manner is an important characteristic of creative thinkers [6].

Creative and critical thinking, although used interchangeably, are different, but linked. Paul using a three-round Delphi study defined critical thinking as:" a process that uses a variety of approaches to solve identified problems and requires reflective thinking and the ability to utilize logical problem solving". Critical thinking is a prerequisite for creative thinking [7]. Studies also indicate there is a direct relationship between academic achievement and creative thinking abilities [8]. Importance of teaching creative thinking skills in nursing education is well shown. [9-13].

The aim of this study is to evaluate the opinions of interventional cardiologists regarding whether mastering creative thinking skills is a mandatory competency for physicians who handle difficult situations in the catheterization laboratory.

Methods

We distributed a 5-item multiple-choice questionnaire, with an open-end query at the bottom of the questionnaire for comments, through Congenital Cardiovascular Interventional Study Consortium (CCISC) to interventional cardiologists. Emails were also sent to Iranian interventional cardiologists who were not a member of CCISC by email.

Items asked in the questionnaire are shown in [Table 1].

Table 1: Items included in the questionnaire.

1	What is your working experience as an interventional cardiologist.
2	How often do use creative methods of thinking or out-of-box thinking to tackle the problems that arise in the catheterization laboratory or in other clinical professional settings.
3	If the out-of-box thinking was removed from your mentality, did you notice any degree of decrease in your professional success?
4	If the out-of-box thinking was removed from your mentality, did you notice any degree of decrease in your professional success?
5	Is it necessary to include teaching the "creative thinking skills" in the curriculum of medical school for medical students in undergraduate medical education? Please state your view by checking one of the boxes in below:
6	Please feel free if you like to comment on the statement: "Mastering creative thinking skills is a mandatory competency for physicians who handles difficult situations".

Results

Twenty-three interventional cardiologist responded to our survey. More than half of the respondents had a working experience of more or equal to twenty years. More than three-fourths of the respondents believed that removing creative thinking skills from their mentality would adversely affect their professional success. Details of responses are shown in Figures 1 to 5.

The summary of 'respondents comments presented as a response to the open-ended question of the questionnaire were:

1. Creative thinking cannot be taught.
2. Creative thinking needs a tolerant and encouraging climate.
3. The problem is how to teach the creative thinking skill.
4. Extrapolations from the past experiences and learning from others may be a method of teaching.
5. Creative thinking can only be learned by increasing experience and should not be taught too early, otherwise it may cause danger to patients.

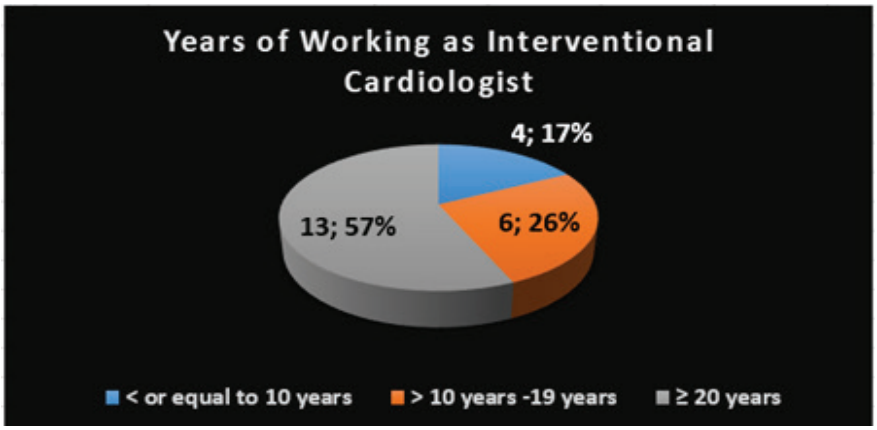

Figure 1: Years of experience in working as interventional cardiologist in the respondents.

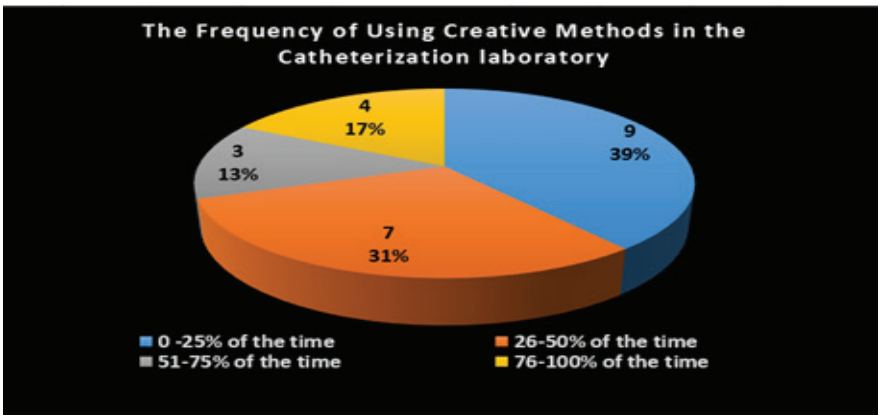

Figure 2: The Frequency of Using Creative Methods in the Catheterization laboratory by the respondents.

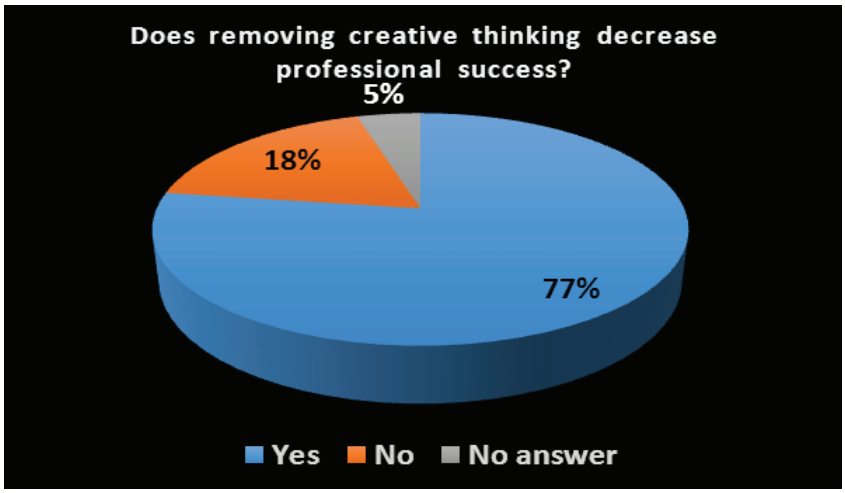

Figure 3: More than three-fourths of the respondents believed that removing creative thinking from their mentality would decrease their professional success.

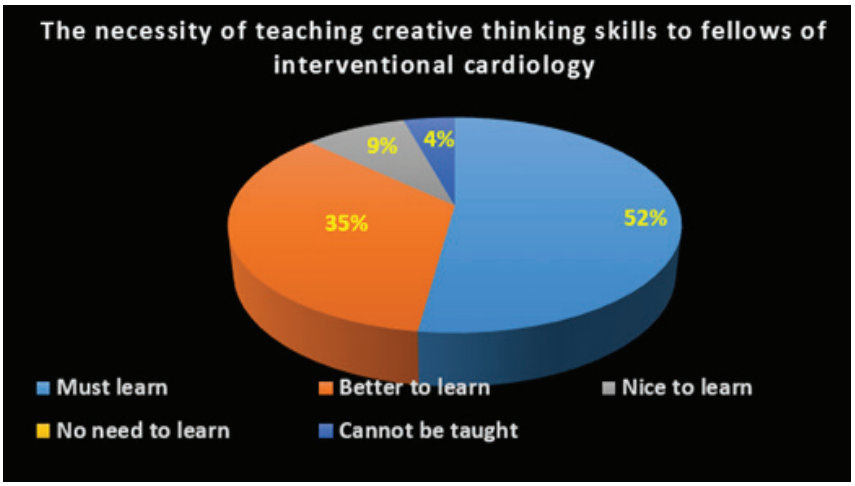

Figure 4: The necessity of teaching creative thinking skills to fellows of interventional cardiology according to the views of respondents.

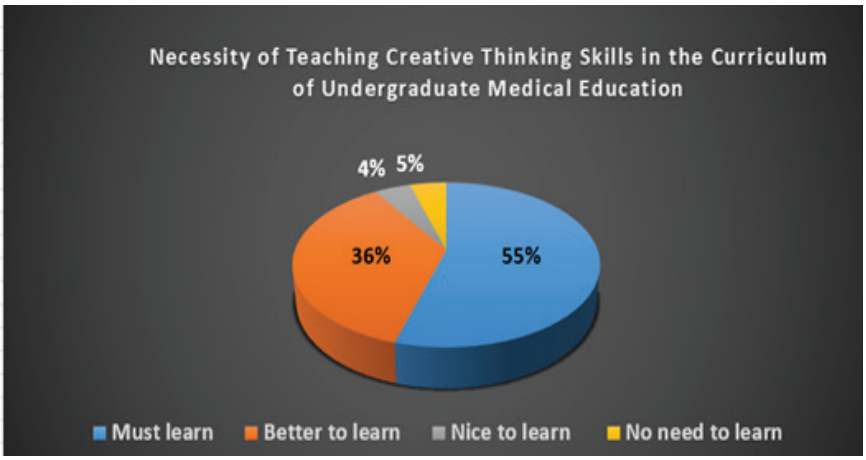

Figure 5: The necessity of teaching creative thinking skills to medical students in undergraduate medical education according to the views of respondents.

Discussion

Our study showed creative thinking skills is an essential skill in the toolkit of experienced interventional cardiologists. Using higher-order thinking can help interventional cardiologists to overcome nightmares in the catheterization laboratories.

The first main concern of our respondents were whether creative thinking is something that can be taught, and if so, how could it be taught. However, there is adequate evidence in nursing education that confirms creative thinking can be

taught and improved by training [14-19]. Chen proposed a four-stage teaching model for teaching creative thinking. The stages are: 1- asking questions 2- Encourage divergent thinking 3- doing 4- evaluation [20]. He also performed a systematic review of creative thinking in nursing education during a 10-year interval from 2002 to 2011.He concluded that four educational strategies can foster creative thinking: teaching diverse subjects such as painting, building self-confidence in the students to think creatively, team-based learning and student-centered teaching [6].

Creative thinking, listed among the skills of the 21st century by the partnership for 21st century skills, may be either inherently existent in some individuals or developed by training [21-28].

Retrospective interactive step-by-step, problem-solving-oriented review of successfully managed nightmares in the cath lab by the experts, can be a very useful resource for authentic instruction of creative thinking skills to the novice trainees. The trainees are encouraged to generate as many solutions as possible to resolve the problem. These creativity-provoking modules can be included in the fellowship program in interventional cardiology. Experts' "think aloud" attitude can help the juniors to learn creative thinking skills during these sessions. In Torrance tests of creativity, the fluency,i.e. the total number of responses is measured as an indicator of creative thinking [29].

Another venue where creative thinking could be taught is in the "Hands On Workshop" that was initiated by Drs. Amin, Moore, and Forbes. These industry- sponsored bi-annual two-day seminars used both didactic and animal lab experiences for overcome problems that may arise in performing interventions.

The second main concern was that climate is an important prerequisite for flourishing of creative thinking, as commented by one of the respondents:

"I think you can create an environment where creativity is tolerated and encouraged, but not sure you can teach people to be creative."

The importance of climate in creativity is already well established. Dubina defines creative climate as:"“inner” environment in which new ideas are being generated and supported." Challenging work, freedom in developing ideas, encouragement, willingness to tolerate uncertainty, support of new ideas, a relaxed atmosphere with trust and liveliness and a will for continuous development, dedication of time for generation of new ideas, are among the essential features of an optimal climate for fostering innovation [30].

The importance of climate is evident in this poem of Molavi: *"When the flower is gone and the garden is ruined, you will no more hear the song of the nightingale."*

Conclusion

Our study shows that creative thinking, is not only an important component in the toolkit of experienced interventional cardiologist, but also an essential skill to be taught to fellows of interventional cardiology. More investigation is required to clearly define the content of the core curriculum and the educational strategy to teach creative thinking skills in the discipline of interventional cardiology.

Conflicts of Interest

There are no conflicts to declare.

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