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# Implementing Perioperative Cardiac Risk Assessment in an Internal Medicine Residency Program: Experience from a Community Hospital

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## Abstract

**Background:** ACGME requires all Internal Medicine training programs to structure the curriculum to optimize resident educational experiences, including perioperative medicine. Teaching residents about perioperative risk management is challenging in a community hospital with limited resources and low surgical volume.

**Objective:** Our goal was to introduce an interactive educational module on perioperative cardiac risk assessment and management in a community residency training program.

**Methods:** The study was a single-center online education-based intervention from September 2020 to January 2021. 24 categorical internal medicine residents at MetroWest Medical center were included. A self-paced online education program followed by two sessions of a 30-minute, group modulated review and discussion were provided monthly. The pre- and post-evaluation with 20 questions were conducted to assess perioperative cardiac risk assessment and perioperative cardiac risk management before and after education.

**Results:** 20 out of 24 residents (83%) were included in the analysis. Medicine residents performed significantly better after involvement with the educational module by comparing the pre- and post-evaluation score ( $10.7 \pm 2.7$  vs.  $13.8 \pm 1.8$ ,  $p < 0.001$ , respectively). The most significant improvement was noticed in postgraduate year PGY-1 residents ( $5.1 \pm 2.5$ ,  $p < 0.001$ ), followed by PGY-2 ( $2.7 \pm 1.6$ ,  $p = 0.004$ ), but not significant in PGY-3 residents ( $1.6 \pm 2.3$ ,  $p > 0.05$ ).

**Conclusion:** Implementing an interactive multi-modular curriculum in a community hospital increased residents' awareness and knowledge of perioperative cardiac risk assessment and management. We are confident that this will result in improved performance on the consult services.

**Keywords:** Peri-operative curriculum in community hospital, Internal medicine residency program in community hospital, Peri-operative education modules

## 1. Introduction

In the United States (U.S.), 3% of patients with non-cardiac surgery have perioperative cardiovascular complications.<sup>1,2</sup> Perioperative cardiac risk stratification, testing, and management can help to prevent these complications.<sup>3</sup> Historically, perioperative assessment was performed by

anesthesiologists.<sup>4</sup> However, Mollema et al. reported that internal medicine involvement significantly affects the appropriate cancellation of surgery and improvement in perioperative management.<sup>5</sup> For these reasons, internists are increasingly involved in assessing and managing patients in the perioperative setting.<sup>6</sup> Moreover, the ACGME requires residency programs to prepare residents to

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serve as consultants in other specialties, including perioperative medicine.<sup>7</sup> Therefore, adjusting the curriculum to include the topic is important.

There are many articles about anesthesia and surgical training in perioperative medicine.<sup>8–10</sup> In contrast, there is little in internal medicine training. Raslau et al. proposed a new curriculum for perioperative education for an internal medicine training program in academic institutions.<sup>6</sup> However, programs in community hospitals may have more limited resources for training than in academic institutions. Many current residents have no contact with either a perioperative clinic or an established curriculum in perioperative assessment.

We introduced a curriculum using an interactive educational module on perioperative cardiac risk assessment and management with open access to train medical residents and improve their knowledge in a community hospital.

## 2. Methods

### 2.1. Settings and participants

We conducted an observational study based on pre- and post-evaluation after the intervention during the academic year 2020–2021. The study took place at MetroWest Medical Center, a community hospital that contains 307 beds with an average of 600–700 surgeries performed per year. We invited all 24 categorical medicine residents to participate during the ambulatory training block. Participants were divided into four groups, with a structure of two interns and four residents per team.

### 2.2. Intervention

Our intervention included the introduction of an interactive asynchronous online program of the Continuing Medical Education (CME) course “Society of the Hospital Medicine (SHM) consults: Perioperative and Consultative Medicine”. The SMH grants access to trainees through an academic access code to Program Directors. In this study, two modules from the SMH Consult Core Curriculum were selected: Perioperative Cardiac Risk Assessment and Management. Each module consists of two 30-min interactive web-based group learning sessions moderated by an attending. The structure of the education program involved in-classroom morning classes during our ambulatory blocks. Overall, there were 4 cohorts; each firm had a total of four sessions given on a monthly basis.

### 2.3. Data collection

The test was developed by one of the Attendings (EC) and consisted of 20 multiple choice questions; 10 questions for the perioperative cardiac risk assessment knowledge and 10 for the management. The same questions were used for a pre- and post-evaluation, which assessed participants before and after the education course. It was an in-person test supervised by an attending that lasted 30 min. Residents who did not complete either pre or post-evaluation were excluded from the analysis.

The study was approved by the Institutional Review Board of the MetroWest Medical Center, which waived the need for written informed consent. Participants were acknowledged that there was a voluntary research component to the course.

### 2.4. Statistical analysis

Matched pre- and post-evaluation scores were compared among the residents. Paired sample t-test and Wilcoxon Signed Ranks test were performed to compare means and median accordingly. Independent t-test and one-way analysis of variance (ANOVA) with LSD were used to compare differences in groups. Means, medians, and standard deviations are provided, with statistical significance defined as a p-value less than 0.05. All statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 27 software (IBM Corporation).

## 3. Results

A total of 20 (83%) residents were included for analysis; 1 PGY-2 trainee and 3 PGY-3 trainees were excluded from the study due to lack of completion of the evaluation. Overall, medicine residents performed significantly better after the introduction of educational modules sessions by comparing the pre-evaluation score and post-evaluation score ( $10.7 \pm 2.7$  vs.  $13.8 \pm 1.8$ ,  $p < 0.001$ ). The percentage of the improvement in performance after education by comparing pre- and post-evaluation scores was more significant in PGY-1 trainees ( $25.6 \pm 12.6\%$ ,  $p < 0.001$ ), followed by PGY-2 ( $13.5 \pm 8.0\%$ ,  $p = 0.004$ ), but not significant in PGY-3 trainees ( $8.0 \pm 11.5\%$ ,  $p > 0.05$ ) (Table 1).

While the performance in perioperative assessment before the education module was not significantly different among residents, the results in perioperative management in PGY-1 trainees were significantly lower compared with PGY-2 and PGY-3 trainees ( $3.4 \pm 2.4$  vs.  $6.1 \pm 1.9$  and  $6.0 \pm 1.6$ ,

Table 1. Comparison of pre and post-evaluation test score among the internal medicine residents.

Perioperative module	PGY level	Pre-evaluation test	Post-evaluation test	p-value
Assessment	Overall	5.6 ± 1.0	7.3 ± 1.4	<0.001
Management	Overall	5.0 ± 2.4	6.7 ± 1.6	0.004
Both		10.7 ± 2.7	13.8 ± 1.8	<0.001
Assessment	1	5.8 ± 1.0	7.5 ± 0.8	0.002
	2	5.7 ± 1.1	7.9 ± 1.8 <sup>††</sup>	0.008
	3	5.0 ± 1.2	6.2 ± 1.3 <sup>††</sup>	0.208
Management	1	3.4 ± 2.4 <sup>*†</sup>	6.8 ± 1.9	0.001
	2	6.1 ± 1.9 <sup>*</sup>	6.7 ± 1.4	0.413
	3	6.0 ± 1.6 <sup>†</sup>	6.4 ± 1.5	0.717

PGY: postgraduate year.

\*PGY1 vs. PGY2; <sup>†</sup>PGY1 vs. PGY3; <sup>††</sup>PGY2 vs. PGY3; p < 0.05.

p < 0.05, respectively). The performance of post-evaluation in perioperative management in PGY-1 trainees significantly improved (pre- and post-score, 3.4 ± 2.4 vs 6.8 ± 1.9, p = 0.001), and there was no statistical difference among PGY-1, 2, and 3 (6.8 ± 1.9 vs. 6.7 ± 1.4 vs. 6.4 ± 1.5, p > 0.05, respectively) (Table 1).

#### 4. Discussion

The results of this study indicate that residents were able to improve their performance in the assessment and management of perioperative cardiac risk assessment after an interactive multi-modular web-based curriculum. It also shows that, as expected, the perioperative cardiac risk assessment and management knowledge is the most lacking in PGY1 trainees. After the intervention, there was a statistical improvement in knowledge in PGY1, PGY2 but not PGY3. Unfortunately, only five Senior residents completed the exams making the assessment difficult. These data suggest that it might be prudent to include the perioperative session early in training.

Even though ACGME acknowledges the importance of perioperative medicine in internal medicine training, there is no specified curriculum to follow. Many university hospitals, including the Mayo Clinic, have developed a comprehensive perioperative education curriculum for internal medicine residency training.<sup>6</sup> However, the resources, surgical volumes, and structure of consult services are usually quite different between large academic centers and small community teaching programs.

One limitation of this study is that it was conducted in a single center. The validity of the data is also limited by each resident's individual experience and the small sample available for analysis. The learning environment was groups (six residents meeting monthly in firm rounds) and included other modules on preoperative assessments. Ideally, residents learn

from performing consults, but at our institution, preoperative assessments are often done by subspecialty consultants, and the surgical volume is low. The fact that the primary study site is a small community hospital with not many surgeries done per year also limits the applicability to other programs. On the other hand, the small groups in our firm system are excellent for the learning environment and being used for the introduction of other curricula.

The effort to pursue the most appropriate perioperative curriculum in internal medicine training should be shaped to fit programs in all settings. As the perioperative cardiac risk modules are shown to improve resident knowledge, we plan to introduce other topics on perioperative management.

#### 5. Conclusion

An interactive multi-modular curriculum in a community hospital raised awareness and knowledge among trainees in perioperative cardiac risk assessment and management, which in turn will improve their comfort in the approach of perioperative assessment and helping patients and colleagues on the surgical teams.

#### Prior or related publications

This case manuscript has not been published nor presented in any meeting.

#### Disclaimer

The educational module used in this study was provided for an academic purpose by the Society of Hospital Medicine.

#### Conflict of interest

The authors declare that they have no competing interests.

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