A Survey of Exercise Stress Test Training in US Family Medicine Residency Programs

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BACKGROUND AND OBJECTIVES: Only 12% of family physicians perform exercise stress testing (EST) in the office even though there are many indications for its use. The purpose of this study was to obtain updated information about attitudes toward EST training from family medicine residency program directors in the United States.

METHODS: A survey regarding EST training was designed and sent to all US family medicine residency program directors by e-mail and online survey method with telephone follow-up for non-respondents.

RESULTS: A total of 179 responses were received from 440 US family medicine programs, for a 41% response rate. A majority (77%) of program directors felt office-based EST was a valuable test for risk stratification, and 64% felt that family physicians should offer this test in the office. Despite these attitudes, only 33% of family medicine residency programs offer EST in their offices now, and only 36% of programs reported offering EST training to their residents. This reflects a 16% reduction compared to the last survey done in 1993. The most important barriers to EST training reported were lack of equipment and lack of expert faculty.

DISCUSSION: Most family medicine training programs want to train their residents in performing EST, but only 36% are doing so. Specifically addressing the barriers to this training will be key to more widespread use of this important test in family medicine settings.

(From the Department of Family Medicine (Drs Newman, Cummings, and Patel and Ms Carmon) and Brody School of Medicine (Mr Lukosius), East Carolina University.)

Only 12% of family physicians offer exercise stress testing (EST) in the office, and barriers cited to providing this test include lack of training during residency. There are many opportunities for family physicians to perform office-based EST. The American College of Cardiology (ACC) has a Class I (high-level evidence to recommend) indication for EST to evaluate patients with intermediate risk pre-test probability of coronary artery disease, which includes the majority of patients presenting in primary care practices. Significant cost savings to the health care system are likely by doing EST in the primary care office compared to the much more expensive nuclear imaging EST.

The patient-centered medical home (PCMH) is becoming the new model for primary care, with one of the major principles including offering frequently required testing at the point of care without the expense and inconvenience of referral. Family physicians have been doing office EST safely and effectively for many years. Given the frequent need for EST for triaging chest pain patients, a strong case can be made to train family physicians in this procedure to achieve wider availability in the PCMH and improved access for chest pain patients to primary care evaluation.

The last study of EST training in family medicine residencies was published in 1993 and showed that 52% of programs offered EST training. The purpose of the current study is to gather updated information on EST training, attitudes of program directors toward this training, and barriers to offering this training in residency.
Methods
A survey was developed by the authors in collaboration with our residency program director and piloted with five physicians in our department, soliciting feedback on the survey instrument. This input led to final modifications and the survey was then sent out by e-mail to all US family medicine residency program directors, initially by list-serve contact up to three times. After a low response rate from the initial list-serve contacts, program directors were contacted up to three additional times and given the option of completing the survey by an online method (Zoomerang24). Finally, for those that did not respond, multiple telephone contacts were made and the survey was administered by phone. The survey questions are given below:

(1) Does your practice perform standard (without nuclear imaging) EST in the office?
(2) Is office-based EST valuable for cardiac risk stratification?
(3) Should family physicians perform EST?
(4) Should only cardiologists perform standard office-based EST?
(5) Should all family medicine residents be trained to perform standard office-based EST?
(6) Does your program currently have a curriculum for teaching EST to your family medicine residents?
(If the answer to #6 is yes, please answer the following questions):
(7) How many curriculum/teaching hours are devoted to teaching EST?
(8) Is this curriculum taught by (check all that apply): family medicine faculty, cardiology faculty, internal medicine faculty, or other faculty?
(If the answer to #6 is No [no curriculum], please answer the following):
(9) What are the barriers for teaching this skill to your residents (check all that apply):
- Lack of curriculum materials
- Lack of time in the curriculum
- Lack of treadmill equipment
- Lack of faculty with expertise
- Not a priority of program/hospital
- No specific Residency Review Committee (RRC) requirement
- Poor reimbursement
- Resistance by cardiologists
(10) Would a standardized curriculum for EST training be useful to your program?
(A Likert scale of 1 to 5 was used to assess responses, with 1 indicating strong agreement and 5 indicating strong disagreement.)
A total of 440 US family medicine residency program directors were sent the survey. Survey sites included both university- and community-based programs. Data on where the program director trained and the type of practice (urban, suburban, rural, or military) were collected. All respondents participated voluntarily and were given the option of declining to participate. Survey responses were collected over an 8-month period from October of 2009 to May of 2010. Multiple attempts were made to get a response.
University Institutional Review Board (IRB) approval for the study was obtained through the East Carolina University IRB. All survey responses were entered into SPSS Statistics version 18 (formerly PSAW). Chi-square analysis was performed to assess the significance of differences in categorical responses.

Results
There were a total of 179 responses from 440 programs contacted, for a 41% response rate. Only 60 of 179 (33%) of programs surveyed performed standard EST without nuclear imaging in the office. Thus, 119 (67%) of family medicine training programs surveyed reported not offering this test in their offices.
Table 1 clearly shows that there is general agreement among residency program directors that office-based EST is a valuable tool for cardiac risk stratification. A total of 138 (77%) either strongly agreed or agreed with this assertion, with only 10 (6%) disagreeing.

Table 1 also shows that the majority of program directors feel that family physicians should perform office-based EST. A total of 115 (64%) either strongly agreed or agreed with this statement, with only three (2%) disagreeing. Interestingly, a substantial minority of 61 (34%) were neutral on this question. By contrast, when asked if only cardiologists should perform standard office-based EST, the overwhelming majority of 157 (88%) of respondents disagreed or strongly disagreed, with only three (2%) agreeing and 18 (10%) being neutral on this question.

Table 1 summarizes the results of attitudes regarding the question of training family medicine residents in office-based EST. Interestingly, more respondents disagreed with training residents to perform EST than the question regarding whether family physicians should perform EST in the office. Specifically, 43 (24%) of program directors disagreed that family medicine residents should be trained to perform standard office-based EST. Surprisingly, only 81 (45%) agreed that they should be trained in this procedure, and 55 (31%) were neutral on the question.
We also stratified our analysis according to whether EST was performed in the residency training program office or not. For those program directors practicing in a setting where the test is offered, 92% felt family medicine physicians should perform EST versus only 50% among those practicing in a setting that did not offer EST ($P<.05$). Similarly, 68% of program directors in settings performing EST felt that family medicine residents should be trained to perform EST versus only 35% among those in settings not performing EST ($P<.05$).
Additionally, we compared university-based and community-based programs and found there were no significant differences in survey results between the two groups. There were not enough rural or military programs to do a meaningful subgroup analysis of these program types.
Only 64 (36%) of programs actually had a curriculum for teaching office-based EST to their family medicine residents, whereas the majority of 110 (64%) of programs did not offer this training. The previous study from 1993 reported that 52% of programs offered this training, suggesting a 16% decline over 17 years.

We also asked the question of who the instructors were in the EST training curriculum if it was offered. Of the 64 programs that had an EST curriculum, 51 (80%) had family medicine instructors, 33 (52%) had cardiology instructors, 16 (25%) had internal medicine instructors, and six (9%) had nonphysician instructors. This shows that many programs had instructors from more than one specialty, but the majority of the teaching was done by family physicians. The amount of time spent in EST training varied widely with a mean of 14.4 hours and a range of 2–120 hours.

Barriers to teaching office-based EST to residents are shown in Table 2. Multiple responses were allowed for each program director. The most important barriers were lack of equipment (43%), presumably related to the cost of purchase, and lack of expert faculty to teach this skill in 74 (41%) training programs. Interestingly, 71 (40%) cited this training not being a priority for the program as a barrier. Lack of time in 58 (32%) programs and lack of standardized curricular materials in 33 (18%) were additional significant barriers cited.

Interestingly, 49 (27%) programs noted the family medicine RRC having no specific requirement for EST training was a barrier to their offering this training. This again suggests many competing demands for training in other areas. Surprisingly, barriers to training that affected very few programs were poor reimbursement in 10 (6%) programs and resistance by cardiologists in only 24 (13%) programs.

Table 1 shows responses to the question regarding whether a standardized curriculum for EST training for family medicine residents would be useful to the program. A majority of 113 (63%) program directors either strongly agreed or agreed with this statement. A total of 32 (18%) were neutral on this question. Only 23 (13%) program directors felt that this curriculum would not be useful.

Lastly, we asked the program directors where they received their family medicine training. A total of 53 (31%) received training in a university-based program and 119 (69%) had trained in a community-based program. Current practice location was surveyed, showing 31 (18%) of programs were university based, 130 (76%) were community based, and 11 (6%) were military programs. This sample is representative of the

<table>
<thead>
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<th>Question</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
<th>No Response</th>
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<tbody>
<tr>
<td>EST is valuable for risk stratification</td>
<td>27% (49)</td>
<td>50% (89)</td>
<td>16% (29)</td>
<td>5% (9)</td>
<td>0.6% (1)</td>
<td>1.1% (2)</td>
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<td>Family physicians should perform EST</td>
<td>25.7% (46)</td>
<td>38.5% (69)</td>
<td>34% (61)</td>
<td>1.1% (2)</td>
<td>0.6% (1)</td>
<td>0</td>
</tr>
<tr>
<td>Family medicine residents should be trained in EST</td>
<td>15% (27)</td>
<td>30% (54)</td>
<td>31% (55)</td>
<td>21% (38)</td>
<td>3% (5)</td>
<td>0</td>
</tr>
<tr>
<td>EST standardized curriculum would be useful for training residents</td>
<td>18.4% (33)</td>
<td>44.7% (80)</td>
<td>17.9% (32)</td>
<td>11.7% (21)</td>
<td>1% (2)</td>
<td>6.1% (11)</td>
</tr>
</tbody>
</table>

Total number of responses=179. Number of program directors responding are in parentheses.

EST—exercise stress testing
American Academy of Family Physicians (AAFP) data on program types. The latest AAFP data reveal that 85% of programs are community based, 12% are university based, and 3% are military. Responses from 43 states were represented in the sample.

**Discussion**

The most important finding from this study is that there appears to have been a 16% decline in the number of family medicine residency training programs offering EST training from 52% to 36% between 1993 and 2010 and a 20% reduction in programs offering EST to their patients from 53% in 1993 to 33% in 2010. The most important barriers to offering this training in the 1993 study were lack of training, cost of the equipment, and poor reimbursement. Quite similarly in the current study, the most important barriers were lack of equipment and lack of trained faculty to teach the procedure. Additionally, EST training not being a priority for the program and lack of time for the training were cited as barriers to offering EST training. Surprisingly, lack of reimbursement and resistance by cardiologists were reported as only very minor barriers.

Interestingly, our findings show significant discrepancies in attitudes of program directors. Eighty-eight percent of them disagreed that only cardiologists should perform ESTs, yet only 64% agreed that family physicians should perform ESTs, and only 45% agreed that family medicine residents should be trained to perform ESTs. These percentages are quite similar to those reported by Jacobson and Nuovo in 1993. The barriers to providing ESTs and training residents to perform this procedure are the most likely explanation for these discrepancies.

Another notable finding from this study relates to who is doing the EST teaching to family medicine residents. The majority of programs (80%) had family medicine instructors compared to the 1993 study where the vast majority of instructors were cardiologists.

Limitations of this study include the response rate of only 41%; however, we augmented our response rate with multiple attempts to contact program directors by e-mail, a web-based survey, and by telephone. As in any survey, there may be respondent bias, and we have no way of knowing how well our sample represents the views of all family medicine program directors. Additionally, we did not ask about doing EST in the hospital. Some family physicians might do their ESTs in hospital locations, leading to lower percentages noted when asking only about office-based EST. An additional limitation may be related to the question asked about a formal EST curriculum. Some programs may teach this procedural skill more informally, answering this question negatively, leading to lower percentages with an EST curriculum.

EST is an evidence-based test for triaging the common complaint of chest pain in the primary care office. Specifically, the vast majority of these patients are intermediate risk for coronary artery disease, and the American College of Cardiology and the American Heart Association guidelines recommend EST without nuclear imaging as the initial test of choice for evaluation, with a Class 1 indication that is well supported by good quality evidence. This strategy has the potential to save tremendous health care costs, as the typical Medicare reimbursement for EST is around $100 compared to nearly $1,600 for EST done with concurrent nuclear imaging.

Given these well-known facts and noting that a substantial number of family medicine residency program directors from this survey feel that EST is a valuable test that should be offered by family physicians, why has there been a decline in the number of programs offering this training? Ironically, this has happened in the context of the resurgence of the PCMH where recommendations are to offer as much at the point of care in the primary care office as possible for convenience and cost savings. This would lead one to anticipate that we should see an increase in the number of programs offering EST training to make this valuable procedure more widely available in the PCMH.

Our findings suggest that the reason this is not happening may relate
to the specific barriers noted above. The problem of lack of equipment can easily be addressed by doing some simple math.\textsuperscript{10} EST equipment ranges in cost from $5,000 for high-quality previously used equipment to $25,000 for new equipment. The current Medicare reimbursement for EST is around $100. Thus, paying off the equipment would require 50–250 procedures depending on the cost of purchase. A family medicine residency with six residents per year group is estimated to generate at least two ESTs per week. Thus, even with the scenario of new equipment purchase, the EST will pay for itself in less than 3 years and within 6 months for used equipment. Quality EST equipment will often last 20 years, so it is clearly a good investment. Perhaps some of the additional revenue practices are receiving from being qualified PCMHs could go toward purchasing this type of useful equipment.

What about the training of residency faculty and practicing physicians in the procedure? Our discipline already has at least three high-quality training programs with a long track record of success. A procedural seminar on EST training has been offered at the AAFP Annual Scientific Assembly for many years. Ken Grauer, MD, has published a handbook on EST training, and this reference has formed the basis for the EST curriculum at many residency programs.\textsuperscript{11} The National Procedures Institute has been teaching this procedure for many years, training numerous family medicine faculty and practicing physicians in EST.

Limited time for training and competing training demands are considerable barriers to offering EST training. Perhaps the FM RRC should more specifically emphasize the need for training in valuable office-based procedures such as EST. Having an introductory curriculum at more programs would expose residents to this procedure and let them decide whether they want to pursue further training in order to offer EST in their practice.

In summary, this study showed that family medicine residency program directors value EST and would like to offer training in this test, even though only 36% actually do. A strong case can be made to increase the number of family physicians offering this evidence-based office procedure in the PCMH. Our discipline should make a concerted effort to address the barriers noted above to achieve this objective.

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References