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Proceedings from the 2019 Society for Academic Emergency Medicine Annual Meeting

ORIGINAL CONTRIBUTION

The Vice Chair of Education in Emergency Medicine: A Workforce Study to Establish the Role, Clarify Responsibilities, and Plan for Success
Dimitrios Papanagnou, Anne M. Messman, Jeremy Branzetti et al.

CONCEPT PAPERS

Too Big Too Fast? Potential Implications of the Rapid Increase in Emergency Medicine Residency Positions
Mary R. C. Haas, Laura R. Hopson, Brian J. Zink

Applying Educational Theory and Best Practices to Solve Common Challenges of Simulation-based Procedural Training in Emergency Medicine
Michael Cassara, Kimberly Schertzer, Michael J. Falk et al.

ORIGINAL CONTRIBUTION

Advancing Diversity and Inclusion: An Organized Approach Through a Medical Specialty Academy
Ava E. Pierce, Lisa Moreno-Walton, Dowin Boatright et al.
CONCEPT PAPERS

The Case for Observation Medicine Education and Training in Emergency Medicine
Margarita E. Pena, Matthew A. Wheatley, Pawan Suri et al. S47

Emergency Medicine Education Research Since the 2012 Consensus Conference: How Far Have We Come and What’s Next?
Michael Gottlieb, Teresa M. Chan, Samuel O. Clarke et al. S57

Gender Disparities in Academic Emergency Medicine: Strategies for the Recruitment, Retention, and Promotion of Women
Pooja Agrawal, Tracy E. Madsen, Michelle Lall et al. S67

Behind the Scenes of Successful Research in Emergency Medicine: Nine Tips for Junior Investigators
Marc A. Probst, Nicholas D. Caputo, Bernard P. Chang S75

Incorporating Sex and Gender-based Medical Education Into Residency Curricula
Alyson J. McGregor, Marna Rayl Greenberg, Rebecca Barron et al. S82

ORIGINAL CONTRIBUTION

Toward Structural Competency in Emergency Medical Education
Bisan A. Salhi, Jennifer W. Tsai, Jeffrey Druck et al. S88

CONCEPT PAPERS

Fostering a Diverse Pool of Global Health Academic Leaders Through Mentorship and Career Path Planning
Jennifer A. Newberry, Shama Patel, Stephanie Kayden et al. S98

Tools for Measuring Clinical Ultrasound Competency: Recommendations From the Ultrasound Competency Work Group
Sara C. Damewood, Megan Leo, John Bailitz et al. S106

Not Another Boring Resident Didactic Conference
Alisa Wray, Margaret Wolff, Megan Boysen-Osborn et al. S113

Geriatric Emergency Medicine Fellowships: Current State of Specialized Training for Emergency Physicians in Optimizing Care for Older Adults
Tony Rosen, Shan W. Liu, Lauren Cameron-Comasco et al. S122

Barriers and Solutions to Advancing Emergency Medicine Simulation–based Research: A Call to Action
Suzanne Bentley, Stephanie N. Stapleton, Phillip C. Moschella et al. S130

COMMENTARY AND PERSPECTIVE

Structural Competency: What Is It, Why Do We Need It, and What Does the Structurally Competent Emergency Physician Look Like?
Ernest E. Wang S140

Preparing a Curriculum Vitae for New Graduates
Muhammad Waseem, Benjamin H. Schnapp S143
The Vice Chair of Education in Emergency Medicine: A Workforce Study to Establish the Role, Clarify Responsibilities, and Plan for Success

Dimitrios Papanagnou, MD, MPH1, Anne M. Messman, MD2, Jeremy Branzetti, MD3, Gretchen Diemer, MD4, Cherri Hobgood, MD5, Laura R. Hopson, MD6, Linda Regan, MD, MEd7, Xiao C. Zhang, MD1, and Michael A. Gisondi, MD8

ABSTRACT

Objectives: Despite increasing prevalence in emergency medicine (EM), the vice chair of education (VCE) role remains ambiguous with regard to associated responsibilities and expectations. This study aimed to identify training experiences of current VCEs, clarify responsibilities, review career paths, and gather data to inform a unified job description.

Methods: A 40-item, anonymous survey was electronically sent to EM VCEs. VCEs were identified through EM chairs, residency program directors, and residency coordinators through solicitation e-mails distributed through respective listservs. Quantitative data are reported as percentages with 95% confidence intervals and continuous variables as medians with interquartiles (IQRs). Open- and axial-coding methods were used to organize qualitative data into thematic categories.

Results: Forty-seven of 59 VCEs completed the survey (79.6% response rate); 74.4% were male and 89.3% were white. Average time in the role was 3.56 years (median = 3.0 years, IQR = 4.0 years), with 74.5% serving as inaugural VCE. Many respondents held at least one additional administrative title. Most had no defined job description (68.9%) and reported no defined metrics of success (88.6%). Almost 78% received a reduction in clinical duties, with an average reduction of 27.7% protected time effort (median = 27.2%, IQR = 22.5%). Responsibilities thematically link to faculty affairs and promotion of the departmental educational mission and scholarship.

Conclusion: Given the variability in expectations observed, the authors suggest the adoption of a unified VCE job description with detailed responsibilities and performance metrics to ensure success in the role. Efforts to improve the diversity of VCEs are encouraged to better match the diversity of learners.

Over the past decade, several medical specialties introduced the vice chair of education (VCE) position as a new role in response to increasing demands for expert educational leadership in academic departments. VCEs facilitate the design and implementation of educational programs and further
integrate undergraduate medical education and graduate medical education (GME) missions.\textsuperscript{1-3} In a survey of 59 internal medicine VCEs in the United States and Canada, Brownfield et al.\textsuperscript{4} identified several themes for the expectations of this role, including the oversight of educational programs, sharing educational expertise, promotion of scholarship in medical education, and leading educational activities within the department.

In 2015, the Alliance of Directors and Vice Chairs of Education in Radiology (ADVICER) developed a comprehensive job description for this role, which identified means through which VCEs could promote excellence in training, leadership, and scholarship within an academic department of radiology.\textsuperscript{3} A survey of VCEs in general surgery further defined the role and its responsibilities, highlighting the importance of providing VCEs with clear expectations and paths for career advancement.\textsuperscript{2}

Additional core skills attributed to VCEs include, but are not limited to ensuring sound educational programming and compliance with accreditation requirements, managing educational expense budgets, creating and supporting policies and procedures, improving undergraduate and graduate medical education curricula, recruiting and mentoring junior faculty, and bridging relationships with the affiliated medical school.\textsuperscript{4}

To date, however, there is still ambiguity with this new role in emergency medicine (EM),\textsuperscript{4} particularly when one considers the clarity of expectations delineated for other education leadership positions (e.g., residency program director [PD], clerkship director [CD]). Moreover, many EM chairpersons have not developed formal job descriptions to help scaffold the career trajectory of candidates newly hired into this role. Given its increasing prevalence in academic EDs, a better understanding of the VCE role in EM is needed, including both the responsibilities it demands and the chairs’ expectations for this relatively new leadership role.

The present workforce-based survey study aimed to address this gap. The authors sought both to understand the current landscape of VCEs in EM and to provide guidance for those involved in building or working within this role. In this paper, the authors present the first national workforce study of VCEs in EM with the following goals: identify demographic trends and training experiences of current VCEs in EM, clarify roles and responsibilities, review qualifications for the role and the career paths of current VCEs, and gather information to develop a unified VCE job description tailored to EM.

**METHODS**

**Study Design**

This was an observational, descriptive, cross-sectional study that employed a survey-based design using target sampling to collect data through an online link distributed to participants via e-mail. The survey instrument was a 40-question, anonymous, electronic questionnaire (see Data Supplement S1, available as supporting information in the online version of this paper, which is available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10407/full). No incentives were offered for completion of the questionnaire. Both qualitative and quantitative data were collected. The study was approved by the institutional review board of Thomas Jefferson University.

**Instrument**

The questionnaire was designed through consensus by the study investigators, who represent experienced educators with training in qualitative research design and educational research methods as well as leadership within academic medical centers and many as VCEs. An extensive literature review was conducted on the VCE role in academic medicine, which included studies that employed a survey design to clarify this role.\textsuperscript{5,6} The authors, who all represent VCEs from academic EDs across the United States, held several focus groups to discuss how each of them conceptualizes the role.\textsuperscript{5,6} The questionnaire was grouped into four sections: demographics and professional background, questions pertaining to current position held by participants and to current roles and responsibilities held by participants, and questions pertaining to future career goals and advice for maximizing success in this role.

Items underwent iterative review and were reviewed for clarity of both content and structure. Cycles of feedback from the co-authors were applied to rounds of survey edits. The survey consisted of quantitative questions that required respondents to make a discrete selection from listed choices, including the option of “other” with a text clarification box. It also included qualitative data in response to open-ended questions that had unlimited free-text entry. The questionnaire was reviewed by an expert in survey design (i.e., non-clinician, education researcher) for readability outside.
of the target audience. The electronic link to the questionnaire was tested for functionality by the investigators prior to distribution to study participants.

Selection of Participants
A comprehensive list of VCEs in EM was compiled using four sources:

1. Department chairs: On behalf of the study investigators, an e-mail was sent to all 129 Department Chairs of Emergency Medicine on the Association of Academic Chairs of Emergency Medicine (AACEM) listserv, which solicited the names and e-mail addresses of their respective VCEs. Chairs provided this information through a link that was embedded in the e-mail.

2. Residency program coordinators: Investigators e-mailed all program coordinators of EM residency programs and asked them to submit the names and e-mail addresses of VCEs in their respective departments. Coordinators provided this information through a link that was embedded in the e-mail.

3. Council of Residency Directors in Emergency Medicine (CORD-EM): An e-mail was sent to EM residency PDs, asking them to provide the names and e-mail addresses of their respective VCEs. Respondents provided this information through a Qualtrics link that was embedded in the e-mail.

4. One study investigator (AMM) reviewed the websites of nonresponder academic institutions to determine whether any faculty member could be identified as the VCE. If contact information for a VCE was not available online for an institution, the study investigator called the EM administrative office to determine if there was a VCE in their respective department.

Survey Administration
The authors used Qualtrics software (Qualtrics, Provo, UT) to administer the online questionnaire. Solicitation e-mails included an introductory paragraph addressed to VCE participants and emphasized the confidentiality and voluntary nature of the study. Survey nonresponders received a total of four reminder e-mails over the course of a 5-week data collection period after the initial request to complete the survey. Duplicate completion of the survey by any one participant was prevented by disabling this feature on the Web-based survey tool. Participants were given the opportunity to go back to change answers.

Data Analysis
Survey data were exported into Microsoft Excel spreadsheets for analysis. For quantitative data, proportions were reported as percentages with 95% confidence intervals, and continuous variables as medians with interquartiles (IQRs). Since not all questions in the survey were mandatory, the number of respondents for each individual question was used as the denominator to calculate percentages. For several questions, multiple responses were possible; for these questions, percentages were not expected to add up to 100%.

For qualitative data, open- and axial-coding methods were used to code individual open-ended responses, generate concepts, and organize responses into thematic categories by three study investigators trained in qualitative analysis for agreement (DP, MAG, AMM). Four additional study investigators (JB, CH, LRH, LR) reviewed the resultant themes and codes; those with discordant interpretations were discussed via phone until consensus was reached.

RESULTS
We identified a total of 59 EM VCEs in the United States as of September 1, 2019; 47 of those individuals completed our survey (79.6% response rate). The VCEs who participated are mostly male (74.4%) and white (89.3%; see Table 1).

All subjects reported a title of VCE (82.9%) or a similarly worded title (17.1%) for a similar role (e.g., Associate Chair for Education). The majority of our respondents are the inaugural VCE in their respective departments (74.5%) and the average time in that current role was 3.56 years (median = 3.0 years, IQR = 4.0 years). Few subjects were hired directly into the

Table 1
Demographics of Survey Respondents (n = 47)

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>74.4%</td>
</tr>
<tr>
<td>Female</td>
<td>23.4%</td>
</tr>
<tr>
<td>Declined</td>
<td>2.1%</td>
</tr>
<tr>
<td>White</td>
<td>89.3%</td>
</tr>
<tr>
<td>Asian</td>
<td>4.2%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>4.2%</td>
</tr>
<tr>
<td>Black</td>
<td>2.1%</td>
</tr>
<tr>
<td>Northeast/Mid-Atlantic</td>
<td>34.0%</td>
</tr>
<tr>
<td>Southeast/Texas</td>
<td>27.7%</td>
</tr>
<tr>
<td>West/Mountain West</td>
<td>23.4%</td>
</tr>
<tr>
<td>Midwest/Central</td>
<td>10.6%</td>
</tr>
<tr>
<td>No response</td>
<td>4.3%</td>
</tr>
</tbody>
</table>
VCE role from outside their institution (12.8%). Many respondents hold at least one additional administrative title, including residency PD (32%), fellowship director (23.7%), dual vice chair roles (10.2%), and appointments in the dean’s office (6.8%). The most common previously held administrative titles were residency PD (42.6%) and CD (27.7%).

All respondent VCEs earned a medical degree (100%; MD, DO, or equivalent degree) and most completed a residency in EM (95.7%); 25.5% completed a fellowship program, although only 6.4% completed a fellowship in education. A small number of VCEs earned a graduate degree in education (8.5%), none at the doctoral level. Less than half of the respondents completed a formal certificate program in education (42.6%), notably the American College of Emergency Physicians Teaching Fellowship (21.3%), university-based certificate programs (10.6%), Association of American Medical Colleges (AAMC) Medical Education Research Certification (6.4%), or Harvard Macy Institute courses (6.4%). Just over half of the respondents completed a leadership development program (51.1%), including university-sponsored programs (23.4%), the Society for Academic Emergency Medicine Chair Development Program (12.8%), and AAMC-sponsored leadership programs (10.6%).

The majority of respondents practiced medicine in university-based hospitals (74.5%) or public hospitals (19.2%), all of which sponsor academic departments of EM (100%). Respondents had been at their respective institutions for an average of 12.6 years (median = 14 years, IQR = 13 years). Professoriate rank of VCEs was almost evenly split between professor (44.7%) and associate professor (48.9%).

All VCEs reported directly to the chair of their department (100%). Most VCEs had no defined job description (68.9%) and reported no defined metrics of success for the role (88.6%). The average percentage of time spent on workplace activities (e.g., effort reporting) was administrative, 32.3%; clinical, 36.0%; education, 24.5%; and research, 7.2%. VCEs generally received a reduction in their clinical duties (77.8%); the average reduction was 27.7% protected time effort (median = 27.2%, IQR = 22.5%). Some received a salary stipend (31.9%) and/or administrative support (17.0%). A majority controlled some aspect of the department budget (85.7%) and were expected to generate an annual report (57.8%).

Five-year career plans of our respondents included remaining in the VCE role (50%), obtaining a chair position (13.6%), retirement (4.6%), part-time clinical practice (2.3%), leaving academic practice for community practice (2.3%), or other career plans (13.4%; e.g., becoming a designated institutional official). None of the respondents reported a 5-year plan for a role in hospital administration or a plan to leave the medical profession entirely. Open-text survey items that underwent thematic analysis, and the key themes identified, are summarized in Tables 2–4.

**DISCUSSION**

We report the first national workforce study of VCEs in EM, highlighting demographics, previous training, job expectations, and allocated resources for the role. The data affirm that the VCE position is a relatively new leadership role in EM. Of the 47 VCEs who completed the survey, the majority of VCEs were inaugural (74.5%), with an average time of 3.5 years spent in the position. While most VCEs (68.9%) had no defined job description, self-identified roles and responsibilities of VCEs within their respective departments thematically linked to three large domains: faculty affairs (Table 5), promotion of the departmental educational mission (Table 2), and promotion of educational scholarship within their respective department.

<table>
<thead>
<tr>
<th>How do you promote the educational mission of the department?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Administrative tasks and oversight, including managing the budget</td>
</tr>
<tr>
<td>2. Faculty development, including faculty promotion and remediation</td>
</tr>
<tr>
<td>3. Ensuring accreditation and quality of the clerkship, residency, and fellowships</td>
</tr>
<tr>
<td>4. Mentorship</td>
</tr>
<tr>
<td>5. Promotion of education scholarship</td>
</tr>
<tr>
<td>6. Recruitment of residents and faculty</td>
</tr>
<tr>
<td>7. Strategic planning and advocacy</td>
</tr>
<tr>
<td>8. New program and infrastructure development</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How do you promote education scholarship?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mentorship of faculty</td>
</tr>
<tr>
<td>2. Trainee scholarship</td>
</tr>
<tr>
<td>3. Development of an incentive model for education scholarship</td>
</tr>
<tr>
<td>4. Advertise employment opportunities</td>
</tr>
<tr>
<td>5. Resource allocation</td>
</tr>
<tr>
<td>6. Promoting collaboration</td>
</tr>
<tr>
<td>7. Directing scholarship committees (e.g., writing accountability groups)</td>
</tr>
</tbody>
</table>

**Table 2**

Oversight of Educational Mission by Vice Chairs of Education
Moreover, there appears to be alignment between VCE departmental priorities (e.g., accreditation, faculty development, mentorship, scholarship) and their goals for personal professional development (e.g., skills development, amplification of scholarship, program development, career advancement).

Similar to previous studies in other specialties, most VCEs in EM were midcareer or senior faculty members, with close to 94% holding the rank of either professor or associate professor.4 Also consistent with previous studies was the overlap of the VCE position with other major academic positions within the department and/or larger institution. A significant number of VCEs held at least one additional administrative title, most commonly residency PDs (32%) and fellowship directors (24%). These additional titles were key educational roles that required a substantial time investment, which may potentially detracted time and diffuse attention from this new, and often poorly defined, role.

The tethering of the VCE and the PD positions, in particular, posed a potential challenge. Residency PDs have historically benefited from a clear job description.7 The Accreditation Council for Graduate Medical Education (ACGME) has delineated strict effort expectations for PDs, spanning educational leadership, curriculum development, resident recruitment, human resource management, learner assessment and advising, mentorship, teaching, and committee involvement.7 The ability of an individual to effectively serve as both VCE and PD is of concern when considering the added educational responsibilities identified in this study that fell outside of the residency program. While fellowship programs are significantly smaller in number when compared to categorical residency programs, a similar concern for dual roles exists. Simply, it is unlikely that, without significant support and protected time, the potential of both the VCE role and a second, time-intensive leadership role can be maximized by a single individual, given the broad scope of responsibilities described by participants in the study.8

| Table 3 |
| Top Priorities and Goals of Vice Chairs of Education |
| Priorities for the department |
| 1. Ensuring the accreditation, quality, reputation, and branding of the educational programs of the department |
| 2. Faculty development |
| 3. Identify funding, opportunities, and resources |
| 4. Provide mentorship |
| 5. Produce scholarship |
| 6. Recruitment of faculty and residents |
| 7. Coordination of administration of educational programs |
| 8. Faculty affairs |
| Personal goals as VCE |
| 1. Development of skills (e.g., leadership, administrative, time management) |
| 2. Building and scaling educational programs |
| 3. Mentorship and teaching |
| 4. Career advancement |
| 5. Produce scholarship |
| 6. Build programs and establish professional reputation |
| 7. Succession planning |
| 8. Wellness |
| 9. Provide service to the department |
| 10. Clearly define the VCE role |

VCE = vice chair of education.

| Table 4 |
| Advice From Subjects About the Role of Vice Chair of Education |
| Advice for chairs |
| 1. Clarify the VCE role, responsibilities, and expectations |
| 2. Define the goals and vision of the department |
| 3. Define performance metrics |
| 4. Mentor, collaborate with, and regularly meet with the VCE |
| 5. Delegate to the VCE appropriately |
| 6. Increase support for and engagement with educational programs |
| 7. Fund the VCE position appropriately |
| Advice for prospective VCE |
| 1. Clarify the VCE job descriptions and identify metrics of success |
| 2. Set goals and develop a mission for the position |
| 3. Engage, support, mentor, and collaborate with other faculty members |
| 4. Ensure autonomy in and relevance of your role |
| 5. Develop your leadership and communication skills |
| 6. Delegate tasks |
| 7. Ensure that your position is distinct from the program director role |
| 8. Advance your career and produce scholarship |

VCE = vice chair of education.

| Table 5 |
| Faculty Affairs Responsibilities of Vice Chairs of Education |
| 1. Annual performance review of faculty members |
| 2. Education/teaching metrics for faculty members |
| 3. Faculty development |
| 4. Faculty recruitment |
| 5. Faculty remediation |
| 6. Faculty succession planning |
| 7. Faculty teaching evaluations |
| 8. Mentorship of faculty members |
This overlap in administrative roles is coupled with the finding that close to 70% of VCEs do not have a defined job description. Without a clear job description, VCEs may not have the scaffolding in place to succeed or the guidance to know what success looks like while serving in the role. Of those surveyed, 89% reported lack of defined metrics of success for the position. Exemplar job descriptions convey specific tasks that an individual is expected to execute, help departmental leadership identify ideal candidates for a specific position, and highlight minimum qualifications for the position. A detailed job description establishes boundaries and accountability for the educational metrics of the department, effort allocation, and reporting relationships, whether the VCE held other roles in the department or not.3,4

Interestingly, none of the VCEs surveyed currently held the position of CD, even though close to 28% of VCEs previously held this educational title. The Alliance for Clinical Education (ACE), in a collaborative statement on the expectations of and for CDs, has proposed that a minimum of 50% of a full-time equivalent be recognized as appropriate support for the CD position.9 This is to provide support for CDs to teach students, develop faculty teaching skills, participate in scholarly activity, and refine enduring materials for student instruction.9 It is also conceivable that CDs, who are extensively involved in the medical school curriculum,10 hold career trajectories that are aligned with leadership opportunities within the medical school, as opposed to within the department. In contrast to the CD role, the PD typically is expected to address academically complex responsibilities within the residency workforce (e.g., human resource management and promotion issues), which naturally overlap with stated VCE duties.7 This may possibly explain why a substantial number of VCEs surveyed (42.6%) reported to have immediately moved into the VCE role after having served as PD.

It is also encouraging to highlight that there is some degree of job satisfaction with the VCE position itself, as half of those surveyed would remain in the position over the next 5 years. In fact, none of those surveyed expressed a plan to leave the medical profession, suggesting that there may be a “protective” effect associated with the role. While part of this may be secondary to job crafting,11 it is conceivable that some VCEs are genuinely satisfied by advancing the educational mission despite having a dedicated job description. Future studies should clarify this observation and specifically determine why current VCEs would not exit the medical profession.

In evaluating demographic data in this study, a sobering observation concerns the lack of diversity of current VCEs of EM in the United States. Findings are congruent with other studies that highlight gender disparities in medicine.12–15 According to the 2013–2014 AAMC report, The State of Women in Academic Medicine, only 15% of department chairs and 16% of deans are women, with only a marginal increase observed over the past decade.14 In a 2015 survey of EM physicians, of 113 chair/vice chair positions, only 15% were women, and only 18% were nonwhite.16 The lack of women and underrepresented minorities (URM) at higher ranks is also congruent with cross-sectional data from the AAMC, despite women constituting close to 50% of all graduating medical students.16

A lack of diversity among VCEs in EM carries potential consequences for trainees and the department as a whole. Diversity in educational leadership impacts policies and teaching practices, shapes institutional culture, informs research activities, empowers URM faculty, and fosters the creation of mentoring and recruiting networks.17 Leadership from varied backgrounds are best suited to integrate diverse individuals with different skill levels and cultural backgrounds to meet departmental goals.18 As the VCE in EM expands, there must be an emphasis on addressing these disparities. VCEs who are URMs may be better suited to bringing their unique experiences and understanding of learner backgrounds to the leadership table. The stated interest of many respondents in continuing in this role for the foreseeable future may also have the effect of creating little turnover, thus making the VCE position relatively resistant to change in its features and occupants.

Another important observation in this data set is the wide range of resources allocated to VCEs in EM. Some respondents report little or no financial incentive, reduction in clinical duties, or administrative assistance. Most commonly, our VCEs receive an average reduction of 27.7% protected time effort. While it may be puzzling why a department leadership role would have such variable support within our specialty, it may be explained by the lack of clear responsibilities and identifiable performance metrics. As the role matures in academic medicine, it is likely that VCE support will become a standard operating expense for large departments.
Similar to other specialties, there is an a priori assumption that the VCE position in EM exists to promote excellence in and ensure quality with training, teaching, and educational scholarship across training programs housed in the ED. In this position, VCEs in EM have the opportunity to steer the academic mission of the department, support educational programs, provide mentorship, and assist faculty with promotions. It is encouraging to discover that there are almost 60 VCEs in EM across the United States who are dedicated to advancing the educational mission of the specialty. The next steps could include creating programming at educators’ meetings specific to supporting and developing this role. The authors advocate for creation of VCE interest groups within national professional organizations that would support a community of practice for members in this role. This would create an opportunity to develop an online community for VCEs, dedicate a meeting space for VCEs during subsequent annual national meetings, facilitate collaboration and support for challenges in this nascent role, and share VCE resources through the organization’s website infrastructure.

LIMITATIONS

This study has limitations worthy of mention. While great care was taken to identify all individuals who held the VCE role prior to survey distribution, there may be additional VCEs not identified, leading to selection bias. There may be EM educational programs (e.g., GME programs or student rotations) that take place at nonacademic medical centers, such as smaller community-based hospitals, that do not assign the same leadership roles as are found in university-based departments. These educational programs may have individuals who execute the roles and responsibilities typical of a VCE, but were not surveyed given the methods of this study. Furthermore, our survey queried only VCEs and did not directly survey departmental chairs for their expectations of their respective VCEs. Concurrently surveying departmental chairs would have provided an additional perspective to the responsibilities ascribed with the VCE role.

CONCLUSION

The vice chair of education in emergency medicine is an emerging academic leadership role that is currently not well defined. Our findings describe how vice chairs of education promote the educational mission in their respective departments; outline their top priorities for their departments and for their own personal, professional development; and offer advice for chairs and prospective vice chairs of education to ensure success. A significant number of vice chairs of education hold at least one additional administrative role in their respective departments and/or institutions, and there is a wide range of resources allocated to individuals in this role. Future considerations should include creating job descriptions for vice chairs of education, with detailed responsibilities and performance metrics as well as expectations for compensation. Substantial efforts to improve the diversity of leadership in education to better match the diversity of their learners should also be encouraged.

References

10. Elnicki DM, Hemmer PA, Udden MM, et al. Does being a clerkship director benefit academic career advancement:


Supporting Information
The following supporting information is available in the online version of this paper available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10407/full
Data Supplement S1. Supplemental material.
Too Big Too Fast? Potential Implications of the Rapid Increase in Emergency Medicine Residency Positions

Mary R. C. Haas, MD, Laura R. Hopson, MD, and Brian J. Zink, MD

ABSTRACT
Emergency medicine (EM) has expanded rapidly since its inception in 1979. Workforce projections from current data demonstrate a rapid rise in the number of accredited EM residency programs and trainee positions. Based on these trends, the specialty may soon reach a point of saturation, particularly in urban areas. This could negatively impact future trainees entering the job market as well as the career plans of medical students. More time and resources should be devoted to obtaining accurate projections, assessing the distribution of emergency physicians in rural versus urban settings, and implementing central workforce planning to protect the future of graduating trainees.

BACKGROUND
An understanding of the historical development of EM helps to illuminate the current state of training in the field. EM emerged in the 1960s, after the need for specialized emergency care was finally recognized in the post–World War II era. The specialty initially struggled to achieve formal recognition. In 1968, the American College of Emergency Physicians (ACEP) was founded by several emergency physicians (EPs), with the establishment of the first EM residency training program quickly following in 1970 at the University of Cincinnati. By 1975, a total of 35 EM residencies had been established. In 1976, the American Board of Emergency Medicine (ABEM) was incorporated out of ACEP and worked with the University Association for Emergency Medicine (UAEM), the early academic EM organization, to develop a certification process for the specialty of EM. EM ultimately achieved formal recognition as the 23rd primary medical specialty by the American Board of Medical Specialties (ABMS) in 1979. In 1978, the formation of the American Osteopathic Board of Emergency Medicine (AOBEM) marked the emergence of osteopathic physicians within the field of EM.
In 1995, a landmark conference sponsored by the Josiah Macy Jr. Foundation was held in Williamsburg, Virginia, to discuss the role of EM in the future of American medical care.2 The proceedings from the conference acknowledged the shortage of board-certified EPs at the time.2 Several resulting recommendations impacted the expansion of EM. The report recommended that government organizations maintain an adequate number of EM residency positions in the face of a changing health care landscape.2 The report also recommended that all medical schools establish appropriately staffed and supported academic emergency departments (EDs).2 An additional recommendation advised that every medical student acquire the knowledge and skills to care for ED patients through experiences supervised by qualified EPs.2 At the time of the report, fewer than 20% of U. S. medical schools offered required EM clerkships.2 A subsequent 1997 article evaluating the EM workforce predicted that supply of EPs would not equal demand until 2020 and called for the creation of additional EM residency programs to bridge the gap.3

Recent declarations of an overall impending physician shortage have also driven the expansion of EM. The American Association of Medical Colleges (AAMC) has predicted the shortage based on an aging physician workforce and rising demand by an aging patient population with increasing medical needs.4 A 2018 study anticipated a shortage of between 42,500 and 121,300 physicians in the U. S. by 2030.5 Concern over inadequate supply of future physicians has resulted in requests for additional funding to increase the number of trainee positions available for all specialties, including EM.5

As a result of this milieu, academic EM has expanded rapidly. The number of academic EDs has increased from 18 in 1989, to at least 115 accounted for in a 2018 AAMC faculty roster of department chairs.6,7 As of 2017, the percentage of U. S. allopathic medical schools requiring EM clerkships had increased to 56%.8 Similarly, the number of EM residency programs has increased from 82 in 1990 to 239 in 2018.9 One study found that nearly 75% of EM bound students come from medical schools with an affiliated EM residency program.10

The historical factors and trends that have resulted in the rapid expansion of EM have been applauded as addressing the feared physician shortage and improving patient access to unanticipated emergency care.11,12 However, the potential negative downstream effects of rapidly increasing the supply of EPs in the setting of potentially changing demand must also be considered.

CURRENT AVAILABLE DATA AND PROJECTIONS

Assessing Supply

The 2019 National Resident Matching Program (NRMP) Main Residency Match numbers were reviewed, including the number of first-year positions offered by EM and the fill rate. These numbers were compared to previous years to assess the rate of increase in the number of offered positions. Overall, the number of residency programs and trainee positions has rapidly increased for nearly all specialties, making the 2019 NRMP Main Residency Match the largest Match on record.13 EM specifically has also undergone a rapid expansion in the number of training programs and residency positions available and now represents 7.7% of available PGY-1 positions (Figures 1 and 2).13 Since 2014, the number of EM positions has increased dramatically by 702 (36.6%).13 In the 2019 Match, EM offered 2,488 first-year positions, which is 210 more than 2018, which itself was 231 more than 2017.13 EM did fill all but 30 positions at 15 programs for a fill rate of 98.8%.13 The percentage filled by U. S. allopathic seniors, however, continued a downward trend and is now only 65.0%.14 The merger of the Accreditation Council for Graduate Medical Education (ACGME) and American Osteopathic Association (AOA) and the resultant movement of osteopathic students into the NRMP Main Match likely accounts for some of the decrease in fill rate by U. S. allopathic seniors. However, despite the increase in residency positions, the number of U.S. Seniors matching into EM has essentially plateaued over the past 3 years, raising potential concerns about saturation of the specialty among allopathic students.14

As the number of EM trainee positions has increased, so has the number of physicians who trained in an EM residency and subsequently completed board certification (ABEM and AOBEM diplomates). Data were obtained from both ABEM and AOBEM. Commensurate with the development of the specialty, the number of active ABEM diplomates has increased from 2,852 to 36,926 from 1984 to 2019 (e-mail communication, October 10, 2018).15 Combined with the current number of roughly 4,100 AOBEM-certified physicians (e-mail communication, October 20, 2018), this represents approximately...
41,026 board-certified EPs, the vast majority of whom can be assumed to be in active clinical practice.

Assessing Demand

Projections of demand were assessed from previous reports in the literature. A 2016 article by Reiter et al. evaluating workforce trends projected that there can be enough ABEM/AOBEM-certified or eligible physicians to comprise the entire EP workforce by 2021, when accounting for both board-certified and board-eligible EPs anticipated to become board-certified. This projection was based on a 1.7% attrition rate estimated from a 2008 American Medical Association physician Masterfile. The projections from Reiter et al. also correlate with a recent Health Resources and Services Administration (HRSA) article that anticipated a discrepancy between demand and supply, with demand for EPs projected to grow at 9% versus supply growing at 18% between 2013 and 2025. Of note, the HRSA data include self-reported EPs, some of whom may not be residency-trained or board-certified in EM.

The demand for EPs will continue to be a complex and dynamic equation, with several evolving variables. For instance, the role of advanced practice providers (APPs) also affects EP supply and demand. Between 2013 and 2015, physician assistant supply in EM was projected to almost double during the same period.
that demand was expected to grow by only 9%. The interplay of APP supply and demand and EP supply and demand may impact the EM workforce in ways that are difficult to predict. The phenomena of the commoditization of the profession, whereby tasks previously in the exclusive domain of the physician are now being forced to the lowest provider on the ladder competent to provide the service, will result in the need to redefine the role and utility of the EP relative to other health care professionals. Potential policy changes loosening supervision requirements and increasing independent practice of APPs may also reduce demand for EPs.

Additional factors with the potential to impact EP demand include an aging patient population and changes in physician utilization, health insurance coverage, and availability of primary care. The increase in freestanding emergency departments (FSEDs), which are located physically separate from a hospital, may increase demand as ACEP guidelines advise they be staffed by qualified EPs. As of 2017, between 550 and 600 FSEDs were reported, compared to only 80 in 2007. FSEDs have been postulated to reduce the burden of crowding on traditional hospital-based EDs by drawing in lower-acuity patients and potentially improving access to care in rural areas where financial strain has reduced the number of critical-access hospitals. A recent analysis of the current state of FSEDs, however, suggests that they may cater to a more affluent patient population rather than address a lack of access to emergency care in underserved areas. The role and impact of FSEDs within the larger system of emergency care thus remains uncertain and continues to evolve. Similarly, urgent care centers (UCCs), walk-in clinics focused on the delivery of medical care for minor illnesses and injuries, may also shunt patients with lower-acuity conditions away from traditional hospital-based EDs or FSEDs. One study estimated that 13.7% to 27.1% of all ED visits could take place at UCCs and retail clinics with an estimated potential cost savings of approximately $4.4 billion annually. While some UCCs are staffed by EPs, the majority of these facilities are staffed by primary care physicians and APPs. The increase in UCCs could thus have variable effects on EP demand. Although EM attrition rates have been found to be relatively low and compare favorably to other specialties, changes in retirement age and practice hours per week may also occur as a new generation of EPs emerges, further impacting demand. Furthermore, the evolution of technology and development of new health care delivery modes and settings will increase the need for flexibility among physicians, including the ability to develop new skills and transition to new modes of practice. For instance, applications of telemedicine, defined as “the delivery of health care services at a distance, using information and communication technology,” have rapidly expanded within EM. Telemedicine may impact workforce dynamics by effectively enhancing supply of EP expertise to small and rural hospitals. Additionally, the ACGME has questioned whether the traditional dichotomous model of generalist and specialist physicians is still the best way to approach planning for future medical education. The lines between who is competent and available to provide urgent or emergent care may blur, also affecting demand for EPs. More detailed explorations of the potential effects of such factors have been previously published.

When assessing demand, it is also important to recognize that despite overall ED visits increasing by 40% over the past two decades, the number of EDs has simultaneously decreased by 11%. The demand for additional EPs may be attenuated by the trend toward ED closures at small hospitals, as visits from the closed EDs are usually consolidated into larger regional EDs in pursuit of economies of scale.

**IMPLICATIONS OF WORKFORCE PROJECTIONS**

Emergency medicine residencies in the United States are currently able to produce nearly 2,500 graduates per year with additional proposed residency programs in the pipeline for approval. The data cited above raise concerns that the EM workforce has the potential to soon reach a point of saturation. To better align the supply of EPs with future demand, the specialty must turn its attention to central workforce planning. Failing to do so could result in negative consequences on the EM workforce as have occurred in other parts of the world. For example, Australia has witnessed a similar explosion in popularity of EM in the absence of a central workforce planning system to provide feedback about supply and demand forces or to limit the number of trainees accepted into EM. The rapid growth in the number of EPs has even outstripped the rising number of ED visits. This has negatively impacted the workforce through the phenomenon of “exit block,” where graduating trainees are unable to find
jobs, as well as “zero-hours” contracts, where employed EPs are not guaranteed regular shifts. Several additional concerns have been raised, including dilution of training experiences and the graduation of trainees not well suited for EM.

National planning for the EP workforce is required to provide a stable environment where medical students will be confident that they can find a job when they complete residency training. Grover et al. noted that a distinguishing feature of the physician workforce is that it relies partly on the collective result of individual physician’s personal choices, including where and what to study and where to train and practice. Such factors can affect the workforce more profoundly than any government initiative.

The specialty of anesthesiology offers a cautionary tale of how projections of oversupply can influence the career choices of medical students and physicians and massively impact the workforce. In the late 1980s and early 1990s, anesthesiology residency programs and positions greatly expanded, with the number of graduates quadrupling between 1984 and 1993. In 1994, the American Society of Anesthesiologists commissioned a study that projected a major oversupply of anesthesiologists in the coming decades. Simultaneously, the Council on Graduate Medical Education (COGME) advocated for efforts to increase the number of primary care physicians and limit the number of U.S. specialty physician trainees. A Wall Street Journal article and other media accounts highlighted difficulties experienced by graduating anesthesiology seeking jobs. In response to these factors, medical students rapidly moved away from anesthesiology as a specialty choice, with the number of U.S. medical school applicants to anesthesiology plummeting by 56% from 1995 to 2000 (from 1,784 to 787).

Although the drop in applicants choosing anesthesiology was somewhat tempered by a large increase in international medical graduates matching into the specialty and growing numbers of certified nurse anesthetists, the resultant shortage of anesthesiologists persists today. Medical students’ perceptions regarding job opportunities, income, and lifestyle factors are key drivers in their specialty selection. As the anesthesiology experience has shown, if those perceptions turn negative, the consequences can be rapid and enduring.

The rapid rise in the number of EM training positions has been more prevalent in certain areas of the country. For example, the state of Florida has demonstrated a particularly dramatic increase in the number of EM training positions, many offered by for-profit hospitals and large, corporate medical groups. Since 2013, the number of EM residency slots in Florida has increased by more than 200%, compared to an only 20% increase in residency positions in all specialties between 2013 and 2017. In 2018, an additional three EM residencies were approved by the Residency Review Committee for Emergency Medicine (RRC-EM) in Florida. A 2019 article in the Florida College of Emergency Physicians (FCEP) newsletter EM Pulse argued that there is little evidence to support that a critical shortage of EPs ever existed in Florida to justify this rapid expansion of EM training spots. The authors concluded that resources would be better shunted toward increasing access to primary care and that EM should not have been added to the list of “critical shortage specialties” on the 2013 Florida state legislative bill SB 1500.

Although the current data presented in this article do not support an impending overall shortage of EPs, rural areas do continue to see a shortage of EPs when compared to urban and suburban settings. A 2014 study evaluating Medicare data found that EPs comprise 63.9% of the emergency clinician workforce in urban counties versus only 44.8% of the workforce in rural counties where a greater proportion of nonemergency physicians and APPs practice. The study identified several factors driving this disparity, including location of residency programs, which tend to be more concentrated in urban areas. Additional factors reported by EM residency graduates as strongly influencing the decision to practice in urban versus rural environments include lifestyle, access to amenities/recreation, ED volume/acuity, and family/spouse.

Many of these factors are not easily amenable to change. Concomitant with the relative shortage of EPs in rural areas is a relative increase in ED visits to rural EDs demonstrated by a recent cross-sectional study of National Hospital Ambulatory Medical Care Survey data. While rural ED visits increased by more than 50% from 36.5 to 64.5 per 100 persons, urban ED visits stayed relatively stable, increasing from only 40.2 to 42.8 visits per 100 persons from 2005 to 2016. This suggests that there may not be a need to train additional EPs who are most likely to pursue jobs in urban ED environments, but rather a need to direct trainees toward rural ED settings. Rural training opportunities have the potential to significantly impact selection of rural practice settings as has been
demonstrated in family medicine residents, including for those raised in urban areas.\textsuperscript{49,50} Although the shortage of rural training opportunities may be due to the perception that patient volume in rural EDs is inadequate for RRC-EM requirements, at least one study has found that patient volumes per physician were similar in rural and urban settings.\textsuperscript{51} An article by Handel et al.\textsuperscript{52} provides valuable recommendations for shunting trainees to rural areas, including creating financial incentives for residents to enter a rural EM practice through assistance with educational debt via government and/or hospital support, adjusting the RRC-EM guidelines to permit training experiences that offer a rural EM component and supporting innovative delivery of rural emergency care under supervision by EPs at academic medical centers via telemedicine. Leaders within EM will need to discuss and arrive at a consensus over whether educational initiatives will follow the recommendations set forth by Handel et al. to address the relative shortage of rural EPs or accept the greater proportion of nonemergency physicians and APPs filling the void in these areas.

In addition to affecting the ability of EM residency graduates to secure jobs upon the completion of training, an overabundance of EM residency positions could have wider-ranging implications for population health. The AAMC has projected a primary care (including family medicine, general internal medicine, general pediatrics, and geriatric medicine) physician shortage of 21,100 to 55,200 physicians by 2032.\textsuperscript{53} Additionally, the AAMC continues to project especially significant shortages in surgical specialties and other specialties, such as psychiatry.\textsuperscript{53} One study evaluating influences on medical students’ choice of EM found that internal medicine, general surgery, anesthesiology, family medicine, and pediatrics were in the top five most common specialties considered as either a student’s first or second alternative.\textsuperscript{10} Individuals who may have otherwise chosen a specialty in need of additional manpower will have devoted time and resources to training in one that is already oversupplied. Additionally, educational debt continues to be a primary factor deterring college students from pursuing a career in medicine, particularly for underserved minorities.\textsuperscript{54} The AAMC estimated that the class of 2018 graduated with a median debt of $200,000, up 4% from the previous year.\textsuperscript{55} EM residency graduates unable to find a suitable job due to oversupply will face increased difficulty paying off student loans. Witnessing this phenomenon could further discourage young, bright minds of diverse backgrounds with the potential to advance medicine from applying to medical school.

History also demonstrates the cyclical nature of workforce projections, with the last century providing several examples of conflicting opinions on whether or not a shortage or oversupply is projected.\textsuperscript{32} The difficulty in formulating accurate projections is in part due to the many assumptions required to calculate them. As previously mentioned, our goal is to highlight potential challenges for the EM workforce and call for additional study to assess the implications of the rapid expansion of EM training programs as well as societal needs. A comprehensive, detailed workforce projection is beyond the scope of this work and excellent examples are available through the resources referenced above.\textsuperscript{16,18} Despite the inherent difficulty in making accurate workforce projections, they should not be ignored. Workforce projections continue to have the potential to significantly influence public policy and medical student specialty selection, which can in turn affect workforce dynamics. Additional resources and efforts should target research that allows for increased accuracy of projections as well as more effective workforce monitoring and planning.

Several potential next steps exist to further explore and address the possible saturation of the EM workforce. National EM organizations must devote attention to this issue, examine workforce dynamics and consider regulating the expansion of EM residency positions. The American Academy of Emergency Medicine (AAEM) recently released a position statement expressing concern that the rapid growth of the EM workforce may result in saturation of the job market.\textsuperscript{56} National organizations should also convene an EM workforce summit involving representatives from the ACGME and the RRC-EM to discuss current issues and develop recommendations. Such decision making will require broad-based involvement from multiple specialty organizations representing the spectrum of stakeholders including leaders of departments and training programs, trainees and students, and regulatory organizations. A consensus-style conference hosted by one or more of the national societies could represent an opportunity for key stakeholders to develop a research and policy plan around EM workforce dynamics.

Additionally, no one particular organization currently assumes responsibility for monitoring EM workforce dynamics, and legal considerations may
complicate strict formal regulation of such. A consensus-style conference could provide an opportunity to determine if and how a particular organization should regulate the number of existing EM residency programs. A natural candidate to consider for this role would be the ACGME, given its significant impact on the supply of EPs through the approval of new programs. Up to this point, its mission has centered around determining whether a program meets quality standards for accreditation and not on whether the need for new programs exists. However, an oversupply of trainee positions could compromise the quality of training through competition for required experiences, and therefore the workforce dynamics of a specialty may need to be considered prior to the ACGME’s approval of new programs as part of the mission to ensure high-quality training experiences.

Emergency medicine granting agencies such as the Emergency Medicine Foundation (EMF) and Society for Academic Emergency Medicine Foundation (SAEMF) should also consider developing specific grants to study the EM workforce. Beyond EM-specific organizations, collaboration with the AAMC’s Workforce Studies Center to examine the EM workforce in detail would also represent a critical step, as the AAMC has continued to project shortages in a variety of specialties.57

**CONCLUSION**

The numbers and trends in the emergency medicine workforce demonstrate the continued robust growth of the specialty. Organizations and leaders in the field have applauded and encouraged this growth, but the data suggest that it is time to call for coordination and increased awareness to proactively maintain the vibrancy and health of emergency medicine workforce dynamics. The issue of workforce projections should be brought to the forefront of the agenda of national EM organizations. Central workforce planning may require regulating the number of residencies and expansion of programs to match future demand rather than risk exceeding it. Additionally, attention to enhancing rural emergency medicine opportunities and experiences for trainees may help redistribute emergency physicians to areas of existing shortage. Future studies are needed to better understand the factors that shape the EM workforce and to develop models that accurately and reliably predict the future workforce.

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Applying Educational Theory and Best Practices to Solve Common Challenges of Simulation-based Procedural Training in Emergency Medicine

Michael Cassara, DO, MSEd1, Kimberly Schertzer, MD2, Michael J. Falk, MD3, Ambrose H. Wong, MD, MSEd4, Sara M. Hock, MD5, Suzanne Bentley, MD, MPH6, Glenn Paetow, MD, MACM7, Lauren W. Conlon, MD8, Patrick G. Hughes, DO, MEHP9, Ryan T. McKenna, DO10, Michael Hrdy, MD11, Charles Lei, MD12, Miriam Kulkarni, MD13, Colleen M. Smith, MD14, Amanda Young, MD15, Ernesto Romo, MD16, Michael D. Smith, MD, MBA17, Jessica Hernandez, MD, MEHP18, Christopher G. Strother, MD19, Alise Frallicciardi, MD, MBA20, and Nur-Ain Nadir, MD, MEHP21

ABSTRACT

Objectives: Procedural competency is an essential prerequisite for the independent practice of emergency medicine. Multiple studies demonstrate that simulation-based procedural training (SBPT) is an effective method for acquiring and maintaining procedural competency and preferred over traditional paradigms (“see one, do one, teach one”). Although newer paradigms informing SBPT have emerged, educators often face circumstances that challenge and undermine their implementation. The goal of this paper is to identify and report on best practices and theory-supported solutions to some of these challenges as derived using a process of expert consensus building and reviews of the existing literature on SBPT.

Methods: The Society for Academic Emergency Medicine (SAEM) Simulation Academy SBPT Workgroup convened approximately 8 months prior to the 2019 SAEM Annual Meeting to perform a review of the literature and participate in a consensus-building process to identify solutions (in the form of best practices and educational theory) to these challenges faced by educators engaging in SBPT.

Results and Analysis: Thirteen distinct educational challenges to SBPT emerged from the expert group’s primary literature reviews and consensus-building processes. Three domains emerged upon further analysis of the 13 challenges: learner, educator, and curriculum. Six challenges within the “learner” domain were selected for comprehensive discussion in this paper, as they were deemed representative of the most common and most significant threats to ideal SBPT. Each of the six challenges aligns with one of the following themes: 1)
maximizing active learning, 2) maintaining learner engagement, 3) embracing learner diversity, 4) optimizing cognitive load, 5) promoting mindfulness and reflection, and 6) emphasizing deliberate practice for mastery learning. Over 20 “special treatments” for mitigating the impact of the 13 challenges were derived from the secondary literature search and consensus-building process prior to and during the preconference workshop; 11 of these that best address the six learner-centered challenges are explored, including implications for educators involved in SBPT.

Conclusions/Implications for Educators: We propose multiple consensus-generated solutions (in the form of best practices and applied educational theory) that we believe are suitable and well aligned to overcome commonly encountered learner-centered challenges and threats to optimal SBPT.

Procedural competency is an essential prerequisite for the independent practice of emergency medicine (EM). It is an expected outcome for graduates of EM residency and continuing medical education (CME) programs. Simulation-based educators within these programs are often tasked with effectively facilitating the development of these skills. Traditionally, procedural training consisted of “on-the-job” practice in an apprenticeship model where learners performed procedures in the clinical setting under supervision (“see one, do one, teach one”). Concerns about the safety, ethics, and effectiveness of this approach have led to a paradigm shift in contemporary procedural training. Using simulation-based procedural training (SBPT) prior to actual task performance in the clinical environment has emerged as the expected norm.

Multiple studies demonstrate that SBPT is an effective method for acquiring and maintaining procedural competency. Research has shown that SBPT for procedures (e.g., central venous catheter insertion, cardiopulmonary resuscitation, etc.) is associated with improved knowledge, behaviors, and patient outcomes. Although the ACGME has not mandated the use of simulation in EM residency curricula, it does encourage and suggest its use for the education and assessment of EM resident learners, and most EM residencies now provide substantial dedicated faculty, time, facilities, and other resources for simulation-based education.

Educators have focused attention on identifying the most effective strategies for promoting psychomotor skill development. The model proposed by Sawyer et al. incorporates many of these practices into one unified approach. In the model used by Sawyer et al., SBPT follows a mastery learning approach using a sequence of six steps: learning procedure-specific knowledge; observing the procedure performed in a competent manner by an expert; deliberately practicing the procedure under simulated conditions (with educator-directed coaching and facilitation); proving competency; performing the skill in actual practice (with progressively escalating autonomy as entrustment is earned); and, ultimately, engaging in a CME refresher program to prevent skill decay over time. A modified version of the original model of Sawyer et al. that adds newer theory-supported and evidence-based additions to SBPT is shown in Figure 1.

To our knowledge, no study has yet evaluated the comparative efficacies of this or any other model for SBPT on learner-oriented outcomes. In addition, challenges often encountered with SBPT can threaten optimal implementation of these newer educational paradigms. The paucity of evidence-supported recommendations on how to best resolve these threats to ideal SBPT leaves instructors feeling unprepared or insecure. Addressing this gap in the literature, identifying the guidelines and strategies grounded in educational theory for overcoming these common problems in SBPT, is the rationale for this concept paper.

The goal and scope of this paper were to propose best practices and theory-supported solutions to six of the most commonly encountered learner-centered challenges identified from expert review of the existing literature for SBPT and expert consensus obtained from participants in our workshop during the Society for 2019 Academic Emergency Medicine Annual Meeting (SAEM19). For brevity, the solutions we identified targeting challenges to SBPT within the other domains (e.g., educator or curriculum) will not be covered.

**METHODOLOGY**

A core group representing an expert community of practice in SBPT (“SAEM Simulation Academy SBPT Workgroup”) convened approximately 8 months prior to SAEM19 following the methods diagrammed in Figure 2. The core group’s initial objective was to develop a faculty development workshop on best practices for SBPT at SAEM19. Core group members were assigned to perform a primary review of the SBPT literature. From the primary literature review, workgroup members identified several best practices and educational theories applicable to SBPT. As the
core group members’ research and informal iterative consensus building progressed, multiple threats (“challenges”) to best practice SBPT emerged. Core group members categorized the challenges by domain for further analysis. Core group members were subdivided into workgroups (three to four experts each) to conduct a secondary literature search on one of the assigned challenges. The purpose of the secondary literature search was to identify solutions (“special treatments”) to mitigate the impact of these challenges to ideal SBPT. Special treatments were defined as those best practices and educational theory from the literature identified by workgroup members capable of overcoming the identified challenges. Workgroup members participated in several facilitated round table discussions. A modified nominal group technique (incorporating an iterative consensus-building process in lieu of group members’ specific ranking of solutions) was used to reach consensus on the best special treatments. Workgroup members, SAEM Simulation Academy members, and SAEM19 workshop participants took part in facilitated round table discussions during the actual workshop implementation to triangulate this expert consensus opinion. Following SAEM19, we analyzed participant feedback using thematic analysis for incorporation into our refined final list of challenges and evidence-based solutions. Transcriptions of the feedback and comments are available in Data Supplement S1, Appendix S1 (available as supporting information in the online version of this paper, which is available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10418/full). The final list of challenges, and the consensus-based unique treatments proposed to effectively address them, have provided the basis for the recommendations presented in this concept paper.

RESULTS AND ANALYSIS

Twenty-one academic EM and pediatric EM physicians participated as members of the core group. Descriptive characteristics of this core group are presented in Table 1. Thirteen distinct educational challenges to SBPT emerged from the expert group’s primary literature reviews and consensus-building processes (these are presented in Data Supplement S1, Appendix S2). Three domains emerged upon further analysis of these 13 challenges: learner, educator, and curriculum. Six challenges within the “learner” domain were selected through core group consensus building for detailed analysis and discussion in this paper, as they were
deemed representative of the most common and most significant threats to ideal SBPT. Each of the six challenges aligns with one of the following themes: 1) maximizing active learning, 2) maintaining learner engagement, 3) embracing learner diversity, 4) optimizing cognitive load, 5) promoting mindfulness and reflection, and 6) facilitating mastery acquisition and maintenance.

Over 20 “special treatments” for mitigating the impact of these challenges were derived from the secondary literature search and consensus-building process prior to and during the preconference workshop. For brevity, only the 11 special treatments targeting learner-centered challenges to SBPT have been included in this concept paper. These have been consolidated, organized by theme, and summarized in Table 2 (challenges, special treatments, and implications for educators) and in the sections that follow. Pertinent concepts and definitions specific to simulation-based education adapted from Lopreiato have been summarized in Table 3 to assist readers unfamiliar with this terminology.

Figure 2. Multistep iterative process for elucidation of procedural training challenges and applied educational theory-based solutions.

**IMPLICATIONS FOR EDUCATORS**

**Maximizing Active Learning**

Simulation-based procedural training immerses learners in realistic contexts where participants actively practice decision making and psychomotor skills. Educators engaging in SBPT often assign learners to small groups. Unfortunately, optimal ratios of educator-to-learner-to-simulator may be exceeded for a variety of reasons. A major challenge to active learning is its requirement for hands-on participation, and this may be compromised by resource constraints and large learner numbers. For example, educators conducting an airway management session with insufficient manikin-to-learner ratios limit opportunities for active engagement and encourage passive observation. We identified several methods that can optimize active learning within these types of groups.

**Experiential Learning Theory.** Kolb’s Experiential Learning Theory (ELT) is a well-recognized theory in support of active learning. It consists of a
four-stage cycle of learning: 1) “concrete experience”; 2) observation of and reflection upon that experience (“reflective observation”); and 3) analysis of that experience with formation of generalized concepts, hypotheses, and heuristics (“abstract conceptualization”), 4) which is used to test hypotheses in future situations, resulting in new experiences (“active experimentation and learning”). ELT proposes that effective learning occurs when a person completes all four stages of the cycle. Kolb theorizes that people naturally prefer learning in different ways and have preferences regarding where to enter the cycle. It is possible to enter the cycle at any stage and follow it through its logical sequence. Some prefer doing before watching,

Table 1
Descriptive Characteristics of the SAEM Simulation Academy SBPT Workgroup

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<thead>
<tr>
<th>Geographic Distribution</th>
<th>Academic Rank</th>
<th>Academic Rank</th>
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<tbody>
<tr>
<td>Northeast</td>
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<tr>
<td>South</td>
<td>25%</td>
<td>Associate Professor</td>
</tr>
<tr>
<td>West</td>
<td>19%</td>
<td>Professor</td>
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<td>Midwest</td>
<td>6%</td>
<td>Instructor</td>
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<td>EM Practice Experience (Years)</td>
<td>Simulation Experience (Years)</td>
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<tr>
<td>5–10</td>
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<td>5–10</td>
</tr>
<tr>
<td>11+</td>
<td>38%</td>
<td>11+</td>
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Board Certification

| EM                     | EM residency program conference space | 21% |
| Pediatric EM           | Simulation center                     | 21% |
| Other                  | Convention center (e.g., national conference) | 20% |
|                        | Tertiary academic center (in situ)     | 16% |
|                        | Cadaver-based procedure laboratory     | 8%  |
| Completed Fellowship   | Computer/virtual/augmented environments | 7%  |
| Yes                    | Community-based ED (in situ)          | 7%  |
| No                     | Simulation Fellowship Faculty          |     |
| Completed Graduate Degree* Yes | 53% |
| Yes                    | Not currently (past)                   | 20% |
| No                     | No                                     | 27% |

Learners

| EM residents           | ED simulation director                | 26% |
| Medical students       | Director of EM resident simulation    | 26% |
| ED attending physicians| Simulation fellowship director        | 22% |
| Other GME specialty residents | Medical student rotator simulation director | 7% |
| Registered nurses      | Simulation research director          | 7%  |
| Advanced practitioners†| Simulation center director            | 7%  |
| Other health professions‡| Other                                 | 3%  |
| Advanced practitioner students | Other                               | 3%  |
| Other non-ED attending physicians | Other                              |     |
| Prehospital professionals§| Additional Qualitative Descriptors of Expertise |
| Nursing students       | CHSE certification                    |     |
| Prehospital professional students | Simulation course faculty           |
|                         | Leadership positions                  |
|                         | Grant awards                          |
|                         | Directorships (already noted)         |
|                         | Fellowship creation/development       |

*e.g., MEd, MSEd, MPH, or equivalent.
†Physician assistant, nurse practitioner.
‡Pharmacist, physical therapist, etc.
§Emergency medical technicians, paramedics, etc.
### Table 2
Challenges, Special Treatments, and Implications for Educators

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Special Treatment(s) and Implications for Educators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Maximizing Active Learning</strong></td>
<td><strong>Experiential Learning Theory</strong></td>
</tr>
<tr>
<td>Example: SBPT among a larger-than-ideal homogeneous small group of learners</td>
<td>What it is:</td>
</tr>
<tr>
<td></td>
<td>• Four-stage cycle of learning linking reflective observation, abstract conceptualization, experimentation, and experience, described by Kolb, building upon Dewey and Lewin.</td>
</tr>
<tr>
<td></td>
<td>• Learners with different preferences may enter the cycle at different points.</td>
</tr>
<tr>
<td>Example: SBPT among a heterogeneous small group of learners (e.g., mixed learning styles or preferences)</td>
<td>How it helps:</td>
</tr>
<tr>
<td></td>
<td>• Enhances learning when learner moves through all four phases of Kolb’s cycle.</td>
</tr>
<tr>
<td></td>
<td>• Accommodates learners with different learning styles and preferences.</td>
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<tr>
<td></td>
<td>• Minimizes need for everyone to be simultaneously active, as some prefer to do before watching and some prefer to watch before doing.</td>
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<tr>
<td>For learners preferring abstract conceptualization or reflective observation:</td>
<td>For learners preferring abstract conceptualization or reflective observation:</td>
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<tr>
<td></td>
<td>• Allow opportunities to watch others perform procedures first (an opportunity to observe first and “test the waters”).</td>
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<td></td>
<td>• Encourage mindful and reflective observation by providing a tool or checklist or by asking prompts.</td>
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<td></td>
<td>• Promote discussion of alternative approaches using hypothetical prompts (“what if”) with learners.</td>
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<td></td>
<td>• Prevent learners from “hiding” in the experience.</td>
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<tr>
<td>For learners preferring active experimentation or concrete experience:</td>
<td>For learners preferring active experimentation or concrete experience:</td>
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<tr>
<td></td>
<td>• Give a few minutes of “free play” at the beginning of the session to examine and “test” equipment at the beginning of SBPT.</td>
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<td></td>
<td>• Focus on facilitation (minimize your performance of the procedure in favor of the learners’ performance).</td>
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<td></td>
<td>• Provide a context or scenario requiring task performance in real time.</td>
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<td></td>
<td>• Integrate just-in-time task training.</td>
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<tr>
<td></td>
<td>• Prevent learners from “taking over” at expense of other learners.</td>
</tr>
<tr>
<td><strong>Maintaining Learner Engagement</strong></td>
<td><strong>Socratic Questioning</strong></td>
</tr>
<tr>
<td>Example: SBPT among an ideal-sized heterogeneous group of learners (density of experience or educational level)</td>
<td>What it is:</td>
</tr>
<tr>
<td>Example: SBPT among an ideal-sized group of learners around a low-technology simulator</td>
<td>• Method of systematic inquiry promoting critical thinking (differs from “pimping”) described by Paul and Elder.</td>
</tr>
<tr>
<td></td>
<td>• Taxonomy of questions that target processes of critical thinking and the quality of reasoning.</td>
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<tr>
<td></td>
<td>How it helps:</td>
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<tr>
<td></td>
<td>• Promotes higher order learning and develops thinking–reasoning skills.</td>
</tr>
<tr>
<td></td>
<td>• Targets–specific learner level.</td>
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<tr>
<td><strong>Psychological Fidelity</strong></td>
<td><strong>When employing Socratic questioning:</strong></td>
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<tr>
<td></td>
<td>What it is:</td>
</tr>
<tr>
<td></td>
<td>• The degree to which learners perceive the simulator to be a believable, authentic surrogate for reality.</td>
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<tr>
<td></td>
<td>How it helps:</td>
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<tr>
<td></td>
<td>• Elicits authentic behaviors, psychomotor, and cognitive responses from learners as would be seen in an actual system (especially when using simulators with high psychological fidelity).</td>
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<td>When employing Socratic questioning:</td>
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<td></td>
<td>• Preserve learners’ psychological safety by reviewing the learner contract, discussing safe space principles and describing the style of questioning to ensue (using a “curiosity-based” mindset).</td>
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<td></td>
<td>• Develop thoughtful, higher-order questions in advance that target multiple learner levels.</td>
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<td></td>
<td>• Use Bloom’s and Anderson-Krathwohl’s taxonomies to form questions that promote higher cognitive thinking.</td>
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<td></td>
<td>To promote and maintain psychological fidelity:</td>
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<td></td>
<td>• Remind learners of the fiction contract and prebrief.</td>
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<td></td>
<td>• Acknowledge that the low-technology simulator is not meant to fully replicate reality.</td>
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<td>• Carefully align the features of low-technology simulators with learning objectives.</td>
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<td></td>
<td>• Orient learners to the simulator (e.g., demonstrate its features related to procedure).</td>
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### Table 2 (continued)

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Special Treatment(s) and Implications for Educators</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Embracing Learner Diversity</strong>&lt;br&gt;Example: SBPT with a heterogeneous group of attending-level emergency physicians&lt;br&gt;Example: SBPT with a heterogeneous group of resident-level emergency physicians (mixed small groups containing all levels of residents, from PGY1 to PGY3/4 or beyond)</td>
<td>• Embed emotional cues into SBPT or integrate procedure within a larger scenario for authentic decision making.</td>
</tr>
</tbody>
</table>
| **Andragogy** | What it is: <br>• Term coined by Knowles (contrast to “pedagogy”) to describe “adult education” principles: using relevant, problem-oriented, active learning strategies in contexts valuing learners’ prior experience.  
• How it helps:  
  • Keeps education relevant, promotes active learning, and encourages problem solving.  
  • Accommodates intrinsically motivated (“self-directed”) participants and values their experiences. |
| **Social Learning Theory and PAL/NPAL** | What these are:  
• Social Learning Theory: learning occurs through observation of models (peers, attendings) in the environment; learner adopts observed behaviors, values, beliefs, and attitudes  
• PAL/NPAL: Incorporation of learners as teachers within an educational experience. PAL: “learner-educators” are at same level of experience as other participants; NPAL: “learner-educators” are more senior/experienced to other participants  
• How these help:  
  • Make learning efficient (learners learn more from one another than on their own; “whole is greater than sum of the parts”)  
  • Improves learner engagement (also, learners in the “teaching role” often feel they learn better)  
  • Frame SBPT around clinical problems or controversies.  
  • Leverage prior experience when refreshing procedures or new psychomotor skill acquisition.  
  • Be transparent with the rationale for the need for SBPT.  
  • Encourage learners in heterogeneous groups to share their heuristics and anecdotal experiences.  
  • Allow learners to share in bearing responsibility for the teaching and learning that occurs in the session. |
| **Optimizing Cognitive Load**<br>Example: SBPT with a group of emergency physician learners, some of whom are new graduates, some of whom are very experienced | **Cognitive Load Theory**<br>What it is:  
• How learners use working memory to process a task; three forms of load: germane, extraneous, and intrinsic described.  
• Load across these forms may be applied or withdrawn for educational benefit.  
• How it helps:  
  • Makes experience more challenging (prepare learners for application of increased cognitive load).  
  • Adds variability to the experience and avoids boredom; promotes activated state that sharpens level of participation; raises “competitive stakes” of SBPT (when conducted in a safe environment).  
  • ZPD and Flow  
  • ZPD: “space” between a learner’s current level of development and his/her potential (future) level of performance.  
  • Flow: state where learners are completely absorbed in task performance while balancing challenges.  
• How it helps:  
  • Introduces escalating challenge (learners always encouraged to achieve goals just beyond their “comfort zone”), making achievements and gains that would normally be “just out of reach” more likely.  
  • Promotes flow (this is often a highly activated but pleasing state of well-being while actively engaged in work). |

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>When applying cognitive load to move learners into the ZPD or into a “state of flow”:</td>
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<tr>
<td></td>
<td>• Minimize initial extraneous load (start with basics, then escalate level of complexity); reduce intrinsic load with deliberate practice, repetition, time, scaffolding, and deconstruction of complex procedures.</td>
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<td></td>
<td>• Create urgency! Increase extraneous load (e.g., reduce time, alter environment or context) within a safe environment where mistakes are acceptable but immediately corrected (give opportunity for a repeat attempts).</td>
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<td></td>
<td>• Select tasks that progress in a stepwise order (each step building on the prior), then add germane load (increased complexity) once intrinsic load is reduced; escalate with successive repetitions as learners.</td>
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<tr>
<td></td>
<td><strong>Promoting Mindfulness and Reflection</strong></td>
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<tr>
<td>Example: SBPT with a homogenous group of novice emergency physician learners (e.g., PGY1 residents)</td>
<td><strong>Mindfulness and Growth Mindset</strong></td>
</tr>
<tr>
<td></td>
<td>What these are:</td>
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<td>• Mindfulness: a learner’s self-regulated attention to a task while remaining oriented “in the moment.”</td>
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<td>• Growth mindset: describes a learner’s embrace of challenge and critique for self-development.</td>
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<td>How it helps:</td>
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<td></td>
<td>• Helps learner fully engage in the SBPT experience and maintain focus on the details (e.g., haptics).</td>
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<td>• Transforms learners’ frustrations with SBPT to embrace of challenge, promoting learning from miscues.</td>
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<td><strong>Reflective Practice</strong></td>
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<td>What it is:</td>
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<td></td>
<td>• Regularly performed process of self-assessment including thinking retrospectively about one’s performance, knowledge recall, and application, whether in real time, retrospectively or prospectively.</td>
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<td>How these help:</td>
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<tr>
<td></td>
<td>• Helps learners become reflective practitioners, comfortable with reflection-on-action (retrospective), knowledge-in-action, reflection-in-action, reflection-for-action (for future enhanced performance), and the process of “think aloud” (cognitive apprenticeship).</td>
</tr>
<tr>
<td></td>
<td>• Promotes expertise (deliberate practice and mastery learning are impossible without it).</td>
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<tr>
<td></td>
<td>To foster mindfulness, a growth mindset, and reflective practice:</td>
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<tr>
<td></td>
<td>• Be transparent with learners, preparing them for possible frustration as they experience challenge/difficulty during SBPT.</td>
</tr>
<tr>
<td></td>
<td>• Ask learners to reflect-in-action, on-action, and for future action; encourage learners to think about how they use knowledge-in-action (“metacognition”).</td>
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<td></td>
<td>• Ensure learner safety and prepare learners for this style of education at the beginning of the session.</td>
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<td></td>
<td>• Think aloud for your learners (or, alternatively, ask learners to think aloud for one another) during SBPT.</td>
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<tr>
<td></td>
<td>• Optimize the physical environment to focus learners’ attention (consider Maslow’s hierarchy of needs) and limit distractions (reorient learners when misdirected).</td>
</tr>
</tbody>
</table>

| Emphasizing Mastery Learning and Deliberate Practice | Mastery Learning |
| Example: SBPT with a homogenous group of novice emergency physician learners for a procedure that, by session’s end, you expect all learners to leave with the ability to perform the basic steps competently | What it is: |
|                                                      | • Structured approach to SBPT providing escalating levels of complexity, individualized performance expectations, specific feedback, repetition, opportunities for adaptation/experimentation, and frequent formative and summative assessments of performance. |
|                                                      | How it helps: |
|                                                      | • Makes experience more individualized and expectations of achievement clear. |
|                                                      | • Promotes, and may accelerate, development and progression from novice to competency/proficiency to expert levels of performance. |

<table>
<thead>
<tr>
<th>Deliberate Practice</th>
<th>What it is:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Term coined by Ericsson to describe individualized, goal-oriented, repetitive practice under supervision of educators who provide coaching, feedback, and opportunities for reflection.</td>
</tr>
</tbody>
</table>
while others prefer watching before doing. However, effective learning only occurs after a learner completes all four stages. Therefore, no isolated stage of the cycle is sufficient for learning on its own. Kolb’s ELT originally described four distinct learning styles,30,31 (based on the four-stage learning cycle) although as many as nine are now proposed.32 Educators who know their participants’ preferences can leverage ELT to maximize active learning in a larger-than-ideal group, since not all members will participate in all stages simultaneously. Educators may allow learners who prefer starting with reflective observation or abstract conceptualization to watch others perform procedures first. They can encourage active and mindful observation by providing a tool/checklist to prompt questions, encourage discussion, and pose hypothetical (“what if”) scenarios for discussion.33 The intentional integration of checklists or “step-by-step” approaches into session design will facilitate active learning among those who are observing. Studies34,35 show that “active” observation of simulation versus hands-on participation offers similar learning outcomes and levels of engagement, with increased observer engagement and role satisfaction of observers when provided with tools to enhance active learning, such as procedure checklists.34 Conversely, learners who prefer to start with active experimentation or hands-on experience may be provided with “free play” at the beginning of the session to allow learners to examine and “test” equipment. Educators accommodating these learning styles may focus on facilitation (minimizing their performance of the procedure in favor of the learners’ practice), create scenarios requiring task performance in real time, or provide SBPT as “just-in-time” task training.36

Maintaining Learner Engagement

Maintaining learner engagement remains a significant challenge in SBPT. This is especially true when using low-fidelity/low-technology models to teach complex procedures such as resuscitative hysterotomy. In such situations, modified Socratic questioning and fostering psychological fidelity can help to optimize the learner experience.

Socratic Questioning. Socratic questioning is a method of systematic inquiry that can engage learners by fostering higher-order thinking.37 This technique can help learners bridge a knowledge gap and attain a higher level of understanding through promotion of critical thinking. It is important to distinguish the Socratic method from another form of sequential questioning known as “pimping.”38 Pimping involves questioning a learner with the intent to shame or humiliate. The Socratic method, when used correctly, seeks to preserve learner psychological safety.39 To this end, facilitators should explicitly prepare learners for Socratic questioning prior to the teaching session. This helps learners engage in knowledge building without fear of humiliation.4 It is imperative for facilitators to prepare questions a priori, tailor them to specific learner levels, and frame them using a curiosity-based mindset. Questions that use Bloom’s40 and Anderson-

Table 2 (continued)

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<thead>
<tr>
<th>Challenges</th>
<th>Special Treatment(s) and Implications for Educators</th>
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<tbody>
<tr>
<td>How it helps:</td>
<td></td>
</tr>
<tr>
<td>• Individualizes SBPT (learners likely to require different numbers of repetitions to reach mastery).</td>
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<tr>
<td>• Promotes ideal “muscle memory” and facilitates learning of educator-preferred techniques.</td>
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<tr>
<td>When integrating deliberate practice as part of a mastery learning approach for SBPT:</td>
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<tr>
<td>• State that the ultimate goal of SBPT is mastery and provide timeline of expectations/milestones.</td>
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<tr>
<td>• Anticipate variation from traditional simulation-based education (frequent interruptions and immediate corrective interventions are necessary following errors to avoid improper reinforcement).</td>
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<tr>
<td>• Advise learners that multiple repetitions are required to reach mastery (varies with the learner).</td>
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<tr>
<td>• Provide learners with multiple simultaneous models for practice. Learners may feel more comfortable taking extra time to practice if there are plenty of models available.</td>
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<tr>
<td>• If model availability is limited, alternating learners between rapid cycling allows observers in a group to learn from others’ experiences and stay engaged as they note the details of the error learning correction.</td>
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</table>

SBPT = simulation-based procedural training; PAL/NPAL = peer-assisted/near-peer-assisted learning; ZPD = zone of proximal development.
### Table 3
Descriptions of Key Terms and Concepts of SBPT

<table>
<thead>
<tr>
<th>Key Term or Concept</th>
<th>Description</th>
<th>Examples in Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Just-in-time training</strong></td>
<td>A brief didactic and practicum focused on high-yield tips and concise, guided practice and review of major steps in a low-frequency, high-stakes procedure, immediately prior to actual performance of the procedure at the bedside.</td>
<td>A supervising instructor assists a learner to practice on a task trainer right before performing a pediatric lumbar puncture on an infant during a shift.</td>
</tr>
<tr>
<td><strong>Engineering fidelity: mechanical fidelity</strong></td>
<td>The degree to which a simulator replicates the design characteristics of the real system simulators with high mechanical fidelity are nearly identical to the context of practice.</td>
<td>A laceration repair task trainer that uses cadaveric skin to represent living human skin.</td>
</tr>
<tr>
<td><strong>Engineering fidelity: environmental fidelity</strong></td>
<td>The extent to which a simulator replicates visual cues, motion cues, and other sensory information from the real task environment.</td>
<td>A transvenous pacing model that shows appropriate vital sign changes in response to specific learner actions.</td>
</tr>
<tr>
<td><strong>Psychological safety</strong></td>
<td>A shared perception that learners can participate, speak up, share thoughts, ask questions, and make mistakes within a simulation-based activity without fear of humiliation or retribution. Psychological safety leads to increased learning, especially in groups with hierarchical membership.</td>
<td>Affirmation at the beginning of a simulation procedure lab or session that all learners are safe and free from judgment and that all questions are valuable questions.</td>
</tr>
<tr>
<td><strong>Psychological fidelity</strong></td>
<td>The degree to which learners perceive the simulator to be a believable surrogate for the trained task. Simulators with high psychological fidelity cause learners to have the same behavioral and cognitive responses as they would in the real system.</td>
<td>A cricothyrotomy model that raises learners’ stress level in a manner that closely resembles a real cricothyrotomy.</td>
</tr>
<tr>
<td><strong>Fiction contract</strong></td>
<td>A collaborative agreement that establishes what instructors and learners should expect of each other to optimize learning and engagement in a simulated environment. Specifically, instructors agree to make the simulated environment as real and engaging as possible while also acknowledging the limitations of the simulation. Meanwhile, learners commit to acting as if everything is real and playing an active role within the simulation.</td>
<td>Example statement by instructor: “We do our best to create a realistic simulated environment but are unable to simulate everything required. We encourage you to engage with this environment AS IF it were real to have the most educational experience.”</td>
</tr>
<tr>
<td><strong>Learner contract</strong></td>
<td>An explicit commitment by the learner to adhere to certain behavioral and performance standards during the simulation experience. These include, but are not limited to, acting professionally and responsibly at all times; treating other learners, faculty, staff, standardized patients, and simulation equipment with respect; acting as if everything is real; showing a genuine desire to learn; and doing the best they can.</td>
<td>The learner contract is most commonly introduced during the “prebrief” (below)</td>
</tr>
<tr>
<td><strong>Andragogy</strong></td>
<td>A term coined by Knowles, referring to the education of adult learners. Often posed in contrast to “pedagogy” (mistakenly referred to as “Adult Learning Theory”). Principles of andragogy involve providing self-directed, active and engaging experiences that leverage learners’ prior experiences and focus on solving problems relevant to current/future performance.</td>
<td>An educator facilitating a small group of EM resident learners in a SBPT session on video-assisted laryngoscopy begins by assessing their knowledge level and previous experience with direct laryngoscopy. The educator leverages that experience to highlight similarities and differences between the two techniques. The educator ensures that “hands-on” time is maximized, and that the SBPT is framed within a clinical problem (“patient in respiratory failure, short neck, receding mandible, and protruding tongue”).</td>
</tr>
<tr>
<td><strong>Prebrief</strong></td>
<td>A focused introduction prior to beginning a simulation session stating the purpose, availability, and functionality of supplies or simulators; roles during the session; introducing the fiction contract; guidelines for conduct; and plan for debriefing following the scenario or procedure.</td>
<td>A course instructor gathers a group of learners at the beginning of a skills training session to review logistics of the day and remind them of basic rules of engagement with simulators before assigning individuals to their stations.</td>
</tr>
<tr>
<td><strong>Debriefing</strong></td>
<td>A dedicated time following a simulation during which an analysis of events occurs, including summary of actions and treatments rendered during the simulation as well as reflection on communication and teamwork. The debrief is the optimal time to present the learner with a review of optimal management in the scenario situation.</td>
<td>A faculty member and simulation instructor provides guided facilitation of a case with a resident physician involving a patient with anaphylaxis requiring management of upper airway obstruction. The discussion focuses on review of the difficult airway algorithm as well as steps performed during the cricothyrotomy.</td>
</tr>
<tr>
<td><strong>Zone of proximal development</strong></td>
<td>Refers to a process or task that is more difficult than what the learner can perform on their own. The learner is able to perform a more complex task with an instructor’s guidance.</td>
<td>A resident is able to perform an uncomplicated delivery, but needs guidance to perform shoulder dystocia maneuvers in the appropriate sequence.</td>
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(Continued)
Krathwohl’s taxonomies\textsuperscript{41,42} as the basis for formulating six Socratic question categories can further promote higher levels of cognition and critical thinking.

**Psychological Fidelity.** “Fidelity” in simulation refers to the degree to which a simulation replicates reality. Many forms of fidelity are described.\textsuperscript{43,44} Fidelity can be subclassified into engineering versus psychological fidelity,\textsuperscript{43} as demonstrated in Table 3. Whereas engineering fidelity (including mechanical and environmental fidelity) is a function of the simulator/model, psychological fidelity is a function of the learner. Interestingly, there is little evidence that “high-mechanical-fidelity” simulators are better than “low-mechanical-fidelity” simulators for procedural skills training or that teaching more complex tasks requires more sophisticated simulators.\textsuperscript{45,46} Psychological fidelity may be more important than mechanical fidelity for learning.\textsuperscript{43} Simulators with high psychological fidelity help learners suspend disbelief and have the same behavioral and cognitive responses as they would in clinical situations.

Psychological fidelity can be optimized through:

1. Acknowledgment to learners that the low-fidelity model is not meant to fully replicate the real environment via the prebrief (fiction contract).
2. Careful alignment of the features of the low-fidelity simulator with explicitly stated learning objectives.
3. Development of a shared focus of attention with learners by orienting them to the task trainer, defining its elements, and highlighting the features necessary to perform the procedure.
4. Embedded emotional cues such as:
   a. A resuscitative hysterotomy training session commencing with an exemplar video of ongoing resuscitation of a pregnant patient in cardiac arrest.
   b. Physical movement of the task trainer to simulate ongoing chest compressions.
   c. Integration of the procedure within a larger simulation scenario so learners must decide when to perform the procedure.

While implementing the strategies above, it is imperative to bear in mind the learners’ experience levels, as inclusion of too many elements within the procedure training session can cause cognitive overload and detract from learning.

**Embracing Learner Diversity.** Heterogeneous learner groups provide a robust opportunity for greater depth of learning while posing unique challenges for the instructor. A diversity of learner perspectives stems from varying levels of experience and expertise. While we acknowledge that diversity of gender, race, and ethnicity are significant influences on learning, a comprehensive treatment of the impact of these characteristics of diversity is beyond the scope of this paper and will not be addressed. Identifying how to leverage variable experience levels in a learner group is key for successful engagement. Learners flourish when they are encouraged to examine the frames of reference that each member brings to the conversation based on their unique experiences.

**Andragogy.** Knowles\textsuperscript{47–49} posits that adult learners: 1) require input into the content of their instruction, 2) come to any educational experience with their own specific learning needs, 3) are motivated to learn because they, 4) want to understand the relevance of instruction, and (5) prefer a problem-based approach. Understanding these assumptions should guide one’s approach to facilitating the group’s educational sessions.

One way educators can leverage these principles of andragogy when facilitating adult learners with varied levels of education, professions, and disciplines is to explicitly value their experience. Facilitators can engage more experienced learners by asking them to draw on their personal experiences and to leverage their own procedural expertise to maximize learning for others in the group. This practice enhances learning for all participants by fostering an emotional commitment and emphasizing the personal relevance of the session regardless of their levels of experience.
Social Learning Theory. While embracing Knowles principles, it is also helpful to recall a key principle of Bandura’s social learning theory. Specifically, it is beneficial to allow adult learners to discover things from one another in a collaborative context in addition to learning things independently. Social learning can be encouraged in SBPT by asking group members to compare and contrast similar, more familiar procedures, as well as consider different approaches to the same procedure. These practices encourage learners to center their focus on practical, relevant problems, to incorporate new learning into prior knowledge, and to develop more expert levels of understanding.

Peer Assisted Learning and Near-Peer Assisted Learning. Peer-assisted learning (PAL) and near-peer-assisted learning (NPAL) are paradigms that utilize teaching by peers or near-peers, respectively. Features of social learning theory and andragogy are both inherent in PAL and NPAL, where adult learners are engaged in both the teaching and the learning processes through sharing of knowledge and experiences. A distinctive feature of PAL and NPAL is that instructors/facilitators are unnecessary. Problem-based learning is one example of how PAL has been employed in medical education. NPAL has similarly been used for mentoring and for teaching technical skills. NPAL allows a more experienced participant to act as a teacher, thus facilitating that participant’s transition to a more advanced level of understanding. Novice learners also benefit from direct teaching that is often more closely geared to their level of understanding.

Optimizing Cognitive Load
When teaching procedural skills, maintaining learner engagement across educational levels can be challenging. Novice learners may be overwhelmed trying to understand and sequence the steps of a procedure, while an advanced group of learners would find the same level of procedural skills training to be boring. The circumplex model of affect describes how unpleasant, distressed, bored, or other deactivated arousal states negatively impact neural processing of stimuli. In contrast, maintaining the learner in an activated state ensures organized and careful processing of information. The use of appropriate cognitive loading strategies can be used to maintain learners in these activated states to optimize their engagement and retention.

Cognitive load theory. Cognitive load theory describes how learners use working memory to process a task, where the intrinsic load is essential to performing the task, extraneous load is nonessential to the task, and germane load is associated with learning the task and storing it in long-term memory. The more pieces of information a learner is managing, and the more those pieces interact and depend on one another (known as element interactivity), the more intrinsic load increases. One way to affect the intrinsic load of a procedure is to decrease the complexity of the task (without losing the context) until the learner becomes more proficient with the individual elements. An example of this might be to break the procedure down into isolated steps (i.e., scaffolding) to facilitate the transfer of knowledge or skills to long-term memory. Once the elements are a part of the learner’s schema (long-term memory), the learner can increase the availability of this information to their working memory, and incorporate these elements together to reduce intrinsic load. As a learner progresses, minimizing the extraneous load, while increasing the complexity of the task (the germane load), is preferred.

Zone of Proximal Development and Flow. The “zone of proximal development” describes how educators can engage learners regardless of their level. Learners take information from their schema and use it to solve new problems (intrinsic load), with guidance from knowledgeable instructors. Increasing the germane load keeps the learner in the zone of proximal development and in a state of “flow.” Flow is the condition in which learners operate at full capacity, completely absorbed in the task at hand while balancing the challenges of the task within the learner’s existing skill set. When applying this concept to SBPT, our goal as educators is to facilitate learner movement into this intrinsically motivated, self-rewarding state and help maintain it.

These ideas conform with what we have already established: multiple, difficult challenges can produce anxiety and too few, or too simple, can produce boredom. Once a complex task is mastered, learners can be continually challenged using extraneous load; this may be accomplished by altering the environment and contexts or reducing the time to complete the procedure.

Promoting Mindfulness and Reflection
Mindfulness and reflection are critical cognitive processes required for psychomotor skill acquisition.
Ideally, SBPT provides learning conditions that accommodate and are conducive to these mental activities. One challenge educators should recognize is that learners require early, sufficient preparation, development, and professional formation if expected to possess the cognitive and affective characteristics required for meaningful mindfulness and reflective practice during SBPT. Other threats to the integration of mindfulness and reflective practice within ideal SBPT, for example, curricular, logistical, and time restrictions, will not be addressed in this paper.

**Mindfulness.** Bishop et al. describe mindfulness as two conjoined processes: “self-regulation of attention” and “orientation to experience.” Self-regulation refers to a learner’s maintenance of attention on the “immediate experience” so that “recognition of mental events in the present moment” is heightened. Orientation to experience refers to a learner’s commitment to “maintain an attitude of curiosity about where the mind wanders whenever it inevitably drifts away” from the task at hand and about “the different objects within [his or her] experience at any moment” including thoughts, feelings, and sensations.

Educators seeking to support mindfulness among their learners during SBPT should focus on:

1. **Optimizing the physical environment.** This means focusing on room temperature, noise level, accessibility of food, and general environmental factors. Recall Maslow’s hierarchy of needs and focus on meeting basic needs of comfort to promote higher-order processing. Optimizing the physical environment limits distractions and serves to better reorient learners when they are misdirected.

2. **Encouraging a growth mindset.** Championed by Carol Dweck, this takes learners from a state of avoiding challenges to one where challenges are embraced, persistence is key, and learning from criticism is essential. It is especially important in procedural training where the response to setbacks is pivotal.

3. **Actively encouraging mindfulness.** In a new psychomotor skill session, encourage active mindfulness and attentive observation. The latter may take the form of tool utilization, using learners as assessors or other active participant actions.

**Reflection.** Schön proposed “reflective practice” as essential for resolving “crises of confidence in professional knowledge” among health professionals. He theorizes that educational experiences that support development of “reflective practitioners” help learners recognize, adapt to, and resolve the uncertainties and competing priorities associated with clinical practice. Others describe the role of reflection as providing resiliency, well-being, and knowledge for improved performance in the future.

With respect to SBPT, debriefing and feedback are the primary strategies educators use when engaged in SBPT to promote reflection. Regardless of the model of debriefing or feedback chosen, the predominant feature of them all is that accommodate reflection. Therefore, to optimize the incorporation of reflection in SBPT, the method chosen may not be as important as the educator’s focus on the following two principles:

1. **Developing the dormant “reflective practitioner” within their learners through SBPT.** Learners may not intrinsically possess a mindset to critically self-reflect. Schön described three main foci of self-reflection: past performance (retrospective; “reflection-on-action”), knowledge recall and application in real-time (“knowledge-in-action”), and metacognition in real time (“thinking aloud” during practice; “reflection-in-action”). Killion and Todnem added a fourth: prospective planning for future performance (“reflection-for-action”). SBPT should encourage these three cognitive activities before, during, after, and in between practice sessions.

2. **Being overtly transparent with learners.** When instructors model “thinking aloud during practice” it is a form of cognitive apprenticeship. Similarly, sharing with learners that the journey to expertise is challenging, and asking learners to remain mindful of their own feelings during this period of development is important.

**Emphasizing Deliberate Practice for Mastery Learning**

Numerous models have been used to measure the developmental journey learners make in their pursuit of psychomotor skill competency. Regardless of the model used to track progression, one universal challenge educators may face in SBPT is promoting learner advancement along his or her individual developmental trajectory. One form this challenge takes emerges with SBPT for novice learners (e.g., early EM residents) seeking procedural proficiency and competency. A corollary form of this problem is seen with proficient and competent learners (e.g., advanced EM...
Deliberate Practice. Ericsson\textsuperscript{84,85} coined the term “deliberate practice” following his study of expertise across multiple domains of expert psychomotor performance. Ericsson observed that learner psychomotor advancement is directly linked to participation in individualized, goal-oriented practice sessions that demand repetitions of performance under the supervision of educators providing coaching and feedback and encouraging reflective practice.\textsuperscript{84} Sessions where educators provided learners with problem-solving experiences allowing technique modification, adaptation, or new method creation were also beneficial.\textsuperscript{84} Mere experience or repetitions in isolation of these features did not translate to improved performance and advancement in expertise.\textsuperscript{84,85}

Mastery Learning. In mastery learning, all learners are expected to achieve a standard predetermined level of competence though the time they take to achieve that competence may vary.\textsuperscript{86–88} This concept is consistent with the emerging concept of competency-based, time-variable medical education.\textsuperscript{89} Educators should recognize that SBPT programs incorporating few sessions for practice do not truly follow the mastery learning approach; learners are unlikely to advance beyond their initial level of performance with so few opportunities to grow. In addition, while some learners independently recognize the need for ongoing deliberate practice, others may need more explicit guidance to identify that competency has not yet been met.\textsuperscript{90} SBPT that features facilitated deliberate practice can be utilized to educate trainees on proper technique for a variety of procedures and situations.\textsuperscript{91} Rapid cycle deliberate practice (RCDP) is an example of a specific approach for SBPT that integrates facilitated deliberate practice and mastery learning.\textsuperscript{92,93} RCDP promotes learner development upwards toward progressively escalating levels of competence while maximizing resources during a limited time frame. RCDP has been applied to SBPT for individual learners and teams of learners in several contexts and learning environments.\textsuperscript{92–95}

Time and human resource limitations, however, may restrict the widespread implementation of mastery learning/deliberate practice approaches to SBPT. Interestingly, novel innovative approaches are emerging describing the effective use of telesimulation and teledebriefing to overcome these limitations. Okrainec et al.,\textsuperscript{96} Mikrogianakis et al.,\textsuperscript{97} Ahmed et al.,\textsuperscript{98} McCoy et al.,\textsuperscript{99,100} Burckett-St Laurent et al.,\textsuperscript{101} and Honda and McCoy\textsuperscript{102} each describe the use of synchronous online platforms to facilitate simulations and debriefings. The work of Okrainec et al.,\textsuperscript{96} Mikrogianakis et al.,\textsuperscript{97} and Burckett-St Laurent et al.\textsuperscript{101} is noteworthy for describing the incorporation of telesimulation technologies in SBPT for the development of psychomotor skills associated with laparoscopy, intravenous needle insertion, and ultrasound-guided regional anesthesia among learners in resource-limited milieus.

CONCLUSIONS

Through our review of the literature and engagement in an iterative consensus-building process, we identified a unifying paradigm that we believe is ideal for SBPT for all learners of emergency medicine regardless of level of education and experience. We also recognized several challenges educators face threatening integration and implementation of this optimal paradigm. Although multiple challenges across three thematic domains (learner, educator, and curriculum) emerged, we concentrated the focus of this concept paper on the six most common, learner-centered challenges having the greatest significance and highest impact on ideal SBPT practice. These were: 1) maximizing active learning, 2) maintaining learner engagement, 3) embracing learner diversity, 4) optimizing cognitive load, 5) promoting mindfulness and reflection, and 6) emphasizing deliberate practice for mastery learning. We formulated consensus-generated solutions from our review and discussion of best practices and educational theory that we propose are suitable and well aligned to overcome them. The recommendations in this concept paper represent the “technique, tools, and tips” we keep in our educators’ toolboxes and use when we anticipate or recognize deviations from ideal practice in our own implementations of SBPT. In the future, we intend to expand upon the other domains of challenges to SBPT (e.g., educator and curriculum) and the special treatments we identified to address them.

We acknowledge several limitations of this concept paper. While many of the members of the Society for Academic Emergency Medicine Simulation Academy SBPT Workgroup engage in interprofessional,
multidisciplinary simulation-based education, our group consists solely of emergency physicians and pediatric emergency physicians. The consensus generated by this workgroup may not represent that diversity of thought and ideas possible with a larger, more inclusive group of interprofessional, multidisciplinary simulation educators and the other stakeholders of SBPT (e.g., learners, residency program directors).

We also acknowledge that performing a structured clinical review incorporating more robust methodologies may identify challenges to optimal SBPT and may provide evidence-supported recommendations and solutions to overcome them that we failed to recognize, appreciate or anticipate. Future work of the Simulation Academy SBPT Workgroup, therefore, will include performing formal research prospectively evaluating our list of challenges and threats to SBPT and our consensus-generated solutions to determining which best practices and educational theories most favorably apply to attenuating them. We believe that continued work in this area is of great value to simulation-based educators and necessary for optimizing the practice of SBPT and improving its efficacy.

References


**Supporting Information**

The following supporting information is available in the online version of this paper available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10418/full
Advancing Diversity and Inclusion: An Organized Approach Through a Medical Specialty Academy

Ava E. Pierce, MD1, Lisa Moreno-Walton, MD, MS, MSCR2, Dowin Boatright, MD, MBA3, Joel L. Moll, MD4, Marquita N. Hicks, MD, MBA5, Jeffrey Druck, MD6, Bernard L. Lopez, MD, MS7, Evrim Oral, PhD8, and Sheryl L. Heron, MD, MPH9

ABSTRACT

Background: The benefits of a diverse workforce in medicine have been previously described. While the population of the United States has become increasingly diverse, this has not occurred in the physician workforce. In academic medicine, underrepresented in medicine (URiM) faculty are less likely to be promoted or retained in academic institutions. Studies suggest that mentorship and engagement increase the likelihood of development, retention, and promotion. However, it is not clear what form of mentorship creates these changes. The Academy for Diversity and Inclusion in Emergency Medicine (ADIEM), an academy within the Society for Academic Emergency Medicine, is a group focused on advancing diversity and inclusion as well as promoting the development of its URiM students, residents, and faculty. The Academy serves many of the functions of a mentoring program. We assessed whether active involvement in ADIEM led to increased publications, promotion, or leadership advancement in the areas of diversity, equity, and inclusion.

Methods: We performed a survey of ADIEM members to determine if career development and productivity, defined as written scholarly products, presentations, and mentorship in the area of diversity, equity, and inclusion was enhanced by the establishment of the academy. To determine whether there were significant changes in academic accomplishments after the formation of ADIEM, two groups, ADIEM leaders and ADIEM nonleader members, were examined.

Results: Thirteen ADIEM leaders and 14 ADIEM nonleader members completed the survey. Academic productivity in the area of diversity, equity, and inclusion increased significantly among ADIEM leaders when compared to ADIEM nonleader members after the founding of ADIEM. In particular, in the ADIEM leader group, there were significant increases in manuscript publications (1.31 ± 1.6 to 5.5 ± 7.96, p = 0.12), didactic presentations (3.85 ± 7.36 to 23.46 ± 44.52, p < 0.01), grand rounds presentations (0.83 ± 1.75 to 8.6 ± 10.71, p < 0.05), and student/resident mentees (6.46 ± 9.36 to 25 ± 30.41, p = 0.02).

Conclusion: The formation of a specialized academy within a national medical society has advanced academic accomplishments in diversity, equity, and inclusion in emergency medicine among ADIEM leadership. Involvement...
Although the U.S. population continues to become more diverse, the percentage of emergency medicine (EM) physicians who are underrepresented in medicine (URiM) or who are lesbian, gay, bisexual, or transgender (LGBT) is small and has not significantly increased.1,2 The benefits of a diverse medical workforce have been well described, including expanding health care access for the underserved, increasing equitable care, and increasing the number of providers and leaders able to meet the needs of a diverse population.3 Despite these recommendations, creating a racially and ethnically diverse workforce remains a challenge for medical specialties, including EM.4–6 In 2018, there were 16,502 URiM academic faculty in medicine and specifically 530 (10%) URiM faculty in EM.1 An accurate assessment of LGBT faculty in academic medicine, including EM, is not known. LGBT populations are difficult to reliably study or count since it is not a required demographic field collected at present by the Accreditation Council for Graduate Medical Education (ACGME) or the Association of American Medical Colleges (AAMC). In addition, disclosure of sexual orientation or gender identity is often not protected by employment law, making disclosure potentially dangerous. Many leaders in health equity efforts believe, however, that this group is underrepresented. Currently, there is little to no literature that addresses an organized approach to advancing URiM and LGBT faculty in EM.1 In 2008, a set of recommendations designed to augment physician diversity in EM was published by the 2008 Council of Emergency Medicine Residency Directors (CORD) Academic Assembly Diversity Workgroup; however, a follow-up study suggested that these best practices have not been widely implemented.7,8

The Academy for Diversity and Inclusion in Emergency Medicine (ADIEM) is an academy within the Society for Academic Emergency Medicine (SAEM) that focuses on enhancing the recruitment, retention, and academic promotion of URiM and LGBT EM faculty, residents, and students with an interest in EM. The organization was established with 100 founding members in 2012 and as of November 2019 had a membership of 379 people.

Much literature exists that supports the power of individuals in positions of leadership to positively impact the career choices and career success not only of their mentees, but of others in their racial, gender, ethnic, and religious groups directly and indirectly.9–11 There is a paucity of literature exploring the value of bonding a group of like individuals from URiM groups in medicine into a cohort that is empowered to support each member in career development and in the establishment of an identity as a leader. A study examining the advancement of women in EM noted that active participation in women-focused groups leads to advancement in career opportunities that advances equity and inclusion.12 SAEM uniquely provided the opportunity to create academies, and the founders of ADIEM created a cohort of empowerment in response to this opportunity. Thus, our primary objective was to determine whether the engagement and participation of URiM and LGBT physicians in our national organization academy enhanced the retention, promotion, and development of URiM and LGBT academy leaders in the field of EM. This is the first time that the impact of such a cohort on the individual leaders and members is being examined.

**METHODS**

**Study Design**

We performed a survey of leaders and other members of ADIEM who did not hold leadership positions to determine the effect on career development that may be associated with the establishment of the academy. Thirteen ADIEM leaders and 14 other members completed the pre- and postsurveys. Leaders included anyone holding elected office on the executive board or appointed to lead a committee within the academy, while other members were from a convenience sample of ADIEM members who had not held leadership positions but remained members during this time period. The survey was sent directly to the members to capture their accomplishments and scholarship related to diversity, inclusion, and equity for the 6 years prior to academy formation and for the 6 years after the academy formation.

The survey was distributed by direct e-mail. The request for survey completion was sent with two additional reminders to the study participants. Each respondent reported on productivity in the areas of
diversity, equity, and inclusion research (e.g., number of abstracts, number of abstract presentations, number of manuscript publications), social media presence (e.g., number of websites created, number of blogs and podcasts completed), book chapters, didactics and grand rounds presented, mentors and mentees gained, and academic promotion and other diversity related accomplishments (Data Supplement S1, available as supporting information in the online version of this paper, which is available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10427/full). The number of websites and blogs created by ADIEM leaders ranged from zero to 40, creating a wide range that would skew the values. Hence, in both the pre- and postsurveys, the number of websites and the number of blogs created by ADIEM leaders were treated as dichotomous values, with 0 correlating to “no” and 1 correlating to “yes.” This study was deemed exempt by the Emory University Institutional Review Board.

Data Analysis
All statistical analyses were performed using SAS 9.4. Descriptive statistics (means, standard deviations, medians, interquartile ranges, and frequencies) were calculated to estimate distributional properties of the outcomes. To determine whether there were statistically significant changes in the accomplishments before and after ADIEM’s inception, paired statistical comparisons were performed using the nonparametric Wilcoxon signed-rank test for the leaders and nonleader members separately, except in the cases of websites and number of blogs for ADIEM leaders. Paired comparisons for websites and number of blogs for ADIEM leaders were performed using the Fisher’s exact tests. To compare the accomplishments of the ADIEM leaders and the ADIEM nonleader members before and after ADIEM’s inception, we calculated the change in productivity for each member and utilized Mann-Whitney U-test statistics.

RESULTS
The demographic characteristics of ADIEM leadership and nonleadership members are presented in Tables 1 and 2. In 2011, before ADIEM was founded, our cohort of EM physicians that would ultimately hold leadership positions reported a mean (±SD) of 1.308 (±1.601, median = 1.00) manuscript publications, a mean (±SD) of 0.000 (±0.000, median = 0.000) letter to the editor publications, a mean (±SD) of 3.846 (±7.358, median = 0.000) didactic presentations, a mean (±SD) of 0.833 (±1.749, median = 0.000) grand rounds presentations, and a mean (±SD) of 6.462 (±9.360, median = 1.000) student/resident mentees. During this same time period, our cohort of EM physicians that would become ADIEM members, but never hold a leadership position reported a mean (±SD) of 1.214 (±2.751, median = 0.000) manuscript publications, a mean (±SD) of 0.143 (±0.363, median = 0.000) letter to the editor publications, a mean (±SD) of 0.571 (±1.284, median = 0.000) didactic presentation, a mean (±SD) of 0.500 (±1.345, median = 0.000) grand rounds presentations, and a mean (±SD) of 7.846 (±14.502, median = 2.000) student/resident mentees (Tables 3 and 4). To assess whether the baseline productivity of the two groups was significantly different, we compared the achievements of leaders and nonleaders before ADIEM was founded and found that there was no statistically significant difference in number of websites (p = 0.5800) or blogs (0.2222) created, number of abstract (p = 0.1617) or abstract presentations (p = 0.3138), number of manuscript (p = 0.3470) and letter to the editor (p = 0.4831) publications, number of books published (p = 0.4615), number of book chapters written (p = 0.1333), number of

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ADIME = Academy for Diversity and Inclusion in Emergency Medicine.
didactic (0.2275) or grand rounds presentations given (p = 0.8261), number of grants obtained (p = 0.4871), number of student/resident mentees (p = 0.9285), number of faculty mentors (p = 1.00), number of mentors personally obtained (p = 0.7569), number of promotions (p = 0.3406), and number of curriculum products created (p = 0.2870) between future ADIEM leaders and nonleaders.

In 2019, after ADIEM was founded, EM physicians that held leadership positions in the Academy reported a mean (±SD) of 5.500 (±7.960, median = 3, p = 0.0117) manuscript publications, a mean (±SD) of 1.100 (±0.994, median = 1.00, p = 0.0156) letter to the editor publications, a mean (±SD) of 23.462 (±44.519, median = 10.000, p = 0.0039) didactic presentations, a mean (±SD) of 8.600 (±10.710, median = 3.000, p = 0.0234) grand rounds presentations, and a mean (±SD) of 25 (±30.414, median = 10.000, p = 0.0195) student/resident mentees, a statistically significant difference from their reported productivity in the same domains prior to ADIEM’s inception. During this same time period, ADIEM members who did not hold leadership positions in the Academy reported a mean (±SD) of 1.357 (±2.649, median = 0.500, p = 0.6250) manuscript publications, a mean (±SD) of 0.071 (±0.267, median = 0.000, p = 1.00) letter to the editor publications, a mean (±SD) of 0.857 (±1.351, median = 0.000, p = 0.6250) didactic presentations, and a mean (±SD) of 0.876 (±2.119, median = 0.000, p = 0.5000) grand rounds presentations, a difference that is not significantly different from reported numbers prior to ADIEM’s founding. The only statistically significant difference that ADIEM members who did not hold leadership positions in the Academy reported after ADIEM’s founding was an increase in student/resident mentees with a mean (±SD) of 10 (±17.046, median = 4.000, p = 0.0469; Tables 3 and 4).

After ADIEM’s founding, members who held leadership positions compared to members without leadership positions reported greater productivity in the following areas: more abstracts published (mean ± SD = 2.500 ± 6.201 and median = 2.000 vs. mean ± SD = 0.000 ± 1.301 and median = 0.000, p = 0.0282), additional manuscripts published (mean ± SD = 4.250 ± 6.969 and median = 2.500 vs. mean ± SD = 0.143 ± 0.535 and median = 0.000, p = 0.0040), increased letter to the editor publications (mean ± SD = 1.222 ± 0.972 and median = 1.000 vs. mean ± SD = −0.07a ± 0.475 and median = 0.000, p = 0.0005), additional didactic presentations (mean ± SD = 19.615 ± 38.470 and median = 5.000 vs. mean ± SD = 0.286 ± 1.590 and median = 0.000, p = 0.0003), increased grand rounds presentations (mean ± SD = 8.111 ± 9.981 and median = 3.000 vs. mean ± SD = 0.286 ± 0.914 and median = 0.000, p = 0.0085), more grants awarded (mean ± SD = 2.4000 ± 5.317 and median = 1.000 vs. mean ± SD = −0.143 ± 0.663 and median = 0.000, p = 0.0196), and additional faculty mentees (mean ± SD = 5.556 ± 8.960 and median = 0.000 vs. mean ± SD = 0.286 ± 0.825 and median = 0.000, p = 0.0085; Table 5). There was not a statistically significant difference in the following accomplishments in 2019, when the leaders’ accomplishments were compared to those of the nonleader members: websites (p = 0.3636), blogs (p = 0.7036), or podcasts (p = 0.2641) created; abstract presentations (p = 0.1007); books (p = 0.1212) or book chapters (p = 0.1027) written; student/resident mentees (p = 0.0798) or mentors gained (p = 0.2349); number of promotions obtained (p = 0.3986); and number of curriculum products created (p = 0.5246).

**DISCUSSION**

Academic productivity increased significantly among ADIEM leadership after the founding of the academy.
In particular, the average number of manuscript publications tripled, the number of didactic presentations nearly doubled, and the number of grand rounds presentations increased by greater than eightfold among faculty leaders after ADIEM was introduced. Moreover, ADIEM leaders note a near fourfold increase in their number of medical student and resident mentees, which enhances the pipeline for URiM’s interested in EM.

These findings are consistent with prior studies showing that membership in a professional organization increases opportunities for networking, training, and career advancement. For nonleader respondents, we did not see similar results noted in their responses.

Study findings may have significant implications for professional societies moving forward. EM as a field continues to struggle to train a diverse physician workforce. Women represent only 25% of active EM physicians, and Black, Hispanic, and Native American physicians comprise less than 10% of all active EM physicians. While evidence-based interventions are needed to increase diversity in EM, holding a leadership position in ADIEM seems to be associated with several key metrics for success in academic medicine including manuscript publications, didactic presentations, and grand rounds presentations among its leadership. Investment in additional resources into both ADIEM and other professional societies whose mission involves supporting underrepresented groups in medicine may be an effective intervention to promote diversity in the physician workforce.

While findings from our study do note several potential benefits associated with ADIEM, it is important to note some areas where improvement did not change in a statistically significant fashion. Of note, the number of educational grants did not increase among our study participants after the founding of ADIEM. It is possible that study respondents have a more clinical or administrative focus in their careers, or the development of grant funding may take longer than the 6-year period we analyzed; nevertheless, grant funding remains a key metric for success in academic medicine. Additionally, the number of promotions did not change in a significant manner for survey participants after the formation of ADIEM. While it is possible that more time is needed before the effect of ADIEM on member promotions is evident, additional study into promotions is warranted as significant literature exists that racial/ethnic minority and women of all colors are less likely to be promoted in academic medicine than their counterparts.13,14

### Table 3

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<th>Educational Scholarship and Mentor/Mentees of ADIEM Leaders Before and After the Founding of ADIEM</th>
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ADIEM = Academy for Diversity and Inclusion in Emergency Medicine.

*All p-values were calculated using Wilcoxon signed-rank test, except for the websites and blogs, in which case Fisher’s exact test was used.
†P-value revealed a statistically significant difference for ADIEM Leaders after ADIEM’s founding.
noting that study participants did not report gains in the number of mentors after the introduction of ADIEM. This may reflect the lack of diversity currently in EM and represent further impetus to strengthen the opportunities for physicians from all demographic backgrounds in EM.

LIMITATIONS

Limitations of the study include a small sample size. This is an observational study, and consequently, causation cannot be determined. It is possible that there are unexamined variables that might account for study findings. While study participants who held leadership positions in ADIEM were similar to nonleaders across several domains prior to ADIEM’s founding, it is possible that there are factors not explored in this study that ultimately explain the difference in productivity between ADIEM members who did and did not hold leadership positions. Additionally, there is the potential for response bias.

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<th>Table 4</th>
<th>Educational Scholarship and Mentor/Mentees of ADIEM Nonleader Members Before and After the Founding of ADIEM</th>
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<td>Websites</td>
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<td>Grand rounds presentations</td>
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<td>Grants obtained</td>
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<td>Student/resident mentees</td>
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<td>Faculty mentees</td>
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<td>Mentors gained</td>
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<td>Promotions received</td>
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<tr>
<td>Curriculum products</td>
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</table>

**ADIEM** = Academy for Diversity and Inclusion in Emergency Medicine.
*All p-values were calculated using Wilcoxon signed-rank test, except for the websites and blogs, in which case Fisher’s exact test was used.
†p-value revealed a statistically significant difference for ADIEM Nonleader Members after ADIEM’s founding.

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<thead>
<tr>
<th>Table 5</th>
<th>Comparison of Differences Between ADIEM Leader and Nonleader Member Accomplishments After ADIEM’s Inception</th>
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<td><strong>Nonleader Members</strong></td>
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<td>Faculty mentees</td>
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Post-ADIEM Accomplishments minus pre-ADIEM accomplishments were calculated. A minus value indicates that the accomplishments decreased after ADIEM’s inception.
ADIEM = Academy for Diversity and Inclusion in Emergency Medicine.
*All p-values were calculated using Mann-Whitney U-test.
CONCLUSION

The formation of a specialized academy within a national medical society has advanced academic accomplishments in diversity, equity, and inclusion in emergency medicine among its leaders. Organizations similar to the Academy for Diversity and Inclusion in Emergency Medicine have been successful in advancing women. Leadership in EM is essential for building a successful recruitment and retention program of underrepresented in medicine physicians, and emergency medicine leaders must be directly involved and vested in all aspects of outcomes. Leadership and involvement of underrepresented in medicine and lesbian, gay, bisexual, or transgender faculty in an Academy fosters mentoring, faculty development, and capacity for educational scholarship and can serve as a foundation for academic promotion. Further research is needed to determine if strategies such as engagement in leadership in targeted organized groups, such as the Academy for Diversity and Inclusion in Emergency Medicine, is sustainable to ensure diversity and inclusion in academic emergency medicine.

The authors acknowledge and thank SAEM and ADIEM membership for their engagement and support of this work.

References


Supporting Information

The following supporting information is available in the online version of this paper available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10427/full

Data Supplement S1. ADIEM Member Accomplishments Survey.
The Case for Observation Medicine Education and Training in Emergency Medicine

Margarita E. Pena, MD1, Matthew A. Wheatley, MD2, Pawan Suri, MD3, Sharon E. Mace, MD4, Elizabeth Kwan, MD5, and Christopher W. Baugh, MD, MBA6

ABSTRACT

Background: Many hospitals have or will be opening an observation unit (OU), the majority managed by the emergency department (ED). Graduating emergency medicine (EM) residents will be expected to have the knowledge and skills necessary to appropriately identify and manage patients in this setting. Our objective is to examine the current state of observation medicine (OM) education and prevalence in EM training.

Methods: In a follow-up to the 2019 Society for Academic Emergency Medicine (SAEM) OM Interest Group meeting, we convened an expert panel of OM physicians who are members of both the SAEM OM Interest Group and the American College of Emergency Physicians Section of OM. The panel of six emergency physicians representing geographic diversity was formed. A structured literature review was performed yielding 16 educational publications and sources pertaining to OM education and training across all specialties.

Report on the Existing Literature: Only a small number of EM residencies have a required or elective OM rotation in an OU. An OM rotation in a protocol-driven ED OU gives residents experience managing patients in this setting and improves skills integral to EM and part of the EM milestones and Accreditation Council for Graduate Medical Education (ACGME) core competencies: reassessment, disposition decision making, risk stratification, team management, and practicing cost-appropriate care. Even without a formal rotation, multiple OM educational resources can be incorporated into EM resident education and didactics. Education research opportunity exists.

Conclusions: This panel believes that OM is an important component of EM that should be incorporated into EM residency as the knowledge and skills learned such as risk stratification, disposition decision making, and team management augment those needed for the practice of EM. There is a distinct opportunity for EM educators to better equip their trainees for a career in EM by including OM education and experience in EM residency training.

Observation is an essential skill for all physicians. In 400 B.C, Hippocrates, the father of medicine, recognized the value of observation: “A great part, I believe, of the art is to be able to observe.” In emergency medicine (EM), observation has its own unique role. Although a patient may present with nonspecific
symptoms, diseases evolve over time. Over a period of emergency department (ED) observation, serious conditions can become more obvious or a response to treatment (or lack thereof) may clarify the path back to wellness.

Almost one-quarter of the patients we treat in the ED will not be ready, stable, or safe to discharge home after a typical visit and will require further observation for testing and/or interventions. Before the emergence of the observation unit (OU), only two dispositions were possible—admission to an inpatient unit or discharge home. This frequently left emergency physicians with difficult disposition decisions if there was clinical uncertainty after initial ED evaluation and the patient did not meet or qualify for inpatient admission. Do we risk discharging a patient, hoping they will do okay and that we will not hear those three dreaded words the next day: “remember that patient . . .?” Do we watch the patient in the ED for several more hours thus decreasing ED capacity and forcing undifferentiated patients to remain in our waiting room? Do we exacerbate inpatient boarding and risk our credibility with the admitting services by admitting a patient who may be ready for discharge the next day? EM leaders have long recognized the need for another disposition option for exactly this type of patients—observation.

Emergency medicine has established itself as the leader in the science and practice of observation medicine (OM). Internal medicine, through the Society of Hospital Medicine, has expressed some interest in this field. However, in their white paper, OM was discussed as an administrative burden. OM encompasses the skill and knowledge needed to appropriately identify patients for observation and actively manage them beyond initial ED care typically up to 24 hours. The American College of Emergency Physicians (ACEP) first issued OM practice guidelines in 1988 and the OM section was established in 2001. For over 30 years, the vast majority of OM literature concerning management principles and strategies, patient selection, operational processes, economics, and quality improvement has been published by emergency physicians. OM textbooks and short-stay management books of chest pain, heart failure, and atrial fibrillation have also been authored by emergency physicians and a book chapter on OM is included in an EM textbook. The science and practice of OM have been formalized and refined in the years since the first OUs were opened and patient care pathways put in place. However, OM education and exposure to OM during EM training has been less well studied. With the increasing number of OUs, it will be more likely that an EM graduate will find a job at a hospital with an OU, and knowledge of OM and the skills necessary to identify ED patients appropriate for this disposition option and manage them beyond their 6-hour ED stay will be expected. In spite of the first OM curriculum published in 1992, this has not been routinely incorporated into EM residency programs. Our objective is to examine the current state of OM education and prevalence in EM training.

**METHODOLOGY**

The importance of EM resident exposure to OM and increasing awareness of OM in the EM medical education community was a central topic of discussion at the 2019 SAEM OM Interest Group meeting. In follow-up to this meeting, we convened an expert panel of OM physicians who are members of both the Society for Academic Emergency Medicine (SAEM) OM Interest Group and ACEP Section of OM. The panel consisted of six emergency physicians who work at academic sites with EM residencies and an OM curriculum in place at various sites across the United States representing geographic diversity. Panelists demonstrated experience in resident education and content expertise in OM via their local and national leadership roles and academic publications.

We performed a structured literature review of PubMed, SCOPUS, and Google with the assistance of medical librarians to create a resource library for panel members. The literature search focused on physician OM education and training. We searched for relevant keyword terms (e.g., observation, OM, OU, short-stay unit, ambulatory care setting, in association with education, EM education, medical education, resident education, medical student education, rotation, and/or curriculum). The search yielded a total of seven full articles, two abstracts, two book chapters, four websites, and one letter to the editor pertaining to OM education and training across all specialties. Panelists were presented with a summary table (see Data Supplement S1, available as supporting information in the online version of this paper, which is available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10413/full) and online access to PDF copies or links.
THE CURRENT STATE OF OM EDUCATION

Observation Care
Observation care as defined by the Centers for Medicare and Medicaid Services (CMS) is “a well-defined set of specific, clinically appropriate services, which include ongoing short-term treatment, assessment and reassessment, that are furnished while a decision is being made regarding whether patients will require further treatment as hospital inpatients or if they are able to be discharged from the hospital.” Observation is a (billing) status and not a location and patients receiving observation care are considered outpatients. Multiple forces have led to an increase in observation care after the introduction of the prospective payment system and diagnostic-related group in 1983. Since hospitals received a single payment based on a patient’s diagnosis, a short length of stay was profitable but not if a patient had a longer than expected stay due to inefficiency, complications, etc. However, this required that admission criteria be met or the hospital would face penalties. Since then, mounting evidence that observation protocols can safely shorten hospital length of stay, increasingly stringent third-party classification systems for admission criteria (e.g., InterQual), inpatient payment denials by insurers, and significant hospital losses due to audits from recovery audit contractors have all contributed in some way to the rise of observation stays.3,14

Patients in observation status are cared for in four different types of settings (see Table 1). Currently in the United States, over two-thirds of these patients are cared for in a type 4 setting, that is, in a hospital ward bed mixed in with inpatients and managed by various provider types with variable care.15 In contrast, patients placed in the type 1 setting of a protocol-driven OU receive active management by a single provider type, utilize evidence-based standardized protocols and clinical pathways, and have a mean length of stay of 15 hours.3 Numerous studies of various conditions have found that compared to inpatient treatment, care given in a dedicated, protocol-driven OU is more efficient and cost-effective, has improved patient outcomes and has greater patient satisfaction.16 In the study by Ross et al.15 comparing a type 1 to a type 4 setting, they found a type 1 setting had a 23% to 38% shorter length of stay, a 17% to 44% lower probability of subsequent inpatient admission, and cost savings of 27% to 42%. Moreover, if all appropriate observation status patients in the United States were cared for in a type 1 unit, they estimated that the national cost savings would be $5.5 to $8.5 billion.

OM Experience in EM Training
The percentage of hospitals in the United States with an OU has increased from 19% found in a 2003 national survey to 36% as per 2007 National Hospital Ambulatory Medical Care Survey data.17,18 Most recently, the 2016 summary tables of NHAMCS show that an estimated 44.6% of hospitals have an OU.19 With over half of OUs currently managed by the ED and as EDOUs continue to open, it is becoming increasingly important for residents to have OM experience. However, a 2002 national survey of EM residency programs found that only 9.8% of programs required their residents to have OM experience. Of those without an OM requirement, only 25.5% offered an observation elective.20

Observation medicine clinical rotations are available as elective EM rotations for medical students and are typically 4 weeks.21,22 Developing OM curricula and educational materials for medical student education is an objective of the SAEM OM interest group and development of an OM Roadmap for the SAEM residents and medical students webpage is in process. Fellowship programs in OM are available to board-eligible or board-certified EM-trained physicians (see Table 2). These are 1 to 2 years in length with clinical, administrative, and/or research components. All are designed to provide the expertise needed for directorship or to start an OU.23 Some programs include

<table>
<thead>
<tr>
<th>Table 1</th>
<th>The Four Types of Settings Where Observation Services Are Provided</th>
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<tbody>
<tr>
<td>Type</td>
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<tr>
<td>1</td>
<td>Distinct unit</td>
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<td>2</td>
<td>Distinct unit</td>
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<tr>
<td>3</td>
<td>Inpatient unit</td>
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<tr>
<td>4</td>
<td>Inpatient unit</td>
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</table>

OU = observation unit. Adapted from Ross et al.15
Table 2
Observation Medicine Resources and Materials (Listed Alphabetically and Chronologically)

<table>
<thead>
<tr>
<th>Conferences</th>
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<tbody>
<tr>
<td>Center for Emergency Medical Education Observation Care. <a href="https://www.ceme.org/obs">https://www.ceme.org/obs</a></td>
</tr>
<tr>
<td>World Congress Observation Management Summit</td>
</tr>
<tr>
<td>Sponsor: The American Board of Quality Assurance and Utilization Review Physicians, Inc. <a href="https://www.worldcongress.com/events/hl19074/">https://www.worldcongress.com/events/hl19074/</a></td>
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<td>ACEP Observation Medicine Section. Observation Medicine Toolkit. <a href="https://www.acep.org/by-medical-focus/observation-medicine/observation-services-toolkit/">https://www.acep.org/by-medical-focus/observation-medicine/observation-services-toolkit/</a></td>
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<th>Fellowship training*</th>
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<tr>
<td>Emory University School of Medicine Atlanta, GA <a href="http://www.em.emory.edu/education/fellowship/observation.html">http://www.em.emory.edu/education/fellowship/observation.html</a></td>
</tr>
<tr>
<td>John Hopkins Medicine, Baltimore, MD <a href="https://www.hopkinsmedicine.org/emergencymedicine/fellowship_programs/observation.html">https://www.hopkinsmedicine.org/emergencymedicine/fellowship_programs/observation.html</a></td>
</tr>
<tr>
<td>University of Colorado School of Medicine, Aurora, CO <a href="http://www.ucdenver.edu/academics/colleges/medicalschool/departments/EmergencyMedicine/Education/Graduate-Medical-Education/Pages/Administration-Operations-and-Quality-Fellowship.aspx">http://www.ucdenver.edu/academics/colleges/medicalschool/departments/EmergencyMedicine/Education/Graduate-Medical-Education/Pages/Administration-Operations-and-Quality-Fellowship.aspx</a></td>
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<tr>
<td>University of North Carolina, Chapel Hill, NC <a href="https://www.med.unc.edu/emergmed/education/fellowships/administration-leadership-fellowship/">https://www.med.unc.edu/emergmed/education/fellowships/administration-leadership-fellowship/</a></td>
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</table>

* Length of fellowship varies, is from 1- 2 years; some are administrative fellowships with observation medicine included in the curriculum.

<table>
<thead>
<tr>
<th>Journal issue</th>
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<tr>
<th>Professional organizations</th>
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<tbody>
<tr>
<td>American College of Emergency Physicians (ACEP) Observation Medicine Section <a href="https://www.acep.org/how-we-serve/sections/observation-medicine/">https://www.acep.org/how-we-serve/sections/observation-medicine/</a></td>
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<tr>
<td>Society of Academic Emergency Medicine (SAEM) Observation Medicine Interest Group <a href="https://community.saem.org/communities/community-home?CommunityKey=43915757-b5b7-4abf-abbe-7c086f200b01">https://community.saem.org/communities/community-home?CommunityKey=43915757-b5b7-4abf-abbe-7c086f200b01</a></td>
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<th>Textbooks</th>
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<tr>
<td>Williams &amp; Wilkins, 2006.</td>
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<tr>
<th>Textbook chapter</th>
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EMRA = Emergency Medicine Residents Association.
attainment of an advanced degree (e.g., Masters in Business Administration or Public Health). There are also fellowship programs in Administration that incorporate OM into the curriculum. Although these are non-Accreditation Council for Graduate Medical Education (ACGME) fellowship programs, SAEM has developed a process by which eligible fellowship programs can earn the endorsement of SAEM as an approved fellowship.24

Emergency medicine resident interest in OM is demonstrated through their involvement with OM publication authorship, research presentations in EM national conferences such as ACEP and SAEM, membership in the ACEP OM section and SAEM OM Interest Group, and OM conference attendance. The Emergency Medicine Residents Association (EMRA) Fellowship Guide available online includes a section on OM fellowships authored by medical students and EM faculty.23 Their website also includes information for medical students interviewing for EM residency and knowledge of OM is included in the “Hot Topics in EM a.k.a EM Issues to Know for Interview Day.”25

**OM Resources and Materials**

There are avenues for EM residents to be involved in OM national and local committees and/or interest groups or attend OM conferences offered yearly to learn more about the OM field and network with OM experts and OU directors. OM educational resources and materials such as textbooks and a journal issue dedicated to OM are available as well as a model longitudinal curriculum developed by a consensus of OM content experts and approved by the SAEM and ACEP Board of Directors that has recently been published.26 The curriculum paper also includes a list of suggested reading for EM residents by postgraduate year (PGY) that could be included in a program’s resident reading list. Didactic and asynchronous learning materials could be incorporated into EM training and faculty development even in programs at institutions without an OU. The 2002 national survey of EM residency programs mentioned above also found that the proportion of faculty who had OM experience as a resident was only 11.3% so there is opportunity for faculty learning. Based on our literature review, opportunity also exists for more research pertaining to OM education and training. Table 2 includes a list of available OM resources and materials.

The next section provides a practical guide on how to implement OM into a residency program. A critical first step is to take stock of your existing OM resources. Does the program have a dedicated OU? If yes, then is it an open or a closed unit? Who is responsible for running this unit? How much departmental and institutional support can be expected for this initiative? Do you have a faculty champion interested in learning and teaching OM? The answers will guide a viable OM education implementation strategy.

**Implementation of OM in EM Education and Training**

Similar to the ACGME graduated responsibility model, longitudinal OM education should increase exposure and responsibility in a stepwise fashion throughout residency.27 The goal for 3-year programs is for the resident to feel comfortable effectively managing patients in an OU when they begin independent practice. In 4-year programs, senior residents can get exposure to OU management and protocol design. This will allow them to take on medical direction and acquire skills in starting an OU after residency.

The longitudinal OM curriculum based on ACGME core competencies describes three elements essential to teaching OM: didactic presentations, self-directed learning, and longitudinal learning (bedside instruction).26 Incorporation of any of these elements into an existing residency program can be challenging as educators need to balance resident duty hours, existing rotation agreements, and other department coverage priorities. Additionally, the presence and location of the OU will have the most impact on the design of a clinical rotation.

Didactic instruction is perhaps the easiest element to incorporate into an EM residency curriculum. This element can include traditional lectures, asynchronous learning, small-group exercises, flipped classroom activity, journal club, and morbidity and mortality cases from the OU (if present). A novel way to teach OM through a “serious game” has also been introduced.28 The simplest solution is to have a dedicated module on OM that every resident will be exposed to at least once in residency. This can include general concepts of observation care as well as specific conditions amenable to observation. A more nuanced approach would be to have recurrent exposure to observation topics that are specific to the level of resident training. This can be accomplished through dedicated class conference days. PGY-1 instruction should focus on review of the foundational literature, patient selection for observation care, applying inclusion and exclusion
criteria, and case review. PGY-2 residents should focus on the specifics of protocol design and in-unit management of observation patients. Small-group exercises could involve a knowledge translation project where a new protocol is researched, designed, and enacted. Senior-level resident curriculum should focus on broader administrative subjects for the OU, such as metrics that indicate a high-versus low-performing unit.

Asynchronous learning should augment clinical and bedside exposure to OM. The relative proportion of self-study to didactics will depend on the number of faculty who feel comfortable teaching OM as well as the size of the residency. At smaller residencies, OM rotations may include one to two residents per month. Residencies without dedicated OM faculty who may use self-study modules are an ideal way to expose residents to basic concepts of OM, specific patient care protocols, and discussion of the most recent research topics. Self-study materials may include a list of foundational OM papers and prerecorded lectures on individual OU protocols. Residents could move through the material at their own pace and be required to complete a posttest. A training session that includes a pretest, learning module, and posttest using an online platform has been described.

To adequately prepare EM residents for the care of observation patients, they need regular exposure to patients in an OU setting, ideally a protocol-driven EDOU. This experience can occur as part of a dedicated OM rotation or regular OU shifts. This is likely the most difficult part of the curriculum to work into an overall residency education strategy as it is influenced by the presence and location of an OU as well as the current resident rotation schedule. A description of a required OM rotation for second-year EM residents is included in a textbook chapter of OM. An example of an OM rotation during EM residency with goals and specific learning objectives is seen in Table 3.

Training sites without an EDOU may need to create an away rotation or one where residents round on patients under observation being managed by inpatient services. Training sites with a dedicated OU will need to decide between a dedicated OU rotation versus regular OU/EM shifts. This decision will likely be influenced by the location and attending staffing of the OU as well as the ability to alter the existing resident rotation or clinical schedule. An EDOU geographically separate from the ED may benefit from a dedicated rotation or dedicated OU shifts. This is especially true if it is staffed by a dedicated OU attending who is not concurrently working an ED shift. This allows for the OU team to have more in-depth teaching rounds. Settings in which the EDOU is colocated in the ED may benefit from having residents working regular, combined OU/ED shifts. They can be paired with faculty in both locations for supervisory and education purposes.

During the OU shifts, residents should assume primary responsibility for patients in the OU including appropriate OU documentation. Residents can begin their shift by interviewing and examining patients, reviewing available diagnostics, and following up with any consultations. On rounds, they should then be able to discuss likely disposition from the OU with the attending and anticipate barriers to timely disposition. Bedside teaching by the attending can focus on how decisions are made regarding admission or discharge from the OU.

**IMPLICATIONS OF OM IN EM EDUCATION AND TRAINING**

The 2016 Emergency Medicine Clinical Practice Model includes observation and reassessment as one of the key physician tasks. In the EM milestone “disposition” (PC7), residents should be able to “correctly assign admitted patients to an appropriate level of care (ICU/telemetry/floor/OU) to reach Level 3. Historically, EM residents were exposed to disease pathophysiology beyond the acute ED phase by rotating for a month or two on inpatient medicine wards. There has been a growing trend among EM residency programs to eliminate this inpatient ward experience. In 1986, 74% of EM residencies had internal medicine rotations with a mean duration of 10.4 weeks. In 2018, among 3-year residencies, only 23% had internal medicine rotations with a mean duration of 4.2 weeks. Of 4-year residencies, 66% had internal medicine rotations with a mean duration of 4.8 weeks. Exposure to a formal OU rotation or a structured OM curriculum would allow residents to follow disease progression after the acute ED phase by rotating for a month on an inpatient medicine ward. There has been a growing trend among EM residency programs to eliminate this inpatient ward experience. In 1986, 74% of EM residencies had internal medicine rotations with a mean duration of 10.4 weeks. In 2018, among 3-year residencies, only 23% had internal medicine rotations with a mean duration of 4.2 weeks. Of 4-year residencies, 66% had internal medicine rotations with a mean duration of 4.8 weeks. Exposure to a formal OU rotation or a structured OM curriculum would allow residents to follow disease progression after the acute ED presentation and improve their ability to better predict patient outcomes beyond the typical ED stay. The opportunity to witness the safe discharge of some OU patients while seeing others declare themselves and require subsequent inpatient admission informs future disposition decision making. Even if we ignore the fact that EM residents will likely
practice in a hospital with an OU after graduation and will be expected to have some OM knowledge and skills, refining disposition decision making improves one’s practice of EM and is another persuasive argument to incorporate OM education into the EM residency curriculum. Although it can be argued that residents may be able to achieve some competency in this seventh milestone through reevaluation of boarded ED patients, these are sicker, already dispositioned patients. Typically, only emergent intervention is provided by the ED physician as the patient awaits inpatient placement. These patients are not representative of the OU appropriate patient receiving standardized care. Furthermore, changes in patient disposition made by the ED physician will be only to a higher level of care (intensive care unit). The decision to discharge typically falls to the admitting physician.

Disposition decisions are highly consequential, impacting patient outcomes as well as hospital and ED throughput. It is an essential skill learned by EM physicians. The 2016 Emergency Medicine Clinical Practice Model lists the physician task definition of transition of care as “Arrange for patient admission, discharge (including follow-up plan), observation, or transfer and transitions of care as appropriate ....”

An important determinant of the quality of their disposition decisions is the understanding of the natural history of disease process. This understanding is a function of how much time a physician gets to spend observing the disease entity. Emergency physicians typically see patients with an acute illness or an acute complication of a chronic illness during its initial presentation. Since the majority of patients are either discharged or admitted from the ED within a short time

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**Table 3**

Example of a Four-week OM Rotation

<table>
<thead>
<tr>
<th>Goals</th>
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<tbody>
<tr>
<td>• Expose EM residents to an ED-managed protocol-driven OU</td>
</tr>
<tr>
<td>• Further develop clinical skills in assessment, treatment, and discharge planning</td>
</tr>
<tr>
<td>• Coordinate care plans across other physician and health care providers</td>
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**Learning objectives**

1. **Patient care**
   - Manage independently a service of up to eight to 15 observation patients
   - Coordinate care among specialty providers, social workers, and case management
   - Perform standard medical procedures as indicated

2. **Medical knowledge**
   - Learn inclusion and exclusion criteria for OU-appropriate patients
   - Diagnose and treat common observation conditions
   - Recognize the need for appropriate subspecialty involvement in complex cases

3. **Practice-based learning and improvement**
   - Utilize available resources to make timely and appropriate diagnostic and management decision
   - Identify and apply hospital system and evidence-based clinical guidelines in the diagnosis and management of patients
   - Use information technology to manage patient-specific information and document appropriately for observation care

4. **Interpersonal and communication skills**
   - Demonstrate effective communication skills and strategies in facilitating patient care within the health care system
   - Provide effective and efficient sign-outs to other OU providers
   - Direct discharge planning to maximize patient safety and well-being in the transition to the outpatient setting including appropriate correspondence with outpatient providers, social work, and case management/discharge planner

5. **Professionalism**
   - Demonstrate respect and compassion through interaction with other health care professionals, patients, and their families
   - Communicate succinctly to consultants, outpatient providers, and other team members about patient care issues
   - Advocate for patients within the health care system, demonstrating sensitivity and responsiveness to patients’ culture, age, sex, and disabilities

6. **Systems-based practice**
   - Demonstrate an understanding of the complexity of directing effective patient-centered care in a hospital system
   - Gain familiarity in the billing and reimbursement for observation services
   - Perform discharge paperwork and discharge summaries as required

**How learning objectives are met**

- Work eight 10-hour shifts supervised by the attending OM physician. Primary responsibility will be independent management of eight to 15 observation patients.
- Read the assigned medical literature covering topics pertaining to OM and discuss one topic with the OM physician during each shift
- Meet with the OU medical director to learn the fundamentals of billing and reimbursement for observation services

OM = observation medicine; OU = observation unit.
frame of 4 to 8 hours, the ED physician is usually very good at predicting short-term patient outcomes. When predicting patient outcomes 24 hours or more in the future, the crystal ball starts getting cloudy.

Experience in an OU allows extended care of patients at intermediate risk and teaches evidence-based risk stratification that impacts disposition decisions. Patients of intermediate risk for certain common conditions such as chest pain, heart failure, syncope, and transient ischemic attack are appropriate for an OU with the added benefits of a shorter length of stay and being less costly compared to admission to an inpatient unit.34–38 As health care systems strain to reduce costs, the threshold for inpatient admission gets higher and more intermediate risk patients are placed in observation. Early exposure to OM gives students a general awareness of the types of patients and conditions that are cared for in an OU and a better understanding of the clinical course of this distinct patient population and assists in acquiring initial skills of risk stratification and disposition decision making.45 OM knowledge gained during their EM rotation can be translated to other clinical rotations that may also have patients in an observation setting such as pediatrics, internal medicine, and surgery.

In summary, this panel believes that OM is an important component of EM that should be incorporated into residency training. OM knowledge and skills learned augment those needed for the practice of EM. As EDOUs continue to open, it is becoming increasingly important for residents to have OM knowledge and experience. There is currently a need for EM educators to include OM education and experience in EM residency training to better equip them for a career in EM. Involvement in OUs also fosters collaboration across the medical center and may lead to leadership and development opportunities.

REFERENCES


Supporting Information

The following supporting information is available in the online version of this paper available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10413/full

Data Supplement S1. Observation medicine education and training literature search summary.
Emergency Medicine Education Research Since the 2012 Consensus Conference: How Far Have We Come and What’s Next?

Michael Gottlieb, MD\textsuperscript{1,}\textsuperscript{a}, Teresa M. Chan, MD, MHPE\textsuperscript{2,}\textsuperscript{b}, Samuel O. Clarke, MD, MAS\textsuperscript{3,}\textsuperscript{b}, Jonathan S. Ilgen, MD, MCR\textsuperscript{4,}\textsuperscript{b}, Jaime Jordan, MD\textsuperscript{5,}\textsuperscript{c}, Phillip Moschella, MD, PhD\textsuperscript{6,}\textsuperscript{c}, Sally A. Santen, MD, PhD\textsuperscript{7,}\textsuperscript{d}, Lalena M. Yarris, MD, MCR\textsuperscript{8,}\textsuperscript{d}, and Wendy C. Coates, MD\textsuperscript{5,}\textsuperscript{d}

ABSTRACT

In 2012, the Society for Academic Emergency Medicine convened a consensus conference on the state of medical education research with goals of defining and advancing a future research agenda. Since that time, emergency medicine (EM) education research has grown significantly. A task force of EM education experts was assembled and sought to understand the current state of EM education research and future directions. Among the advances are increases in medical education fellowships, advanced degree and certification programs, faculty development programs, publication venues, and funding. These findings are discussed in light of the prior objectives from the 2012 consensus conference, and recommendations for future directions are provided.

Over a decade ago, leaders in emergency medicine (EM) education identified a need to bring key stakeholders together to form an intentional roadmap to facilitate our specialty’s growth in medical education research. The 2012 Academic Emergency Medicine (AEM) consensus conference “Education Research in Emergency Medicine: Opportunities, Challenges, and Strategies for Success” convened 175 participants who, with the guidance of national and international medical education and research experts, engaged in the work of developing an agenda for EM education research.\textsuperscript{1} The conference mission was “to stimulate the development of a coordinated initiative within EM to inform a research agenda in education science for the next decade [in order] to advance effective and validated methods of teaching and assessment at all levels.”\textsuperscript{1} The specific objectives are found in Table 1.

In the years since the conference, our field has seen significant growth in education research training opportunities, EM specialty-specific venues for publishing education scholarship, and prominence of EM education research leaders in national medical education arenas.\textsuperscript{2,\textendash}7 The topics pursued by EM education researchers have also evolved substantially since 2012 in response to programmatic changes such as the Accreditation Council for Graduate Medical Education...
Table 1
Specific objectives of the 2012 Academic Emergency Medicine consensus conference.1

| 1. Review the current state of research in EM instructional methods and identify the most critical agenda areas within each specific education research domain. |
| 2. Review the current state of research in assessment methods in EM and identify the most critical agenda areas within each core competency. |
| 3. Identify common barriers that educators face in conducting well-powered, rigorous education research and develop recommendations for overcoming these barriers. |
| 4. Develop a national agenda for strengthening the infrastructure around education research in EM, including: |
| b. Constructing a framework for an EM Education Research Consortium designed to foster multi-institutional and multidisciplinary collaboration; |
| c. Propose a coordinated agenda to promote grant-funded education research in EM. |

EM, Emergency Medicine

(ACGME) milestones project and the influences of novel modalities for education, assessment, and evaluation.8–17

In 2019, the Society for Academic Emergency Medicine (SAEM) Board of Directors convened a special task force, Advanced Research Methods Evaluation and Design for Medical Education (ARMed MedEd). The mission of this task force is to advance medical education research by providing high-quality training with a focus on early to midcareer medical education scholars who have some prior knowledge of basic education research principles. All members of the task force were appointed by the SAEM President-Elect based on their demonstrated expertise in this field. The task force consisted of 12 members ranging from assistant professors to tenured full professors with over 1,000 combined publications. The two objectives for this task force were to: 1) summarize and contextualize the current state of medical education research as a follow up to the 2012 AEM Consensus Conference and 2) design a longitudinal research course whose curriculum is aimed at the early to midcareer medical educator who has basic foundational knowledge of education research methods. To address this first component, the task force sought to identify the degree to which each of the AEM 2012 objectives was met.

The aim of this paper was to describe the progress in EM education research since the 2012 AEM consensus conference. This work will measure and describe changes in formal training opportunities (from episodic faculty development opportunities to dedicated postgraduate fellowships), trends in EM-sponsored education research funding opportunities, EM education research and publications, and venues for disseminating EM education scholarship. The current state of EM education research will be compared with the 2012 AEM consensus conference objectives as a means to highlight how critical agenda priorities have been addressed by the academic EM community over time. Finally, current gaps and future directions will be considered in order to inform future directions in EM education scholarship.

METHODS

The goal of this narrative review is to provide an overview of the growth of education scholarship within the field of EM since the 2012 AEM consensus conference, tracking general trends in publications and identifying infrastructure changes within academic emergency departments that provide ongoing support and faculty development. Given the intent of this article and the breadth of scholarship that falls under the umbrella of “education research,” the goal of our literature review was to illustrate general publications trends rather than to systematically review and synthesize the available literature.18

The authors searched PubMed and Google Scholar for relevant articles using search terms including medical education, health professions education, and emergency medicine, identifying relevant articles and resolving discrepancies by consensus. The authors then summarized the available information, iteratively discussed how these aligned with the 2012 AEM recommendations, as well as existing gaps, and provided recommendations for how to strengthen the support for EM education research. When existing research was unavailable, the task force members directly extracted publication-level data from major medical journals. In order to assess trends in publication types, the authors reviewed all original research articles in Academic Emergency Medicine over a 5-year period (2014–2018) and categorized articles by subtype. The authors specifically assessed the percentage of articles that utilized primarily qualitative methodology as this is more common in the health professions education (HPE) literature when compared with the EM literature. Because AEM Education and Training was started in 2017, the authors also assessed qualitative publications among AEM Education and Training from 2017 to 2018. The authors then compared the percentage of published qualitative studies
from 2014 to 2016 with 2017 to 2018. To assess grant funding, the authors reviewed all articles published in Academic Medicine and AEM Education Training from 2018 to 2019 and recorded how many original research articles were funded. The authors then compared the percentage of funded articles between the two journals. When assessing medical education fellowship data, the authors utilized the SAEM Fellowship Directory. As there is not a central database for advanced degree programs HPE, degree programs were identified through group consensus, querying of available literature, and review of websites from major medical societies frequented by EM educators (e.g., Association of American Medical Colleges, Accreditation Council for Graduate Medical Education, Council of Emergency Medicine Residency Directors, Society of Academic Emergency Medicine). Task force members engaged in regular phone calls and met in-person at the 2019 SAEM Scientific Assembly, as well as asynchronously using email and GoogleDocs. The advances and recommendations were iteratively derived based on the available literature and recommendations from the group.

ADVANCES IN MEDICAL EDUCATION SCHOLARSHIP

Medical Education Fellowships

During the 2012 AEM consensus conference, a breakout group convened to outline the suggested content and structure for medical education fellowships in EM. With a handful of fellowships already in existence, the group envisioned the emergence of two primary formats of education fellowships. The first would be focused on teaching, education innovations, and career development. The second would be devoted to developing education scholars and would focus on research training in addition to developing expertise in teaching, education innovations, curriculum design, programmatic assessment, and theories of learning. The second group was suggested to be longer (i.e., at least 2 years in length) to facilitate completion of an optional advanced degree, to allow sufficient time to produce a body of scholarly output, and to position graduates competitively within the academic EM job market.

The past 7 years have seen a steady growth in the number of EM education fellowships across the country. While these fellowships were guided by the recommendations put forth in the original consensus conference documents, many of the program-specific components (e.g., numbers of shifts, funding of degrees) and expected service activities (e.g., serving as an assistant program director or assistant clerkship director) are determined by the individual site. In response, the SAEM Fellowship Approval Committee was formed to review and approve non-ACGME fellowships (e.g., education, global health, administration, wilderness medicine, geriatric EM) to ensure greater uniformity and standards for these fellowships. This process was modeled after the approval process SAEM developed for research fellowships and was intended to ensure that non-ACGME-accredited fellowships share common standards for academic rigor, curricular breadth, and adequate clinical protection. In addition, SAEM maintains a directory of EM fellowships throughout the United States to raise their visibility and accessibility for potential applicants. The directory currently lists 32 active education fellowships in the United States, nine of which are categorized as education scholarship fellowships. Of these programs, 17 are 2-year programs, 11 are 1-year programs, and four did not have program length data available.

As the academic job market in EM has become more competitive, fellowship training among applicants is increasingly becoming the norm. Within the sphere of medical education, chairs in EM have expressed a growing recognition of the importance of education research, as well as the need for well-trained education researchers. However, while there are an increasing number of medical education fellowships, only a limited number are primarily focused on education scholarship.

Advanced Degree or Certification Programs

There has also been substantial growth in the world of structured HPE degree and certification programs. In 1996, there were only seven established HPE degree programs (University of Illinois at Chicago, University of Southern California, University of Calgary, Cardiff University, University of Dundee, University of Maastricht, and University of New South Wales). In 2012, there were 76 HPE degree programs worldwide. By 2013, the number had increased to 121 programs around the world. Similarly, doctoral programs have started becoming de rigueur; in 2014, there were 24 PhD programs focused on HPE, with many other adjunctive disciplines (e.g., psychology, generalist education, psychometrics/assessment, sociology, anthropology, kinesiology) also training scientists who enter into HPE.
Beyond these formal degree programs, there are other advanced certifications being developed in various jurisdictions to train clinical educators. Similar to the medical education fellowships described previously, these programs target advanced or fully qualified clinicians. In the United Kingdom, there is the Academy of Medical Educators,28 which aims to raise the capacity of medical and veterinary educators via their certification program. More recently, the Royal College of Physicians and Surgeons of Canada developed their Clinician Educator Area of Focus Competency Diploma program.29 This is a competency-based, time-variable, professional development program leading to an advanced designation.30 These emerging programs represent a new group of clinically relevant, skills-based training for interested educators. These programs aim to raise capacity in educators’ skills, providing a more practical training opportunity for those interested in the application of theory into practice.

Faculty Development Programs
In addition to fellowships and advanced degrees, external faculty development programs are also on the rise. Interprofessional courses, such as the Harvard Macy Program for Educators in Health Professions and the Association of American Medical Colleges’ (AAMC) Medical Education Research Certificate (MERC) programs, offer interprofessional opportunities for learning teaching and curricular best practices as well as the basics of education research. While few specialty-specific faculty development programs existed,31–33 the “MERC at CORD Scholars Program” within the community of EM educators provided an innovative structure for longitudinal project development, interinstitutional collaborations, and mentorship.34–36

With the advent of the Free Open Access Medical education (FOAM) movement, initiatives like the Academic Life in Emergency Medicine (ALiEM) Medical Education in Cases series,37 the Education Theory Made Practical electronic books,38 the Simulcast podcast for simulation educators,39 and the KeyLIME podcast40 have all emerged to help with the mission of fostering the continuing development of clinician educators and scholars.41–43

There has also been an increase in more robust faculty development offerings in medical education at university- or hospital-affiliated institutions, as well as at the national level.36,44–47 Externally, faculty development courses have also sprung up. Courses run by The Teaching Co-Op,48 Medutopia,49 ALiEM Faculty Incubator,50 and Emergency Medicine Educators Course51 have emerged, developed by interested and entrepreneurial educators looking to improve education.16

Publication Venues and Research
An earlier study of EM academic leaders perceived a lack of venues for publishing education scholarship.52 In recent years, there has been an increase in the number of outlets for medical education research. The number of HPE journals listed in the AAMC Annotated Bibliography of Journals for Education Scholarship increased 20% between 2016 and 2017.53 More specifically, the number of outlets for medical education research within EM has also increased. Examples of newer journals and special issues focused on EM education research include AEM Education and Training, Journal of Education and Teaching in Emergency Medicine (JETem), and the annual Council of Emergency Medicine Residency Directors/Clerkship Directors in Emergency Medicine supplemental issue of the Western Journal of Emergency Medicine. Many of these were developed in direct response to the needs identified by the AEM consensus conference. These offer increased opportunities for publishing medical education research within EM as well as allowing for targeted EM-specific education research to be published.

As a result of many of the above initiatives, there has been a significant increase in the number of medical education and HPE publications within EM. A search of PubMed from 2010 to 2018 assessing for the number of publications on medical education and HPE publications within EM. A search of PubMed from 2010 to 2018 assessing for the number of publications on medical education and health professions education in association with EM identified a greater than threefold increase in publications from 2010 to 2018 (Figure 1).

Additionally, there has been an overall increase in the quality of education research and expectations from EM and other fields.4,53–61 As consumers of research, educators are looking for more rigorous methods and conceptual frameworks in published research.54 In fact, the overall impact factor of medical education publications has also been increasing over time, which is likely due to a combination of greater number of publications and higher-quality research.53 As a result, EM education researchers are increasingly publishing in both EM and non-EM journals.63 This has resulted in increasing application of methods that are more common in other fields, such as the social sciences.

One example is the increased use of qualitative research within the EM literature. Historically,
qualitative methods were rarely represented in traditional EM journals, but with increased availability of education-focused journals, the method was increasingly appreciated and accepted. This can be seen when comparing data in Academic Emergency Medicine from 2014 to 2016 with 2017 and 2018, wherein the percentage of qualitative publications increased from 2.8% to 4.2%. Of note, AEM Education and Training was created as a companion journal to Academic Emergency Medicine in 2017. During that same period in 2017 and 2018, 11.4% of all publications in AEM Education and Training used qualitative methods. This suggests an increased recognition of qualitative research within more traditional EM and EM education journals. As this trend grows, there will be an increased need for more peer reviewers with expertise in social science– and education-based research methodology to match the rise in these publications.

**Funding**

Following the rapid growth of EM education fellowships and EM-specific HPE journals, there has been increased recognition of the need for investment and support for new scholars and research in this emerging field. External funding has been shown to be a crucial step toward the maturation of successful investigators and increasing the knowledge base complexity of publications. One series of articles evaluating EM education research found that the number of funded studies increased from 16% in 2014 to 20% in 2015, although this declined to 11% in 2016. We conducted a review of all publications from 2018 and 2019 in AEM Education and Training and found that 34% of original manuscripts had reported some form of funding. By contrast, the multidisciplinary medical education journal Academic Medicine had 41% of original literature publications reported some form of funding. This is encouraging, although further research is needed to better quantify the amount, breadth, competitiveness, and sources of funding as well as the role that funding plays in medical education research success.

Importantly, investment in primary investigators takes several forms as they mature within their field. While initial internal support is integral for a new investigator, sustained and often increasing demands for funding necessitate external support from other funding agencies. Within the clinical and basic sciences, receiving initial K12 grant funding through the National Institute of Health (NIH) has been associated with significant increases in future grant funding and scholarly productivity within EM. While NIH funding is limited, there have been increasing numbers of specialty-specific funding opportunities for EM HPE research through organizations such as the American College of Emergency Physicians, the Canadian Association of Emergency Physicians, the Council of Emergency Medicine Residency Directors, the Emergency Medicine Foundation, and the Society for Academic Emergency Medicine. However, the number of funding opportunities remains limited and it is essential that, as a specialty, we work to both increase internal and external funding opportunities and develop frameworks for education researchers to overcome funding obstacles through collaboration.
DISCUSSION

The objectives set forth for the 2012 AEM Consensus Conference have progressed at varying rates and the community of education scholars in EM has grown in numbers and quality.

Objective 1: Review the Current State of Research in EM Instructional Methods and Identify the Most Critical Agenda Areas Within Each Specific Education Research Domain

This objective established a baseline for experts in the discipline and identified a process by which the domain of education research could advance in a manner similar to emergency care research, by applying translational research principles (Table 2). The T1 level aims to take theoretical research and apply results to patient care in controlled settings. For medical education research, this involves applying cognitive, psychological, and educational principles and theories to learners in classrooms, simulation centers, and clinical settings to understand how theories behave in learners. The T2 level translates clinical trials outcomes to generate treatment guidelines to be applied broadly to patient care. In medical education research, once the learning process is understood, guidelines for educators can be developed and ideal educational methods for various types of learning needs can be identified. The T3 level broadens the scope of effective treatments to populations for a greater impact. An example in medical education research is the widespread adoption of simulation as a means to teach about a variety of teamwork, procedural, and rare patient conditions to learners.

Objective 2: Review the Current State of Research in Assessment Methods in EM and Identify the Most Critical Agenda Areas Within Each Core Competency

Assessment strategies in medical education were a relatively nascent field at the time of the AEM Consensus Conference. Educators at all levels were interested in finding optimal methods for assessing their learners. This was also at a time when core competencies in residency education were being modified to identify milestone-based subcompetencies. The conference’s keynote address, “The focus on competencies and individual learner assessment as emerging themes in medical education research” set the stage for eight of the breakout consensus sessions. Assessment has been a popular focus of education research in the ensuing years since the consensus conference.

Objective 3: Identify Common Barriers that Educators Face in Conducting Well-powered, Rigorous Education Research and Develop Recommendations for Overcoming These Barriers

Educators have reported barriers in obtaining protected time, departmental support, and funding for their research. They cited a lack of proper training in research methods and unavailability of appropriate training programs to develop this skill set. As described in our paper, numerous specialized fellowships have arisen and there are both society-driven and institutionally-driven short courses to establish basic knowledge. With these options, educators are now ready to advance their skills in research and scholarship. The emergence of graduate degree programs and focused longitudinal courses for intermediate skill development, such as ARMED MedEd, aim to further fill this need.

Objective 4: Develop a National Agenda for Strengthening the Infrastructure Around Education Research in EM, Including

A Development of postgraduate and longitudinal professional development opportunities for education researchers;

B Constructing a framework for an EM Education Research Consortium designed to foster multi-institutional and multidisciplinary collaboration;

Table 2

<table>
<thead>
<tr>
<th>Translational Research Level</th>
<th>Emergency Care Research</th>
<th>Medical Education Research</th>
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</thead>
<tbody>
<tr>
<td>T1</td>
<td>Bench research and clinical trials</td>
<td>Cognitive education theory and how learners learn in situ</td>
</tr>
<tr>
<td>T2</td>
<td>Clinical research and evidence-based guidelines</td>
<td>Learner processing and educational program comparisons, development of practice guidelines for educators</td>
</tr>
<tr>
<td>T3</td>
<td>Individual patient care and population care</td>
<td>Individual modalities, widespread standard of education practice, and impact on patient care</td>
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Adapted from Santen et al. 71
C Propose a coordinated agenda to promote grant-funded education research in EM.

Educators who are research experts began to address the task of strengthening the infrastructure by designing and implementing fellowships in education scholarship for graduates of EM residency programs. The creation of the Fellowship Approval Committee at SAEM is a good first step toward standardization of educational goals and objectives of education scholarship fellowships. Additional programs, such as MERC and the ALiEM Faculty Incubator, are longitudinal programs that have been developed to help address these needs. With the increased number of trained researchers, informal networks and consortia have formed to create multi-institutional collaborations. However, the establishment of a formal education research consortium remains a desired outcome among the community of researchers. Enacting this type of structured system would provide greater knowledge sharing and improve generalizability of educational innovations. Expansion of this network to include education researchers from medical school departments of education and scholars who practice in various clinical disciplines would further enhance the collaborative research enterprise.

A major barrier to high-quality research is the lack of funding available to education researchers. In general, funded research is of higher quality and the availability of targeted sources for education research is limited. However, limited mentorship and the absence of prior research funding remain major barriers to future research. Future efforts are needed to increase medical education research mentorship and funding to continue to advance this field.

CONCLUSION

The 2012 Academic Emergency Medicine consensus conference was instrumental in gathering like-minded experts with a goal of establishing an agenda for advancing the field of emergency medicine education research. Since that time, there have been significant advances in the field with respect to education, training, publication outlets, and funding for education researchers. However, despite these advances, we recognize a need for greater development and collaboration among investigators to continue the growth and sophistication of scholarship within the field. Scholarship in medical education requires unique knowledge and skills that are often not taught during medical school or residency training. This has contributed to a need for additional and advanced training, as evidenced by the increasing number of fellowships, degree and certification programs, and faculty development programs. Finally, individual institutions, as well as large funding agencies, must recognize the value of supporting continued training and collaboration to allow individual investigators to continue their growth. This will drive not only individual success but also that of the field at large.

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Gender Disparities in Academic Emergency Medicine: Strategies for the Recruitment, Retention, and Promotion of Women

Pooja Agrawal, MD, MPH1, Tracy E. Madsen, MD, ScM2, Michelle Lall, MD, MHS3, and Amy Zeidan, MD3

ABSTRACT

Although women comprise half of all medical students, the number of female academic emergency medicine (EM) physicians remains at approximately 27%. In addition, despite having equivalent credentials, female EM faculty remain underrecognized and undercompensated when compared to their male counterparts. Recent studies have shown superior outcomes among patients treated by EM physicians who are women; however, disparities in advancement persist. This white paper, prepared on behalf of the Academy for Women in Academic Emergency Medicine, describes recent evidence demonstrating gender disparities in the EM workforce including content presented at the 2019 Society for Academic Emergency Medicine Annual Scientific Meeting. The authors describe strategies to address the identified problems. Specific recommendations include individual as well as institutional/systems-level approaches to creating directed programming and initiatives to recruit, support, and promote women at all aspects of the career continuum.

The current political climate and dialogues stemming from the #MeToo movement have highlighted the ubiquitous presence of gender disparities across all aspects of the workforce. Academic emergency medicine (EM) is no different. The mission of the Academy for Women in Academic Emergency Medicine (AWAEM), an academy of the Society for Academic Emergency Medicine (SAEM), includes attracting women to academic EM, providing opportunities for faculty development, leadership, and mentorship to retain and elevate women, and to develop strategies to address barriers to the advancement of women in academic EM.

For over two decades, roughly half of all medical school graduates have been women.1 Despite equal representation at the medical school level, however, 2019 ACGME data show a striking trend that while 34.9% of EM residents are female, only 27% of EM physicians and 16% of EM chairs are female.2 In 2019, Association of American Medical Colleges (AAMC) data show that 36.2% of EM academic faculty and 12.7% of department chairs are women.3 There is a pipeline problem: fewer women are choosing academic EM, and some that do will not stay in academic EM for the length of their careers. This substantial decline in proportion of women from medical school to leadership positions among academic EM faculty groups is troubling and speaks to larger issues in the recruitment and retention of women in EM, as has been described previously in several published articles, including Kuhn et al.4

A growing body of evidence has revealed substantial gender disparities that may contribute to this lack of retention, including gender gaps in academic rank,
leadership positions, and salary. An additional theory is that women are more likely to face career stagnation manifested by promotion disparities. 2018 AAMC data show a decline in female representation at each escalating faculty rank position, from instructor (46.7%) to assistant professor (39.6%) to associate professor (28.9%) and full professor (18.1%). This difference in promotion is despite the fact that women are more likely to be fellowship trained, less likely to be core faculty, and less likely to hold administrative roles but work similar hours as their male counterparts. Women are less likely to be chairs, vice-chairs, or emergency department directors. Most strikingly, even after adjusting for a comprehensive list of variables including race, region, rank, years of experience, clinical hours, core faculty status, administrative roles, board certification, and fellowship training, the mean salary for women is $19,418 less than men. This gender salary gap has notably remained stable over the past few years.

The challenges described above all contribute to physician burnout, another factor that negatively impacts physician retention. Female physicians in particular demonstrate higher levels and manifestations of burnout. Female residents face gender-specific challenges in addition to the stress typically associated with residency. They receive quantitative and qualitative evaluations that are worse than their male counterparts from both nurses and faculty. Similarly, female faculty receive poorer teaching evaluations from students in comparison to their male counterparts. Female faculty and residents report higher rates of sexual harassment, gender bias, and discrimination directed from both patients and colleagues and ultimately higher rates of burnout and attrition from the workforce. Recognizing these risk factors and addressing disparities can help decrease burnout of female physicians and lead to better retention.

There should be little doubt that these disparities contribute to under recruitment, potentially poor retention and relatively less advancement of women in academic EM. Building and maintaining a diverse workforce in EM benefits not only EM physicians, but also patient care. For example, a 2016 study of the Medicare population showed that if male physicians had the same outcomes as female physicians, there would be 32,000 fewer deaths. Women are also two to three times more likely to survive a heart attack if their doctor is a woman. Female physicians may confer an additional benefit to their male counterparts: the same study found that male physicians had better patient outcomes when there was a higher percentage of female physicians within their group.

In 2008, the SAEM Task Force on Women in Academic Emergency Medicine provided recommendations for the recruitment, retention, and advancement of women in academic EM. While prior articles have made similar recommendations and some progress has been made, many of these recommendations remain relevant today. In this report, current leaders of the AWAEM, an academy within the SAEM, review recently published literature and present a series of strategies to address and combat these pervasive disparities.

THE FRAMEWORK

Prior literature has highlighted successful programmatic interventions for the advancement of women in academic medicine. A literature review by Laver and colleagues summarized findings, citing 18 studies that evaluated dedicated programming for women in academic medicine. Many programs were tailored to women at specific career stages and most commonly focused on mentoring, education, and professional development. They found that gender-specific programs at the national, institutional, and departmental levels had positive outcomes as measured by participant satisfaction, skill acquisition, and improvement. Data on more objective outcomes, i.e., promotion and retention, were mixed, pointing to the need for further research on institutional-level strategies that would increase the promotion and advancement of women.

Not surprisingly, a few studies assessed educational interventions on gender bias in hiring practices and demonstrated an enhanced awareness of gender bias after program implementation. Overall, some of the strategies described in the literature were flawed as they placed additional burden on individual faculty rather than targeting institutional-level strategies.

As evidenced by the wide spectrum of studies included in the review, there are many strategies to enhance the recruitment and retention of women in EM. We recommend implementing the following four concepts to guide global strategies: commitment to the education, management, and elimination of gender bias; affording women with equal access to opportunities and resources; providing leadership support and engagement; and supporting and creating a culture that strengthens work-life integration and family-friendly policies.
These concepts can be implemented at institutional, departmental, and individual levels and should be adapted and refined as appropriate. Programs should be tailored to the stage of each individual’s career, acknowledging that gender-specific challenges may be different throughout the continuum from residency to retirement. This is especially important as we consider and acknowledge the lack of equal advancement and the departure of women from academic medicine. A summary of recommendations is included in Table 1.

<table>
<thead>
<tr>
<th>Topic/Subtopic</th>
<th>Key Strategies</th>
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| **Recruitment** | - Expose students to EM early  
- Include female faculty in recruitment  
- Pair students with female mentors and arrange shadowing opportunities |
| **Resident selection** | - Implement gender-blind and holistic review of applications  
- Enlist a diverse selection committee  
- Conduct regular resident demographic audits and address imbalances |
| **Resident inclusion** | - Develop a dedicated mentorship program between female residents and faculty  
- Educate faculty on gender bias in evaluations, gender neutral feedback and communication  
- Engage with departmental, institutional, and national female professional development organizations |
| **Hiring processes** | - Provide job-specific mentorship on CV building, interview techniques, and contract negotiation  
- Discuss family-friendly policies during interviews with all applicants |
| **Retention** | - Use transparent metrics and evaluation rubrics to determine salaries and bonuses  
- Conduct regular audits to uncover differences in salaries and bonuses  
- Standardize and audit nonfinancial or indirect compensation  
- Consider using blinded techniques and external independent auditors  
- Elevate any persistent pay disparities to an institutional level |
| **Promotion** | - Promote female faculty to leadership positions within the department  
- Assign equitable value to teaching activities for those on clinical-educator track  
- Use transparent and standardized promotions criteria  
- Track promotion rates and include female faculty on promotions committees  
- Identify and support a confidential liaison to address bias-related concerns  
- Conduct periodic blind reviews of the promotion processes |
| **Combating burnout** | - Sponsor and support wellness programming within the department  
- Allow faculty personal time and schedule control as needed  
- Establish a culture of teamwork and relationship building  
- Conduct periodic wellness assessments and respond to any negative findings |
| **Faculty development** | - Provide time and resources for female faculty to travel to conferences  
- Support workshops on grant/manuscript writing and public speaking  
- Nominate female faculty for speaking opportunities, awards, editorial positions  
- Publicly amplify and highlight achievements of female faculty |
| **Family friendly** | - Provide 6 to 8 weeks’ parental leave and access to FMLA |
| **Policies** | - Ensure fair and transparent policies that provide adequate compensation, flexible scheduling, graduated return to work, less-than-full-time option  
- Offer clinical shift adjustments during and after pregnancy  
- Provide lactation spaces in close proximity to patient care areas  
- Schedule department meetings during daytime hours  
- Provide child/dependent care subsidies and on-site emergency care services |
| **Professional Development groups** | - Encourage involvement by covering membership fees, travel, and providing protected time for conferences  
- Support the creation of a departmental PDG |

PDG = professional development group.
Each recommendation would be ideally supported by positive findings from a randomized control trial; however, as this is not realistic, readers are cautioned to trial strategies to find ones that work for them and ideally study them for the benefit of others.

**STRATEGIES ACROSS THE CAREER CONTINUUM: PRIMING THE PIPELINE**

Effectively addressing the stagnation and attrition of women in academic EM begins by focusing on recruitment and retention strategies for female medical students and residents and continues with interventions to support and retain female faculty through equity in hiring, resources, and career advancement. The ongoing attrition of female EM physicians even after the completion of a grueling residency indicates that the field has a serious retention issue that must be investigated and slowed.

**Sparking Medical Student Interest in EM**

Closing the gap between the 50% of medical students and 35% of EM residents who are female will take concerted and directed efforts. Early exposure to EM during medical school can help demystify the field and demonstrate its potential as a career choice. Involving female faculty in medical student recruitment would allow future residents the opportunity to see firsthand how female EM attendings can functionally balance their academic, clinical, and personal lives. Residency leadership should consider deliberate recruitment strategies such as pairing students and other trainees with female mentors and arranging for shadowing opportunities.

**Resident Selection**

A gender-blind review process can help remove unconscious and conscious bias from resident selection. If that is not feasible, a holistic review of all applications and acknowledgment of gender bias in the review, interview, and ranking processes is important. Ensuring diverse membership and equal representation of each gender on the selection committee is also critical. Additionally, residency leadership should conduct regular audits of resident gender breakdown and planned actions to address imbalances in recruitment.

**Resident Inclusion**

Specific strategies to combat female resident burnout include dedicated mentorship and sponsorship programs with female faculty who could serve as potential role models for young trainees. Female residents should be included in conversations about wellness and combating burnout during residency. Residency and departmental leadership are encouraged to provide education regarding feedback and communication techniques devoid of gender bias to faculty that focus on clinical competency and to routinely identify, evaluate, and eliminate gender bias in evaluations. Engagement with departmental, institutional, and/or national female professional development groups (PDGs) provides opportunities for broadening one’s network and may help identify external female mentors. Finally, to ensure that women continue to enter and excel in academic EM, female residents should be mentored closely during times of transition, especially as they explore postresidency career options.

**Hiring Practices**

The transition from resident to faculty can be a challenging one to navigate on both a personal and a professional level. Women making midcareer job transitions also need particular consideration. Data have shown that women approach contract negotiation differently and often less effectively than men, resulting in less optimal terms or terms that do not fully reflect a candidate’s capabilities, achievements, or potential. As hiring decisions are sometimes not fully transparent and subject to implicit bias, the best way to navigate the process may not be evident. Additionally, the outcomes of an initial contract negotiation can have a lasting impact on academic rank, promotion, clinical responsibilities, and compensation. A first step is to provide job-specific mentorship to senior residents with individualized attention and coaching on CV building, interviewing techniques, and contract negotiation. In addition, improvements in the hiring process such as gender-blind evaluations and incorporating women in recruitment as well as acknowledging the existing biases could help. Educational interventions targeting gender bias in hiring practices have demonstrated enhanced awareness after program implementation. Additionally, including family-friendly policies in all hiring discussions regardless of gender can benefit all applicants and indicate a culture conducive to gender equity.

**RETENTION STRATEGIES**

Fewer women are rising to leadership roles within academic EM faculty groups. Disparities in compensation
and promotion, burnout, and gender-based harassment all contribute to the substantial attrition of women from EM. Furthermore, the challenge of finding reasonable work–life integration during the dynamic journey from parenthood to empty nesting substantially contributes to this attrition. Retention strategies must address these challenges.

**Ensure Gender Equity in Compensation**
Female academic EM physicians are paid less than their male counterparts. This is the most fundamental and quantifiable of all disparities. Department chairs should use transparent metrics and evaluation rubrics and conduct regular audits to uncover gender-based differences in salaries and bonuses, perhaps using blinded techniques and external independent auditors. Nonfinancial and indirect compensation, such as buy down, continuing medical education funds, or compensated travel, should be standardized and audited. Finally, if disparities in pay persist, the issue should be elevated above the department chair to an institutional level.

**Ensure Gender Equity in Promotion**
As described above, women are less likely to be promoted to associate and full professors and have leadership positions than men. Gender imbalances in many areas pertinent to promotions, such as authorship, grant funding, speakerships, and participation on editorial boards, have been well documented and need to be addressed. To achieve gender equity in promotion, which is often set at the institutional level, women need to be equally represented in each of these activities. Promoting female faculty to leadership roles in the department and assigning appropriate and equitable value to teaching activities for those on clinical-educator tracks can ensure parity in the process, rather than only regarding traditionally defined metrics such as research publications and grants as accomplishments worthy for promotion.

On a departmental level, there should be transparency and standardization of the promotions process. Departments and institutions should track promotion rates to evaluate for gender discrepancies and include women on promotions committees. Departments should elect a confidential liaison to address and be the contact person for bias-related questions or concerns. Finally, a periodic blinded review of the promotion and recruitment process could ensure equity.

**Foster the Development and Advancement of Female Faculty**
What is more striking than the attrition of female EM physicians between residency and faculty positions is how few women rise to leadership positions. There are many strategies for leadership to make a concerted effort to promote the development and advancement of their women faculty. Providing resources and time to allow women to travel to conferences and professional development courses can increase their visibility and name recognition, allow opportunities for networking, and help them acquire necessary skills to increase their chances of being awarded grants or becoming a successful researcher, speaker, or leader in the field. Female faculty should be provided opportunities to attend workshops on manuscript writing, grant writing, and speaking, as this helps in the promotions process. They should be given administrative time to allow for department representation, leadership, and visibility inside and outside of their group. As women are often reluctant to nominate themselves for awards, speaking opportunities, editorial positions, and other competitive opportunities, faculty leadership should make a point of encouraging them or even doing so on their behalf. Female faculty should be encouraged to seek national positions and leadership should sponsor them for positions on stakeholder, promotions, or institution-wide search committees. Publicly amplifying and highlighting achievements also promotes retention and advancement.

**Combat Burnout**
Burnout is a major issue in academic EM and contributes to attrition. Department leadership should be attentive to signs of burnout in their faculty and intervene when appropriate. Following many of the strategies outlined in this paper can help address some of the root causes of burnout in women and decrease the risk of burnout. Additionally, leadership should consider initiating wellness programming such as faculty retreats, social activities, mental health support, and recognition of service. Providing faculty with opportunities to disengage clinically and spend time with loved ones when needed without suffering consequences, including “stop-the-clock policies” for tenure and promotion, would enhance work–life integration. Additionally, allowing faculty increased control over their schedules, establishing a culture of teamwork and positive relationships, and conducting periodic
wellness assessments with reflective adjustments can also help combat burnout.57,58

Institute Family-friendly Policies
Family-friendly scheduling and leave policies benefit all residents and faculty as they offer flexibility, encourage wellness, and contribute to a safe and productive workplace culture. When not standardized, highly variable family leave and lactation policies can add additional stress during and after pregnancy.59 While leave policies are often set at the institutional or medical school level, department leadership can be strong advocates for fostering change to institutional policies. Faculty leadership should consider a 6- to 8-week parental leave policy separate of vacation or sick leave, access to FMLA regardless of level of training, and parental leave for non–birth parents.60 Fair and transparent family leave or significant life event policies should provide adequate compensation and the option for flexible scheduling and graduated return to work.57 Additionally, clinical adjustments during pregnancy and after delivery, specifically with regard to shift timing and acuity, would contribute to wellness. Lactation spaces should be in close proximity to patient care areas and equipped with the resources needed for pumping mothers. Other family-friendly scheduling considerations include offering a less than full-time work option, scheduling department meetings during daytime hours, and providing child care subsidies and emergency child care or dependent care services.61

Foster PDGs
Dedicated female PDGs have been shown to positively impact women at all stages of their career.22,23 Participants report a range of benefits including academic advancement, career retention, mentorship and sponsorship, and fostering a network of peer support.24,62 Departments should support involvement in national PDGs by paying membership fees, encouraging involvement at both member and at leadership levels, and supporting travel and protected time for national conferences. Many institutions and departments have created their own PDGs with allocated financial and leadership support, which provide opportunity for local collaboration and recognition.36

 Identify and Address Gender-based and Sexual Harassment
Sexual harassment in academic medicine remains highly prevalent and creates a culture that is not conducive to the advancement of women at any stage.63 While specific strategies to address and stop sexual harassment are outside the scope of the paper, we must recognize that sexual harassment is an organizational and institutional problem that until eliminated will continue to exacerbate many of the gender disparities highlighted in this paper. Women cannot excel in an unsafe environment that allows for sexual harassment and sends a message that they are not equal and valued.

IMPLICATIONS FOR EDUCATION AND TRAINING IN EM
A culture of equity for female physicians is beneficial for patients, for trainees, and for the physician workforce in general. Female physicians often employ unique and collaborative engagements with patients and trainees and advocate for family centered policies that promote work–life integration and workforce equity. Female trainees will often look to female faculty as mentors and role models. A diverse workforce enhances the learning and teaching environment for all trainees, and efforts to promote it through the recruitment and retention of female faculty should be cultivated and supported.

FUTURE STEPS
While there has been some improvements in gender inequities in academic EM, progress has been slow moving and so far insufficient. More robust data supporting the above proposed strategies would provide the evidence some departments need to make effective changes in their approach to supporting their female faculty. Intensified advocacy efforts by individual departments, PDGs and EM specialty societies would help maintain a dialogue about persistent inequities and highlight best practices that can lead to productive change.

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Behind the Scenes of Successful Research in Emergency Medicine: Nine Tips for Junior Investigators

Marc A. Probst, MD, MS1, Nicholas D. Caputo, MD, MSc2, and Bernard P. Chang, MD, PhD3

NARRATIVE ABSTRACT
Education related to clinical research often focuses on methodology, statistics, ethics, and study design. While knowledge of these conventional skills is essential to the operationalization of research, many “soft” skills related to leadership, communication, and team management are critical to the successful conduct research in the real world.

Conducting clinical research in the emergency department is generally a challenging endeavor. Based on our prior experience as clinical researchers and a narrative review of the published literature, we offer nine practical strategies to help junior investigators conduct research. To successfully execute a research study, investigators must know how to motivate their team, create a brand around their study, communicate effectively, maximize clinician and patient engagement, and celebrate victory, among other skills. These skills and strategies are often missing from the formal research education and in peer-reviewed manuscripts but are, in fact, invaluable to the successful development of junior investigators. Thus, we offer the “story behind the study” in an effort to contribute to research education with material that is not typically covered in formal curricula.

Research education is an important component of emergency medicine training, with many programs encouraging formalized exposure to research for students, residents, and junior faculty.1,2 Regardless of whether directly involved with research or not, a basic understanding of research methodology aids emergency clinicians in the assessment of scientific evidence and its potential relevance to clinical practice.3 While many such research-focused educational curricula emphasize important foundational skills, such as biostatistics, ethics, and study design,4 such programs may not highlight the unique characteristics of the emergency department (ED) environment that often present specific challenges for conducting clinical research.5,6 Potential challenges include a clinical setting in which physical space is often limited, noise levels are high, and patient and providers are constantly in flux. Additionally, the ED may present difficulties related to inconsistent patient follow-up, varying degrees of patient health literacy, and multiple competing clinician demands with frequent interruptions.7 Despite these challenges, with the right resources and strategies, high-impact ED clinical research can be successfully accomplished.8

Scientific manuscripts typically report their methods in an objective, highly standardized way focusing on aspects such as inclusion and exclusion criteria, sample size calculation, details of the research protocol,
and statistical analysis. While such reporting guidelines help with important aspects of transparency and reproducibility, often times the narrative experience of the study team dynamics that contributed to the success of the study is left out. As readers, we have often wondered about the “the story behind the study.” In other words, what were some of the strategies or approaches the team of investigators utilized to accomplish their goals? How did the investigators tackle some of the operational and logistic challenges they encountered while conducting the study?

The goal of this concepts paper is to provide trainees and early investigators with strategies to successfully conduct research studies in the ED. We hope that such information will complement existing research curricula on methodology and study design. By sharing a “behind-the-scenes” look at research in the acute care setting, these approaches (summarized in Table 1) can help junior investigators learn practical lessons about how to conduct a research study.

### PROCESS

The development of this article was a two-step process. First, as three board-certified emergency physician researchers, we combined ideas based on our own experiences as clinical researchers. We then conducted a brief, narrative review using published manuscripts via PubMed, PsychINFO, and Google scholar, evaluating team dynamic, branding, mentoring, and leadership strategies. Following this review, we discussed the findings and arrived at nine general recommendations. The authors include federally funded independent investigators with a diverse range of research methodology and content expertise, ranging from clinical trials, prospective mixed methods studies, large database analyses, and retrospective chart reviews.

### NINE KEY RESEARCH STRATEGIES AND APPROACHES

#### 1. Motivate Your Team

Research groups in the ED are often team based, composed of not only the principal investigator (PI) but also a project managers, coinvestigators, analysts, and research assistants. It is critical for your entire research team to feel motivated and inspired. No one likes to do work for the sake of work, but people do like to be part of a mission with a larger purpose. That is why it is key for everyone to understand why this research is important and what the overarching goal is. Investing time in clearly and regularly explaining the “why” will give everyone on the team a sense of purpose.

Fulk and Boyd’s organization psychology summary on work looking at team structures notes communication “gaps” between management and frontline workers regarding overarching company mission and goals. The consequences of this gap can lead to decreased performance across all employees and a decreased subjective sense of investment and motivation toward attaining the project’s success. Ideally, all team members feel invested in the success of the study. This should not be limited to the PI and senior staff of the project, but to all levels of the study from research assistants to the project manager. As PI, you were excited enough about your research idea to take the time to operationalize it into a program of research. Now, you should take the time to transmit this enthusiasm to your entire team.

Tangible examples of completed work (e.g., peer-reviewed manuscripts, oral presentations, and podcast episodes) can help the team to see how their future work will lead to advancement of the knowledge base of emergency care. It can build trust in the PI and in the feasibility of the proposed project while keeping everyone focused on the final goal.

**Example:** While conducting research on shared decision making in the ED, the first author (MP) ensured that everyone on the team fully understood the concepts of patient engagement and patient-centered care. This was accomplished through a series of interactive team discussions using real cases from the ED, drawing for each

<table>
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<th>Strategy</th>
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<td>Low team motivation/</td>
<td>Motivate your team by starting with the “why?”</td>
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<td>engagement, slow progress</td>
<td>Set goals, recognize small wins, and celebrate milestones.</td>
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<td>Suboptimal</td>
<td>Hold regular, effective meetings.</td>
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<td>communication</td>
<td>Be available and approachable.</td>
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<td>Lack of awareness</td>
<td>Create a brand around your study, use signage.</td>
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<td>Promote your study to clinicians.</td>
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<td>Hitting obstacles</td>
<td>Seek out targeted mentorship.</td>
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<td>Low recruitment rate</td>
<td>Proper use of incentives, front-line feedback.</td>
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<td>Data management issues</td>
<td>Use a Web-based data capture system.</td>
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team members’ personal experience in the health care system, and allowing ample time for questions, all without using methodologic jargon. Connecting the research to team members’ lived experiences in some way was particularly valuable. Research staff could then fully understand the benefits of shared decision making on an intuitive and emotional level, which made carrying out the more mundane aspects of the research protocol more palatable.

2. Seek Out Targeted Mentorship
Research is often said to be “standing on the shoulders of giants” (i.e., those that came before us). Young investigators will benefit greatly from the identification of targeted mentors and developing a mutually beneficial relationship with them. Mentors can play various important roles for young investigators including providing overall guidance on the research, coaching around a particular skill (e.g., analyzing qualitative data), or connecting them with others in their network. Getting advice from someone with the content expertise in your area of interest is invaluable. For example, if performing research in emergency airway management, reach out to more experienced researchers in this niche and begin to build a professional relationship.

Regardless of how innovative a study may seem, it is almost certain that someone has previously conducted a similar study in the ED. Investigators should actively seek out that person, be it through their professional network or social media (e.g., Twitter) or simply with a “cold” direct e-mail after finding a key published article. Mentors can help you anticipate and overcome obstacles related to protocol logistics, clinician buy-in, enrollment, retention, data management, and so on. The emergency medicine research community is particularly collegial and collaborative; investigators are almost always willing to advise colleagues.

3. Convene Regular, Effective Meetings (but Don’t Meet for the Sake of Meeting)
Organizational work from a number of disciplines has found that meetings held at regular intervals offer the benefits of helping to keep a study moving forward and for the team to feel a sense of progression. They also create accountability so that assigned tasks are completed in timely fashion and reported back to the team. In-person meetings are best for team building but logistics sometimes force us to meet virtually. Either way, regular group communication is crucial. Literature on team dynamics suggests that prospective studies benefit from weekly or every-other-week meetings, although others may only need to meet monthly depending on the needs of the study. Scheduled meetings frequency can be viewed from the goldilocks quip: not too many, but not too few. If meetings start to wane in content, the frequency should be reduced since low-yield meetings can be source of frustration for busy team members. Do not meet just for the sake of meeting. Too many meetings have been associated with decreased employee well-being and decreased efficiency.

Running an effective meeting is a learned skill; many articles have been written on this topic. We have found that these techniques helpful:

a. Develop a written agenda and share it in advance.
b. Ask every member of the team to give feedback one at a time so that all voices are heard, not simply the most confident or senior ones. Ask the “front-line” research assistants for their ideas on how to maximize enrollment by identifying barriers and facilitators. They will have invaluable feedback on what is working and what can be potentially improved.
c. Every meeting should start and end on time. At the end, agree on individually assigned, specific “action items” with clear timelines.
d. Have members of the team, other than the PI, occasionally “run” meetings so that everyone gets leadership experience. This will also help members to stay focused on the goals of the project and give them ownership as well.
e. Shorter meetings are generally better. Consider that everyone’s time is precious and that the time spent at a meeting could potentially be spent devoted to goals of the study, e.g., subject recruitment.

Finally, with the rise of research teams based in different physical locations, the use of technologies such as videoconferencing and remote meetings is common. Initial studies examining remote teams have found that outcomes and productivity for these teams have been similar, although the value of occasional in-person meetings cannot be understated.

4. Create a Brand Around Your Study
The importance of branding in health care is well known. Although secondary to the science underlying the research questions, creating a recognizable “catchy”
name for your study can lead to better recognition of study. Acronyms work well for this. One to three syllables is best for a study name. This will help everyone remember and easily refer to the study. This will also allow clinicians, researchers, bloggers, and those on social media (e.g., Twitter) to easily refer to the trial after publication.

Example. Instead of referring to a study as the “Shared decision-making for low-risk syncope in the ED study,” it was named “SynDA” (Syncope Decision Aid).24

The next level in study branding is to create a logo for your study. This can be done by someone with basic graphic design skills or, ideally, a professional graphic designer, if you have such resources available (see Figure 1 for an example of a study logo). This also relates to number 5 below, “promoting your study to clinicians.” Graphic design skills are also useful when creating a visual abstract to disseminate your study findings after publication.25

5. Be Available and Approachable

The PI of a study is the leader of the team. A great leader sets the tone by being the hardest worker on the team. Part of how this is reflected is by being readily available and approachable.26 Previous work has found that such invested team structures is associated with overall employee engagement and work satisfaction.27 The PI should consider sharing his/her cell phone number to be available during certain days/times via telephone or text message to respond to urgent questions, issues, or obstacles that will inevitably arise. It is essential to foster a culture in which everyone feels genuinely comfortable asking for help as often as needed. It is often easier to avert a problem (e.g., a protocol violation) in real time than to fix it the next day.

6. Promote Your Study to Clinicians

For most prospective studies of ED patients, it is critical that clinicians be aware of, familiar with, and amenable to enrolling patients into the study. Clinicians often play a key role in the research process by helping to identify potential subjects, confirming inclusion and exclusion criteria, cooperating with the research protocol, and possibly collecting data. Thus, it is imperative for the clinicians in your ED to be “on board” with the study. Regular announcements at the weekly departmental conferences and faculty meetings is a reliable way to message out our study to ED residents and faculty. If your ED employs advanced practice providers, this is another essential group to get engaged. Meeting with leadership from the nursing department is also important since the study protocol could affect nursing workflow. It is better to overcommunicate than risk leaving people feeling excluded or ignored. For those working in academic centers, appointing a resident champion can be useful to liaison with the residents, get feedback, and improve messaging. Formally involving residents in research can be challenging given their substantial clinical workload. However, emphasizing the developmental benefits of becoming involved in research, presenting at conferences, and publishing papers may help motivate them. Certainly, for those pursuing fellowship training or a career in academics, the benefits of demonstrating research productivity are manifold. Finding a strong, motivated site PI for multicenter studies is also vitally important. Recruit your clinical faculty into the research process by emphasizing that involvement in research can lead to opportunities for publication, local/regional recognition, and ultimately, career advancement.

Recognition is key. Sending out e-mails and making announcements in faculty and resident meetings when goals are met, naming specific providers who helped meet that goal, will help keep the study fresh in everyone’s minds. Awareness is a big part of recruitment. If your staff is mindful that there is a study ongoing, they are more likely to help enroll. Creating signage to advertise your study in the clinical spaces is often helpful, especially if these signs are placed in strategic locations. During the shared decision-making trial, “SynDA” signs were placed in the faculty and resident lounges with the study logo and the current/target enrollment, e.g., “41 out 50 patients enrolled so far” (see Figure 2).

Finally, being physically present can help tremendously. Actually showing up in the ED and reminding people to enroll goes a long way, especially when there is a patient that meets recruitment criteria but is at risk of being “missed.”

7. Consider the Use of Appropriate Incentives

Participating in a prospective study often means considerable effort and time commitment from the

Figure 1. The SynDA trial logo. SynDA = Syncope Decision Aid.
patient. In this situation, to help improve participant adherence and to recognize this effort, some form of compensation should be considered.\(^{28}\) Well-thought-out patient incentives can significantly improve your enrollment rate.\(^{29}\) Understanding the lives and habits of the patients you are recruiting is important. An Amazon gift card is not useful to someone without an Amazon account. Using paycards that require an Internet connection will not be practical for certain patients and can lead to frustration if such individuals have difficulty obtaining the financial compensation they were promised.

Cash often works well but can be harder to track. Reimbursement for transportation with a Subway/bus card can go a long way. Separating incentives into installments dispensed at different time points can be useful to maximize follow-up rates.\(^ {30}\) At times, provider incentives can also help boost enrollment for studies that require provider cooperation, assuming that this is approved by the institutional review board (IRB). Providing incentives is contingent on having the necessary funding for your study, but may be infeasible for unfunded studies. In that case, relying on good will, and the advancement of science, will hopefully suffice. Using tips from sections 4, 5, and 6 of this paper should also help.

8. Use a Web-based Data Capture System

Data management is a critical aspect of conducting research. Compared with paper-based data collection, entering data directly into an electronic database can save time and money while increasing data accuracy.\(^ {31}\) The authors have successfully used tablet devices (e.g., iPad) and Web-based databases such as REDCap (https://www.project-redcap.org/) or Filemaker (https://www.filemaker.com/) to collect and store data. These data services have increasingly advanced functionality including randomization, de-identification, audit trails, and allow for easy download of data for subsequent analysis.

9. Set Goals, Recognize Small Wins, and Celebrate Milestones

Setting specific goals for your study team is key to achieving them. Typical examples would include obtaining IRB approval, training research assistants, starting enrollment, reaching enrollment milestones such as 25, 50, and, of course, 100% of your target enrollment. Set goals for abstract presentation as well (e.g., American College of Emergency Physicians scientific assembly, Society of Academic Emergency Medicine annual meeting) and let your team know that these meetings are more than just about the presentation. These are precious opportunities to network, make new connections, and develop collaborations that will lead to future academic achievements.

A wealth of literature from social psychology and behavioral economics has found that employees across a spectrum of professions thrive on recognition.\(^ {32}\) Gratitude and praise are a very simple way to keep your team engaged and motivated. Even small wins should be recognized in a public manner. Every new patient enrolled in a study is an opportunity to share that small “win” with the rest of the team and acknowledge hard work. Other milestones that should be communicated with your entire study team (not simply co-investigators) would be completion of data analysis, abstract presentation, and article publication. Celebrating these milestones give people a sense of pride and achievement.

All members of your team are likely invested in the success of your study but are approaching it from different backgrounds. Some staff may be students who are considering medical or graduate school, while others are full-time professionals in research science. Regardless, recognizing their efforts will help maintain their enthusiasm and investment in the study. In general, for those individuals who make significant contributions to the study, including them as coauthors on the final products (e.g., abstracts, peer-reviewed manuscripts) is a great way to highlight their efforts and offer formal recognition. As well, investing in the individuals by helping them achieve their career goals behind the current project is a wonderful way to build rapport, e.g., writing a reference letter for medical school or other graduate program.
Eating and drinking together is a proven way to build a cohesive team. PIs should consider taking out the entire team for a meal to celebrate a research milestone, e.g., completing study enrollment.

**CONCLUSION**

In summary, education related to clinical research in the ED is more than just learning research methodology, ethics, and biostatistics. Education focused on the “soft skills” and leadership strategies needed for research should also be provided. This list of nine strategies and approaches may be useful for junior investigators learning about clinical research in emergency care. It is our hope that this material, in addition to ongoing formal education, will improve overall research-related education in emergency medicine.

**References**


Incorporating Sex and Gender-based Medical Education Into Residency Curricula

Alyson J. McGregor, MD, MA1, Marna Rayl Greenberg, DO, MPH2, Rebecca Barron, MD, MPH1, Lauren A. Walter, MD3, Jeannette Wolfe, MD4, Ashley L. Deutsch, MD4, Steven A. Johnson, DO2, Derek A. Robinett, MD3, and Gillian A. Beauchamp, MD2

ABSTRACT

Background: Emergency medicine (EM) residents do not generally receive sex- and gender-specific education. There will be increasing attention to this gap as undergraduate medical education integrates it within their curriculum.

Methodology: Members of the Sex and Gender in Emergency Medicine (SGEM) Interest Group set out to develop a SGEM toolkit and pilot integrating developed components at multiple residency sites. The curriculum initiative involved a pre- and posttraining assessment that included basic demographics and queries regarding previous training in sex-/gender-based medicine (SGBM). It was administered to PGY-1 to -4 residents who participated in a 3-hour training session that included one small group case-based discussion, two oral board cases, and one simulation and group debriefing.

Analysis: Components of the developed toolkit (https://www.sexandgenderhealth.org) were implemented at four unique SGEM Interest Group member residency programs. Residents (n = 82/174, 47%) participated; 64% (n = 49) were male and 36% (n = 28) were female. Twenty-six percent (n = 21) of the residents reported that they had less than 1 hour of training in this domain during residency; 59% (n = 48) reported they had 1 to 6 hours and 16% (n = 13) reported they had >6 hours. The average preassessment score was 61% and postassessment was 88%. After training, 74% (n = 60) felt that their current practice would have benefited from further training in sex-/gender-based topics in medicine during medical school and 83% (n = 67) felt their clinical practice would have benefited from further training in this domain during residency.

Implications: The majority of EM residents who participated in this training program reported that they had limited instruction in this domain in medical school or residency. This initiative demonstrated a method that can be emulated for the incorporation of SGBM educational components into an EM residency training educational day. After training, the majority of residents who participated felt that their current practice would have benefited from further training in sex- and gender-based topics in residency.

It is imperative that postgraduate trainees are exposed to sex and gender aspects of clinical practice during residency training. This is particularly relevant in the context of the integration of sex and gender into biomedical research and the subsequent mounting evidence that sex and gender influence health and disease. In fact, the American Medical Association issued a Resolution [604-A-15] in 2016 stating that sex- and gender-based medicine (SGBM) should be incorporated into clinical practice.

From the 1Department of Emergency Medicine, Warren Alpert Medical School of Brown University, Providence, RI; 2Department of Emergency and Hospital Medicine, Lehigh Valley Health Network, USF Morsani College of Medicine, Allentown, PA; and 3Department of Emergency Medicine, University of Alabama at Birmingham, Birmingham, AL; 4Department of Emergency Medicine, University of Massachusetts Medical School–Bayside Springfield, Springfield, MA.

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Address for correspondence and reprints: Marna Rayl Greenberg, DO, MPH; e-mail: mrgdo@ptd.net

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In regard to emergency medicine (EM) clinical research, recommendations on this topic include the consideration of sex and gender on health outcomes, the inclusion of both men and women in study design to facilitate sex-based analysis and the reporting of sex and/or gender composition among study subjects and study findings including prognosis, outcomes, and interventions.\(^1\) In anticipation of these advancements in EM scientific investigation, EM researchers convened at the Academic Emergency Medicine’s 2014 Consensus Conference “Gender Specific Research in Emergency Care” to develop a SGBM agenda.\(^2\) This agenda served to guide emergency care research, which included acknowledgment of the expanding influence that sex and gender has on disease presentation, performance of diagnostic testing, treatment responses and outcomes, and provider behavior.\(^3\) Biological sex and gender identity influence provider behavior, health care utilization and disparities in the delivery of medical care.\(^4\) As research specific to sex- and gender-based differences in EM accelerates, there is increasing recognition of its potential to improve patient outcomes in clinical practice.\(^4\) Thus, beyond the need to fill gaps in sex and gender research, it is essential to establish effective pipelines that allow integration of important discoveries into bedside care. One potential avenue for rapidly dispersing new medical information is through resident education. Ideally, including SGBM at the residency level would ensure that graduating residents are familiar with basic concepts and poised to build a broad clinical practice that evolves as research advances.

While many practicing emergency physicians have long noted sex and gender differences in the clinical presentations of patients, the incorporation of proven sex and gender differences has yet to be formally implemented in EM residency training.\(^5\) To date, EM trainees do not typically receive dedicated sex- and gender-specific education in EM practice.\(^6\) There is no a plethora of literature indicating the barriers to implementing this type of curriculum, but anecdotally the Sex and Gender in Emergency Medicine (SGEM) Interest Group of the Society of Academic Emergency Medicine (SAEM) perceived that lack of available standard cases and nonexistent evidence that the content could be incorporated into residency training were obstacles. For these reasons, members of the SGEM Interest Group set out to develop a SGEM toolkit and pilot integrating developed components at multiple residency sites.

**METHODOLOGY**

A novel SGEM toolkit was developed by members of the SAEM SGEM Interest Group to provide resources for EM educators on incorporating novel educational tools into preexisting training. The goal of the SGEM toolkit is to facilitate increased sex- and gender-based clinical knowledge among EM resident physicians to optimize their patients’ care and outcomes.

As an innovative supplement to existing EM residency curricula, the SGEM toolkit components consist of readily available online resources with potential for dynamic integration and utilization. Members of the interest group volunteered to take particular components and develop content. Components of the SGEM toolkit include: slide sets, video lectures, interactive learning modules, case examples for small group discussion, oral boards cases, simulation scenarios, compilations of landmark articles for journal clubs, and instruction on utilizing a validated SGBM PubMed search tool. Once drafted, the workgroup reviewed, edited, and made changes to the curriculum. The finished product is readily available as a free resource on Texas Tech University Health Sciences Center Sex and Gender Specific Health site sponsored by the Laura W. Bush Institute for Women’s Health (https://www.sexandgenderhealth.org).

After institutional review board review and approval, interest group members implemented SGEM curriculum from the toolkit in 2018 at four EM residency programs in the United States (Alabama, Massachusetts, Pennsylvania, and Rhode Island). The sites included both 3- and 4-year EM programs, and one had dual (Accreditation Council for Graduate Medical Education, American Osteopathic Association) accreditation. The selection of what components of the toolkit were used was a shared decision of the interest group and based on a desire to have variety of learner experiences in the session.

Identical pre and post assessments that included basic demographics and queries regarding previous training in SGBM, attitudes toward this training, and content knowledge material were administered to a convenience sample of EM residents who participated in a scheduled EM education day (Data Supplement S1, available as supporting information in the online version of this paper, which is available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10390/full). The assessment was developed and edited by members of the author team (SGEM Interest
Group members). Each program’s simulation faculty was provided the SGEM toolkit materials to execute the study but did not have any organized advance faculty training (see Web Resources). The 3-hour training was structured similarly at all four sites. The training was scheduled in advance by the programs and required as an educational opportunity with the normal exclusions at individual sites (e.g., night shift residents were allowed to leave early per duty hour guidelines). All residents (including PGY-1 to PGY-4 levels of training) who came to this single educational training day took the pre- and posttraining assessment (who came to this single educational training day took the pre- and posttraining assessment but were offered an “opt out” option if they did not want their results included in the study analysis. The results of the study at an individual level were anonymous and were not used in any residency program performance assessment. The 3-hour educational session included one small group case-based discussion (1 hour), two oral boards cases (30 minutes each = 1 hour), and one high-fidelity simulation and group debriefing (1 hour). The small group case-based discussion was based on sex differences in morphine and propofol and the faculty guide with session description can be found at https://www.sexandgenderhealth.org/assets/sgem-toolkit-small-group-discussion-sex-differences-in-morphine-and-propofol_clean.pdf. The associated slide set for the small group case-based discussion can be found at https://www.sexandgenderhealth.org/assets/sgem-toolkit-small-group-discussion-case_clean.pdf. The two oral board cases were based on a transgender patient with a pulmonary embolism (https://www.sexandgenderhealth.org/assets/sgem-toolkit-transgender-patient-oral-boards-case_clean.pdf) and a QT prolongation case (https://www.sexandgenderhealth.org/assets/sgem-toolkit-qtprolongation-torsades-oral-boards-case_clean.pdf). The high-fidelity simulation case was based on sex and gender differences in chest pain (https://www.sexandgenderhealth.org/assets/sgem-toolkit-sim-high-fidelity-chest-pain-simulation_clean.pdf; see Web Resources).

The content was delivered by EM academic faculty and the assessment was administered, collected, and subsequently stored anonymously by trained research personnel. Aggregate anonymous data from participating sites were used to assess the competency of resident trainees after the completion of the educational program. Demographics and assessment results were compared and reported in simple frequencies and percentages. Qualitative comments were captured informally as results of conversation and feedback generated by faculty and participants.

**ANALYSIS**

Eighty-two EM residents of 174 potential trainee participants (47%) from four unique academic EM residency programs participated in the training program. Sixty-four percent ($n=49$) of the participants identified as males and 36% ($n=28$) females. Twenty-eight percent ($n=22$) were PGY-1, 22% ($n=17$) were PGY-2, 31% ($n=25$) were PGY-3, and 19% ($n=15$) were PGY-4 residents.

Thirty percent ($n=25$) of those participating reported that during medical school they had either no training or less than 1 hour of training regarding sex and gender differences in the clinical presentation and management of patients. Fifty-two percent ($n=43$) reported they had 1 to 6 hours of training and 18% ($n=15$) reported they had over 6 hours of medical school training in this domain.

Twenty-six percent ($n=21$) of the residents reported that during residency they had either no training or less than 1 hour of training (including lectures, small-group sessions, asynchronous learning modules, or bedside education) regarding sex and gender differences in the clinical presentation and management of patients. Fifty-nine percent ($n=48$) reported they had 1 to 6 hours of training and 16% ($n=13$) reported that they had over 6 hours of training in this domain during residency. There were some site differences in reported residency training. For example, zero residents at site A (where there is a SGEM fellowship) reported having no training in SGEM, but in site C, 23% reported having no training in SGEM. Conversely at site A, 19% of the learners reported over 6 hours of training in SGEM compared to site D that had only 8% (Table 1). There were reported differences in amounts of training in medical school and residency by male and female

<table>
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<tr>
<th>Site Difference in Reported Residency Training in SGEM</th>
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<td>Site A</td>
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<td>Site B</td>
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<td>Overall</td>
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Data are reported as $n$ (site %).

SGEM = sex and gender in emergency medicine.
In medical care, disparities occur based upon patients’ sex and gender. Medical training must guide efforts to reduce both bias and health care disparities through approaches that are sensitive to health beliefs and behaviors, epidemiology, and treatment efficacy in different population groups. While incorporation of sex and gender medicine into EM simulation education programs has been recommended, this study is the first to implement a defined curriculum into EM residency programs from a toolkit designed by the SGEM Interest Group of SAEM.

After the program was completed, the percentage of both men and women who believed that their current practice would benefit from further training in SGBM increased, suggesting that the curriculum might have facilitated learner recognition of potentially important SGBM-based knowledge gaps. Of note, some of the most robust queries were related to the care of transgender patients. Participants were particularly interested in understanding what pronouns to use to address transgender patients and how to respond to patient queries about hospital room assignments and bathroom use. Despite this interest, a survey of U.S. programs in one specialty showed only half of the responding program directors reported offering clinical training in transgender health care. More recently, an EM survey reported that nearly half of the respondents felt history and physicals were more challenging for transgender patients. This is an important knowledge gap to address; as there are currently 1.4 million adults in the United States that identify as transgender and the barriers to their health care are considerable.

Understanding the importance of personalizing patient care based on biological sex and gender identity will be crucial in providing appropriate medical care for this increasing population.

In this study, there were minor gender differences in assessment results and their self-report of content training in medical school and residency. Jenkins et al. published the results of a national student survey on sex and gender in medical education, which found that male medical students reported a higher exposure rate to SGBM content during their training than female medical students. Further study on this reported difference may help distinguish the extent and etiology of any gaps between male and female learners in perceived exposure to SGBM content.

Educators also need to be aware of the national and international movement to integrate sex- and gender-based health into undergraduate medical education. Together, the “Sex and Gender Medical Education Summit: A Roadmap for Curricula
Integration” (2015) at Mayo Clinic and the “Sex and Gender Health Education Summit: Advancing Curricula through a Multidisciplinary Lens” (2018) at University of Utah Health together welcomed over 350 educational leaders (https://www.sghesummit2018.com/) from various national and international academic institutions to progress the integration of sex and gender differences into health professional’s education. The medical students receiving this integrated curriculum will be our future residents and will have the expectation that sex- and gender-based differences will continue to be part of their education in becoming proficient physicians.

A Web-based survey of residency graduates and program directors in EM residency programs found that more than half of the participants reported that their SGBM instruction was inadequate and that gender differences in conditions seen in the emergency department were relevant to their clinical practice. In contrast, the survey also found that only 16.3% of program directors felt that SGBM content was a priority within the curriculum, and 76.6% felt that other curricular demands were an obstacle to integration of SGBM content into the curriculum. The SAEM SGEM toolkit has been designed to address these gaps in EM residency education and to provide solutions to facilitate integration of SGBM into residency curricula. Future work needs to be done to fully integrate the growing sex and gender knowledge base throughout the entire curricula in an effective and efficient way. A first step in this direction has been incorporating feedback from both learners and educators across these four study sites. Subsequently, the SAEM SGEM Interest Group has revised the content of the educational experience studied in this investigation and has made the content available online for educators. This curriculum is easily adaptable and relevant to many other specialties, future research would ideally include evaluation of the training after application in other residencies.

This program curriculum pilot was performed at academic sites in which a core member of the teaching faculty was an SAEM SGEM member and, in particular, one of the sites had a sex and gender in EM fellowship. The baseline knowledge of the residents at these participating sites on the impact of sex and gender on clinical medicine may have been higher than sites at which a champion for this content was not present. The assessments used in this project were not standardly available, were developed by the workgroup and not previously validated. Qualitative reports were collected informally and subject to author recollection bias. In addition, while there were overall consistent trends in all of this educational endeavor, there was some variability in the residencies (some had 3-year vs. 4-year programs).

The SGEM Interest Group hopes that by describing this experience we have demonstrated a method that can be emulated for the incorporation of SGBM educational components into an EM residency training educational day. After completion, our residents demonstrated increased competence in their knowledge of the sex and gender aspects presented as reflected by their increased scores on the assessment. Additionally, the vast majority of resident who participated in this convenience sample cohort study felt that their current practice would benefit from further training in sex- and gender-based topics in medicine during residency.

**WEB RESOURCES**


**References**

2. Greenberg MR, Safdar B, Choo EK, McGregor AJ, Becker LB, Cone DC. Future directions in sex- and gender-


Supporting Information

The following supporting information is available in the online version of this paper available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10390/full

Data Supplement S1. Supplemental material.
Toward Structural Competency in Emergency Medical Education

Bisan A. Salhi, MD, PhD1,2, Jennifer W. Tsai, MD3, Jeffrey Druck, MD4, Jacqueline Ward-Gaines, MD4, Melissa H. White, MD, MPH1, and Bernard L. Lopez, MD5

ABSTRACT
As the emergency department (ED) is the “front door” of the hospital and the primary site by which most patients access the health care system, issues of inequity are especially salient for emergency medicine (EM) practice. Improving the health of ED patients, especially those who are stigmatized and disenfranchised, depends on having emergency physicians that are cognizant and attentive to their needs in and out of the medical encounter. EM resident education has traditionally incorporated a “cultural competency” model to equip residents with tools to combat individual bias and stigma. Although this framework has been influential in drawing attention to health inequities, it has also been criticized for its potential to efface differences within groups (such as socioeconomic differences), overstate cultural or racial differences, and unintentionally reinforce stereotypes or blaming of patients for their ill health or difficult circumstances. In contrast, emerging frameworks of structural competency call for physicians to recognize the ways in which health outcomes are influenced by complex, interrelated structural forces (e.g., poverty, racism, gender discrimination, immigration policy) and to attend to these causes of poor health. We present here the framework of structural competency, extending it to the unique ED setting. We provide tangible illustrations of the ways in which this framework is relevant to the ED setting and can be incorporated in EM education.

Health policy, material deprivation, inequality, and stigma are implicated in poor health outcomes among emergency department (ED) patients.1–3 Researchers have emphasized the role of the social determinants of health,4,5 structural racism,6 gender discrimination,7 homophobia,8,9 and transphobia10,11 on the health of ED patients. These topics continue to gain interest and attention as their ties to medical education, clinical care, and population health are elucidated and emphasized. A unifying thread in this emerging research is the contextualization of individual patient encounters within structural conditions (i.e., historical, political, and material factors). These considerations influence the choices and resources available to patients and emergency providers before, during, and after the clinical encounter. Thus, they become embodied in the health and welfare of patients, communities, and systems.12,13 Improving the health of ED patients, especially those who are stigmatized and disenfranchised, depends on having emergency physicians (EPs) that are cognizant and attentive to their needs in and out of the medical encounter.

Attention to health inequities is not new to emergency medicine (EM). Since the Institute of Medicine’s landmark report on health disparities,14,15 EPs have paid greater attention to the ways in which implicit bias and stereotyping16–18 along with access-related factors (e.g., insurance and income)19–22 contribute to health inequalities among patients. The Accreditation Council on Graduate Medical Education (ACGME) created six core competencies to “define the foundational skills that every practicing physician should...
possess” and as a way “to shape and evaluate the education of residents.”\textsuperscript{23,24} For example, the systems-based practice milestone requires that residents demonstrate an awareness of and responsiveness to the larger context and system of health care.\textsuperscript{25} In response, educational programs have traditionally incorporated a “cultural competency” model to equip residents with the tools to “enhance health professionals’ awareness of how cultural and social factors influence health care, while providing methods to obtain, negotiate, and manage this information clinically once it is obtained.”\textsuperscript{15} The cultural competency framework has been influential in EM, drawing attention to the ways in which understandings and expressions of health and illness can vary across racial, ethnic, gender, and other lines.

Although this was an important development in medical education, cultural competency has been increasingly critiqued for failing to frame “culture” as a static attribute of a group, thereby inadvertently reinforcing misconceptions or prejudice. For example, relying on broad cultural terms to understand and describe ethnic or racial groups can obscure intra-group variations. These variations, which may arise from material conditions or socioeconomic constraints, can instead be chalked up to “the way people just are.”\textsuperscript{26} Indeed, work from medical sociology and anthropology has convincingly shown that variations attributable to culture are often the result of entrenched structural inequalities and profound material deprivation.\textsuperscript{27-29} Moreover, cultural competency implicates individual physician behavior, interpersonal relationships, and within-hospital practices without critically interrogating upstream causes of social inequality—whose impact on health outcomes eclipses that of clinical care.\textsuperscript{30-33}

Emerging frameworks of structural competency, first introduced by Metzl and Hansen,\textsuperscript{34} call for physicians to recognize the ways in which health outcomes are influenced by complex, interrelated structural forces (e.g., poverty, racism, gender discrimination, immigration policy) and to attend to these causes of poor health.\textsuperscript{35} Throughout this paper, we use “structure” as a shorthand reference to the way that a society is hierarchically organized through institutions, political and economic policies, and normative beliefs. Metzl and Hansen define structural competency as:

The trained ability to discern how a host of issues defined clinically as symptoms, attitudes, or diseases (e.g., depression, hypertension, obesity, smoking, medication “noncompliance,” trauma, psychosis) also represent the downstream implications of a number of upstream decisions about such matters as health care and food delivery systems, zoning laws, urban and rural infrastructures, medicalization, or even about the very definitions of health and illness.

This definition draws upon robust traditions in the humanities, social sciences, and public health and proposes five core structural competencies integral to this framework: 1) recognizing the structures that shape clinical interactions, 2) developing an extraclinical language of structure, 3) articulating “cultural” presentations in structural terms, 4) observing and imagining structural interventions, and 5) developing structural humility.

EM has already taken important steps toward recognizing and addressing the ways in which stigma and disenfranchisement affect the health of ED patients. Yet there remains an important opportunity to incorporate structural competency into resident education, thus giving trainees a foundation to provide the best care to the individual and populations of patients. The aims of this paper are: 1) to define structural competency and its relevance to the unique setting of the ED, 2) to provide tangible and useful illustrations of the ways in which this framework is relevant to the ED, and 3) to illustrate how this can be incorporated in EM graduate medical education.

**METHODS**

This concept paper was developed from a needs assessment based on the experiences of members of the Academy for Diversity and Inclusion in Emergency Medicine (ADIEM, an academy of the Society for Academic Emergency Medicine [SAEM]), whose mission includes the promotion of “equal access to quality healthcare and the elimination of disparities in treatment and outcomes through education and research.”\textsuperscript{36} The concept of this paper was introduced at the ADIEM business meeting during the 2019 SAEM Annual Meeting in Las Vegas, Nevada, which was open to all SAEM meeting attendees. The writing group consists of five EM physician educators and one EM resident with a mutual interest and expertise in social medicine, health inequality, residency education, and diversity and inclusion in EM. All members of the writing group are members of ADIEM from
institutions that represent broad geographic locations and diverse patient demographics: Emory University, The University of Colorado, Thomas Jefferson University, and Yale University. In this concept paper, we aimed to provide a conceptual framework to develop resident education towards minimizing health inequalities, aligning EM education with broader trends in EM research and advocacy, furthering the mission of ADIEM, and improving patient care.

**Structural Competency and EM**

Structural competency challenges the prevailing tendency to think of health as the sum total of genetic predisposition and individual choice. Instead, it affirms the position that health is a product of the policies, economic systems, and institutions (e.g., health care, educational, housing, carceral) that contribute to and maintain social inequalities. These policies, systems, and institutions produce disenfranchisement and marginalization that operate along lines of socioeconomic class, race, gender, and sexual orientation, to which health inequities necessarily correspond in parallel.37,38

Nuanced theorization of social inequalities has required researchers and medical educators to draw from the social sciences. Using principles and literature from fields such as public health, sociology, medical anthropology, and history, scholars are able to illustrate how social cohesion, inequality, and material deprivation are critical to understanding health disparities and poor health outcomes of ED patients.39–43

EPs have advocated for ways to diversify the workforce of emergency providers,44 to combat implicit bias in the clinical encounter,16 to address the material needs of patients that extend well beyond the ED,4 and to equip EDs with the resources to meet the diverse social needs of our patients. In fact, the ACGME has recognized these steps as crucial to creating an inclusive workplace, now requiring residency programs, departments, and hospital systems to have plans in place to assure their makeup reflects their community’s makeup and diversity.

Each of these represents a powerful step toward the development of a social EM agenda for research, advocacy, and education. There remain opportunities to draw on the social sciences to expand our understanding of social forces and the ways that they manifest in the clinical encounter and our patients’ health. For instance, historians analyze the ways in which categories and understandings of health vary across time.45,46 Medical anthropologists and sociologists illuminate how systems of inequality can manifest at individual, community, and regional levels.47–49 Economists demonstrate that financial systems and funding priorities influence health outcomes and life expectancies.50,51

We do not expect that EPs will become experts in these varied disciplines during their medical education. Each of these disciplines has important contributions to EM practice but alone are not sufficient to account for the multiplicity of conditions under which we practice. We present these examples as opportunities for interdisciplinary engagement to better illuminate the ways in which seemingly simple or mundane patient interactions can represent manifestations of interrelated economic, historical, cultural, and political conditions. Indeed, it is clear that progress in the realm of health justice mandates collaboration between these fields. We firmly believe that the scholarship of social sciences is critical to improving the health of our patients and education of our trainees.

Structural competency is therefore not a replacement for EM’s increasing attention to social circumstances and their relationships to health. Rather, it is a framework that seeks to unify and teach the ways that ostensibly disparate aspects of social organization influence health and play out in the ED.

**The Structurally Competent Emergency Physician**

To operationalize cultural competency within medical education, Metzl and Hansen propose five core structural competencies, which we present below, adapted for EM training and explicated through relevant clinical examples.

**Recognizing the Structures That Shape Clinical Interactions**

The first component of structural competency is to recognize how political, economic, and material conditions (i.e., structures) influence the clinical encounter. This recognition is critical to achieving the ACGME’s patient care competency. Indeed, it is impossible to provide effective, appropriate, and compassionate care without consideration of the obstacles and conditions. Consider, for example, the following case:

Ms. Navarian is a 74-year-old woman who presents to the ED with a complaint of chest pain and dyspnea. Her work-up reveals AFib and an
NSTEMI. She is treated appropriately, and the decision is made to admit her for further management. When her resident informs her of the need for admission, she adamantly refuses and asks to sign out against medical advice. When evaluating her, the resident notes that she recently lost her husband and questions if she may have undiagnosed dementia that could be affecting her capacity to participate in the medical decision-making process.

While Ms. Navarian’s decision-making capacity is a worthwhile consideration, one must also be careful not to conflate aging with cognitive decline and to consider other variables in her treatment.52 To illustrate, when asked, Ms. Navarian states that being admitted would leave her home unattended, thereby making her vulnerable to burglary. Moreover, she states that the death of her husband has left her with unpaid bills related to his end-of-life care and funeral expenses and she is concerned about accruing further debt with this admission. Within this case lie important issues of housing affordability, eviction and tenants’ rights, and the financial precarity associated with aging.53 As the U.S. population ages, there is growing concern and evidence that elder patients face marked instability and insecurity stemming from difficulty or inability to access essential resources—circumstances that will regularly manifest within the ED.54–56

Thus, the resident treating Mrs. Navarian may recognize that the loss of her spouse may unveil cognitive deficits, but may also expose her to personal and material hardships. Consequently, the resident may inquire further about her living arrangements, the availability of social support, and her most immediate concerns beyond the stated chief complaint. This information may reveal immediate solutions to ease some of her burdens (e.g., a trusted friend may stay in her home to ease her concerns of burglary). However, even if no immediate solutions present themselves, this information could have important implication for her follow-up care, treatment, and linkage to resources.

Structural constraints are not unique to patients within the clinical encounter. EPs are under pressure to treat patients expeditiously and to balance patients with a wide range of complaints and acuities. EPs often do not have time to delve into the difficulties of each patient’s circumstances, as with Ms. Navarian. Further, EPs may be constrained by the availability of social services, outpatient services, drug pricing, and local and state laws that limit the scope of their practice. These are all factors under which physicians have little control, yet awareness of the existence of these structures and constraints provides a productive way to articulate the circumstances under which we deliver care—to patients, colleagues, hospital administrators, and policy makers. Therefore, attention to structure should not be approached as an additional task or competency that EPs have to undertake, but rather a reorientation of the physician’s role and the clinical encounter toward the macro-level structures in which we are all implicated. Of note, the EM Model of Clinical Practice explicitly states that these issues are crucial for the knowledge and practice of EPs. For example, the model states that EPs must “recognize age, gender, ethnicity, barriers to communication, socioeconomic status, underlying disease, and other factors that may affect patient management.”57

Developing an Extraclinical Language of Structure

Structural competency draws on a range of disciplines within the social sciences to push the limits of medical education and to challenge what the role of the physician might be with regard to patient safety and health. This dovetails with the ACGME’s “interpersonal and communication skills” competency, which requires that residents demonstrate the ability to effectively communicate with and understand the conditions of patients from a variety of backgrounds. To illustrate, we offer the following case:

Ms. Gomez is a young immigrant from Honduras with a prior medical history of untreated hypertension. She presents to the ED with a complaint of progressively worsening dyspnea for one month. Her ED work-up reveals a diagnosis of end-stage renal disease (ESRD) and prompts her admission and the initiation of emergent hemodialysis. Once stabilized, she states that she is undocumented and delayed seeking care because she was concerned that she would be jailed or deported if she sought treatment for her symptoms.

Ms. Gomez is one of thousands of undocumented immigrants who depend on scheduled dialysis to survive but are unable to access it in the outpatient setting.58 They rely on EDs for dialysis, many of which
have varying policies and inconsistent definitions of “medical necessity” for emergent dialysis.59

One can understand Ms. Gomez’s situation in terms of pathophysiology and access to care, specifically her exclusion from the Social Security Amendment of 1972, which guaranteed the provision of dialysis to U.S. citizens with ESRD. One cannot fully understand her situation, however, without contextualizing it within the broader debates about citizenship and their hidden, normative assumptions about who has “the right to have rights.”60 Social scientists, including medical anthropologists, sociologists, legal scholars, and historians, have made considerable headway in theorizing the gap between codified civil rights and their enforcement.28,61–64 They have pointed out the ways in which certain groups (e.g., women, African Americans, immigrants, or members of the LGBTQ community) rely on powerful institutions to secure their rights, which may change depending on popular opinion or the political climate.65

While these issues may seem overly abstract for EM practice, they contribute directly to inequality in conditions such as immigration, housing, education, and incarceration—all of which contribute to health inequalities that manifest in EDs across the United States.31 Seen in this light, Ms. Gomez’s case can be articulated in more complex terms than a simple indication for dialysis. Thus, instead of asking, “What are the clinical indications for emergent dialysis and does Ms. Gomez meet them today?” one may ask, “How is healthcare implicated in the local, regional, and national immigration policies that make Ms. Gomez continually choose between her health and safety?” Adding a language of structure to aid EPs in articulating patients’ barriers to care may facilitate empathy, discourage individual blame, and make complex patient care less daunting. We argue that structural fluency is needed to achieve the interpersonal and communication skills competency. Further, this framework presents opportunities to engage in advocacy, pushing the limits of our current imagination and breaking existing silos within EM.

Rearticulating “Cultural” Presentations in Structural Terms

Cultural competency has been criticized for its potential to efface differences within groups (such as socioeconomic differences) and reduces “culture” to a static set of traits to be committed to memory.26 Not only does this approach sometimes overstate cultural or racial differences in preferences to treatment, but it can also have the unintended effect of engendering frustration and reinforcing the idea of the patient as “other.”66,67 Moreover, cultural competency frameworks often conceptualize culture as an attribute of patients, thereby rendering invisible the culture inherent to medicine and its workforce.68

This is not to deny the existence of culture or to minimize the headway that cultural competency has made in humanizing medicine and making EPs aware of the variations in approaching health and illness. Nevertheless, it is time to address the critiques of cultural competency.

Reframing the encounter in structural terms may help address these critiques and give EPs the ability to produce sound medical plans that attempt to overcome barriers of inequality. We present the following case to further illustrate this point.

Mr. James is a middle-aged African American man with a history of diabetes. He presents to the ED with a complaint of hyperglycemia. Upon questioning, he reports that he has not been taking insulin as prescribed during his previous ED visit for the same complaint.

This is a common case that can be approached in a variety of ways. Traditional cultural competency approaches may reference the infamous Tuskegee Syphilis Study69 as a reason to explain (or blame) Mr. James’ behavior as part of a pervasive culturally or racially based distrust of the health care system. This implicitly reinforces the idea that Mr. James’ health is a product of personal beliefs and decisions. Moreover, this approach operationalizes race as an explanatory model of individual behavior (i.e., this patient believes X because he is Y) and detracts from a more accurate conceptualization of race as a marker of discrimination and disenfranchisement. Thus, at worst, a resident may dismiss the extensive history of medical racism and misconduct as bygones, stereotype Mr. James as lacking health literacy, or view his condition as unchangeable. At best, a resident treating Mr. James may be encouraged to elicit his personal understandings of his diagnosis of diabetes and his subjective experiences of his illness to build trust and to encourage medication adherence. The resident may focus on Mr. James’ diet, recognizing that knowledge and attitudes toward foods are culturally learned and attempting to educate him on healthier food choices.
These are important ways with which to provide care, but they are based on the implicit assumption that the medication regimen prescribed to Mr. James is correct and that his nonadherence is based in subjective belief or misunderstanding. The resident treating Mr. James may therefore overlook material difficulties that are more important contributors to his current health. For instance, a structurally based approach to the history may illicit that his diet is restricted not by his knowledge but by the fact that he is concerned about being evicted from his home and often must choose between paying for food and basic utilities and paying for rent. Having intermittent access to electricity makes it difficult to refrigerate insulin and, coupled with its high price and his limited income, makes it untenable for him to take regularly. Thus, instead of insisting on a treatment plan outside of Mr. James’ reach, a resident treating him may brainstorm ways to modify his treatment regimen by prescribing more affordable drugs or linking him to discounted prescription drug programs.

Emergency physicians may draw upon structural vulnerability frameworks to ask Mr. James about what barriers he faces, what he is able to accomplish with his existing resources, and what he would find helpful in accomplishing specific health goals. EM residents, for example, may be taught to use a questionnaire developed by Bourgois et al. to address structural barriers to good health. Suggested patient questions include: “Do you have enough money to live comfortably—pay rent, get food, pay utilities, telephone?”; “Do you have friends, family, or other people who help you when you need it?”; “Do you have any legal problems?”; “Are you afraid of getting in trouble because of your legal status?” Bourgois et al. also suggest that providers reflect on their own position within an interaction, asking themselves questions such as: “May some service providers (including me) find it difficult to work with this patient?” and “Could the interactional style of this patient alienate some service providers, eliciting potential stigma, stereotypical biases, or negative moral judgment?” These questions provide useful starting points for conversations that may otherwise be uncomfortable for EPs and patients.

Reorienting the clinical encounter to focus on the structural constraints that Mr. James navigates daily does not undermine the historical indignities visited upon African Americans by the medical community. Indeed, the same systems of prejudice that facilitated unethical experimentation also contributed to disenfranchisement from housing, education, employment, and public services that persist today. A structural approach illuminates continuities between these historical injustices and inequalities and their contemporary relevance, rather than flattening them to isolated incidents that live on only in individuals’ or communities’ memories.

Observing and Imagining Structural Interventions

Central to a structural competency approach to EM education is a conviction that physicians can and should act in their capacity on behalf of patients outside the ED. This is critical to achieving the “systems-based practice” competency, which addresses residents’ response to the larger system of health care and requires a facility with resource utilization. Residents may feel intimidated by this prospect or protest that a physician’s role is limited to the patient encounter. We argue, however, that steps toward the amelioration of suffering can range anywhere from being empathetic at the bedside to dedicating one’s career to social advocacy. These are not mutually exclusive decisions. To help residents recognize this, we propose integrating structural interventions into the systems-based practice competency curriculum in two steps.

First, residents should be exposed to organizations and initiatives working to provide food, employment, and stable housing. Some programs have integrated visits to local institutions tackling poverty into their intern orientation, thereby exposing their incoming interns to the ways in which local organizations support people living in poverty or experiencing other forms of stigma or marginalization. We note that observation and exposure to such organizations is a critical component of structural competency because it reinforces the importance of listening and engenders iterative learning among residents—qualities that are critical in their advocacy and in caring for patients. Not only does this have the potential to empower residents, but also it can broaden their network of allies, experts, and teachers.

Second, having observed successful structural interventions as noted above, residency programs may use their didactic curriculum to debrief residents on their clinical experiences, to place these with structural frameworks, and to propose informed interventions. Metzl and Hansen propose the following questions, which represent productive starting points for discussion and resident engagement: 1) What “problems”
do organizations or interventions aim to address? 2) Which notions of structure from parts 1, 2, and 3 above—e.g., medical, anthropological, sociological, historical—are most helpful when identifying problems and conceptualizing solutions? 3) What are the barriers to, and benchmarks of, treatment or success over time? 3) What types of interventions can you imagine or enact that might also address structural health issues (in your ED, hospital, city, or state)?

Residents may be encouraged to partner or participate within these organizations or to find other avenues for civic engagement. For instance, some residency programs have taken their residents to state capitals to meet local legislators and to demystify the legislative process and to demonstrate the role physicians can play in the political process. Residency programs may also encourage residents to participate in their hospital or university committees, to develop and deliver lectures to medical students and fellow residents on a topic of interest to them, to write op-eds and participate in public scholarship, or to provide medical evaluations for asylum seekers in their region. There is no shortage of issues or opportunities for engagement and advocacy, and residents should be reminded of the social capital that comes along with their medical training and should be given the tools to deploy their social capital on behalf of their patients. Resident advocacy may be supported (with time, institutional resources, or funding) and incentivized (through recognition and praise). In this way, residency leadership is uniquely positioned to facilitate resident advocacy in their cultural valuing of these initiatives.

**Developing Structural Humility**

We recognize that the concepts, issues, and frameworks introduced thus far are broad and do not lend themselves to easy solutions. An important aspect of structural competency is the recognition that structures are constantly and rapidly changing. In part, the point of structural competency is to deprioritize “solutions” in favor of productive, active engagement with these issues, and a cultivated self-awareness among EPs. To that end, structural humility should be incorporated in the “practice-based learning and improvement” competency. It refers to the trained ability for EPs to recognize the boundaries of their knowledge, the fallibility of their perceptions, and the limits of medical interventions. Like structures themselves, these are constantly changing across time, regions, individuals, and even hospitals. The very idea of “competency” proposed here does not refer to a once-and-for-all mastery of issues of structure. Like other skills within EM (e.g., airway management and medical resuscitation), EPs should not expect to learn a set of skills that they can continue to apply without modification throughout their clinical careers. Rather, they should make a commitment to lifelong learning from their patients and taking seriously the ways that structural forces play out in patient care.

The “structurally humble” EP is therefore one who strives to provide the best care for her patients and is simultaneously aware of her own abilities or constraints. She recognizes the limits of medical practice and the unintended consequences of medicalizing social problems. She does not promise or expect that the ED will immediately solve patients’ housing difficulties or change their immigration status. She bears witness to the ways in which these issues manifest in the ED; develops a structural fluency that builds trust and understanding in the patient encounter; and continually learns from patients, colleagues, and other content experts.

Residency programs may foster structural humility in residents by providing a platform for non-physicians to share their perspectives and expertise (e.g., at departmental grand rounds or journal clubs). Residency programs may partner with local organizations to offer social medicine electives to their residents. Residents may also be encouraged to seek advice or feedback from social scientists and/or community organizations when developing scholarly or quality improvement projects. These efforts demonstrate the value of our colleagues’ perspectives outside of EM and model structural humility for our trainees.

**CONCLUSION**

The ED’s unique role as the “safety net” of American health care makes the structural competency framework especially salient for emergency medicine practice and education. In adapting structural competency for the emergency medicine context, we aim to provide a theoretical framework to underpin the development of emergency medicine curricula. Emergency medicine educators are uniquely positioned to train the next generation of emergency physicians to deliberately incorporate structural competencies into their medical practice and professional development. By building on this framework, we can train emergency physicians...
who are structurally competent (knowledgeable about the structures that create disparities) and who are structurally humble (understand the limits of their knowledge and the care that they provide). They “entertain multiple interpretations for scenarios whose tensions are, in the heat of the moment, too-often reduced to explanatory models based in cultures, ethnicities, and other urgencies of here-and-now clinical encounters.”

These emergency physicians do not rush to attribute Mrs. Navarian’s difficulties to old age, dismiss Ms. Gomez’s fears as unfounded or as byproducts of her own choices, or write off Mr. James as “noncompliant.” Structurally competent and humble emergency physicians simultaneously recognize their social capital, their own structural constraints, and the limits of their knowledge.

As the emergency medicine research and advocacy agendas evolve to include attention to social medicine, social determinants of health, and historically and structurally based inequalities, so too must resident education intentionally incorporate these issues toward meeting Accreditation Council on Graduate Medical Education and emergency medicine core competency requirements. This can be done through formal didactic presentations, assigned readings, and small-group discussion and can easily be incorporated into case scenarios that are frequently used in simulation. Drawing on the experience and expertise of our colleagues in public health and the humanities and social sciences and incorporating those insights into emergency medicine will bring us closer to our goals of improving patient care and minimizing health inequities for our patients.

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Fostering a Diverse Pool of Global Health Academic Leaders Through Mentorship and Career Path Planning

Jennifer A. Newberry, MD, JD, MSc1, Shama Patel, MD, MPH2, Stephanie Kayden, MD, MPH3, Kelli N. O’Laughlin, MD, MPH4, Eric Cioè-Peña, MD, MPH5, and Matthew C. Strehlow, MD1

ABSTRACT

Established in 2011, the Global Emergency Medicine Academy (GEMA) aims “to improve the global delivery of emergency care through research, education, and mentorship.” Global health remains early in its development as an academic track in emergency medicine, and there are only a small number of global emergency medicine academic faculty in most institutions. Consequently, GEMA focused its efforts at the Society for Academic Emergency Medicine (SAEM) Annual Meeting in 2019 on developing a diverse pool of global health academics and leaders in emergency medicine. Current and previous members of the GEMA Executive Committee convened to appraise and describe how current GEMA efforts situate within existing knowledge in the arenas of professional development and mentorship. The 2019 SAEM Annual Meeting unveiled the Global Emergency Medicine Roadmap, a joint venture between GEMA and the residents and medical students (RAMS) group. The roadmap guides medical students, residents, and fellows in the exploration of global emergency medicine and career development. GEMA’s mentorship roundtable complemented this effort by providing a version of speed mentoring across several critical areas: work–life balance, identifying near-peer and long-distance mentoring opportunities, negotiating with your Chair, finding funding, networking, and teaching abroad. Finally, the GEMA-sponsored panel “Empowering Women through Emergency Care Development in LMICs” underscored the potential for empowering women through global emergency medicine development, including policy advocacy, inclusive research approaches, and mentorship and sponsorship. In summary, GEMA is committed to developing a diverse group of future global health leaders to guide the expansion of emergency medicine worldwide. Our work indicates critical future directions in global emergency medicine education and training including building innovative mentoring networks across institutions and countries. Further, we will continue to focus on growing faculty diversity, empowering underrepresented populations through emergency care development, and supporting rising global emergency medicine faculty in their pursuit of advancement and promotion.

Established in 2011, the Global Emergency Medicine Academy (GEMA) is one of the eight academies within the Society for Academic Emergency Medicine (SAEM) dedicated to uniting members with akin expertise and interests. With 297 members, it stands as the fourth largest academy in SAEM and the second fastest growing academy behind the Academy for Women in Academic Emergency Medicine (AWAEM). GEMA aims to improve the global delivery of emergency care through research, education, and mentorship. To achieve this goal of strengthening emergency care worldwide, GEMA launched a strategic plan in 2018 founded on four pillars: 1) knowledge creation and dissemination, 2) professional development of emergency medicine physicians locally and internationally, 3) leadership and advocacy for the development of emergency care in LMICs, and 4) building and sustaining an academy with global reach.

From the 1Department of Emergency Medicine, Stanford School of Medicine, Palo Alto, CA; the 2Department of Emergency Medicine, New York Presbyterian, Columbia University, New York, NY; the 3Department of Emergency Medicine, Brigham and Women’s Hospital, Harvard Medical School, Boston, MA; and the 4Departments of Emergency Medicine & Global Health, Harborview Medical Center, University of Washington, Seattle, WA; and the 5Zucker School of Medicine at Hofstra/Northwell, Hemptstead, NY.

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Supervising Editor: Daniel Egan, MD, FACEP.

Address for correspondence and reprints: Jennifer A. Newberry, MD, JD, MSc; e-mail: newberry@stanford.edu.


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and internationally, 3) advocacy for global emergency medicine education and research, and 4) building inclusive collaborations that foster community and service. The immense opportunity to improve the care of billions of underserved people with limited access to high-quality emergency care has made global emergency medicine one of the fastest-growing subspecialties of emergency medicine. The increasing number of emergency medicine faculty members, trainees, and medical students pursuing international opportunities is evidence of the expanding interest in global health. This rapid growth has led to tremendous achievements, including the passage of the World Health Assembly resolution 60.22 in 2019 which states “that additional efforts should be made globally to strengthen provision of trauma and emergency care so as to ensure timely and effective delivery to those who need it in the context of the overall health-care system, and related health and health-promotion initiatives.” Successes in advocacy are mirrored in the expansion of global emergency care research, emergency medicine education programs in low- and middle-income countries (LMICs), and emergency care delivery system improvements in many countries with developing health care infrastructures.

Despite advancements in global emergency medicine, rapid growth of the field has produced challenges. Global health remains early in its development as an academic track in emergency medicine, and there are only a small number of global emergency medicine academic faculty at most institutions. This small number of faculty is insufficient to address the rapidly growing need for mentorship and career guidance in global health among trainees and junior faculty both in North America and overseas. Additionally, the travel required to support academic partnerships and research in remote locations further compounds the already hefty workload experienced by academic emergency physicians. Finally, global emergency medicine often requires pursuit of nontraditional funding mechanisms, which can be challenging to identify and secure.

Moreover, the nature of global health has changed dramatically in recent years. While historically global health physicians focused their work on medical missions, travel medicine, and combating infectious disease, current global health and emergency medicine academic tracks have shifted their efforts elsewhere. Our understanding of the current global burden of disease has honed efforts in the areas of noncommunicable diseases, trauma, mental health, displaced populations, and changing levels of access. Today’s global health academic practice has evolved significantly to center on local capacity building through educational program development, training, and supporting local emergency care researchers and strengthening emergency care systems within LMICs. This evolution of the field further exacerbates the shortage of senior faculty with adequate knowledge and experience to provide meaningful mentorship.

Finally, GEMA’s efforts at fostering inclusion and equity within global health and emergency medicine face profound obstacles. Women academics in the United States already facing disproportionate family responsibilities must additionally navigate prolonged travel schedules in potentially high-risk locations. In LMICs, careers in emergency care for women and minority populations are commonly discouraged or nonexistent due to cultural barriers and safety concerns.

Guided by the changing landscape of global health, with both its opportunities and its challenges, GEMA focused its efforts at SAEM 2019 on promoting a diverse pool of rising global health academics and leaders in emergency medicine.

**METHODS**

Over the course of the past year, culminating with the 2019 SAEM Annual Meeting, GEMA focused on the challenge of growing global emergency medicine leaders and academics. Members from the 2018 to 2019 and 2019 to 2020 GEMA Executive Committee convened to appraise and describe how current GEMA efforts situate within existing knowledge in the arenas of professional development and mentorship, particularly where mentors are scarce and pathways for advancement are still being forged. Unfortunately, there is limited literature specific to the global health setting and/or focused on transnational mentorship approaches. The following sections describe activities launched or hosted at the 2019 SAEM Annual Meeting that leverage GEMA’s national and international network to provide guidance and mentorship in global emergency medicine that may not otherwise be available to trainees and junior faculty.

**CAREERS IN GLOBAL EMERGENCY MEDICINE ROADMAP**

Global health has become an important and prominent aspect of undergraduate medical education,
residency, and postresidency careers for an increasing number of physicians. As entering into a global emergency medicine career can be daunting, GEMA partnered with the SAEM residents and medical students (RAMS) group to help ease this burden through the development of a global emergency medicine roadmap. The RAMS Roadmap Project was conceived to guide students and physicians toward academic careers in emergency medicine. The objective of the RAMS Global Emergency Medicine Roadmap is to increase recruitment into the subspecialty of global emergency medicine and, while not replacing mentorship, provides a general framework for career development and advancement (Figure 1).

The roadmap begins with foundational topics: background, resources, and insider advice. The background of global emergency medicine underscores that while it is a developing and nascent field, significant opportunities exist for a new generation of physicians to address research gaps in clinical care, epidemiology, and medical education. The roadmap prepares the individual for the journey ahead with a discussion of key challenges. Some of the most common challenges rising academics face are finding a niche within the broad field of global emergency medicine, negotiating adequate protected time for fieldwork, and securing funding for time spent within locations of need. Finally, the roadmap emphasizes the importance of mentorship in growing a global emergency medicine career. Mentees must consider seeking out mentorship from both within and outside of their institutions. In fact, broad mentoring networks rather than intimate mentoring dyads are often better able to stitch together the diverse range of mentoring needed, particularly in a field where there are few mentors available.

Beginning with medical students, the Roadmap provides recommendations focused on the first two years and the last two years of medical school. During the first two years, the goals are to find a global emergency medicine mentor, to explore fieldwork opportunities during the summer between first and second year of medical school, and to engage in local initiatives that provide exposure to global health principles. During the final years of medical school, a student’s focus should shift toward learning the fundamentals of global health, engaging in international electives, and continuing to solicit mentorship.

Upon entering residency, developing clinical skills is of critical importance for junior residents. If needed, efforts should also be made to identify mentors at their new institution and beyond. Senior residents must find time for an international-based elective, in addition to outlining goals for postresidency work. Planning for international rotations is paramount, which includes the necessity of identifying an in-country partner to provide in-country support. The

Figure 1. Global emergency medicine career pathways roadmap.
literature on predeparture preparation and international elective learning objectives continues to grow to meet this need.10–13

At the conclusion of residency, there are several options for early career emergency physicians to obtain additional training specific to the field of global health. These options include completing a 1- or 2-year global emergency medicine fellowship, procuring an advanced degree, or engaging in other postresidency training programs, such as those offered by the CDC or the NIH’s Fogarty Global Health Program. In addition, working at an academic emergency medicine department or community hospital while independently procuring protected time for travel and fieldwork can also enable junior faculty to pursue global health projects.

The roadmap offers additional components, including a webinar on global emergency medicine research and podcasts with leaders in global emergency medicine. Taken together, the roadmap helps medical students, residents, and junior faculty navigate opportunities to enter this new and exciting field.

GLOBAL EMERGENCY MEDICINE MENTORSHIP ROUNDTABLE

At SAEM 2019, GEMA launched a new global health mentorship roundtable session. Mentors from around the country staffed six different roundtables. Participants rotated through four of the six roundtables, spending 30 minutes at each one. The mentorship roundtable topics covered work–life balance, finding and working with a mentor, negotiating with your Chair, how to find funding, networking, and teaching abroad. Key pearls from each roundtable are mentioned below (Table 1).

The mentorship roundtable approach is akin to “speed mentoring,” which has been used successfully in other academic medicine settings, including pediatrics and surgery.14,15 GEMA’s mentorship roundtable was successful in providing structured and pertinent guidance on key issues facing global emergency medicine faculty. In addition to advice, the mentorship roundtable provided exposure to at least eight

<table>
<thead>
<tr>
<th>Topic</th>
<th>Pearls</th>
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<tbody>
<tr>
<td>Work–life balance</td>
<td>• Protect time for family and self vigorously.</td>
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<td></td>
<td>• Set clear boundaries in advance of starting new projects.</td>
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<td></td>
<td>• Learn when to say “yes,” which may be important for career or politically imperative, but moreover learn when to say “no.”</td>
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<tr>
<td></td>
<td>• Write a career plan and keep the bulk of your extracurricular activities focused on your career plan.</td>
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<td></td>
<td>• Be flexible but with intention.</td>
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<tr>
<td>Finding and working with a mentor</td>
<td>• Mentors may be within your institution or outside of your institution.</td>
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<tr>
<td></td>
<td>• There is rarely one mentor to meet all your needs: you may need different mentors for different aspects of your life and career.</td>
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<td></td>
<td>• Developing yourself as a good mentee takes work and commitment.</td>
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<tr>
<td>Negotiating with your Chair</td>
<td>• Critically, understand the goals of your Chair.</td>
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<td></td>
<td>• Negotiate with your Chair’s goals in mind.</td>
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<td></td>
<td>• Titles and nonmonetary asks are often more feasible for your Chair than monetary asks.</td>
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<td></td>
<td>• Relocation expenses and money for continuing medical education are generally more workable monetary asks than salary increases.</td>
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<td></td>
<td>• Incentivize the Chair to support your work by engaging medical students, residents, and other groups in which the Chair is invested.</td>
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<tr>
<td>How to find funding</td>
<td>• Funding for global emergency medicine is difficult, but you should not work without funding indefinitely.</td>
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<td></td>
<td>• Funding takes on different forms, but most academics obtain funding from grants or foundations.</td>
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<td></td>
<td>• Some institutions provide international funding, but it can be difficult to negotiate with your Chair.</td>
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<tr>
<td>Networking</td>
<td>• Networking is work and requires putting yourself out there.</td>
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<td></td>
<td>• Be bold: most people in the global emergency medicine will respond if you reach out.</td>
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<td></td>
<td>• Actively networking is important but also performing well on projects will help you build a reputation of being competent and able.</td>
</tr>
<tr>
<td>Teaching abroad</td>
<td>• You are a guest. No matter how experienced you are clinically at home, those you are teaching will be more familiar with the cultural, social, and practical realities of the setting you are visiting.</td>
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<td></td>
<td>• Learn about the health care system prior to traveling. Research the level of care available where you will be working (e.g. care for head trauma, stroke, myocardial infarction; referral network; insurance)</td>
</tr>
<tr>
<td></td>
<td>• Understand the medical education requirements, including residency. Research the types and levels of providers that exist, in particular, for those providing emergency care.</td>
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<td>• Learn about the culture. Get to know those you are teaching to be more effective and to truly invest in their education.</td>
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<td>• Be prepared to be outside of your comfort zone: chalk talks are more reliable than PowerPoints, Internet may not be available, and language barriers require effort and patience to overcome.</td>
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<tr>
<td></td>
<td>• In the end, you will learn more than you teach when abroad.</td>
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potential mentors, opportunities for peer-to-peer shared experiences, networking, and possible collaborations. Future expansion of the mentorship roundtable activity to include short-term goal setting by participants and check-in’s following the roundtable, could prove beneficial and aid in building longer-term relationships.

**EMPOWERING WOMEN THROUGH EMERGENCY CARE DEVELOPMENT IN LMICS—PANEL**

The development of emergency care in LMICs can be a catalyst for empowering women. The panel started from the premise that empowerment is a “process by which those who have been denied the ability to make strategic life choices acquire such an ability.” Emergency medicine as a field has unrecognized and under-valued potential to empower women globally as physician and nonphysician providers, researchers, and advocates for their own health. Specifically, emergency systems development, research, education, workforce growth, and sustainability can all serve to empower women by increasing access to resources, by strengthening women’s sense of agency and self-efficacy, and by providing a means of achievement and advancement. Further, research suggests that confronting restrictive gender norms and inequities in health systems development, particularly in these early stages, can impact outcomes and community health more broadly.

To begin, emergency medicine is an empowering specialty for women. Panelists noted that by simply being told and shown that they could be emergency physicians, they felt empowered and capable. As an emergency physician, from resuscitation room to disaster response, they noted that one must be able to lead a team in the middle of chaos. The ability to lead and to multitask at a high level, the rapid impact of one’s actions, and the visibility that comes with the role can increase a sense of agency and self-efficacy (Table 2). The importance of role modeling is underscored by research noting that women not uncommonly leave emergency medicine due to a lack of role models, particularly with respect to combining career and family. In addition, women may be forced to leave the profession because there is no support for maternity leave during residency training. However, paid maternity leave and parental leave policies in LMICs have been shown to improve health outcomes across sectors.

Sharing and supporting maternal leave policies with our global health partners can help change these norms (Table 2).

Beyond our own careers, working in global health provides opportunities to empower women more widely. Hiring women, particularly those of childbearing age, as research assistants and emergency department staff can be a pathway to gaining new technical skills not otherwise available (Table 2). In addition, supporting the development of stronger women-to-women peer mentorship networks can help women empower each other. However, in most LMICs this is particularly challenging because emergency medicine is in its infancy. Establishing peer mentor relationships cannot happen organically and must be a deliberate act that may require innovation, such as leverage teleconferencing with U.S.-based women emergency physicians. Beyond mentoring, global emergency physicians can and must act as sponsors (Table 2). Sponsorship is the active support of someone with influence within an organization who advocates for the advancement of an individual. Within academic medicine there is emerging literature to support the critical role of sponsorship above and beyond role modeling and mentorship to advance the careers of women.

As we work to increase opportunities for women through emergency care development, we must be vigilant for barriers and limitations to these efforts. For example, English is often the language used in medical and/or academic settings. We can advocate for meetings and policies to be made in both English and local languages for women in positions such as nurses, program managers, and research assistants who may feel most comfortable in a local language. One particularly difficult area to navigate in breaking down barriers may be the high-income country (HIC) to LMIC power differential. HIC academics, regardless of intent, must be aware of the structural power they carry in many of the roles they assume in global health, whether physician, educator, researcher, or sponsor. Further focus must be paid to the intersectionality of gender, power, and ideas of colonialism when developing bidirectional partnerships.

Moving forward, the panelists set forth personal goals and challenges to those in the audience. GEMA can be an influential body with both great opportunity and obligations, including 1) to amplify the discussion on women’s empowerment, incorporating deliberate action into our global health endeavors and planning;
2) to share resources, including those pertaining to parental leave policies and gender equity in pay; and 3) to challenge each other to do better with every opportunity. As efforts to build emergency care systems and the specialty of emergency medicine grow, there must be deliberate action to provide mentorship and sponsorship, while being vigilant to build structures that empower women.

### IMPLICATIONS AND NEXT STEPS

To strengthen emergency care worldwide, GEMA is committed to growing a diverse membership of emergency medicine global health experts. GEMA’s programs and services strive to be locally relevant, accessible, and contribute directly to the professional success of its members and their development as future leaders in global health. The roadmap along with the GEMA-sponsored mentorship roundtable and panel on empowering women through emergency care development at the SAEM 2019 Annual Meeting furthered this commitment and established the foundation for future GEMA endeavors aimed at fostering career development.

To provide a foundational guide, accessible to anyone, the roadmap disseminated shared knowledge and experience on growing a successful career in global emergency medicine. The roadmap was designed to be a longitudinal reference that spanned the different early career stages, emphasizing the importance of individual career development from medical students through junior faculty. It is GEMA’s intention to actively disseminate this tool across the United States and internationally so trainees will have the opportunity to consider the many aspects of academic global emergency medicine early in their careers. GEMA will

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**Table 2**

Examples of Empowering Women Through Emergency Care Development

<table>
<thead>
<tr>
<th>Mechanism for Empowerment</th>
<th>Examples in Emergency Care Development</th>
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| Increasing access to resources | Economic:  
  - Hiring women as research assistants, residents, staff, and faculty  
  - Advocating for paid parental leave  
  - Using emergency care systems to expand access to obstetric emergency care, sexual and reproductive health care  
  - Decreasing inequities in access to care for trauma, noncommunicable diseases, and infectious disease by being a point of entry to the larger health system  
  - Increasing participation in technology and science by women through skill development as researchers and providers  
  - Newer fields of study within health care including opportunities for education and skill development as emergency physicians and nonphysician providers  
  - Generating novel long distance peer-mentoring programs |

| Strengthening self-efficacy, autonomy, and agency | Clinical care:  
  - The (near) immediate impact of emergency interventions provides a timely connection between action and efficacy  
  - The emergency medicine approach to acute patients requires women to execute independent decision making and quick action, reinforcing autonomy and agency  
  - Frequent opportunities for women to act and see themselves as leaders as they lead teams in resuscitation and managing patient flow  
  - As part of the first generation of emergency medicine physicians and nurses, women will necessarily carry leadership roles in educating subsequent generations  
  - Sustainable models of growing the health care workforce can employ women as trainers  
  - Leading teams for program implementation provides a sense of autonomy and strengthens self-efficacy  
  - Advocating for community voices in research and systems strengthening |

| Providing means of achievement and advancement | Mentornship:  
  - Recruiting women into residency programs and leadership positions  
  - Providing guidance on advancement in academic medicine  
  - Providing support, advocacy, and role modeling for integrating personal and professional obligations  
  - Placing women in positions and roles where they are seen as experts (e.g., presenting research results)  
  - Advocating for women to advance into leadership positions and creating new leadership opportunities for women |

| Sponsorship:  
  - Placing women in positions and roles where they are seen as experts (e.g., presenting research results)  
  - Advocating for women to advance into leadership positions and creating new leadership opportunities for women |
continue to expand the content and availability of this tool as it receives feedback from members throughout the 2020 academic year.

Central to GEMA’s efforts to provide career assistance and support to its members are the establishment and strengthening of mentorship programs. Mentorship is a key component in professional development, especially in global emergency medicine where the pathway for advancement is less well established. The subspecialty is extremely broad in scope and relatively new, making mentorship critically important but also difficult to obtain. Traditional mentorship programs that centralize mentorship at the institution level are often ill-equipped to meet the challenges facing trainees and junior faculty in global emergency medicine. Innovative mentorship models such as speed mentoring and interinstitutional faculty twinning (pairing universities in HICs with those in LMICs), may better address the shortage of global emergency medicine faculty mentors at most institutions. These innovative models may be particularly suited to our pioneering colleagues in LMICs as well. GEMA provides a critical function by serving as a locus for consolidating and integrating mentorship strengthening efforts that can then be made available to trainees and faculty across institutions and borders.

GEMA’s previous activities focused on cross-collaboration between junior and senior GEMA members to foster mentoring relationships. With the initiatives launched at SAEM 2019, GEMA expanded its focus to include students, early trainees, and underrepresented groups, particularly women. Future additions to GEMA’s mentorship programs may include real-time and asynchronous online mentorship roundtables, video- and chat-based speed mentoring, targeted networking events expanded to the regional level, “mini mentorship moments” following didactics, and fostering direct mentee–mentor relationships within GEMA’s membership.

Beyond the implications for innovations in developing mentorship programs and activities tailored to global health, our work points to future work needed in other areas of education and training. Despite the progress GEMA has made in identifying opportunities for growth in fostering global health academics and leaders, we recognize that persistent gaps remain. Most notably, more can and must be done to actively grow diversity within global emergency medicine and to support the advancement and promotion in academics as global emergency medicine faculty.

**Growing Diversity**

Global Emergency Medicine Academy and its membership must seek to increase diversity within faculty ranks as well as to build research programs and emergency care infrastructure deliberately with a lens toward diversity and empowerment. This may be as straightforward as using the GEMA website to share and centralize best practices for recruitment and retention, approaches to community engagement in emergency research, or parental and family leave policies. Additionally, targeted integration with endeavors such as Women Leaders in Global Health can serve to advance this goal, building off and contributing to their momentum. For SAEM 2020, GEMA has reserved one of its didactic spots for an LMIC speaker, reserved funds to support their participation and travel, and committed to providing speaking mentorship. Efforts such as this that provide an opportunity to highlight an LMIC colleague’s expertise and talent are just the beginning.

**Supporting Advancement and Promotion in Academics as Global Emergency Medicine Faculty**

Repeatedly, whether via the aforementioned activities or other GEMA programs, global emergency medicine faculty report that global health work is often not considered academic or a departmental priority. Consequently, they face difficulty securing funding and time as well as challenges in advancement and promotion. Professional organizations like GEMA can help to shift this perspective by showcasing the contribution of global academic emergency medicine as impactful research, education, and clinical innovation. GEMA also can recognize on a national stage an individuals’ contribution to the field of global emergency medicine, better highlighting their work. Finally, similar to clinical educators in emergency medicine generally, the global emergency medicine faculty’s scholarly work may not be well captured by traditional curriculum vitae categories. Through networking events and more structured ventures, GEMA plans to facilitate the sharing of proven successful strategies and new ideas for describing scholarly output and adapting current academic efforts to more clearly meet this mandate.

**SUMMARY**

This article contextualizes GEMA’s work on mentorship and career development at the SAEM 2019
Annual Meeting within current research. There is scant literature on these topics specific to global emergency medicine. Our work begins to fill that gap and points to needed future directions in global emergency medicine education and training to leverage technology, to build innovative mentoring networks across institutions and countries, to grow diversity and empower underrepresented populations, and to support rising global emergency medicine faculty in their pursuit of advancement and promotion.

References

ABSTRACT
Competency in clinical ultrasound is essential to ensuring safe patient care. Competency in clinical ultrasound includes identifying when to perform a clinical ultrasound, performing the technical skills required for ultrasound image acquisition, accurately interpreting ultrasound images, and incorporating sonographic findings into clinical practice. In this concept paper, we discuss the advantages and limitations of existing tools to measure ultrasound competency. We propose strategies and future directions for assessing competency in clinical ultrasound.

Defining Competency in Clinical Ultrasound
Clinical ultrasound is focused ultrasound performed and interpreted by a clinician, in the context of providing direct patient care. It is utilized as a diagnostic modality to investigate a specific clinical question, safely guide invasive procedures, and assess response to therapeutic interventions. The term “clinical ultrasound” is synonymous with other terms such as “bedside ultrasound,” “emergency ultrasound,” and “point-of care ultrasound,” encompassing a broad spectrum of ultrasound examinations performed by various specialties in diverse situations.1

Competency is the ability of health care professionals to integrate knowledge, skills, values, and attitudes into encounters in their clinical practice.2 As applied to clinical ultrasound, competency reflects clustered skills of medical knowledge and technical aptitude to employ clinical ultrasound for optimized patient care and clinical outcomes. One published model, with the acronym I-AIM, has defined four subcompetencies of clinical ultrasound: identifying when to perform a clinical ultrasound, performing the technical skills in image acquisition, interpreting images, and incorporating those ultrasound findings into medical decision making and clinical practice.3

An example of competent clinical ultrasound use can be illustrated by the evaluation and management of a patient with acute, undifferentiated shortness of breath. The initial task involves the understanding of the scope and utility of lung ultrasound for the etiologies of shortness of breath. The next skill requires obtaining and optimizing lung images. This is followed by the knowledge to correctly identify pathologic findings such as bilateral B-line patterns or pleural effusions and applying these findings in the context of history, examination, and other diagnostic findings. Finally, the information gleaned from ultrasound
imaging guides successful management of a patient with an acute exacerbation of congestive heart failure.

**Measuring Competency in Clinical Ultrasound**

Measuring competence requires defining what is expected at different stages of the learning process. Bloom’s revised taxonomy divides learning into cognitive, affective, and psychomotor domains, each of which have milestones that move from “novice” to “minimally trained” to “well trained” to “expert” on comparable levels of skill and knowledge. In a similar way, the Next Accreditations System (NAS) milestones from the Accreditation Council for Graduate Medical Education (ACGME) seek to prepare physicians for clinical practice with assessments of competency. These milestones assess learners on a spectrum from a baseline level of nonexpertise through mastery, with the goal of enhancing quality and patient safety. The ACGME emergency medicine (EM) residency milestones include a dedicated ultrasound milestone that uses a threshold number of scans (150 total) as a surrogate to determine proficiency for graduating EM residents.

While the ACGME EM ultrasound milestone suggests that performing a minimum number of ultrasound examinations can be used as a surrogate for overall clinical ultrasound competency, studies have found that different clinical ultrasound applications demonstrated different learning curves. Using a standard number of ultrasound examinations to determine competency may not be the most accurate means of measuring clinical ultrasound competency, as learners may not uniformly meet a level of mastery at a predefined number of performed ultrasound examinations. Clinical ultrasound competency encompasses more than the technical skill of acquiring images that is reflected in the assumption of competency solely by reaching a quantitative metric. These concerns led to a multiorganizational suggestion for a revised EM ultrasound milestone that more accurately reflected performance progression throughout EM residency.

The EM ultrasound milestone has provided a general benchmark for resident assessment, but agreement on how best to utilize the milestones and suggestions for revision are still evolving. More importantly, there has been little discussion of how to assess competency across the different learner groups that perform clinical ultrasound, such as medical students, ultrasound fellows, practicing physicians, and advanced practice providers. Even among EM residency programs, there is a wide variety of clinical ultrasound assessment tools utilized. In addition to the variety of users, the broad spectrum of clinical ultrasound applications renders a single, focused, standardized competency assessment challenging. Based on review of available published guidelines and content expert insights, this article provides a description of these tools with recommendations for practical utilization and suggestions for future directions in clinical ultrasound competency assessment.

**METHODS**

Currently, there are a number of national EM organizations with sections that focus on clinical ultrasound training, including the Society of Academic Emergency Medicine (SAEM)’s Academy of Emergency Ultrasound, the American College of Emergency Physician (ACEP)’s Ultrasound Section, and the Society of Clinical Ultrasound Fellowships (SCUF). In 2016, members from SCUF coordinating a working group focused on clinical ultrasound competency, drawing from the membership of the aforementioned three organizations. Members of this working group were identified as subject matter experts in the field of clinical ultrasound education. The working group’s goal was to identify and describe the tools used to assess competency in clinical ultrasound.

To identify the current state of clinical ultrasound competency assessment, published guidelines and policy documents describing assessment in clinical ultrasound were reviewed. Documents reviewed include those from the American Board of Emergency Medicine, ACEP, Council of Emergency Medicine Residency Directors, SAEM, the American Institute of Ultrasound in Medicine, and the ACGME. A subset of the working group reviewed these documents and performed a textual analysis. A list of tools for measuring clinical ultrasound competency was identified from these published documents.

The investigators performed iterative content analysis and discussed their clinical practice, educational experiences, and assumptions about clinical ultrasound competency assessment tools. This ensured that unrecognized assumptions relevant to the results were discovered and supported through group consensus. Institutional ethics review and approval were not required as this investigation consisted of review of
published documents and voluntary participation of discussions performed with the working group regarding assessment techniques. There was no external financial support for the investigation or manuscript development.

RESULTS

Despite published documents suggesting a standard means of clinical ultrasound training, there is no universally accepted means of measuring clinical ultrasound competency. Our document review found six documents; two were excluded because they did not explicitly describe means of measuring competency. The documents ranged from six to 46 pages in length, and the time span of these policy documents were from 2009 to 2016. A listing of these documents is found in Data Supplement S1 (available as supporting information in the online version of this paper, which is available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10368/full). Our iterative process resulted in a listing of five different assessment methods for measuring clinical ultrasound competency. In the following section we provide our analysis and expert commentary on these modalities.

Written Examination

Description. Traditional written examinations can be utilized to assess the trainee’s knowledge of indications and contraindications, interpretation of images, and medical decision making in clinical scenarios specifically created for the test. Written examinations with multiple-choice questions are widely used to assess medical knowledge, including the tests created by the National Board of Medical Examiners.20

Benefits. A wide breadth of content can be assessed, and the questions can be standardized across a large group of learners. Once the examination is created, execution requires much less time and resources than other assessment modalities.

Limitations. Written examinations are limited to the demonstration of tacit knowledge and fail to assess the technical skills required to obtain and optimize ultrasound images. Moreover, while written tests can assess if the application of clinical ultrasound is appropriate for specific clinical scenarios, it may not translate to how the examinee would actually incorporate clinical ultrasound into daily practice. Additionally, creation of a written test involves evaluative strategies to ensure that the test is fair and reliable.

Practical Utilization. In summary, a written examination is insufficient to measure all aspects of competency in clinical ultrasound and should be supported by additional assessments of psychomotor proficiency. An alternative method to written testing would be to ask examination-type questions during image review sessions or hands-on sessions. This could be in addition to, or instead of, a formal written examination. Oral questioning allows the learner to explain his or her thought process and allows the evaluator to target follow-up questions tailored to the learner’s knowledge base. As with written testing, it is important to track learners’ progress toward competency and set benchmarks for acceptable scores.

Image Review

Description. Review of recorded ultrasound images assesses learners’ image quality and interpretation skills, after an ultrasound examination has been performed.

Benefits. Image review provides insight into the learner’s performance in scanning actual patients. Timely asynchronous review of recorded ultrasound images can provide longitudinal feedback to learners, highlighting those areas which the learner needs to focus on improvement and those areas that the learner demonstrates proficiency. Sequential image review provides a longitudinal assessment of a learner’s evolving skills and provides a documentation of a learner’s progress.

Limitations. The disadvantage of this approach is that it is performed after the examination was completed, so it may not be clear if the provider has missed relevant findings on their ultrasound examination at the time of clinical evaluation. For example, if the learner provides an image of Morrison’s pouch with no visible fluid, it may be difficult for the assessor to determine if fluid was truly absent or if the learner missed fluid on the recorded images due to incomplete visualization of the area. Additionally, feedback to the learner is likely not as impactful when delayed from real-time scanning. This approach does not consistently assess application into clinical practice. There must be available faculty to review images on a regular basis. Image archiving systems can facilitate image review to be performed on a broad scale of learners; however, this incurs cost if utilizing a commercially available option.
Practical Utilization. In summary, image review is an important and integral part of competency assessment in clinical ultrasound but should be performed in a timely manner to provide meaningful feedback. Video clips demonstrate a more thorough visualization of the area scanned, yet still images document that the learner recognizes the key anatomy. Concurrent review of other imaging tests as well as the hospital course provides additional formative feedback, illustrates additional findings, and provides information on limited quality scans.

Objective Structured Clinical Examinations Description. Objective structured clinical examinations (OSCEs) can assess various aspects of competencies related to clinical ultrasound.21 OSCEs are typically structured with multiple stations or scenarios, each designed to test specific learning objectives.21 OSCEs have become widely utilized in graduate and postgraduate medical training and have been endorsed as a tool for assessing clinical ultrasound competency by major emergency ultrasound national organizations.16,17,22–25

Benefits. Objective structured clinical examinations provide a more realistic patient care scenario than would be possible with a written test, assessing both the technical skill of image acquisition and the knowledge for image interpretation as well as theoretical clinical application. The evaluator can observe an entire simulated encounter, which provides information on the learner’s knowledge and skill base beyond reviewing the eventually acquired images, and further education can be customized for individual learners. The simulated clinical scenario can be designed to ensure that important but less common clinical presentations are regularly assessed.

Limitations. A major disadvantage of the OSCE is the time and cost involved, which can include proctor availability, equipment organization, development of the test, and recruitment of standardized patient models. Another limitation is that the reliability of an OSCE requires multiple samples across several stations to ensure that there is adequate sampling. In addition, the use of most standardized patient models can create a situation where pathology is lacking. Although an OSCE is designed to simulate a clinical encounter, it remains a simulated, testing environment and may not fully measure a learner’s true behavior in a clinical situation.

Practical Utilization. An OSCE is useful in assessing baseline ultrasound skills in beginners prior to initiating a training regimen or following training to determine the effect of the training. Given the available resources, repetitive OSCEs can serve as longitudinal competency assessments to monitor skill maintenance or progression over time. If available, high- and low-fidelity ultrasound simulation products are well suited to provide a breadth of repeatable, normal, and pathologic standardized source of images for OSCEs.26

Standardized Direct Observational Tool Description. The Standardized Direct Observational Tool (SDOT) is a uniform predefined checklist to evaluate a learner’s performance in performing proctored examinations.27,28 This checklist can be used during a clinical patient encounter or applied in a simulated setting.

Benefits. A series of standard objectives can be tested, allowing for uniformity among grading, often with a predefined minimum passing score to declare competency. SDOT can be designed to assess technical skill and interpretative ability.

Limitations. Similar to the OSCE, the SDOT requires the availability of a trained examiner and the time to perform the examination.

Practical Utilization. The Council of Emergency Medicine Residency Directors have developed SDOTs to help evaluate residents across all of the EM Milestones, including the ultrasound milestone: https://www.cordem.org/globalassets/files/sdots/milestones-version-patient-care-specific-sdot-pcl-14.doc. Repetitive SDOT examinations can be used to monitor an individual learner’s longitudinal progress and can easily be applied to both simulated and clinical scanning sessions, or an SDOT can be performed at the end of a training period to ensure that specific metrics have been met.

In-Situ Live Clinical Observation Description. In situ live clinical observation, as a means of measuring clinical ultrasound competency, involves observing a learner perform, interpret, and apply findings while in the clinical environment.

Benefits. Clinical observation can assess how a learner applies ultrasound in real clinical practice.
across all four subcompetencies, including identifica
tion the indications and limitations of clinical ultra-
sound, performance the technical skills in image
acquisition, interpretation images, and incorporation
those ultrasound findings into medical decision mak-
ing and clinical practice. This allows for appreciation
of actual pathology, more challenging patient examina-
tions, and a realistic testing environment, while avoiding
time outside of clinical shifts needed to execute
other testing. Additionally, the learner can be assessed
using a variety of patients and pathology. Direct obser-
vation allows the evaluator to confirm findings and
degree of imaging difficulty by repeating aspects of the
clinical ultrasound themselves.

**Limitations.** Clinical observation can be limited by
available time on shift and the unpredictability of
patient factors presenting in the clinical environment.
For example, for a learner to be evaluated on their use
of biliary ultrasound, there must be a patient with a
gallbladder, ideally with a clinical presentation necessi-
tating a biliary ultrasound examination. Additionally, it
requires evaluator time to observe a learner in clinical
practice, which may not be feasible given volume and/
or acuity of the clinical environment. It may not be
practical to use for simultaneous assessment of a large
groups of learners, and it may not comprehensively
assess a learner’s ultrasound knowledge.

**Practical Utilization.** In summary, clinical obser-
vation assessment is relatively easy to incorporate into a
clinical shift or clinical imaging session. However, the
clinical environment itself may limit the feasibility of this
competency assessment tool. Incorporating an SDOT
on a scheduled basis ensures consistency of the evalu-
ation across learners. A recent study demonstrated that
measuring clinical ultrasound competency via in situ
clinical observation as measured by SDOT correlated
well with assessment via asynchronous image review.29

**DISCUSSION**

There is no currently established consensus on which
assessment tools are best to measure clinical ultra-
sound competency. Therefore, educators must weigh
the benefits and limitations of each tool, summarized
in Table 1.

Revisiting the example of applying clinical ultra-
sound to a patient with undifferentiated dyspnea, there
are a variety of strategies that could be employed to
assess the subcompetency in clinical ultrasound, as
illustrated in Table 2. Using a combination of tech-
niques ensures a reliable assessment of all four sub-
competencies in clinical ultrasound. One assessment
strategy would be to use a written test to assess the
learner’s subcompetencies of clinical ultrasound knowl-
edge and image interpretation and use scheduled
direct observation to assess how the learner incorpo-
rates clinical ultrasound into medical decision making
and clinical practice.

Another assessment strategy would be to first per-
form an OSCE to determine initial skill level, followed

<table>
<thead>
<tr>
<th>Assessment Modality</th>
<th>Benefits</th>
<th>Limitations</th>
</tr>
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<tbody>
<tr>
<td>Written examination</td>
<td>Easily standardized Less time-intensive than other assessment methods May be easily repeated to evaluate knowledge retention</td>
<td>Does not assess image acquisition or application of findings Insufficient to use as a holistic method of assessment</td>
</tr>
<tr>
<td>Image review</td>
<td>Assess subcompetencies without faculty presence in real time Natural longitudinal assessment of trainee’s progression</td>
<td>Requires a robust quality assurance structure Review is delayed, so missed findings will not be discovered or acted on contemporaneously</td>
</tr>
<tr>
<td>OSCE</td>
<td>Real-time evaluation of image acquisition technique and image interpretation Can create realistic clinical scenario</td>
<td>Faculty and time-intensive May require hiring standardized patients May incur resource costs Creation and scoring of tool requires additional faculty training</td>
</tr>
<tr>
<td>SDOT</td>
<td>Standardized means of evaluation Real-time evaluation of image acquisition technique and image interpretation</td>
<td>Faculty and time-intensive May require hiring standardized patients or incorporating in unpredictable clinical environment</td>
</tr>
<tr>
<td>Direct observation</td>
<td>May be performed during a clinical shift May reduce need for multiple faculty Can assess all four areas of competency simultaneously Naturally repeatable over the duration of training</td>
<td>Difficult to standardize due to unpredictable clinical environment Requires faculty facile in all core clinical ultrasound applications to evaluate</td>
</tr>
</tbody>
</table>

OSCE = objective structured clinical examination; SDOT = standardized direct observation tool.
by scheduled SDOTs during the training period with weekly image review and structured feedback, followed by a final written test. The approach of combining assessment techniques to better measure competency in medical education has been suggested by other authors. Van Der Vluten and Schuwirth advocate that assessments in medical education address complex competencies and thus require quantitative and qualitative information from different sources, as well as professional judgment.

Given the broad spectrum of subcompetencies in clinical ultrasound, combining multiple assessment techniques is necessary to create a comprehensive picture of a learner’s progression to competency. Research is needed to establish which modalities or combinations of modalities are most effective for establishing competency, with consideration for different learner groups and varied educational environments. Additionally, efforts should be directed in generating validity evidence and gathering psychometric evidence for new clinical ultrasound assessment tools.

As with other clinical skills, measuring competency in clinical ultrasound is essential to ensuring safe patient care. In this concept paper, we discussed the advantages and limitations of a variety of existing clinical ultrasound competency assessment tools. In doing so, we propose strategies for utilization and future directions for assessing clinical ultrasound competency.

The authors thank and acknowledge the other members of the Ultrasound Competency Work Group: Kristen Carmody, Resa Lewis, Rob Ferre, Chris Raio, Andrew Liteplo, Nova Panebianco, Thomas Constantino, Rob Huang, Alyssa Abo, Pat Hunt, Matt Fields, Jason Nomura, Jesse Schafer, Joe Minardi, Vicki Noble, Laura Oh, Jeremy Boyd, Srikar Adhikari, Michael Woo, Matt Nelson, Matthew Tabbut, Tim Jang, Jay Thakkar, Creagh Boulger, Jeremy Welwarth, and Heidi Kimberly.

Table 2
Example of Clinical Ultrasound Subcompetencies Applied to a Clinical Presentation of Undifferentiated Dyspnea

<table>
<thead>
<tr>
<th>Subcompetency</th>
<th>Potential Assessment Modalities</th>
<th>Practical Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify indications for clinical ultrasound</td>
<td>Written examination, oral examination, in situ observation</td>
<td>Query the indications and limitations of clinical ultrasound for the evaluation of undifferentiated shortness of breath</td>
</tr>
<tr>
<td>Acquire clinical ultrasound images</td>
<td>OSCE, SDOT, in situ observation</td>
<td>Directly observe the provider performing a lung ultrasound examination on a patient with shortness of breath</td>
</tr>
<tr>
<td>Interpret clinical ultrasound images</td>
<td>Written examination, oral examination, quality assurance session, in situ observation</td>
<td>Assess the provider’s interpretation of the lung ultrasound examination</td>
</tr>
<tr>
<td>Incorporate findings into medical decision making and clinical practice</td>
<td>Quality assurance sessions, in situ observation</td>
<td>Examine the provider’s appropriate application of lung ultrasound in clinical practice</td>
</tr>
</tbody>
</table>

OSCE = objective structured clinical examination; SDOT = standardized direct observation tool.

References


Supporting Information

The following supporting information is available in the online version of this paper available at http://onlinelibrary.wiley.com/doi/10.1002/aet2.10368/full

Data Supplement S1. Documents and Policy Statements Reviewed.
Not Another Boring Resident Didactic Conference

Alisa Wray, MD, MAEd1, Margaret Wolff, MD2, Megan Boysen-Osborn, MD, MHPE1, Warren Wiechmann, MD, MBA1, Sara Paradise, MD1, Elizabeth Runcie, DO1, Gabe Sudario, MD1, and Shannon Toohey, MD, MAEd1

ABSTRACT

Background: The Accreditation Council for Graduate Medical Education (ACGME) requires that residency programs in emergency medicine plan at least 5 hours of didactic experiences per week. Instructional methods should include small-group techniques, problem-based learning, or computer-based instruction. Despite recommendations from the ACGME, many programs’ conference didactics continue to include primarily lecture-based instruction.

Methods: The authors describe instructional methods that promote active learning and may be superior to traditional lecture-based education.

Results: These methods include varying instructional methods, case-based learning, team-based learning and the flipped classroom, audience response systems, simulation, “wars,” oral boards, escape rooms and scavenger hunts, expert panel discussions, debates, clinical pathologic cases, and leaderboards. The authors discuss how these methods can be implemented to make emergency medicine didactic conferences more varied and interactive for learners.

Conclusions: While there is minimal research on the efficacy of these methods in graduate medical education, many have shown to improve engagement of learners and to be effective in undergraduate medical education. Further research will be needed to determine if long-term learning outcomes can be improved with these strategies.

The Accreditation Council for Graduate Medical Education (ACGME) requires that residency programs in emergency medicine plan at least 5 hours of didactic experiences per week.1 Instructional methods should include small-group techniques, problem-based learning, or computer-based instruction.1 Individualized interactive instruction (III) can account for up to 20% of planned didactic activities.1 Despite recommendations from the ACGME, it can be tempting for conference planners to default to the traditional, inexpensive, and easy-to-plan instructional design of didactic lectures.

Instructional methods that promote active learning may be superior to traditional lecture-based education.2-5 Bloom’s taxonomy breaks down educational objectives into a framework that includes
Remembering, understanding, application, analysis, evaluation, and creation. Educators should aim to incorporate high-level Bloom’s objectives into their didactic sessions.

There is a lack of literature regarding best practices for overall residency didactic planning. There have been previous articles discussing engaging teaching techniques for the millennial learner as well as numerous articles on utilization of the flipped classroom in graduate medical education. However, our review of the literature did not find any articles on best practices or recommendations for implementing these techniques within a didactic curriculum.

During this review, the authors discuss a variety of ways to better engage learners during didactic conferences, encouraging learners to apply and analyze concepts rather than simply “remember” them. The following “tips” are suggestions and examples from the authors’ institutions, to improve learner engagement in weekly didactic conference (Figure 1). Given the lack of literature on best practices for didactic curriculum planning, these recommendations are based on a logical approach combining existing literature on individual techniques and best practices, as well as author experience at two educational sites to create recommendations for engaging didactic planning. These techniques have been implemented at the University of California at Irvine with the emergency medicine residency didactic curriculum. A curriculum was developed using Kern’s model and a needs assessment based on previous didactic evaluations and resident feedback. We then utilized the Model of Clinical Practice of Emergency Medicine to determine subject areas and planned the curriculum with varied methods and matched methods for various topics to maximize engagement and learning based on the literature and practices discussed below.

The authors of this paper collectively have more than 35 years of experience in graduate and undergraduate medical education. Dr. Wolff has a Master of Health Professions Education (MHPE) and extensive experience in interactive teaching techniques with numerous publications on best practices for active learning. She has served as an associate program director for a pediatric emergency medicine fellowship and is now a fellowship director for a medical education fellowship. Dr. Boysen-Osborn has a MHPE and has 5 years of experience as a program director with 3 years of experience as an associate program director and completed a fellowship in education. Dr. Wiechmann has served as the Associate Dean of Clinical Sciences and the Associate Dean of Educational Technologies at the University of California at Irvine for 4 and 6 years, respectively, and has extensive experience in educational technologies and innovation. Dr. Boysen-Osborn and Dr. Wiechmann are co-directors of a fellowship in multimedia design and education technologies for emergency physicians. Dr. Toohey and Dr. Wray collectively have 5 years of experience as associate and assistant program directors, and both have completed fellowships in education and received Masters of Arts in Education with an emphasis in multimedia design and technology.

**USE A VARIETY OF INSTRUCTIONAL METHODS ON ANY GIVEN CONFERENCE DAY**

It is important to consider one’s learning objectives when deciding which instructional strategies to use. For example, communication skills are best learned with role playing and/or standardized patients, procedure skills are best learned through simulation and task trainers, and small-group learning works well for case-based learning and visual diagnosis. Lectures may provide a consistent message to a large audience, but lecture length should be shortened to maximize engagement. Asynchronous learning and III allow learners to go at their own pace, which may improve learner retention. The authors discuss several strategies below and it is our opinion that instructional methods should be varied throughout a conference day to best keep learners’ attention. For example, a 5-hour conference day may include two 30-minute lectures, a 90-minute team-based learning (TBL) didactic, a 60-minute multistation visual diagnosis challenge and debrief, a 45-minute interesting or morbidity and mortality case discussion, and the remaining conference replaced by III and a reading quiz. A comparison of complexity and instructor support needed by instructional method is presented in Table 1.

**START SIMPLE, USE CASE-BASED LEARNING WHEN POSSIBLE**

Case-based learning is well established within medical education as an effective teaching modality as it helps create a deeper understanding of content. There are many ways to expand basic lectures into more interactive case-based learning sessions. At a basic level,
<table>
<thead>
<tr>
<th>What is it?</th>
<th>Where do I start?</th>
<th>What are some tips?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case-based learning</td>
<td>Start simple by providing a series of interesting cases for learners to work through in small groups, then progress to more complicated implementations such as case-based visual diagnoses or quiz-show style competitions</td>
<td>Learners can submit cases for a diagnosis of the month competition or leverage ultrasound quality assurance (QA) sessions to identify interesting cases</td>
</tr>
<tr>
<td>TBLs / Small Group / Flipped Classroom</td>
<td>Create a flipped classroom element — Learner responsible content (LRC). In-class pre-quiz based on flipped content — individual readiness assurance test (iRAT). Learners then work through iRAT questions together — group readiness assurance test (gRAT)</td>
<td>Pre-prepared TBLs available in online journals such as MedEdPortal and the Journal of Education and Teaching in Emergency Medicine.</td>
</tr>
<tr>
<td>Audience Response Systems</td>
<td>During weekly didactics, include a 5-10 question quiz to assess knowledge and to reinforce key points of assigned weekly core-content reading</td>
<td>Commercial systems such as Poll Everywhere, Mentimeter, or Kahoot are free or low-cost solutions that do not require “clickers” or hardware</td>
</tr>
<tr>
<td>Simulation</td>
<td>Incorporate into weekly didactics with a single case or task trainer or as a “simulation conference” with multiple cases or task-trainers. Simulation groups can be divided based on learner experience or groups with varying experience. Conferences can involve single or multiple cases</td>
<td>Faculty or senior residents can teach skills-based stations, utilizing senior faculty or program leadership during the simulation cases for assessment of learners in addition to immediate meaningful feedback. Consider leveraging institutional simulation or skills centers if departmental resources are limited</td>
</tr>
<tr>
<td>Wars and Games</td>
<td>For “wars”, divide learners into small teams (4-6 members) that compete in short cases, where points are awarded for meeting critical actions. For “games”, have teams compete in an initial round of quizzes, followed by multiple rounds of hands-on challenges.</td>
<td>National and regional conferences often host a SimWars or SonoGames competition. Consider hosting a regional competition with local programs for collaboration and resource sharing</td>
</tr>
<tr>
<td>Oral Boards</td>
<td>Faculty or senior residents can serve as mock examiners using academic offices as testing rooms. Mock examinations can be spread over multiple conferences to utilize a smaller number of examiners</td>
<td>Cases can be found on the CORD website, published in the Journal of Education and Teaching in Emergency Medicine and in various textbooks</td>
</tr>
<tr>
<td>Escape Rooms / Scavenger Hunts</td>
<td>In escape rooms, learners must solve educational riddles, logic problems and know or find the answer to questions related to a certain topic in order to “escape” each challenge. In scavenger hunts, learners compete by solving similar challenges that are placed around the learning space</td>
<td>Look to commercial escape room experiences for ideas for challenges. Retail escape room kits and “how-to” books are also available for purchase. For scavenger hunts, consider using as a tool for new intern orientation.</td>
</tr>
<tr>
<td>Expert Panels</td>
<td>Panelists may be given a controversial clinical question, a case with consecutive questions, or a series of cases for which they can respond with their “expert” opinion.</td>
<td>Variation amongst hospital systems, practice environments, and preferred local culture may influence panelists views on topics and provide residents with broad perspectives on topics</td>
</tr>
<tr>
<td>Resident Debates</td>
<td>Two groups of residents and/or faculty are assigned opposing viewpoints and are given a brief time to present their viewpoint (supported by the literature), followed by a rebuttal.</td>
<td>Considering using controversial topics from the literature</td>
</tr>
<tr>
<td>CPCs</td>
<td>Case presenter (junior resident) takes 5 minutes to introduce the case without easily disclosing the diagnosis. The discussant (senior resident or faculty) uses this information to create a 20-minute presentation that walks the learners through their thought process to determine a their guess at the diagnosis. The presenter then takes 10 minutes to reveal the final diagnosis, discuss case outcomes, and present key teaching points</td>
<td>Case competitions are part of some annual educational meetings and are highlighted in various journals such as the New England Journal of Medicine</td>
</tr>
<tr>
<td>Awards / Badges / Leaderboards</td>
<td>Start simple by mounting a large cork board and brightly-colored awards and badges for each residency class in your didactic space</td>
<td>Think beyond the didactic sessions and highlight any academic accomplishments (leadership positions, publications, presentations) or provide positive reinforcement of certain behaviors (patient compliments, conference attendance, timeliness).</td>
</tr>
</tbody>
</table>

**Figure 1.** Overview of instructional methods to improve learner engagement in weekly didactic conference. [Colour figure can be viewed at wileyonlinelibrary.com]
creating a series of interesting cases for residents to work through in small groups can be interactive and fun, while developing knowledge-based scavenger hunts (discussed below) or case-based visual diagnoses (where learners go around the room and identify a diagnosis based on images) may be more advanced case-based techniques. An element of competition can be added by timing sessions, using audience response systems (ARS) or jeopardy style games with buzzers. For complicated concepts, answers can be reviewed in a large-group format following to ensure understanding.

Additionally, interesting cases and images can be used as a bridge to weekly conference activities using a diagnosis of the month competition where residents are encouraged to submit descriptions of interesting cases, with the winner announced on a regular basis. Other examples include ultrasound of the week where the ultrasound director can share the most interesting ultrasound from each quality assurance session.

EXPAND TO TEACH WITH TBL, SMALL GROUPS, AND THE FLIPPED CLASSROOM

One implementation of small-group learning that has become popular is the flipped classroom model.21,22 For this method, the instructor sends materials (e.g., relevant blog posts, articles) to learners to review prior to the didactic session. This allows for higher-order learning to occur during the didactic session, moving from Bloom’s taxonomy levels for remembering to analysis or application.23 If it is difficult for learners to find time for prelearning, the instructor can select a short resource (such as a paper or video) that can be digested in 5 to 10 minutes at the beginning of the didactic session.

An engaging method to build upon the flipped classroom model is team-based learning, or TBL. A classic TBL includes a flipped classroom element that is named “learner-responsible content” (LRC). The in-class session includes a prequiz, or individual readiness assurance test (iRAT) based on the LRC, followed by a group readiness assurance test where learners work through the iRAT questions together.24 Finally, an instructor/facilitator reviews learning points and clarifies any confusion.

Team-based learning encourages teamwork and communication, improves learning outcomes and examination scores, and develops lifelong learning skills.15,16 When preparing TBLs, it is important to create a well-prepared answer key so that the didactic session can be reproduced for future learners. Preprepared TBLs are available in online journals, such as MedEdPortal and the Journal of Education and Teaching in Emergency Medicine.

ENGAGE LEARNERS WITH ARS

Audience response systems can be a fun, engaging way to test learners’ knowledge through the use of a trivia-style question and answer format. ARS can test learners’ knowledge, confirm understanding of a key concept, or solicit feedback or opinions from a group. PollEverywhere or Mentimeter are commonly used in education and have several different question formats including multiple-choice questions, free text/word cloud, response segmenting/team competitions, rank order questions, and clickable images. Kahoot engages learners in a “trivia night” format that gives points for getting a correct answer in the shortest amount of time.

Numerous studies have shown that ARS increase both immediate25–29 and long-term25,26,28–32 retention of information in the context of health professions education. Participation in such activities has been shown to be near 100%.33

The University of California at Irvine emergency medicine residency program uses ARS to increase engagement and knowledge retention during weekly didactics. At the end of each conference session, a five- to 10-question Kahoot quiz is used to assess knowledge and to also reinforce key points of assigned a weekly core content reading. Learners who win the quiz are given a badge on their class leaderboard, which creates a sense of friendly competition.

There are a few logistic considerations and limitations of the use of ARS. As with any technology, there is a learning curve regarding the use of the program and its applications. Most ARS work on a Web-based format, which can delay if there is not a strong Internet connection. A free version of a software may limit the number of questions they allow instructors to use, the number of learners allowed to respond to questions, or other advanced features such as team competition.

UTILIZE SIMULATION

Training learners to perform challenging or uncommon procedures is not always possible, cost-effective,
or safe. Many skills can be taught via simulation. Simulation tools including manikins, task trainers, computer-based programs, or discussion and serve as an alternative tool to teach and evaluate residents. In creating a simulation opportunity, it is recommended to integrate simulation with similar educational experiences, such as the learner’s recent clinical exposure, or during system-specific blocks. Simulation provides an opportunity for just-in-time and just-in-place learning as well as frequent and meaningful feedback and can be utilized as an effective way to assess learners.

Cases can be found on online databases or prepublished books or created by residents or faculty. Simulation can be incorporated into weekly didactics with a single case or task trainer or as a simulation conference with multiple cases or task trainers. Faculty or senior residents can teach skills-based stations, while senior faculty or program leadership can assist or observe the simulation cases as this allows for assessment of learners in addition to immediate meaningful feedback.

HAVE RESIDENTS COMPETE IN “WARS”

Gamification and serious games can enhance learning by increasing learner motivation and engagement. SimWars, a well-known national competition, uses high-fidelity simulations scenarios to challenge resident teams on a variety of clinical cases. This “war” format is readily adaptable to a conference session given over 90% of programs use simulation as a training method in their programs. To encourage participation and engagement, event coordinators may choose a theme or encourage teams to have names and/or dress in costume. To start, residents should be divided into teams of four to six and a team leader is selected. Teams compete in 8- to 10-minute cases and are given points for meeting critical actions and elements such as team communication, crew resource management, and clinical judgment.

Similarly, SonoGames or sonoolympics is another engaging way to teach ultrasound in a competition-based format. Typically, the format is a knowledge-based quiz (e.g., identification of images) as the initial round, followed by multiple rounds of hands on ultrasonography challenges. Scores are tallied per round, with categories include image acquisition, interpretation of imaging, incorporation into medical decision making, procedural performance, communication, and teamwork. Creative ideas for stations include Pictionary, blindfolded scanning, scanning with distractions (e.g., being questioned, patient moving), use of water baths to scan, measuring structures on live patients, and self-scanning activities. While no large prospective studies have been performed on this format, some data suggests that the above formats create skills that are improved through dedicated practice. Observers and instructions may also benefit from these sessions by learning from the decision making and techniques from different providers. Residents have high satisfaction with these sessions, rating such competitions highly.

While games and wars can improve learner engagement, they may not be the ideal instructional strategy for some concepts. Instructors must ensure that there is adequate time to debrief, ask questions, and go over answers in between stations or at the end of the competition so that instructors can ensure that learning objectives are met. To engage effectively in many educational games, learners must have some basic knowledge or understanding about a topic.

PRACTICE ORAL BOARDS

The American Board of Emergency Medicine (ABEM) administers an oral board examination to residency trained EM physicians, as one of the requirements for EM board certification. Mock oral examinations are recommended by the ACGME outcome project. Previous papers have suggested that oral board practice can be used to assess core competencies including medical knowledge, system-based practice, professionalism, and communication skills.

Our program provides semiannual mock oral boards sessions with all residents for assessment and feedback. Cases should be varied to ensure that residents do not repeat cases during their residency. eOral cases can also be integrated into mock oral boards, as ABEM oral board now includes this modality. While it does require a larger faculty involvement and additional training to ensure consistency, it provides an engaging, high-yield activity. Debriefing can cover oral board techniques as well as medical knowledge concepts from the applicable cases. Oral board cases can be found via the Council for Residency Directors in Emergency Medicine (CORD) website, published in the Journal of Education and Teaching in Emergency Medicine and in various textbooks. Furthermore,
CORD now offers eOral cases to programs so residents can become familiar with this format.  

**IMPLEMENT ESCAPE ROOMS AND SCAVENGER HUNTS**

Escape rooms have increased in popularity in the public over the past several years. Some authors have translated these concepts to learning-based escape rooms for use in the classroom. Learners must solve educational riddles and logic problems and know or find the answer to questions related to a certain topic to escape or move onto the next room. This gamifies a didactic experience and promotes team collaboration and participation in conference. The University of California at Irvine emergency medicine residency uses a published toxicology escape room template and apply the same type of puzzles to other topics. There are several possible game types, such as requiring learners to perform a calculation (anion gap, osmolar gap, calculating a risk score [HEART, PECARN, etc.]) to find the combination to a lockbox. In some games, learners must match images, concepts, diagnoses, definitions, or cases to find lockbox combinations. Another option is to have questions or cases where learners shade in a matrix containing correct and incorrect answers to identify and match a pattern. There are books and websites on educational escape rooms that provide ideas on other game options.

While escape rooms take significant planning, scavenger hunts may be a budget- and time-friendly alternative. Scavenger hunts have been shown to engage students while increasing comfort on topics. Scavenger hunts can be a more interactive way to review visual diagnoses or case-based multiple choice questions. Multiple-choice or visual diagnosis questions (EKGs, X-rays, common physical examination findings) are printed and posted around a lecture hall or around a building, akin to the clinical images exhibit at the Society for Academic Emergency Medicine Annual Meeting. Learners can solve each case individually or in teams. It is important for instructors to go over each answer at the end of the hunt to answer questions and go over key learning points.

Alternatively, scavenger hunts can be used to introduce new interns to the hospital staff (the unit secretary, the nursing supervisor) or find important hospital locations (the charting room, the suture cart, the cafeteria), with stations being strategically placed around the hospital or with staff.

**LEAD EXPERT PANEL DISCUSSIONS**

Panels are a commonly used method of presenting learners with a variety of perspectives on a topic. Panelists may be given a controversial clinical question, a case with consecutive questions, or a series of cases for which they can respond with their expert opinion. Ideas of panels may include “orthopedics in the community” (how community versus academic physicians would manage orthopedic cases), management of hypertensive episodes based on specialty (e.g., internal versus cardiology vs. emergency medicine), or pediatric emergency cases (with experts in pediatric EM or pediatric intensive care). Panelists can be subject matter experts in varying specialties or from varying hospital systems such as academics versus community. Variation among hospital systems, practice environments, and preferred local culture may influence panelists views on topics and provide residents with broad perspectives on topics.

**HAVE RESIDENTS DEBATE**

Debates may improve knowledge transfer, communication, critical thinking, and literature appraisal skills. Two groups of residents and/or faculty can be assigned opposing viewpoints on a controversial topic in emergency medicine (e.g., hypothermia for cardiac arrest) and provided with an exemplar article. Each group reviews this article and other related literature to support their article. Groups can be given 10 to 15 minutes to present their viewpoint to the group, followed by 15- to 20-minute rebuttal. A similar implementation was studied and showed that learners had increased confidence with their ability to find, compare, and retain information from primary literature.

**COMPETE WITH CLINICAL PATHOLOGIC CASE**

The CORD hosts the clinical pathologic case (CPC) competition at their annual meeting. These competitions can be easily adapted at the local level. The CPC is a case-based competition where junior learners present an interesting case and senior learners or faculty participants work through a clinical case out loud to share a rational approach to information gathering and synthesis.

Traditionally, the case presenter (typically a junior resident) takes 5 minutes to introduce an interesting
case, including history, physical, and relevant data, to a discussant (generally a faculty member). The case presenter’s goal is to provide enough information that the discussant can determine the diagnosis, but not so much that the answer is readily apparent. This information is typically given to the faculty member a few weeks in advance, allowing them time to create a 20-minute presentation that walks through their thought process as they logically examine the information, provide a broad differential, and narrow down their differential. The case presenter will then take 10 minutes to present the final diagnosis and discuss the case outcome and any key teaching pearls. In addition to medical knowledge about the interesting case, the CPC may demonstrate how experts employ medical decision making.

To apply to residency didactics a program can select junior residents as the case presenters and senior residents as the discussants. Faculty can participate as the judges of the presentations and provide additional educational pearls at the conclusion of the case.

CREATE AWARDS, BADGES, AND LEADERBOARDS

Awards, badges, and leaderboards may gamify a weekly didactic conference. For example, a program could use a large cork board in the teaching classroom to display badges for each residency class. These boards serve as the centerpiece to highlight resident and faculty academic accomplishments (leadership positions, abstract presentations, manuscript publications) and knowledge acquisition (reading quiz, diagnosis of the block, ultrasound of the week winners) and provide positive reinforcement of certain behaviors (patient compliment, on time to conference).

Table 1
Comparison of Complexity and Instructor Support needed by instructional method

<table>
<thead>
<tr>
<th>Activity</th>
<th>Level of Complexity</th>
<th>Instructors Needed</th>
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</thead>
<tbody>
<tr>
<td>Case-based learning</td>
<td>+</td>
<td>Single</td>
</tr>
<tr>
<td>ARS</td>
<td>+</td>
<td>Single</td>
</tr>
<tr>
<td>Awards/badges/leaderboards</td>
<td>+</td>
<td>Single</td>
</tr>
<tr>
<td>Resident debates</td>
<td>+</td>
<td>Few</td>
</tr>
<tr>
<td>Expert panels</td>
<td>+</td>
<td>Few</td>
</tr>
<tr>
<td>TBLs/small group/flipped classroom</td>
<td>++</td>
<td>Single</td>
</tr>
<tr>
<td>CPCs</td>
<td>++</td>
<td>Few</td>
</tr>
<tr>
<td>Simulation</td>
<td>++</td>
<td>Many</td>
</tr>
<tr>
<td>Oral boards</td>
<td>++</td>
<td>Many</td>
</tr>
<tr>
<td>Escape rooms/scavenger hunts</td>
<td>+++</td>
<td>Many</td>
</tr>
<tr>
<td>Wars and games</td>
<td>+++</td>
<td>Many</td>
</tr>
</tbody>
</table>

ARS = audience response systems; CPCs = clinical pathologic cases; TBL = team-based learning.

CONCLUSION

While lectures are still a common format for didactic sessions in emergency medicine residency training, educators are increasingly looking for ways to actively engage learners. The techniques described allow faculty and program leadership to make conference more varied and interactive for learners. While there is minimal research on the efficacy of these methods in graduate medical education, many have shown to improvement engagement of learners. Further research will be needed to determine if long-term learning outcomes can be improved with these strategies.

References

1. ACGME Program Requirements for Graduate Medical Education in Emergency Medicine. Chicago, Accreditation Council for Graduate Medical Education (ACGME), 2017.


Geriatric Emergency Medicine Fellowships: Current State of Specialized Training for Emergency Physicians in Optimizing Care for Older Adults

Tony Rosen, MD1, Shan W. Liu, MD2, Lauren Cameron-Comasco, MD3, Sunday Clark, ScD1, Mary R. Mulcare, MD1, Kevin Biese, MD4, Phillip D. Magidson, MD5, Katren R. Tyler, MD6, Don Melady, MD7, Phraewa Thatphet, MD2, Thiti Wongtangman, MD2, Natalie M. Elder, MD8, and Michael E. Stern, MD1 for the Academy of Geriatric Emergency Medicine

ABSTRACT

Improving emergency department (ED) care for older adults is a critical issue in emergency medicine. Institutions throughout the United States and Canada have recognized the growing need for a workforce of emergency physician (EP) leaders focused on clinical innovation, education, and research and have developed specialized fellowship training in geriatric emergency medicine (GEM). We describe here the overview, structure, and curricula of these fellowships as well as successes and challenges they have encountered. Seven GEM fellowships are active in the United States and Canada, with five offering postresidency training only, one offering fellowship training during residency only, and one offering both. The backbone of the curriculum for all fellowships is the achievement of core competencies in various aspects of GEM, and each includes clinical rotations, teaching, and...
Improving emergency department (ED) care for older adults is a critical issue in emergency medicine. The population of older adults is growing rapidly, due to increased life expectancy and the aging of the “baby boomer” generation, with U.S. adults aged ≥ 65 projected to double to 83 million by 2050. The population of oldest old (aged ≥ 85) is increasing even more dramatically and will triple in the same period. Additionally, older adults are increasingly seeking care in EDs rather than other settings. As a result, it is projected that older adults may represent as much as 33% of ED patients by 2030.

Older adult patients, who often have multiple chronic issues, atypical presentations of disease, and cognitive impairment, are fundamentally different than younger adults. Caring for older adults requires more ED resources, including more laboratory/imaging tests and social services. Older adults have longer ED stay lengths, are more likely to be admitted, and are more frequently require intensive care unit admission. They are also more likely than younger adults to have adverse outcomes after ED discharge. High-quality ED care has the potential to make a dramatic impact on an older adult’s health, both in managing their acute complaint and in potentially identifying and intervening to address functional decline.

Most EDs were designed to manage acute injuries and illnesses and, especially in the context of increasing operational demands for rapid assessment, throughput, and early disposition, they are not set up to optimally care for older adults, who are typically complex patients with chronic disease. Emergency physicians (EPs) report inadequate training in management of older adults and more difficulty caring for them. Additionally, ED assessment and management of many common geriatric syndromes, such as delirium, falls, polypharmacy, and elder abuse, remain underresearched.

The importance of improving ED care for older adults has been long recognized, but it has begun to receive increased focus. EP researchers have been funded by the National Institutes of Health, the Society for Academic Emergency Medicine (SAEM) Foundation, the American College of Emergency Physicians’ (ACEP) Emergency Medicine Foundation, and other public and private funders to explore high-priority geriatric emergency medicine (GEM) questions. An expert panel has developed geriatric competencies for EM residents to guide curriculum development. Furthermore, SAEM’s Academy of Geriatric Emergency Medicine, launched in 2009, and ACEP’s Geriatric Emergency Medicine Section are growing in membership and programmatic activities.

The Geriatric Emergency Department Guidelines were developed and published in 2014, through a collaboration between SAEM, ACEP, the American Geriatrics Society, and the Emergency Nurses Association to facilitate improvements in ED care to older adults. These guidelines focus on staffing, education, enhanced policies and procedures, transitions of care, equipment, and performance improvement measures. Based on these guidelines, ACEP launched the Geriatric Emergency Department Accreditation (GEDA) program in 2018. The GEDA program accredits EDs for geriatric expertise at different levels (Levels 1, 2, 3) based on an ED’s initiatives to improve and measure quality of care for older adults. Additionally, the Geriatric ED Collaborative (GEDC) was created with funding from the John A. Hartford Foundation and the Gary and Mary West Foundation. The GEDC assists hospital systems interested in making their community EDs more appropriate for care of older adults using the guidelines. GEDC works through collaboration with local leadership, on-site workshops, assistance with quality improvement projects, and information sharing. GEDC leaders have developed the Geriatric Emergency Care Applied Research (GEAR) Network, which is establishing research priorities, standardized data approaches, and measures for common geriatric emergency care syndromes. This network is also building a validated data...
bank to support opportunities to conduct geriatric emergency care research and facilitating future multicenter studies. As a result of these efforts, GEM is growing as a subspecialty within emergency medicine. Institutions throughout the United States and Canada have recognized the growing need for a workforce of EP leaders focused on clinical innovation, education, and research and have developed specialized fellowship training in GEM. We describe here the overview, structure, and curricula of these fellowships as well as challenges and successes they have encountered.

OVERVIEW OF CURRENTLY ACTIVE FELLOWSHIPS

At the time of this publication, there are seven GEM fellowships active in the United States and Canada. Details of these fellowships are shown in Table 1. The fellowship director from each of these programs has contributed to this manuscript (SWL, LCC, KB, PM, KT, DM, MES). The first fellowship was launched at Beaumont Hospital, in Royal Oak, Michigan, in 1998, although the earliest iteration of the curriculum differed from its current program as well as from more recently developed programs. Weill Cornell launched its program in 2005, the first of many with similar curricula. Five programs are exclusively postresidency fellowships. Johns Hopkins offers a 1-year minifellowship during the fourth year of a 4-year residency. Schwartz/Reisman Emergency Medicine Institute/Mount Sinai Hospital/University of Toronto offers both a fellowship during the fourth year of a 5-year Canadian residency and a postresidency fellowship. Three of the postresidency fellowships offer an option of a 2-year fellowship with increased focus on research including a fully funded master’s degree. To date, a total of 25 fellows have completed these seven programs.

FELLOWSHIP DESIGN AND FUNDING

All of the postresidency clinical fellowships are designed with the fellow working part-time independently as an attending EP while participating in the fellowship. Fellows work clinically as an attending physician generally between 40% to 70% of full-time attending, with the remaining time devoted to fellowship activities. This approach completely or partially funds the fellowship using clinical revenue (many
GEM fellowships are designed to be budget neutral, allows for the fellow to earn a more competitive salary during training, and ensures that recent residency graduates continue the active development of their clinical practice. Some fellowships receive additional funding provided by the department, institution and/or by foundation support, and private philanthropy.

**SAEM FELLOWSHIP ENDORSEMENT/APPROVAL**

To date, existing GEM fellowships have not sought to become accredited by the American College of Graduate Medical Education (ACGME). Despite the potential value of accreditation, GEM fellowship directors have recognized that ACGME involvement would fix a fellow’s salary based on postgraduate year and would preclude independent practice as an attending EP at the institution during fellowship training. This would dramatically change both the funding for the fellowship and its desirability to potential applicants. In addition, the non–ACGME-accredited status enables changes and improvements to fellowship programs to occur more expeditiously, as is fitting for a new specialty. To ensure a degree of standardization to fellowship training within fellowships not accredited by the ACGME, SAEM created an endorsement/approval process for fellowships in specialized areas, including GEM.

In 2014, as part of this endorsement/approval process, guidelines were developed for training programs that address milestones in curricular elements, faculty support recommendations, and career development opportunities. Two authors (KB, MES) served on the committee developing the process and requirements for GEM fellowships. Programs wishing to have SAEM endorsement/approval of their fellowship may complete an application, which is independently reviewed. Five GEM fellowships currently have SAEM endorsement/approval and another is currently applying.

**GEM CURRICULUM**

The backbone of the curriculum for all fellowships is the achievement of core competencies in various aspects of GEM. The core competencies used by Weill Cornell, which have also been adopted subsequently by other fellowships, are shown in Table 2. These are an adaptation for fellows of the GEM core competencies for EM residents published by Hogan et al. in 2010. During the fellowship, to develop these competencies and become a leader in GEM, the fellow participates in clinical rotations, teaches, and conducts a research project.

**Clinical Rotations**

Each fellowship includes several clinical rotations, intended to increase the fellow’s understanding of multidisciplinary primary and specialty care of older adults across the continuum of care and to expand and reinforce their understanding of GEM core competencies. Additionally, these rotations help the fellow identify gaps in care provision and opportunities for improvement. Rotations that are included in at least one fellowship are shown in Table 3.

The goal of inpatient rotations is for the GEM fellow to develop an understanding of the continuation of acute management after admission, the multidisciplinary team approach to patient care, safe discharge planning, application of functional assessment tools, and ethical and legal issues related to caring for older adults. Inpatient rotations typically include services devoted exclusively to care of older adults, including acute care of the elderly units. Geriatric clinic rotations demonstrate the outpatient management of acute and chronic illness, including ED-relevant strategies to maximize quality of life and function, minimize the impact of geriatric syndromes such as polypharmacy, ensure treatment approaches are consistent with a patient’s goals, and collaborate effectively with families and caregivers. Due to the increasing number of independent older adults with chronic medical conditions, the need for home-based clinical care is steadily increasing. As a result, many fellowships include a rotation with home-based primary care/house calls. Specialty services and clinics with particular relevance for older adults, including palliative care, psychiatry, trauma/orthopedics, neurology, and physical medicine and rehabilitation, are also included. Many fellowships include exposure to long-term care and subacute rehabilitation facilities to improve the fellow’s understanding of management of both chronic conditions and emergencies in older adults who are residents of these institutions. Particular focus is on appreciating circumstances surrounding the decision to transfer a resident to the ED and how they may be avoided or optimized. An important emphasis of all rotations is transitions of care for older adults and continuity between different health care settings. Notably, Schwartz/Reisman Emergency Medicine Institute/Mount Sinai Hospital/
Table 2
Geriatric Emergency Medicine Fellowship Core Competencies

<table>
<thead>
<tr>
<th>1. Trauma/falls</th>
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<tr>
<td>a. Recognize patterns of injury in geriatric trauma.</td>
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<td>b. Recognize difficulty in recognizing occult shock in geriatric trauma patients (older adults may present with absent or blunted signs and symptoms (e.g., absent pain, tachycardic response and neurologic changes). Understand the benefit to instituting appropriate early monitoring and testing.</td>
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<tr>
<td>c. Assess the effect of preexisting conditions on morbidity and mortality in geriatric trauma.</td>
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<tr>
<td>d. Evaluate for precipitating causes of falls (e.g., infection, physiologic changes of aging, medications, substance/alcohol use/abuse, gait instability, comorbidities).</td>
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<tr>
<td>e. Assess for gait instability in all community-dwelling older adult. Awareness of appropriate disposition/services and follow-up.</td>
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<th>2. Delirium and dementia</th>
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<tr>
<td>a. Know the definitions of delirium and dementia. Assess current mental status including any subtle changes from baseline (using ED-friendly tools). Determine if delirium is superimposed on dementia.</td>
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<td>b. Formulate an age-specific differential diagnosis for older adults with cognitive and behavioral impairment.</td>
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<tr>
<td>c. Initiate a diagnostic workup to determine the etiology and initiate appropriate treatment.</td>
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<tr>
<td>d. Recognize causative factors in agitated older adults (e.g., untreated pain, hypoglycemia, hypoxia, and use of irritating tethers—Foley catheter, IV, monitor leads, blood pressure cuff, pulse ox, environmental factors (e.g., noise, light, temperature), lack of family member, and sundowning).</td>
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<th>3. Atypical presentation of disease</th>
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<tbody>
<tr>
<td>a. Know the physiologic changes (including each organ system) associated with aging that increase the risk of atypical presentations of disease.</td>
</tr>
<tr>
<td>b. Formulate a differential diagnosis for older adult patients with infectious processes, acute abdomens, and acute coronary syndromes in light of potential absent or blunted signs and symptoms (e.g., fever, cough, pain, leukocytosis).</td>
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<tr>
<td>c. Recognize the common geriatric syndromes (e.g., falls, dizziness, altered mental status, generalized weakness) and generate a differential diagnosis for older adult patients with these presentations.</td>
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<tr>
<th>4. Medication management and polypharmacy</th>
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<tr>
<td>a. Know the physiologic changes associated with aging that affect pharmacokinetics and pharmacodynamics (e.g., bioavailability, renal function, fat distribution, CNS sensitivity) and how they increase the risk of polypharmacy.</td>
</tr>
<tr>
<td>b. Be able to prescribe appropriate drugs and dosages for the older adult taking into account their current medications, acute and chronic diagnoses, and functional status.</td>
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<tr>
<td>c. Assess for adverse drug events as the etiology for presentations to the ED. Generate a list of high-risk drugs, used either alone, or in drug–drug or drug–disease interactions (e.g., benzodiazepines, digoxin, insulin, NSAIDs, opioids, and warfarin).</td>
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<tr>
<td>d. Explain all newly prescribed drugs to older adults and caregivers at discharge assuring they understand how and why the drug should be taken, the possible side effects, and how and when the drug should be stopped.</td>
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<th>5. Transitions of care</th>
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<tr>
<td>a. Document history obtained from skilled nursing or extended care facilities of the acute events necessitating ED transfer, including goals of visit, medical history, medications, allergies, cognitive and functional status, advance care plan, and responsible PCP, and provide skilled nursing or extended care facilities and/or PCP with ED visit summary and plan of care, including follow-up when appropriate.</td>
</tr>
<tr>
<td>b. With recognition of unique vulnerabilities in older adults, assess and document suitability for discharge considering the ED diagnosis, including cognitive function, the ability in ambulatory patients to ambulate safely, availability of appropriate nutrition/social support, and the availability of access to appropriate follow-up therapies.</td>
</tr>
<tr>
<td>c. Select and document the rationale for the most appropriate available disposition (home, extended care facility, hospital) with the least risk of the many complications commonly occurring in older adults during inpatient hospitalizations.</td>
</tr>
<tr>
<td>d. With recognition of unique vulnerabilities in older adults, assess and document suitability for discharge considering the ED diagnosis, including cognitive function, the ability in ambulatory patients to ambulate safely, availability of appropriate nutrition/social support, and the availability of access to appropriate follow-up therapies.</td>
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<tr>
<th>6. Palliative care and pain management</th>
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<tbody>
<tr>
<td>a. Assess older adult patient’s goals of care for those with a serious or life-threatening condition and manage accordingly.</td>
</tr>
<tr>
<td>b. Assess for pain and provide ED management mindful of specific considerations for pain management in the older adult.</td>
</tr>
<tr>
<td>c. Know how to manage older adult patients undergoing hospice care while in the ED and how to access hospice care if relevant.</td>
</tr>
</tbody>
</table>

NSAIDs = nonsteroidal anti-inflammatory drugs; PCP = primary care physician.

University of Toronto includes an ED-based rotation where the fellow only provides care for older adult patients.

The educational goals are similar for all GEM fellowships, and the decision to include specific rotations has been driven primarily by the potential for the clinical experience to enhance the fellow’s nuanced understanding of GEM core competencies. Fellowships have chosen different rotations to include based on practical concerns including availability of a clinical service at the institution/health system, how active a service is and how frequently it interfaces with the ED/cares for ED patients, the willingness of a service to integrate a GEM fellow in a meaningful role, the educational culture of a service, and the presence of other trainees. Notably, geriatric specialty offerings differ widely in scope and size between institutions. As a result, rotation differences for GEM fellowship programs also reflect the heterogeneity of existing strategies for geriatric care delivery.

Each fellowship has a core of required rotations and an opportunity for the fellow to choose among
electives to allow an educational experience tailored to their goals and interests.

**Fellow as Educator**

A key component of the fellow’s training is learning to be an educator of GEM concepts. Each fellowship requires the fellow to teach emergency medicine resident physicians and others. Typically, this includes developing and presenting lectures, designing/writing simulation cases, leading discussions on GEM best practices, and acting as a resource from providers from other disciplines including nursing and emergency medical services. Additionally, the fellow conducts bedside teaching while working clinically.

**Research Project**

Each fellowship is required to develop a significant scholarly project. The fellow is closely mentored by the fellowship director and others to define a project that is impactful and feasible. Previous successful GEM fellow projects have included development and assessment of a clinical delirium protocol, examination of injury patterns suggestive of physical elder abuse, investigation of the impact of use of various anticoagulants on intracranial hemorrhage risk in falls, assessment of alcohol misuse/abuse in older adults, a protocol to guide appropriate use of indwelling urinary catheters in geriatric ED patients, pain management in orthogeriatric syndromes, and strategies for identifying frailty. Fellows completing a 2-year fellowship and obtaining a master’s degree are prepared to pursue academic research careers in GEM, with several applying for extramural grant funding during or shortly after the conclusion of the fellowship.

**EVALUATION**

As these programs were unique when initially designed, a robust evaluation process has been necessary to track progress toward milestones, ensure that fellows have a high-quality educational experience, and identify any opportunities for improvement. Current fellowships have various strategies of formal and informal evaluation, including regular one-on-one meetings with the director, formal written evaluations of program and rotations, performance reviews, participation in geriatrics fellow in-service examinations, and exit interviews. This evaluation and feedback have allowed for significant curricular changes at several institutions. For example, rotations on which opportunities for relevant experience was limited or the fellow was not able to play a meaningful role were replaced by others, and rotations offering unique, high-quality training were expanded. These evaluations have also facilitated customization of the fellowship experience for individual fellows based on their goals and interests. Notably, formal evaluation of the impact of the existence of GEM fellowship training on patient-related outcomes or ED metrics has not yet occurred.

**SUCCESSES AND CHALLENGES**

Existing fellowships have already had important successes, shown in Table 4. Key successes include an improved collaborative relationship with geriatrics faculty that led to additional initiatives and projects and former fellows already becoming regional and national leaders in GEM. Fellowships have identified several challenges in launching and maintaining these ambitious training programs. These challenges are shown in Table 4. The most critical challenges have been ensuring adequate funding and recruiting new fellows each year who are interested in this clinical area, although recent increased attention nation attention on GEM has led to increased numbers of applicants at some programs.

**CONCLUSION AND NEXT STEPS**

Geriatric emergency medicine fellowships play a critical role in improving care for older adults by developing

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**Table 3**

Geriatric Emergency Medicine Fellowship Rotations

<table>
<thead>
<tr>
<th>Inpatient</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Geriatrics service (acute care for the elderly unit)</strong></td>
</tr>
<tr>
<td><strong>Geriatrics consult service</strong></td>
</tr>
<tr>
<td><strong>Geriatric psychiatry consult service</strong></td>
</tr>
<tr>
<td><strong>Palliative care consult service</strong></td>
</tr>
<tr>
<td><strong>Geriatric trauma/fracture/orthopedics service</strong></td>
</tr>
<tr>
<td><strong>Intensive care units</strong></td>
</tr>
<tr>
<td><strong>Clinical pharmacology</strong></td>
</tr>
<tr>
<td><strong>Geriatrics clinic</strong></td>
</tr>
<tr>
<td><strong>Home-based primary care/house calls</strong></td>
</tr>
<tr>
<td><strong>Geriatric psychiatry clinic</strong></td>
</tr>
<tr>
<td><strong>Hospice/palliative care clinic</strong></td>
</tr>
<tr>
<td><strong>Movement disorders/neurology clinic</strong></td>
</tr>
<tr>
<td><strong>Physical medicine and rehabilitation clinic</strong></td>
</tr>
<tr>
<td><strong>Urology clinic</strong></td>
</tr>
<tr>
<td><strong>Neuropsychology</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Long-term care</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nursing home/subacute rehabilitation center</strong></td>
</tr>
<tr>
<td><strong>ED</strong></td>
</tr>
<tr>
<td><strong>Emergency care for geriatric patients</strong></td>
</tr>
</tbody>
</table>
the next generation of regional, national, and international emergency physician leaders in clinical medicine, education, and research. In addition, former fellows may use their expertise to become local champions in the EDs in which they work, educating their peers and leading new initiatives and changes in clinical practice. The next steps include exploring former fellows’ postfellowship experiences, careers, accomplishments, and contributions to geriatric emergency medicine to better understand the impact of geriatric emergency medicine fellowships. Additionally, future research should explore the impact of launching and maintaining a geriatric emergency medicine fellowship as well as having fellowship-trained faculty on staff and in leadership positions on patient-related outcomes and ED metrics is another critical future goal. These investigations may be incorporated into existing research programs such as the Geriatric Emergency Care Applied Research Network.

Interest in specialized geriatric emergency medicine training will likely grow as emergency physicians increasingly recognize the value of optimizing care for older adults, who will comprise more and more of their patients. Additionally, geriatric ED accreditation will likely be pursued by many EDs, driven by a desire to improve quality of care and to stay competitive with peer institutions. To receive accreditation, an ED must have a physician champion/medical director, and geriatric emergency medicine fellowship graduates are uniquely qualified to serve in this role. As a result of this increased interest, it is likely that new geriatric emergency medicine fellowship programs will be launched, with some already in planning stages. We hope that the structure, curricula, and experience of currently active programs described here will inform the design process. Further, we believe that opportunities exist to combine geriatric emergency medicine fellowship training with a focus in research, administration, or health policy to create unique new types of highly impactful specialized training. Ultimately, we hope that specialized fellowship training will continue to play an important role in the development of geriatric emergency medicine as a subspecialty and the improvement of quality of care delivered to older adult ED patients.

References

Barriers and Solutions to Advancing Emergency Medicine Simulation–based Research: A Call to Action

Suzanne Bentley, MD, MPH1,2, Stephanie N. Stapleton, MD3, Phillip C. Moschella, MD, PhD4, Jessica M. Ray, PhD5, Shana M. Zucker6, Jessica Hernandez, MD, MEHP7, Elizabeth D. Rosenman, MD8, and Ambrose H. Wong, MD, MSEd5

ABSTRACT
Simulation technology has successfully improved patient safety and care quality through training and assessment of individuals, teams, and health care systems. Emergency medicine (EM) continues to be a leader and pioneer of simulation, including administration of simulation-based fellowships and training programs. However, EM simulation–based research has been limited by low rates of publication and poor methodologic rigor. The Society for Academic Emergency Medicine (SAEM) Simulation Academy is leading efforts to improve the quality of scholarship generated by the EM simulation community and to foster successful research careers for future generations of EM simulationists. Through a needs assessment survey of our membership and a year-long consensus-based approach, we identified two main clusters of barriers to simulation-based research: lack of protected time and dedicated resources and limited training and mentorship. As a result, we generated four position statements with implications for education, training, and research in EM simulation and as a call to action for the academic EM community. Recommendations include expansion of funding opportunities for simulation-based research, creation of multi-institutional simulation collaboratives, and development of mentorship and training pathways that promote rigor in design and methodology within EM simulation scholarship.

Simulation-based training and assessment have proven to be vital to medical education and patient safety by providing a safe and controlled environment to foster repeated, deliberate practice on tasks and clinical skills that occur infrequently or are high risk. Virtual reality simulators, robotic and static manikins, artificial and cadaver models, live animals, inert animal products, and standardized human actors have all been employed as educational tools for these purposes. Through the use of simulation-based training, experts have successfully demonstrated sustained improvements in health care quality and safety at multiple levels of the health care system. Efforts have targeted individuals to improve learner confidence, medical knowledge, and clinical performance; teams to foster adherence to clinical algorithms and enhance interprofessional collaboration; and system-wide efforts to address safety culture and decrease adverse events across hospital units. In addition to training and education, simulation technology has become a
widely used platform for assessment and testing across multiple venues of health care, including procedural competency, transitions of care, team function, rollout of new physical clinical spaces, and system performance.8

Emergency medicine (EM) has embraced simulation-based training and assessment and has developed a growing community of simulationists, defined by the Society for Simulation in Healthcare as any individual who is involved in the design, implementation, and/or delivery of simulation activities, including educators, technologists, administrators, or researchers using simulation technology.9 In a 2008 review, 91% of EM residencies programs in the United States incorporated simulation in training.10 The Accreditation Council for Graduate Medical Education (ACGME) includes simulation as a frequently recommended assessment modality of their milestones-based competencies. This led to a multi-institutional initiative to design simulation cases targeting eight of the EM subcompetencies.11 In addition, EM physicians direct a significant percentage of simulation training programs worldwide.12 Thus, the EM simulation community is also responsible for training future generations of simulationists across the health care system,13 and must ensure that best practices for simulation-based training and assessment are applied.

Simulation-based research is an important component of medical education and patient safety initiatives. Calls for EM-focused simulation-based research started over 10 years ago in a consensus paper issued by the Society for Academic Emergency Medicine (SAEM) Simulation Task Force. They strongly recommended research on “the impact of simulation training on patient safety; the transfer of skills into real world settings; the assessment of the validity and reliability of simulation for procedural, clinical, and behavioral competency evaluation; the assessment of various debriefing techniques; and the impact of simulation training on team function.”14 High-quality simulation-based research is needed to identify these best practices and distill future areas for improvement and expansion. Simulation-based research is also important to the promotion and professional development of simulation academic faculty. The ACGME, and specifically the EM Residency Review Committee, requires that residency program core faculty “establish and maintain an environment of inquiry and scholarship with an active research component” and demonstrate scholarship via “publication of original research or review articles in peer reviewed journals, or chapters in textbooks.”15

Unfortunately, simulation-based research is challenging and lags behind training initiatives. Experts have noted that scientific rigor in simulation-based research is inconsistent and sometimes poor.16 EM simulation-based research has historically been limited by single-site studies, small sample sizes, and the absence of patient-level outcomes. A meta-analysis of EM-based simulation studies found that the methodologic rigor was relatively low, and many publications needed strengthening of design features such as randomization, blinded outcome assessment, collection of validity evidence for outcome measures, and focus on measurements of learner behaviors and downstream patient effects.17 Specifically, researchers often failed to focus on a research question grounded in prior empirical work and robust conceptual frameworks. Even within medical education and simulation, EM simulation–based research is lagging. In a review of EM-focused studies on procedural training, articles were commonly written by non–EM-trained groups.18

Recent efforts to improve simulation-based research initiatives are directly applicable to EM. This includes guidelines for reporting outcomes and components of simulation design to improve the quality of published simulation studies.19 The pediatric simulation community created the International Network for Simulation-based Pediatric Innovation, Research, and Education (INSPIRE) to address this issue, which uses a crowdsourcing, collaborative approach to assist simulation-based investigators in improving their scientific and methodologic rigor. This initiative has resulted in multiple successful collaborations and publications, ranging from pediatric resuscitation to procedural skills.20

To develop a culture of higher quality research within the EM simulation community, it is important to explore and remove barriers to conducting and understanding research. General research barriers have been previously investigated and include lack of training in research skills, lack of trained research faculty mentors, and logistic constraints.21,22 However, little research to date has specifically focused on simulation-based research and the unique associated barriers and challenges in EM. To address this gap, the SAEM Simulation Academy convened during the Annual Meeting in May 2018 and recommended the formation of a research subcommittee. The objective of this work is to describe the steps and results of the research subcommittee efforts to identify and describe
the barriers to simulation-based research within the EM community and to provide consensus-based recommendations to address these barriers.

METHODS

Our group used a combination of expert consensus and survey-based research to identify barriers, as well as potential solutions, to simulation-based research within EM. The overall timeline and steps for the Simulation Academy Research Subcommittee that led to this article are depicted in Figure 1. The study received institutional review board approval as an exempt study by the Icahn School of Medicine at Mount Sinai.

In 2016, the Simulation Academy initiated the Simulation Novice Research Grant in conjunction with the Society for Academic Emergency Medicine Foundation (SAEMF) to support new investigators in their EM simulation research careers. However, very few applications were being submitted by members on an annual basis. At the Simulation Academy Business Meeting during the SAEM Annual Meeting in May 2018, the executive leadership discussed this issue with the membership at large, resulting in the creation of a research subcommittee. The charge of the subcommittee was to develop and foster membership engagement with the SAEMF/Simulation Academy Novice Research Grant and provide better support for research within the EM simulation community.

As a subcommittee, we met monthly by virtual video conference starting in July 2018 and reported directly to the Simulation Academy president. After several rounds of group consensus, we generated several key questions to investigate: 1) What are the barriers to EM simulation–based research projects and publication? 2) How do we foster a pathway of professional growth and academic promotion in EM simulation? 3) Why are submissions to the SAEMF/Simulation Academy grants fewer than expected? and 4) How do we increase submissions to the SAEMF/Simulation Academy grant? In addition, we sought to explore potential barriers to apply for funding of simulation-based projects within the EM community at large.

To better address these key investigative questions, we surveyed the academy membership to identify experience with and barriers to conducting simulation-based research. We started the survey instrument design with a current literature review of simulation-based research and then modified it through three rounds of refinement with input from the subcommittee and academy executive leadership members. We tested the survey through a limited pilot distribution within the subcommittee and executive leadership with minor changes added for clarity and readability.

Using the SAEM Simulation Academy Listserv, we distributed an anonymous, 17-question, web-based survey issued through e-mail invitation (SurveyMonkey) to Simulation Academy members. The survey queried previous simulation-based research and publication experience, previous grant funding for simulation projects, and professional background information such as current level of training, presence of fellowship training, and current role in simulation. Additionally, we queried respondents on barriers to conducting simulation-based research initiatives and potential solutions and improvements for the Simulation Academy to support members with research and scholarly...
activities. We compiled and analyzed descriptive data with Microsoft Excel 19.

We presented the results of the survey to the Simulation Academy business meeting during the subsequent SAEM Annual Meeting in May 2019. We discussed the results with the members in attendance and recorded overall comments and recommendations from the audience. Subsequently, the research subcommittee met on three separate occasions to compile the results of the survey and all of the shared recommendations and consensus of both the general Simulation Academy members and that of the subcommittee. As a result, the subcommittee generated overall recommendations and position statements as well as potential action items for the academy and the EM simulation community.

CURRENT STATE OF THE SAEM SIMULATION ACADEMY

We received 41 responses out of the 145 SAEM Simulation Academy members surveyed (28.3% response rate). Results regarding training and clinical demographics are summarized in Table 1. Survey respondents represented 36 distinct institutions and included both academic university-based and community hospital-based locations. With regard to current level of training, 19.5% were medical students, residents, or simulation fellows; 34.1% were less than 5 years out of residency training; 24.4% were 5 to 10 years postresidency; 14.6% were more than 10 years postresidency; and 7.3% were PhD-trained or administrators. Approximately 43.9% completed a simulation fellowship. Respondents participated in a wide spectrum of simulation activities as part of their academic portfolio, with the majority being involved with graduate medical education (85.4%) and curriculum development (73.2%).

Table 1
Simulation Academy Research Survey Results: Training and Clinical Demographics (N = 41)

<table>
<thead>
<tr>
<th>Training &amp; clinical demographics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Current level of training</td>
<td></td>
</tr>
<tr>
<td>Medical student</td>
<td>2 (4.9)</td>
</tr>
<tr>
<td>Resident</td>
<td>1 (2.4)</td>
</tr>
<tr>
<td>Simulation fellow</td>
<td>5 (12.2)</td>
</tr>
<tr>
<td>&lt;5 years out of residency training</td>
<td>14 (34.1)</td>
</tr>
<tr>
<td>5–10 years out of residency training</td>
<td>10 (24.4)</td>
</tr>
<tr>
<td>&gt;10 years out of residency training</td>
<td>6 (14.6)</td>
</tr>
<tr>
<td>Other (PhD, administrator, etc.)</td>
<td>3 (7.3)</td>
</tr>
<tr>
<td>Completed simulation fellowship?</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>18 (43.9)</td>
</tr>
<tr>
<td>No</td>
<td>17 (41.5)</td>
</tr>
<tr>
<td>Other (some training other than fellowship)</td>
<td>6 (14.6)</td>
</tr>
<tr>
<td>Involvement with simulation activities (more than one may apply)</td>
<td></td>
</tr>
<tr>
<td>Undergraduate medical education</td>
<td>25 (61.0)</td>
</tr>
<tr>
<td>Graduate medical education</td>
<td>35 (85.4)</td>
</tr>
<tr>
<td>Faculty education</td>
<td>25 (61.0)</td>
</tr>
<tr>
<td>Community of Practice</td>
<td>13 (31.7)</td>
</tr>
<tr>
<td>Curriculum development</td>
<td>30 (73.2)</td>
</tr>
<tr>
<td>Research</td>
<td>23 (56.0)</td>
</tr>
</tbody>
</table>

Data are reported as n (%).

IMPLICATIONS FOR EDUCATION AND TRAINING IN EM

Mirroring some of the challenges in other realms of academic EM, our survey results revealed two predominant clusters of barriers to simulation-based research, which consisted of the lack of time, funding, and resources to conduct simulation-based research, and need for formal training and mentorship in simulation-based research. Table 2 lists survey responses related to research activities and barriers to simulation-based research, and relevant points are incorporated below regarding implications for education and training in EM. Table 3 summarizes key factors, position statements, and recommended action items generated by the research subcommittee.

Time, Funding, and Resources
Simulation-based research includes studies that assess the efficacy of simulation as a training methodology as well as studies where simulation is used for investigation of phenomena at the team, individual, and system levels of health care. While simulation settings offer standardization of case presentation and experimental control, simulation-based research is not without its own challenges. As a research methodology, simulation is resource-intensive requiring significant time allocation, research support, and participant recruitment. The need for dedicated time, funding, and access to resources represent common, interconnected barriers to conducting rigorous simulation-based research with meaningful outcomes.

Simulation-based activities can require hundreds of hours of faculty and support staff time to generate successful learning and knowledge transfer. While
dedicated simulationists may have protected time for simulation-based training and education, most do not have the additional protected time sufficient to conduct simulation-based research and scholarly activities. In our survey results, 73.2% of respondents indicated that they lacked the dedicated time for simulation-based research. The ACGME has provided guidelines for clinical versus educational time for program directors and residency core faculty, but no similar guidelines exist for simulationists. As clinician-educators or clinical-educator-simulationists, simulation alone often represents an additional educational commitment. A reallocation of protected time is necessary for simulationists to expand commitments to include research.

A common pathway for gaining such protected time is through dedicated effort from grant funding. Expanding simulation commitments to include research requires not only additional time commitments from educator-researchers, but also dedicated support staff time, research assistants, participant incentives, physical space, and specialized equipment. For centers exclusively funded for education or for new simulation investigators without access to an existing research infrastructure, implementing a simulation study may require external funding to pay for these critical resources. Limited project funding was noted as a problem by 65.9% of respondents. With a limited number of simulation-specific grant opportunities, new or junior simulation-based researchers face the challenge of introducing their methodology in an already competitive review process for broad award announcements. Achieving grant funding requires new investigators to invest significant time to training in research methodologies, to building a track record of publication as well as dedicated time for preparing grant applications. Thus, while grant funding may offer financial incentive for time spent on research, without protected time from the researcher’s organization, competitive demands remain for the human resource.

Currently, a very limited number of simulation-specific funding opportunities are available to simulation researchers. While small seed grants are available through the SAEMF/Simulation Academy and the Society for Simulation in Healthcare, additional funds are needed to allow researchers to build research programs and infrastructure. Funds should be allocated to match the challenges of simulation-based research, both in time and in costs. Even small simulation-based research projects often require significant time and resources for data collection, scoring, and analysis. Funding opportunities should be developed with

| Table 2 |
| Simulation Academy Research Survey Results: Research Activities and Factors Affecting Simulation-based Research (N = 41) |

| Simulation-based research activities |
| Experience with simulation-based research |
| No experience at all | 5 (12.2) |
| Helped with a project | 5 (12.2) |
| Completed project as lead, but never published | 12 (29.3) |
| One project published via peer review | 7 (17.0) |
| Multiple published projects | 6 (14.6) |
| At least two or three first-author publications | 4 (9.8) |
| Other (more than one of above) | 2 (4.9) |

| Ever received grant funding for simulation? |
| Yes | 16 (39.0) |
| No | 25 (61.0) |

| Types of dissemination/scholarship for simulation |
| Abstract (at meeting or in Journal) | 31 (75.6) |
| Simulation case(s) | 13 (31.7) |
| Innovation/education/review | 20 (48.8) |
| Blog post/news or media article | 6 (14.6) |
| Research paper | 13 (31.7) |
| None of the above | 9 (22.0) |

| Factors affecting simulation-based research |
| Barriers to Involvement in simulation-based research |
| Lack of time | 30 (73.2) |
| Lack of project funding/resources | 27 (65.9) |
| Too much clinical obligation | 21 (51.2) |
| Lack of mentorship | 21 (51.2) |
| Lack of institutional support | 11 (26.8) |
| No ideas/concepts amenable for research | 6 (14.6) |
| Not within academic interest | 0 (0.0) |

| Potential solutions/improvements to support simulation-based research |
| Increase collaboration amongst academy members | 30 (73.2) |
| Create support/structure for research (list serve, working groups) | 28 (68.3) |
| Develop/disseminate research resources/training | 30 (73.2) |
| More funding opportunities | 21 (51.2) |

| Potential changes to increase applications to the simulation academy research grant |
| Less paperwork, or shorter grant length | 27 (65.9) |
| Focus on education/innovation | 21 (51.2) |
| Improved instructions | 11 (26.8) |
| More money per grant | 5 (12.2) |
| More number(s) of grants/opportunities | 17 (41.5) |
| Assistance with mentorship, possibly across institutions | 29 (70.7) |

Data are reported as n (%).
recognition of these fundamental challenges specific to simulation-based research. Simulation specific funding opportunities provide new researchers the opportunity for peer review and feedback on their research plans from researchers experienced in simulation research methodologies, thus providing an important learning experience within the funding application process. In generating additional funding opportunities, however, it is also important to consider the requirements and time commitment necessary to complete the application process. Small project and early investigator application requirements should be tailored to reflect the scope of the award (i.e. shorter page limits for smaller projects/awards).

Position #1: Advancing simulation-based research requires funding opportunities that consider the additional time and resources needed for simulation-based studies, especially targeting investigators at earlier stages of experience and scientific inquiry.

Recommended Action Item #1a: Create more EM simulation-specific funding opportunities and review requirements tailored for simulation-based research.

Recommended Action Item #1b: Advocate with foundational and federal agencies to open avenues for funding of simulation-based research.

Table 3
Summary of Findings and Recommendations for EM Simulation-based Research

<table>
<thead>
<tr>
<th>Factor</th>
<th>Interpretation</th>
<th>Position Statement</th>
<th>Recommended Action Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time, funding, and resources</td>
<td>Simulation-based research is resource-intensive and requires significant time allocation, unique equipment and expertise, and additional commitment beyond use of simulation as educational modality.</td>
<td>1. Advancing simulation-based research requires funding opportunities that consider the additional time and resources needed for simulation-based studies, especially targeting investigators at earlier stages of experience and scientific inquiry.</td>
<td>I. Create more EM simulation-specific funding opportunities and review requirements tailored for simulation-based research.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Development of an EM-based simulation research collaborative would facilitate higher scientific quality and productivity, including multicenter studies and reporting of patient-level outcomes.</td>
<td>II. Advocate with foundational and federal agencies to open avenues for funding of simulation-based research.</td>
</tr>
<tr>
<td>Training and Mentorship</td>
<td>Paucity of formal training, experience, and exposure to high-quality mentorship in simulation-based research has limited caliber of EM simulation scholarship.</td>
<td>3. EM should facilitate training programs, resources, and opportunities specific to conducting simulation-based research, encouraging the use of well-defined measures of success, rigorous methodology, and identification of known gaps in scientific knowledge in emergency care.</td>
<td>I. Establish an EM simulation research collaborative.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Efforts to expand and formalize mentorship within the EM simulation community should leverage both peers and experiential research opportunities across institutions, specialties, and disciplines.</td>
<td>II. Liaise and collaborate with experts in research networks and investigators of existing multi-institutional studies.</td>
</tr>
</tbody>
</table>

...
can advance simulation-based research by broadening the participant pool. This allows for both an increased number of participants and the diversity needed to translate and generalize findings across institutions. A majority of our respondents (73.2%) also cited this as an important improvement to support EM simulation-based research. Collaboratives also allow for pooled resources in the scenario development, data collection, and statistical analysis. Finally, collaboratives could provide the opportunity to bring together both experienced and novice simulation researchers. For simulationists trained primarily as educators but are interested in entering the research arena, collaboratives can provide easy entry for learning research methodologies and building the skills and publications necessary for developing their own research career and initial grant applications. Existing recommendations on logistics, operational framework, site selection, leadership, subcommittees, guidelines for authorship, and measures for success can be extrapolated from established collaboratives like INSPIRE and expert consensus work on an EM education research network during the 2012 Academic Emergency Medicine consensus conference.

**Position #2:** Development of an EM-based simulation research collaborative will facilitate higher scientific quality and productivity, including multicenter studies and reporting of patient-level outcomes.

Recommended Action Item #2a: Establish an EM simulation research collaborative.

Recommended Action Item #2b: Liaise and collaborate with experts in research networks and investigators of existing multi-institutional studies.

### Training and Mentorship

Although simulation-based research is rapidly expanding, the quality and rigor of study design and reported outcomes are still inconsistent. This may reflect the fact that most simulationists, including those who practice in EM, are attracted to the field due to interests and expertise in education and training, rather than research scholarship. Thus, the focus on training and mentorship of EM simulation falls more heavily on instruction (e.g., curriculum design, debriefing methodology) rather than research, leading to a paucity of academic productivity and scholarship that lends itself to successful publication in peer-reviewed journals. The survey results demonstrate this fact, as 53.7% of respondents had either no involvement with simulation-based research or were involved with projects that did not result in dissemination of a final product. Furthermore, of those final products, only 31.7% consisted of peer-reviewed research papers. In addition, the logistics and writing process involved in putting together a full grant application may be daunting for those without prior experience, training, or mentorship in grant submissions, especially for new investigators who do not have access to existing research infrastructure. This is also reflected in the survey results, as 65.9% of respondents requested less paperwork and shorter grant length as a potential change to increase applications to the SAEMF/Simulation Academy grant.

Lack of formal training and experience with simulation-based research undermines the caliber of EM simulation scholarship. Within our cohort of survey respondents, 68.3% requested more resources for education and training in research methods for simulation academy members. This is similarly reflected in the literature on research training within simulation training programs. A recent survey of simulation fellowship respondents reported that 92% included research as a core learning goal, but 67% also reported that scholarly writing was the most difficult skill for fellows to master and needed enhancement in their curriculum. A follow-up survey of recent simulation fellowship graduates consisted of 71% EM-trained respondents. When evaluating their fellowship experience, fellows felt that the most challenging part of their fellowship curriculum to master was research design and dissemination and reported that research design and methods were areas of their fellowship curriculum that needed the most improvement. As the level of scientific rigor for simulation-based research is increasing in the literature, graduates of EM simulation fellowships will need strong research skills to meet the higher standards of scientific journals and successfully publish their scholarly work.

These results, in conjunction with our survey responses, indicate that more rigorous training in research methodology is needed within the EM simulation community. This may require partnership and collaboration with research experts and training resources outside of the simulation and education fields to supplement the fellowship experience, including opportunities like SAEM’s Advanced Research Methodology Evaluation and Design (ARMED) Course. Embedment of training and experience with simulation-based research also needs to occur.
consistently and systematically within simulation fellowships so that graduates receive a solid foundation to initiate their own scholarly activities upon starting their academic EM careers as junior faculty.

Position #3: EM should facilitate training programs, resources, and opportunities specific to conducting simulation-based research, encouraging the use of well-defined measures of success, rigorous methodology, and identification of known gaps in scientific knowledge in emergency care.

Recommended Action Item #3a: Incorporate structured and formal training curricula and competencies for research into simulation training programs and fellowships.

Recommended Action Item #3b: Foster venues for EM simulationists to pursue continuing professional development of research skills, including online modules and resources, and capitalization of existing research training programs.

High-quality mentorship is thought to play a critical role in the development of junior faculty. Specifically, it has been cited as a key factor in establishing a research environment and in influencing the academic productivity of clinical educators. It is also associated with increased career satisfaction and can help individuals develop a “research identity,” which promotes self-efficacy and a sense of belonging within a research community.

Unfortunately, mentorship has also been reported as an inconsistent, and often scarce, resource. This is true within the medical education community as a whole and within EM specifically. Several systematic reviews of faculty development programs within medical education highlight the focus on teaching effectiveness, rather than research productivity. In a survey of EM department chairs, 43.6% reported a formal mentorship program, although the content of these programs was not reported.

Our work has several significant limitations. Our survey response rate was low, and although we supplemented our process through consensus methods with our research subcommittee members, our findings may still be subject to nonresponse bias and not fully reflect the needs of the EM simulation community at large. In addition, the majority of our survey respondents were less than 10 years posttraining and 50% were very early in their academic careers. This may potentially overemphasize the importance of access to mentorship and difficulties in securing funding. Future work may include purposive sampling of EM.
simulationists across a spectrum of experience to better reflect the needs of those individuals in more advanced stages of their careers.

CONCLUSION

Through a synthesis of survey responses from our simulation academy membership and consensus methodology within the research subcommittee, we identified important barriers and limitations to performing simulation-based research within EM. Respondents cited several key factors consisting of time, funding, resources, training, and mentorship. Although these barriers to research also exist in other fields, this work highlights the unique challenges for EM simulationists to overcome them and serves as a call to action for the academic EM community to advance EM simulation-based training and assessment. Because healthcare simulation has the ability to intersect medical education with patient safety and quality, investment in simulation-based research within EM has significant potential to develop services and interventions that can yield measurable improvements in the health of individuals and society in the acute phase of illnesses and disease. While the overall field is growing, the number of leaders in the field with both sustained funding and recurrent publication is few. More investment should be devoted to help support the academic productivity of those involved to help propagate novel and effective methods and prevent waste and inefficiency. The time and support investments should consider the clear requests of respondents for continued mentorship. Future work will include expansion of funding opportunities for simulation-based research, creation of multi-institutional simulation collaboratives, and development of pathways that stimulate academic success for EM simulationists through novel methods of mentorship and rigorous training in research design and methodology.

REFERENCES


Structural Competency: What Is It, Why Do We Need It, and What Does the Structurally Competent Emergency Physician Look Like?

Ernest E. Wang, MD, FACEP

In this issue, Salhi et al. introduce the academic emergency medicine (EM) community to the concept of “structural competency” and provide compelling rationale for why we need to move “Toward Structural Competency in Emergency Medical Education.” The authors’ objective is to translate the original concept, developed with the broader landscape of medical education in mind, into an EM-relevant framework. The authors effectively link the five domains of structural competency to the ACGME EM Core Competencies and provide examples of how this framework will serve as the launch point for enhancing resident education on the social determinants of health in the clinical learning environment.

WHAT IS IT?

The term structural competency was originally described by Metzel and Hansen as “... the trained ability to discern how a host of issues defined clinically as symptoms, attitudes, or diseases (e.g., depression, hypertension, obesity, smoking, medication ‘non-compliance,’ trauma, psychosis) also represent the downstream implications of a number of upstream decisions about such matters as health care and food delivery systems, zoning laws, urban and rural infrastructures, medicalization, or even about the very definitions of illness and health.” Essentially, physicians who have learned this skill have an understanding of the impact of the social structure on a social group or individual.

WHY DO WE NEED IT?

Salhi et al. contend that cultural competency does not provide the emergency physician with sufficient social and societal context to allow the clinician to see how these factors lead to poor health outcomes. Indeed, they argue that cultural competency may reinforce bias and misconceptions. As a result, there is the potential for trainees to “become frustrated and/or resort to stereotyping, stigmatizing, and blaming patients.” The definition of cultural competency is too myopic and does not train residents to see the effect of structural competency (i.e., social determinants of health).

Metzel and Hansen assert that “public health, social science, and critical race studies scholars have, over the last decade, begun to locate stigma, not just in the attitudes of individual persons, but in the actions of institutions, markets, and health care delivery systems” (emphasis added). Furthermore, they argue that “if stigmas are not primarily produced in individual encounters but are enacted there due to structural causes (emphasis added), it then follows that clinical training must shift its gaze from an exclusive focus on the individual encounter to include the organization of institutions and policies, as well as of neighborhoods and...
cities, if clinicians are to impact stigma-related health inequalities.”

Contemporary emergency physicians need to be aware of and recognize “how social and economic determinants, biases, inequities, and blind spots (emphasis added) shape health and illness long before doctors or patients enter examination rooms.”

Contemporary EM residency education, then, needs to evolve by teaching structural competency so that graduates have the skills and desire to advocate for patients at a systemic level.

WHAT DOES THE STRUCTURALLY COMPETENT EMERGENCY PHYSICIAN LOOK LIKE?

Salhi et al. introduce a term, “structural fluency,” that I believe is extremely important in this discussion. The term competency implies a degree of mastery, which is arguably aspirational in any domain of residency training. However, to become learned with the definitions, concepts, and factors and become structurally fluent is definitely achievable and will better equip our trainees to identify and assist our patients toward better health outcomes.

Emergency medicine residency training that is attuned to the elements of structural competency “need not be approached as an additional task or competency that EPs have to undertake, but rather a reorientation of the physician’s role in the clinical encounter with attention to the five elements of structural competency. So what does the structurally competent emergency physician look like?

1. They recognize the social structures that can influence and shape clinical interactions in the questions they ask in the history of present illness, social history, and discharge instructions:
   - Can you support your basic needs (food, shelter, clothing, utilities)?
   - Do you have a reliable social network (family and friends)?
   - Do you have a primary care provider? If so, what are the factors that prevent you from making the visit (i.e., work, transportation, money, etc.)?
   - Are you able to take care of yourself? If not, who provides care for you at home?
   - Can you afford your medications?
   - Are you safe at home (if you have one)?
   - Does the emergency physician always provide easy-to-understand instructions about what to do to care of their illness and how to take their medications?
   - Does the emergency physician take the time to perform a teach back and ascertain whether the patient can describe how they will follow discharge instructions?

2. They develop an extraclinical language of the structural elements beyond clinical symptoms, signs, and pathophysiology of disease. They have a broader understanding of contribution of medical sociology, for example. They can see the how a patient’s environmental “structure” can limit a patient’s ability to make favorable choices that impact their immediate disease state and ultimately their overall health. For example, the individual who must decide between food or medication for their chronic illness or the ESRD patient who cannot miss work to go to dialysis. If we invoke Maslow’s Hierarchy of Needs—for many individuals, health is a luxury.

3. They rearticulate “cultural” presentations in structural terms. Instead of attributing a patient’s condition (i.e. “an African-American non-compliant diabetic female presents with DKA”) to racial or social stereotypes and stigmas, the structurally fluent emergency physician does not blame patients and recognizes the limiters to health maintenance and compliance (i.e. “an African-American female who cannot make it to her doctors appointments because she has two jobs, is supporting two children, and cannot afford her medication presents with DKA”).

4. They observe and imagine structural intervention. Structural fluency and competency becomes the spark that motivates the EM resident to become interested in public health, health policy, advocacy, and community engagement to better serve their patients beyond the ED encounter.

5. They develop structural humility. They understand the influences of their conscious and unconscious biases, they recognize their limitations, and as Salhi et al. put it, they “deprioritize ‘solutions’ in favor of productive, active engagement with these issues” and cultivate their self-awareness.

Given the ever-increasing influence of structural factors on people’s lives, there is a real need for EM training to evolve and provide trainees with the
knowledge, skills, and attitudes to navigate the immense external challenges to our patients’ health and survival. Salhi et al. have developed a starting point from which the specialty of EM will be able to create training programs that develop structural fluency. Emergency physicians, trained in structural competency, will be better able to identify the social determinants that lead to poor health and social inequity. They will be able to create stronger connections and engender trust with their patients. Most importantly, they will have the skills to advocate for and develop innovative solutions outside the typical clinical encounter to improve the lives of the patients they serve.

References

Preparing a Curriculum Vitae for New Graduates

Muhammad Waseem, MD, MS, FAAP, FACEP¹, and Benjamin H. Schnapp, MD, MEd²

During the transition into residency training, preparing a curriculum vitae (CV) can seem like a daunting task, especially when each example seems a little bit different and no definitive guide exists. Nevertheless, the effort to craft a great CV is worth it, and this guide will endeavor to make the task easier by setting out the essential “dos and don’ts.” A CV serves as a professional passport, cataloguing accomplishments, opening doors to employment, and creating opportunities for professional connections.

RESUME VERSUS CV

A curriculum vitae is a comprehensive list of your accomplishments, including education credentials, teaching, and publications and can run for many pages, while a resumé (which you may be familiar with from a previous career) is a one-page abbreviation of the most relevant accomplishments you wish to highlight for a particular application.¹ Fortunately, there is a general understanding in medicine that accounting for the full range of one’s achievements can take up significant space; the prevailing standard is for potential employers to request an applicant’s CV. You may still be asked to prepare a resumé for special purposes such as applying for a leadership position or award, which will present only your most relevant qualifications for the position.

EDUCATION

Start with residency training and work backward, including any graduate school and undergraduate experience. Include all awarded degrees, dates of attendance, and location. High school should be omitted.

LICENSURE

List the issuing state, whether it is a permanent or a temporary license, and the active dates. It is not necessary to list specific license numbers on a CV.

CERTIFICATIONS

List all board certifications in chronological order even if the certification is incomplete or in process. For example, it is acceptable to list board eligibility having not sat for both ABEM examinations. Include such potential future employers to contact the applicant if needed. Optional information includes home and professional addresses, date of birth, and birthplace, but this information usually is not required by employers. Do not underestimate the potential benefit of strategic deployment of this type of biographical information. For example, if applying for a distant job, employers may be reassured to learn that the applicant was born nearby. Beware that this information could backfire, however, as when an employer unlawfully discriminates against an applicant based on their age or marital status. Do not list social security numbers.

Personal Information

Providing a name, e-mail address, and home and work telephone number is fairly standard, as these allow
accolades as Diplomat of the National Board of Medical Examiners (passed all three parts of USMLE), but do not include any scores. Some choose to list “merit badges” here (e.g., ACLS, ATLS, PALS) as well, as prospective employers may wish to know an applicant’s status prior to employment.

PROFESSIONAL ACTIVITIES

These include memberships in medical organizations and activities that highlight involvement in hospital, residency, regional, and national medical organizations. Examples include membership on committees and involvement within the residency program (e.g., committees, interviewing). This is also the place to list the additional coursework outside of residency. It may be beneficial to group these activities together to emphasize common themes (e.g., advocacy, EMS).

RESEARCH AND PUBLICATIONS

Include your involvement with any research projects here. Prospective employers may ask about specifics of listed research including level of participation, especially if the potential position has an academic focus. List all scholarly products, starting with both peer-reviewed and non–peer-reviewed publications. Be sure to include publications submitted and accepted but not yet published as "in press." Abstract presentations are generally listed second; however, be sure that they are clearly listed as abstracts rather than manuscripts. Grants, if any, are included in the final section.

LECTURES AND PRESENTATIONS

List all significant lectures and presentations. There may be more than initially apparent—a brief talk at a residency conference or an invited presentation at a meeting within your hospital system should be included. If you have any doubts, add it to your CV and discuss with a mentor; activities can always be removed if they are felt to be too trivial.

TEACHING LOG

When applying for an academic position, it is beneficial to create a separate section dedicated to teaching activities. Highlight the depth, breadth, and quality of teaching. List courses designed and led, the number and level of learners (e.g., medical students, residents, faculty), and the time commitment (e.g., once a year, biweekly). Include summary evaluation results, if available. A robust teaching log demonstrating proven teaching success provides leverage in a competitive academic job market. Each activity demonstrates subject matter expertise and public speaking skill, both valuable assets to most employers. In addition, the content may spark interest and opportunity from an employer intrigued by a lecture or presentation. A chance morning report on sepsis may create a connection with someone whose focus is quality improvement. Do not miss out on these potential opportunities (see Figure 1 for an example teaching log).

PROFESSIONAL WORK EXPERIENCE

The value of listing previous employment, including hospitals worked at during residency, may not be obvious at first. However, potential employers may not be familiar with the diverse clinical experiences offered in each residency program, and experience in multiple different clinical environments is an asset. Also showcase nonmedical jobs that may be relevant to the employer (e.g., scribe experience which may demonstrate documentation efficiency) or positions held prior to residency that demonstrate leadership potential, project management skills, and organizational skills.

EXTRACURRICULAR ACTIVITIES

While hobbies and nonprofessional activities may have been a focus of residency interviews, they are less valuable for postgraduate employment. Similar to professional experience, focus on activities that demonstrate leadership, business skills, or community engagement. These can be kept to a minimum or, better yet, omitted entirely from a CV.

FORMATTING

Curriculum vitae should be written in the third person, concise, mistake free, and well organized. Many universities have a specific CV format that they prefer or require—check with your own institution to see if this applies, as they may provide a template. Proofreading is essential to avoid typographical and grammatical errors. While it is permissible to change the font size for different sections of the CV—generally 18 pt for name, 12 to 14 pt for headings, and 10 to 12 pt for main text—use the same font throughout
the entire document. Finally, avoid placing dates in the left margin which tends to overemphasize the date as opposed to the activity itself.

COVER LETTER

The cover letter addresses three important matters that the CV does not:

1. Position sought
2. Most important accomplishments
3. Vision for the new position

While 1 is straightforward, 2 and 3 should be customized for each position. A cover letter for a fellowship might emphasize the applicant’s interest in learning and how additional training will support future career goals. A cover letter for an academic faculty position, on the other hand, should highlight important achievements and accomplishments and how they relate to the institution’s mission or goals. Background information about a potential employer may provide important context within which to frame a cover letter. There are many great examples available online. Friends or coworkers who have recently completed their own job searches may be willing to share their own examples.

PROFESSIONAL REFERENCES

Professional references should also be listed separately from the CV. References should be from individuals who are willing to be contacted to attest to the applicant’s past job performance and future potential. Employers routinely expect three references, including one from the residency program director. Not listing the program director as a reference can be interpreted by some employers as a red flag, so be prepared to defend the omission if necessary. For other references, the applicant should choose people with whom they have worked closely and who can highlight the candidate’s strengths. Other valuable references may include research principal investigators; section chiefs; fellowship directors; or anyone with intimate knowledge of the candidate’s work ethic, communication skills, and affability. To avoid unpleasant surprises, be certain to ask permission of anyone listed as a reference.

YOUR CV AND PROFESSIONAL RECRUITERS

As you progress in your career, recruiters may offer assistance with job placement. While some recruiters can be helpful, we urge applicants to resist the temptation to outsource the leg work of job hunting. Recruiters may charge thousands in fees just for making a few phone calls and sending a few e-mails. A recruiter who circulates a CV among several groups may claim to have made the introduction and lay claim to a lucrative commission even if the applicant ultimately does much of the work themselves. Exceptions include internal recruiters who are agents of specific groups or health care networks. If it is unclear who you are interacting with, it is okay to ask.

ONLINE RESOURCES

There are several paper and online resources available to help one guide the creation of a CV. Some of our favorites can be found here:

- https://www.thebalancecareers.com/medical-curriculum-vitae-example-2060325
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5673141/
- https://www.ama-assn.org/residents-students/career-planning-resource/creating-standout-cv
- https://www.bmj.com/content/356/bmj.j82

CONCLUSION

The curriculum vitae is an important professional tool, not just for job hunting but also for obtaining appropriate recognition for your work through annual reviews, promotions, awards, and committee memberships. However, it is only as good as the information it contains. Be thoughtful and be accurate. A great
curriculum vitae takes time and will require ongoing effort throughout residency. Update achievements, job histories, and scholarly work regularly, at least every 6 months. Your curriculum vitae is a living document that will naturally evolve over the course of your career. Create a system to collect accomplishments in real time as they occur to ensure all they are accurately recorded in a timely manner. Many find keeping a copy on the desktop of their computer helpful to facilitate timely updates. Now get out there and create an amazing curriculum vitae!

The authors thank David Barnes, MD, FACEP, for his assistance with editing.

References

2. Green M. Preparing the perfect medical CV. BMJ 2011;343:d5289.