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EDUCATIONAL ADVANCE

Rural Clinical Experiences for Emergency Medicine Residents: A Curriculum Template

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Abstract

Rural emergency departments (EDs) in the United States are less likely to be staffed with emergency medicine (EM) residency–trained and American Board of Emergency Medicine (ABEM)-certified physicians than urban EDs. Rural EM clinical experiences during residency training have been suggested as a strategy to encourage future rural practice, but past Accreditation Council for Graduate Medical Education (ACGME) Residency Review Committee for Emergency Medicine program requirements and a lack of familiarity with rural rotations in the EM graduate medical education (GME) community have limited their availability. To provide a template for the development and implementation of a rural EM clinical experience, Kerns six-step approach was followed.

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Rural emergency medicine (EM) has received much attention in recent years, and several reports have suggested the need for increased emergency department (ED) experience in rural communities during the course of residency training.[1] Changing needs in health care require new educational experiences, but initiating a new curriculum or curricular component is a complex task requiring a structured approach. This article describes rural EM curriculum development according to the six-step model proposed by Kern, linking curricula to health care needs.[2] The six components addressed in this process are problem identification/general needs assessment, targeted needs assessment, goals and objectives, educational strategies, implementation, and evaluation and feedback.

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PROBLEM IDENTIFICATION/GENERAL NEEDS ASSESSMENT: LOW NUMBERS OF RESIDENCY-TRAINED/BOARD-CERTIFIED EPS PRACTICING EM IN RURAL COMMUNITIES IN THE UNITED STATES

Studies addressing EM workforce issues describe relatively low numbers of residency-trained/board-certified emergency physicians (EPs) practicing in rural EDs compared to their urban counterparts and estimate that this discrepancy will increase in the future. An analysis of the 2008 American Medical Association Physician Masterfile found 31% of physicians staffing rural EDs were EM residency-trained, and 43% were American Board of Emergency Medicine (ABEM) certified, compared to 57% and 59%, respectively, for physicians staffing urban EDs.[3] When considering only EDs with a minimum annual census of 10,000 or more, a patient volume more clinically and financially consistent with a residency-trained, board-certified group of EPs, this discrepancy in residency training and board certification rates persists. For the upper Midwest states of Nebraska, North Dakota, and South Dakota, 12% of physicians staffing rural EDs were ABEM certified, and 31% were EM residency trained, versus 48 and 65% for physicians in urban EDs.[4]

One suggested strategy for addressing this problem is the development of rural clinical experiences for EM

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residents during the course of their training,[1,5,6] but several limitations, including the usual urban location of the primary ED of most residency programs, the Accreditation Council for Graduate Medical Education (ACGME) Residency Review Committee (RRC) requirement for a minimum ED patient volume, and the general lack of experience in the EM graduate medical education (GME) community with rural rotations, have hindered their development. An Institute of Medicine report suggests the modification of RRC-EM requirements to allow for rural focused training programs or hybrid urban–rural programs as a strategy to strengthen the rural workforce in the future.[1]

While there may be a perceived need for residents to experience EM in a rural setting in some manner, it is not clear whether a rural experience during EM residency is an effective strategy for encouraging future rural EM practice. Past studies report survey-based evidence that residency rotations in rural practice environments may influence future choice to practice EM in a rural community, but these studies are retrospective, involve non-EM specialties, and do not specifically address a brief exposure of a few months.[7–9] One recent EM study suggests an increased likelihood of rural EM practice if a rural ED rotation is required within the curriculum of an EM residency, but low numbers of residency programs with required rotations limit the effect on the rural EM workforce. Many residencies now offer rural EM electives, but the availability of these experiences may be limited, since only 14% had a predesignated site.[6]

Another potential benefit of a rural rotation during EM residency training is the opportunity for residents to experience EM in a nonacademic, nontertiary care setting. A recent commentary addressing perceived shortcomings of current EM residency training questions whether residents trained in high-volume teaching hospital EDs in Level I trauma centers may lack the practical experience necessary to make independent clinical decisions without the support of in-house hospitalists and admitting teams, a wide range of readily available consultants, and the resources capable of providing a complete set of diagnostic information in a relatively short time frame.[10] Since half of all U.S. EDs see fewer than 18,903 patients annually, many EPs practicing in the United States, in urban, suburban, and especially rural areas, will find themselves working solo in community EDs.[11] Lower-volume EDs, including free-standing EDs, may lack specialty consultation availability and resources when compared to the large teaching institutions, making a rural community ED rotation a valuable learning experience for any EM resident. In addition, the opportunity for a resident to supervise the overall patient flow and the operation of an entire ED, although not exclusive to a rural ED, is a rare opportunity in EM residency training today and an added benefit of the rural EM experience. Last, a recent survey reports that 44% of EM residency graduates choosing urban practice sites perceived access to specialist consultation as very important, versus only 22% of in rural EDs.[5] One possible interpretation of this finding is that EM residency graduates feel that they are inadequately prepared to staff a rural ED lacking in specialist coverage.

TARGETED NEEDS ASSESSMENT: ADEQUATE FACULTY SUPERVISION AND AN ACTIVE CLINICAL EXPERIENCE IN A RURAL ED

A subcommittee of the American College of Emergency Physicians (ACEP) Academic Affairs committee was formed to address the general need to increase residency-trained/board-certified physician staffing of rural EDs. The ACEP Board of Directors requested the development of a template to facilitate the initiation of rural ED rotations for EM residents in collaboration with the Association of Academic Chairs of Emergency Medicine (AACEM), the Council of Residency Directors in Emergency Medicine (CORD-EM), and the Society for Academic Emergency Medicine (SAEM). One aspect of this effort was the development of a model rural EM curriculum. Representatives from each organization served as subcommittee members. The members of this group reviewed published articles and obtained additional expert opinion regarding rural EM experiences for residents. The needs for a rural EM rotation were identified.

Limitations of the Rural ED: Adequate Patient Volume

Emergency medicine residency programs are typically located in the most urban areas of the United States, with most clinical experiences occurring in the primary ED of the program. While some programs include community ED rotations in nonacademic urban or suburban EDs, very few include opportunities to experience community EM in rural settings. Previous efforts to initiate rural ED rotations at nonprimary sites were limited by the 1997 RRC-EM program requirements setting the minimum annual patient volume at 36,000, with a subsequent revision to 30,000 in 2005, in response to an inquiry by a new program seeking to require residents to complete 2 months in a rural ED with an annual volume of 22,000:

> II.D.4. There must be sufficient patient population, of all ages and both sexes, having a wide variety of clinical problems to meet the educational needs of emergency medicine residents, as well as for other residents assigned training in emergency medicine. The primary clinical site and other emergency departments where residents rotate for four months or longer should have at least 30,000 emergency department visits in each annually. Educationally justifiable exceptions will be considered, such as clinical sites in a rural setting (http://www.acgme.org/acWebsite/downloads/RRC_progReq/110emergencymed07012007.pdf).

Although the ED patient volume limits no longer prevent residents from rotating at lower-volume EDs, there is an optimal range to ensure an active clinical experience at a rural site. Patients evaluated by residents in the primary EDs of residency programs generally range from 1.0 to 1.25 per hour,[12,13] which would require a minimum annual ED census of approximately 10,000 at a rural site to provide a similar level of clinical activity for a single resident. A recent study identified 857 rural EDs with 10,000 or

more annual visits, providing ample opportunities for rural training.[11]

Limitations of the Rural ED: Board-certified Supervisory Faculty

While lower-volume EDs are now an acceptable option for EM training, several factors must guide the choice of an appropriate rural site, including ensuring appropriate supervision and the overall quality of the clinical experience, as well as a determination of what constitutes a rural site. Adequate supervision is essential to postgraduate medical education, with ABEM certification considered the necessary credential for any supervising EP:

> II.B.2. The physician faculty must have current certification in the specialty by the American Board of Emergency Medicine, or possess qualifications acceptable to the Review Committee.
>
> a) This standard applies to all core physician program faculty and to other attending staff who provide supervision for emergency medicine residents (http://www.acgme.org/acWebsite/downloads/RRC_progReq/110emergencymed07012007.pdf).

Unfortunately, studies addressing the certification of EPs in rural EDs indicate that adequate supervision is present in a small minority of rural EDs in certain areas of the United States,[4,14] making supervision the limiting factor for many rural sites.

Clinical Environment: Ensuring an Optimal Clinical Experience in a Rural Community ED

The overall quality of care provided at a rural site directly affects the clinical experience of rotating residents and, if suboptimal, may even serve to dissuade a resident from future rural EM practice. Adequate patient volume and acuity are indicators of an adequate clinical experience, but additional quality measures, such as policies addressing procedural sedation and administration of thrombolytics in the ED without prior consultation, immediate availability of ultrasound equipment for EP use, or Level III or IV trauma center designation, are some specific examples of descriptors of the clinical environment that provide additional information on a departmental and institutional level. Increasing availability of other quality measures from Centers for Medicare & Medicaid Services data may serve as an additional method to assess potential sites.[15]

Whether a site meets the definition of rural will likely differ between programs. One possible approach is to consider the level of care provided by the hospital and the location of the community served. Prior RRC requirements could not be met by these low-resource EDs:

> II.D.3. The hospital must ensure that all clinical specialty and subspecialty services are available in a timely manner for emergency department consultation and hospital admission. Clinical services should include, but are not limited to, internal medicine and its subspecialties, surgery and its subspecialties, pediatrics and its subspecialties, orthopedics, obstetrics and gynecology (http://www.acgme.org/acWebsite/downloads/RRC_progReq/110emergencymed07012007.pdf).

However, a revision now includes an exception: rotations in rural settings will be considered with appropriate educational justification.[16] A rural EM experience must include the limited consultation availability and relative lack of resources that typically challenge rural EPs. However, some EDs in rural areas may enjoy all the amenities of a tertiary hospital ED, making selection of a rural training site as determined by U.S. Census standards alone problematic.[17] Therefore, an optimal rural site should combine a limited-resource/limited-consultation/limited-specialty back-up/Level III or IV trauma center or a non–ACS-designated ED with a rural community setting. Most critical access hospitals in the United States will likely meet this description.

Targeted Needs Summary: The Optimal Clinical Environment for a Rural Site

- ABEM board-certified/board-eligible for all supervising EPs;
- Single physician staffing with or without midlevel coverage;
- High-quality, up-to-date medical care for level of resources;
- Limited resources, appropriate for location and patient population;
- Limited consultation availability;
- Limited specialty/subspecialty back-up;
- Significant transport time to tertiary care center (i.e., > 1 hour);
- Rural community setting;
- Exposure to unique patient population;
- ED patient census of 10,000 to 30,000, or a minimum average of 1.0 patient contacts per hour.

GOALS AND OBJECTIVES: TOPICS IN RURAL EM

The goals and objectives of a rural clinical experience should follow ACGME competencies, with emphasis on key differences between urban and rural ED practice. For patient care and procedural competency, clinical presentations and diagnoses commonly addressed in standard EM residency curricula, but requiring an alternate approach in a rural ED, deserve special attention. One example is the administration of thrombolytic therapy to a patient with acute myocardial infarction in a hospital lacking cardiac catheterization and cardiology consultation availability. For medical knowledge, a review of patient presentations and expert opinion may identify diagnoses occurring more commonly in a rural ED. For communities engaged in agricultural work and animal handling, these rural diagnoses may include silo fillers disease, green leaf tobacco pickers disease, and tilmicosin injection. Interpersonal communication skills and professionalism in a rural ED involves cultural awareness for patient populations more common in rural communities, such as migrant workers and Native Americans. Rural systems-based practice focuses on

management of patient flow as a solo practitioner and transfer of patients to higher levels of care, including EMTALA compliance from the perspective of the transferring physician.

The specific objectives listed in Data Supplement S1 (available as supporting information in the online version of this paper) represent rural EM on a national level in the United States. Program directors and rotation site supervisors must customize the objectives to address the specific needs of the communities they serve.

EDUCATIONAL STRATEGIES: RURAL CLINICAL EXPERIENCE AND STRATEGIES FOR DIDACTICS AT A DISTANCE

To achieve the educational objectives of a rural EM curriculum, a resident must participate in a rural clinical experience during the course of his or her training program. In addition, various methods of didactic instruction addressing selected topics from the objectives, based on region and specific program needs, may enhance learning of the objectives and may include teleconferencing, asynchronous learning, and simulation.

Rural Clinical Experience

The clinical experience in the rural ED must allow the resident to evaluate and manage an unselected rural patient population to maximize the educational experience. Consultation for conditions listed in the learning objectives must not preclude the direct involvement of the resident in the management of these conditions. The mix of patient presentations, acuity, resuscitations, and procedures should be monitored to ensure an appropriate experience. A study comparing resident clinical experience in a rural versus urban ED reports similar patients per hour and the frequency of most procedures between the rotation sites, but notes a difference in admission rates, suggesting lower acuity in the rural ED. Residents performed more intubations and adult medical resuscitations at the urban site and more orthopedic procedures and pediatric trauma resuscitations at the rural site.[18] These differences emphasize the need to closely monitor resident experience while rotating at a new rural site to ensure an appropriate educational experience within the requirements of the residency program.

The recommended clinical experience in rural EM will likely involve postgraduate year (PGY)-2, PGY-3, and/or PGY-4 level residents providing solo resident coverage with single faculty supervision at any given time. This staffing model is more likely to benefit senior-level residents with the clinical experience necessary to evaluate and manage multiple patients while also functioning as the medical decision-maker for the ED as a whole, managing patient flow, determining resource utilization, and facilitating patient transfers. In addition, many rural hospitals may prefer senior-level residents as they are more able to adapt to a new clinical environment, positively affect ED patient flow, and require less faculty direction for many clinical situations.

Teleconferencing

Access to all didactic activities provided by a residency program is important for all residents whether rotating at a remote, rural site or in the primary ED. However, certain constraints inherent to rotating at a remote rural site are difficult to overcome. The need for the program director (PD) to make special arrangements to ensure resident access and participation in regularly scheduled conferences while rotating at a rural site depend on certain factors. First, the duration of the rural experience and the structure of the residency curriculum will dictate the amount of planned educational activities a resident may miss while on a rural rotation. From the ACGME Program Requirements for Graduate Medical Education in Emergency Medicine, "The program director must"

> II.A.4.s) ensure that residents are relieved of clinical duties to attend these planned educational experiences. Although release from some off-service rotations may not be possible, the program should require that residents participate, on average, in at least 70% of the planned emergency medicine educational experiences offered (excluding vacations). Attendance should be monitored and documented (http://www.acgme.org/acWebsite/downloads/RRC_progReq/110emergencymed07012007.pdf).

From most programs, resident absence from planned educational activities while rotating at a rural site will not lead to an average attendance of less than 70%. The typical duration of a rural rotation for EM residency programs currently requiring rural rotations is 1 to 3 months over the course of 3 years of training—a duration not likely to significantly affect average attendance.

However, full access to all didactic activities while rotating at a rural site is desirable. Rural EM training sites located more than a commutable distance from the primary training site will limit resident participation in the didactic activities of the program if alternate strategies are not in place. One potential strategy is interactive teleconferencing. In regard to this educational modality, the ACGME Program Requirements for Graduate Medical Education in EM state:

> II.A.4.t) The Committee will consider the use of alternative methods of education, such as interactive teleconferencing, with appropriate educational justification (http://www.acgme.org/acWebsite/downloads/RRC_progReq/110emergencymed07012007.pdf).

Programs with residents currently rotating in rural EDs have used interactive teleconferencing to rural sites located over 300 miles from the sponsoring institution. This modality allows residents to view the speaker, conference room, or computer screen, while the primary conference attendees may simultaneously view the remote participant. Verbal interaction can be facilitated by a voice-activated system, allowing participant discussion.

Asynchronous Learning: Web-based Modules

Asynchronous learning while at the rural site is an attractive alternative to teleconferencing, and due to recent changes in program requirements, asynchronous learning may account for 20% of total didactic time. A 1- to 2-month module addressing rural EM objectives would allow for rotating residents to participate in didactic education if they are prevented from attending scheduled conference by geographic constraints.

Simulation of Rural Clinical Presentations/ Diagnoses

Certain rural patient presentations may not occur with the frequency necessary for adequate resident learning from clinical experience alone, especially with the 1-month duration of a typical rural rotation. Simulation may play a key role in exposing residents to less frequent presentations in rural EDs. A review of rural ED patients will likely identify high-yield cases for potential simulation. While the facilities, equipment, and personnel for hands-on simulation activities are not likely to exist at a rural site, a longitudinal simulation experience addressing rural presentations as a part of the recurring curriculum at the primary site is a viable option.

IMPLEMENTATION: THE WHERE, WHO, WHEN, AND HOW FOR A RURAL SITE

The steps required to implement a rural EM rotation will vary among residency programs. There are currently required rural rotations at six EM residency programs and rural electives at 92 programs.[6] Through discussions with program directors and chairs at EM residency programs with required rural EM rotations, as well as discussions with GME administrators, we propose a stepwise plan for the implementation of a rural EM rotation. In general, it is much easier to implement a rural EM elective rather than a required rural EM rotation; however, the steps are similar.

1. Identify rotation site(s): we have previously described the attributes of the optimal rural ED site. Ideally, every residency program interested in a rural EM rotation would have an optimal rural ED site within its hospital system. This situation greatly simplifies the completion of an institutional affiliation agreement and usually makes it easier to ensure qualified faculty. Several of the programs with required rural EM rotations use sites within their hospital systems. If no rural ED site exists in a programs hospital system, any site that reasonably meets the optimal rural ED site criteria can be considered as a potential rural EM rotation site. Site selection: programs with rural sites located more than 1-hour driving time from the primary ED should provide residents with housing for the duration of the rotation. All rural sites, regardless of distance from the primary site, must provide call rooms/sleep rooms if shift length are 8 hours or more or if shifts begin or end before 8:00 a.m. or after 11:00 p.m. At some established rural sites, resident housing is provided by the local EM group and the rural hospital.

2. Develop a program letter of agreement (PLA): institutional GME directors should be involved early in the development of a rural EM rotation. The onus is on the program to develop a PLA that provides educational justification for the addition of a rural EM rotation. The unique clinical experience, the potential effect on workforce, and resident's generally positive reactions to such rotations provide for educational justification. In addition, the PLA will require each of the following:

- Learning goals and objectives—this may include all or part of the goals and objectives outlined in this article. There should also be a description of the site, the expected clinical experience, and the resources available.
- The rotation structure and duration—the PLA should propose and justify a rotation structure and duration.
- A site director—the PLA should designate a faculty member at the proposed rural site with primary responsibility, along with the PD, for resident education. A general description of faculty oversight should also be provided.
- Educational experiences—the PLA should include a description of didactics, group activities, and asynchronous opportunities that are available during the rotation. The curriculum outlined in this article can be developed into an asynchronous module or integrated longitudinally into the current EM curriculum.
- Feedback and evaluation mechanism—Web-based evaluation systems allow the PD to monitor resident evaluation of the clinical experience, didactic education, and faculty. Monthly review of this information is critical for targeted faculty development activities.
- Consideration of resident burden—a consideration of resident burden such as travel time, travel cost, and site resources must be discussed. It is also desirable to inform applicants to the program of these considerations.

3. Develop an institutional affiliation agreement (IAA): Whereas the PLA outlines the educational aspects of the rural rotation, the IAA provides the structure of funding, malpractice coverage, and facility resources. In a previously unaffiliated site, the development of an IAA usually requires the involvement of hospital administrative and legal teams. The following issues need to be addressed in the IAA:

- Resident salary—if the site is within the same hospital system, funding is usually not an issue. If administration at the rural site recognizes a recruiting or educational benefit of participating in resident education, they may be willing to pay all or some of the resident salary during the duration of the rotation.
- Malpractice insurance—again, if the rural affiliate is within the same system, this is usually not an issue. The issue should be addressed through the GME office and the malpractice provider for new affiliates. Most programs provide coverage to their residents for required rotations at sites with which they have IAAs. This is not necessarily the case, however, for electives because not all electives have IAAs.

- Other costs—other considerations such as travel costs and housing, if required, should be addressed in the IAA. There is at least one program at which the rural site is willing to cover these costs for the opportunity to have residents at their site.
- The costs of a rural rotation include resident salary, resident housing (if needed), communications (Internet access, teleconferencing fees, etc.), and travel-related expenses. Resident salaries for rural rotations may be paid by the rural hospital, the rural ED group, the residents department at his or her primary institution, and/or Centers for Medicare & Medicaid Services funds.
- Hospital facilities—affiliated sites should be required to provide sleep space, educational space, and basic provisions for resident rotators. Teleconferencing capabilities may also be required. The specifics should be outlined in the IAA.

4. Identify/recruit faculty: past experience with rural ED training sites suggests the need to first identify sites staffed by physicians with ABEM certification and an interest in participating in the clinical instruction of residents. Ideally, all rural site faculty would be ABEM-certified; however, finding a site with such coverage can be a challenge. A site can still be considered if it has sufficient ABEM-certified faculty to supervise the expected volume of rotating residents. Once the supervision requirements have been met, the program must meet minimum faculty requirements. The requirements are as follows:

- Requirements for the site director—the site director is responsible for the ground-level implementation and ongoing assessment of the educational goals and objectives. The site director must be well versed in duty hour requirements, resident fatigue mitigation, and supervision rules. In addition, the site director must ensure proper evaluation and feedback is occurring and is responsible for reviewing any educational activities that occur at the rural site.
- Requirements for rural EM faculty—faculty at the rural site must be given electronic copies of educational goals and objectives, work hours rules, and supervision rules. In addition, faculty must be provided with feedback from the residents.

In addition to the requirements, residency programs should seek to implement a faculty program.

- Live faculty development—programs on bedside teaching and evaluation and feedback skills can be coordinated for the faculty at the rural EM site. These can be held at the primary site or the rural site. Some programs with required EM rotations have their core faculty rotate for a small number of shifts at the rural site; this practice provides a learning opportunity both for the rural faculty and primary site faculty.
- Asynchronous faculty development—several sites provide training and CME credit for faculty at the rural sites using online modules.
- Further faculty development at a selected site may then progress through either the ongoing recruitment of skilled faculty to a rural site or the initiation of faculty developments activities to enhance the skills of current faculty. Recruitment to rural sites is problematic. Some have proposed an affiliation of academic EDs with rural EDs and rotating academic faculty at the rural site.[1]

Implementation of a rural EM rotation will have different educational, geographic, and political challenges at each residency program. The basic steps as outlined above, however, provide a framework that can be used to navigate these challenges.

EVALUATION AND FEEDBACK: MONITORING THE LEARNERS AND THE LEARNING ENVIRONMENT AT A DISTANT SITE

Evaluation and feedback provide a means for continued improvement of both residents and the rural EM curriculum, and this is of particular importance during the initial implementation of the rotation. The PD and site director must ensure that the residents receive timely evaluations of their clinical performance at the rural site, specifically addressing the objectives of the rural EM curriculum outlined in the previous section. The remoteness of a rural site makes Web-based evaluation systems a valuable means by which the PD may monitor resident performance. The PD and the site director should ensure that residents are able to access their evaluations during the course of the rotation to foster improvement in clinical performance.

Resident evaluation of faculty provides important information for a new rural site. Faculty may not have extensive experience in resident supervision, bedside teaching, evaluation of resident performance, or the provision of feedback on resident clinical performance, and the PD will likely not have firsthand knowledge of the teaching skills of the rural faculty. Faculty evaluations will allow for targeted faculty development activities to address any identified deficiencies and facilitate a smooth implementation of the new curriculum.

FUTURE DIRECTIONS

With the anticipated increase in the numbers of EM residency programs implementing rural EM rotations, opportunities to collect structured, prospective data will likely increase as well, allowing for a more complete description of EM resident experience in a rural ED. The development of separate tracking systems for rural patient contacts, procedures, and acuity measures may allow for a more precise description of resident clinical experience and provide valuable information for continued curriculum development. Pre- and postrotation surveys of residents to assess the value of the rotation in providing the skills necessary to practice at the rural site will also provide important information addressing the effect of a rural rotation. In addition, postresidency surveys will be important to determine the effect of the rural EM curriculum on workforce distribution. Finally, collection of data from rural EM/EMS providers who come in contact with rotating residents may help us improve our outreach and educational training sessions for rural providers.

CONCLUSIONS

Graduate medical education must address the health care needs of the nation, and each individual institution, the specific needs of the communities they serve. Emergency medicine residency programs located in states with large rural populations should consider instituting rural ED clinical experiences for their residents to ensure that their graduates consider practicing in rural EDs as a viable practice opportunity and then successfully transition from the role of resident member of a team of physicians with multispecialty back-up in a large urban ED to a solo practitioner in a small rural ED.

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Supporting Information

The following supporting information is available in the online version of this paper:

Data Supplement S1. Specific objectives.

The document is in PDF format.

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