

EDUCATION AND PRACTICE

STRATEGIES OF HIGH-PERFORMING PARAMEDIC EDUCATIONAL PROGRAMS

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ABSTRACT

Objective. To identify the specific educational strategies used by paramedic educational programs that have attained consistently high success rates on the National Registry of Emergency Medical Technicians (NREMT) examination. **Methods.** NREMT data from 2003–2007 were analyzed to identify consistently high-performing paramedic educational programs. Representatives from 12 programs that have maintained a 75% first-attempt pass rate for at least four of five years and had more than 20 graduates per year were invited to participate in a focus group. Using the nominal group technique (NGT), participants were asked to answer the following question: "What are specific strategies that lead to a successful paramedic educational program?" **Results.** All 12 emergency medical services (EMS) educational programs meeting the eligibility requirements participated. After completing the seven-step NGT process, 12 strategies were identified as leading to a successful paramedic educational program: 1) achieve and maintain national accreditation; 2) maintain high-level entry requirements and prerequisites; 3) provide students with a clear idea of expectations for student success; 4) establish a philosophy and foster a culture that values continuous review and improvement; 5) create your own examinations, lesson plans, presentations, and course materials using multiple current references; 6) emphasize emergency medical technician (EMT)-Basic concepts throughout the class; 7) use frequent case-based classroom scenarios; 8) expose students to as many prehospital advanced life support (ALS) patient contacts as possible, preferably where they are in charge; 9) create and administer valid

examinations that have been through a review process (such as qualitative analysis); 10) provide students with frequent detailed feedback regarding their performance (such as formal examination reviews); 11) incorporate critical thinking and problem solving into all testing; and 12) deploy predictive testing with analysis prior to certification. **Conclusion.** Twelve specific strategies were identified by representatives from high-performing paramedic education programs. Further study should be conducted to determine whether implementation of these recommendations would improve program pass rates on the NREMT credentialing examination and improve entry-level paramedic field performance. **Key words:** paramedic; EMT-paramedic; education; curriculum; quality

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INTRODUCTION

According to a recent study conducted by the National Association of State EMS Officials, there are 226,803 state-licensed paramedics in the United States.¹ This is a dramatic increase over the 115,678 paramedics reported in *Emergency Medical Services* magazine in 1998.² Despite this nearly doubling of the number of paramedics in the past ten years, ensuring an adequate pool of qualified paramedics remains a subject of considerable concern in the emergency medical services (EMS) community.³ An essential element of the supply of paramedics is the efficiency and effectiveness of paramedic educational programs.

While the number of paramedics is rising, the pass rate on the national paramedic certification examination has remained relatively stable. Nationally, the average first-attempt pass rate on the National Registry of Emergency Medical Technicians (NREMT) cognitive examination ranged from 62% to 64% between the years 2003 and 2008.⁴ Despite stability at a national level, there are considerable differences in the pass rates among educational programs. Educators, administrators, accrediting agencies, and the public generally consider performance on standardized tests to be an important indicator of program quality. This study uses methods previously employed

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to determine the strategies of high-performing emergency medical technician (EMT)-Basic educational programs.⁵

Most educational programs are committed to quality improvement. Since first-time pass rate is often used as an indicator of program quality, programs are highly motivated to implement strategies that improve performance on standardized tests. It is hypothesized that high-performing programs employ similar educational strategies resulting in their ability to demonstrate success over time. If present, these strategies should benefit educational institutions desiring to improve program success. The objective of this study was to identify educational strategies employed by high-performing programs.

METHODS

This project was granted institutional review board approval from the American Institutes for Research. This study is a replication at the paramedic level of previous work conducted on EMT-Basic education. Data collected and utilized in this study came from a focus group that employed the nominal group technique (NGT) described elsewhere.⁵ Briefly, the NGT process employs seven steps (presentation of a question to the group; silent idea generation; round-robin idea submission; discussion and clarification of generated ideas; initial voting; discussion/clarification; and final ranking.⁶⁻⁸) to obtain consensus opinions from a group of experts. Focus groups using NGT have been used to evaluate medical school curricula,⁹ undergraduate educational programs,¹⁰ nursing curricula,¹¹ and EMT-Basic education.

The inclusion criteria, selection methodology, and focus-group question were adapted from a previous study of EMT-Basic educational programs. The beta testing and pilot testing conducted for the initial study are explained elsewhere.⁵ For the purposes of this study, high-performing paramedic programs were defined as those able to maintain a $\geq 75\%$ first-attempt pass rate for at least four of the past five years. Programs were selected from the NREMT database and must have had five years of complete data (January 1, 2003–December 31, 2007). To ensure program stability, they must have graduated ≥ 20 candidates per year for each of the five years. Finally, only states that required NREMT paramedic certification for the initial issuance of a state license from 2003 to 2007 were included.

The above selection criteria were applied to the NREMT database to identify consistently high-performing paramedic educational programs. A representative from each selected educational program was initially contacted by telephone and invited to participate. A follow-up e-mail explained the purpose of the study and requested that an individual responsible for the leadership of the paramedic program attend the

focus group. Participants were informed that they would be reimbursed for their travel and lodging expenses. There were no incentives offered for participation.

The focus group session was conducted in Columbus, Ohio, on July 15 and 16, 2008. The investigator serving as facilitator briefly explained the study objective and the steps of the NGT. Prior to data collection, all participants signed informed consent and confidentiality statements. The facilitator then presented the following question to the group: "What are specific strategies that lead to a successful paramedic educational program?"

RESULTS

Nationwide, 12 programs met the inclusion criteria and were invited to participate; all sent representatives to the session. The demographics of the meeting participants are summarized in Table 1.

TABLE 1. Demographics and Characteristics of the Focus-Group Participants

Characteristic	Sample (N = 12)
Highest degree	
None	1 (8%)
Associate's degree, n (%)	2 (17%)
Bachelor's degree, n (%)	5 (42%)
Master's degree, n (%)	4 (33%)
Is your program nationally accredited (CoAEMSP)?	
Yes, n (%)	9 (82%)
No, n (%)	2 (18%)
Unknown, n (%)	1 (9%)
Years of paramedic teaching experience	
Mean \pm SD	21.7 \pm 7.4
Range	5.5–29.5
Percent of time spent in:	
Paramedic instruction, mean \pm SD	45.7% \pm 26.8
EMS instruction other than paramedic, mean \pm SD	3.7% \pm 4.8
Instruction other than EMS, mean \pm SD	1.8% \pm 4.0
Administration, mean \pm SD	47.1% \pm 30.2
Other, mean \pm SD	1.9% \pm 6.6
Number of lead paramedic instructors	
Mean \pm SD	5.8 \pm 6.4
Range	1–25
Number of lab/practical instructors	
Mean \pm SD	19.1 \pm 13.1
Range	1–44
Number of field preceptors	
Mean \pm SD	49.3 \pm 26.1
Range	6–100
Number of hospital preceptors	
Mean \pm SD	57.3 \pm 62.2
Range	5–200
Class capacity	
Mean \pm SD	33.9 \pm 12.4
Range	20–60
Applicants per class	
Mean \pm SD	45.6 \pm 15.7
Range	1–44

CoAEMSP = Committee on Accreditation of Educational Programs for the Emergency Medical Services Professions; SD = standard deviation.

Following completion of silent idea generation, the round-robin idea submission generated 141 unique responses to the question posed to the group. As specified in the NGT method, the first discussion session was intended to clarify and ensure that responses were specific strategies. Following clarification and discussion, 145 responses remained (some were eliminated as duplicates, while others were split because they represented multiple concepts). Participants then confidentially voted for the five strategies that they felt were most likely to help a paramedic educational program attempting to improve pass rates on the NREMT certification examination. Thirty-eight of the initial strategies received at least one vote by one participant.

The facilitator then led an in-depth discussion that clarified the 38 remaining strategies. During this step, participants were encouraged to advocate for specific strategies they felt were the most important. As a result of the in-depth discussion, four of the strategies were eliminated because the group unanimously agreed that these strategies were entirely duplicative of another strategy. The second round of secret balloting was conducted and yielded the 12 final strategies listed in Table 2. An in-depth discussion of each strategy was facilitated to provide the investigators with a detailed understanding of major themes.

DISCUSSION

Using the NGT, the focus-group participants were able to identify specific strategies of high-performing paramedic programs. The 12 strategies appear to relate to four major categories: educational infrastructure, philosophy/culture, curriculum/instruction, and student evaluation. Following is a summary of the 12

TABLE 2: Instructional Strategies to Improve National Registry of Emergency Medical Technicians Paramedic Pass Rates

- Achieve and maintain national accreditation
- Maintain high-level entry requirements and prerequisites
- Provide students with a clear idea of expectations for student success
- Establish a philosophy and foster a culture that values continuous review and improvement
- Create your own examinations, lesson plans, presentations, and course materials using multiple current references
- Emphasize EMT-Basic concepts throughout the class
- Use frequent case-based classroom scenarios
- Expose students to as many prehospital ALS patient contacts as possible, preferably where they are in charge
- Create and administer valid examinations that have been through a review process (such as qualitative analysis)
- Provide students with frequent detailed feedback regarding their performance (such as formal examination reviews)
- Incorporate critical thinking and problem solving into all testing
- Deploy predictive testing with analysis prior to certification

ALS = advanced life support; EMT = emergency medical technician.

strategies and the major themes identified by the focus-group participants.

Educational Infrastructure

Achieve and Maintain National Accreditation

The issue of national accreditation has received considerable attention in recent years. The *EMS Education Agenda for the Future* (2000) recommended "a single, nationally recognized accreditation" for EMS educational programs¹² and the Institute of Medicine report *Emergency Medical Services at the Crossroads* (2007) recommended that "states should require national accreditation of paramedic education programs."³ The focus-group participants readily recognized that national accreditation of a paramedic program is "not the be all and end all" of program success. Accreditation does not address all aspects of a quality program. In fact, as one participant stated, "Accreditation is not intended to make a program better; it is to demonstrate [that the program] has achieved the standards."

Of note, nine of the high-performing programs self-reported having national accreditation. While the cost and resources necessary to apply for and maintain accreditation were discussed as a possible barrier for smaller programs, one participant stated that "Underfunded and underresourced [programs] stand to benefit the most [from the accreditation process]."

Maintain High-Level Entry Requirements and Prerequisites

As was the case in the previous study with EMT-Basic programs, participants recognized the role of student selection in program success. All paramedic programs represented had some form of student selection. The most common were 1) EMT-Basic and cardiopulmonary resuscitation (CPR) certification (100%); 2) basic academic skills testing/assessment (83%); 3) letters of recommendation (67%); 4) EMT assessment (written and/or practical) (58%); 5) EMT experience (50%); and 6) criminal background check (50%). Of note, 75% (9/12) of these programs reported applications in excess of class capacity.

In reference to entry requirements, one participant stated, "Even if your structure does not allow screening, consider a course sequence within the class [that enables you to identify students unlikely to be successful]." The goal of screening was purported to be to "assist students in assessing their readiness for the [paramedic] class."

While participants universally agreed that paramedic graduates are expected to be competent in EMT skills, disagreement emerged regarding the value of EMT-Basic certification and experience as a prerequisite for paramedic training. Some participants

felt that EMT-Basic experience was necessary and incorporated EMT level knowledge and/or skills assessments into the student selection process. Others were skeptical as to the value of EMT experience for a variety of reasons. First was the practical limitation of where EMT-Basics could gain experience in some communities; as one participant noted, "It is a waste of time putting people through EMT prior to paramedic. There is no place for my students to become experienced EMTs." Others cited the fact that most other health professions do not have a progressive certification "ladder" (in other words, despite the fact that registered nurses [RNs] are expected to have all of the competencies of practical nurses [PNs], they are generally not required to be licensed as a PN prior to RN training). Finally, some participants commented on the difficulty of "un-teaching" bad habits developed as an EMT.

Philosophy/Culture

Provide Students with a Clear Idea of Expectations for Student Success

Discussion regarding this strategy began with a comment "doesn't everybody do this"? The group unanimously agreed that it is necessary to establish and fully communicate expectations for knowledge, skills, and behaviors. While this may be obvious, it was recognized that some programs fail to do so. It was also recognized that the national accreditation process ensures that students are prospectively informed of the requirements for successful completion of the program.

Establish a Philosophy and Foster a Culture that Values Continuous Review and Improvement

By its very nature, education is a process of personal growth, reflection, change, and improvement. The focus-group participants recognized the role of initial professional education because it instills students with the expectation that learning is a lifelong process. Developing a culture of excellence in the classroom was considered by the participants to be an essential element of building a high-performing program.

The group generated a number of ideas regarding how programs can begin to develop such a culture. First, the programs must demonstrate a commitment to quality improvement. One participating asked, "How can you expect this of your students if you do not continually improve your program and yourself?" Suggestions by participants to increase the receptivity of students to constructive feedback included the following: use frequent low-stakes evaluations, develop online assessment instruments, and have students conduct peer evaluations.

Curriculum/Instruction

Create Your Own Examinations, Lesson Plans, Presentations, and Course Materials Using Multiple Current References

This recommendation appeared to stem from the group's identification that many struggling programs rely heavily on commercially available instructional support materials and the National Standard Curriculum (NSC). High-performing programs recognized the paradox that as better materials are available (typically from publishers), instructors and programs tend to take less time and care in developing their own materials. In some cases, this leads to a lack of preparation for class ("Just giving instructors a PowerPoint file fosters lack of preparation"). One comment summarized the group opinion, "It is no problem to start with commercially available resources, but it does not end there." Another comment characterized the role of the NSC: "The NSC is a framework and a start. You need to do research and fill in the blanks."

One participant pointed out that programs do not need to create all the materials on their own and espoused the virtues of cooperation. It was noted that the new educational standards may encourage greater cooperation between programs as many will need to develop new support materials.

Emphasize EMT-Basic Concepts throughout the Class

A common mantra in paramedic education is "BLS before ALS." The focus-group participants felt strongly that EMT knowledge needs to be reinforced throughout a paramedic class. Paramedic instructors should teach and test EMT-level knowledge and skills. A few participants offered practical suggestions such as insisting that all EMT skills be completed "correctly every time" from beginning to end and "Everything should be done in class exactly as it should be done in the field" during skills practice sessions and scenarios. While time-consuming and resource-intensive, this was considered by programs to be an essential component of program success. One participant suggested that students peer-evaluate EMT-Basic skills. He stated that the evaluation role was valuable in itself and that, in his experience, peers tended to be constructively critical and fair evaluators.

Use Frequent Case-Based Classroom Scenarios

The focus-group members recognized that the role of the classroom was not only the transmission of knowledge, but also helping students understand how to apply their knowledge in actual cases. Using case-based scenarios in class not only adds realism to the classroom environment, but also fosters a higher level of

teaching. While problem-based learning was one of the instructional techniques specifically identified, it was noted that case-based teaching was not limited to this format.

One participant cautioned, "Case-based learning is not a collection of your personal war stories." It is an active learning strategy that helps "make book-smart paramedics understand how to apply their knowledge [in practice]." It was suggested that taking actual cases from field internships is an ideal way to develop cases for instructional purposes.

Expose Students to as Many Prehospital Advanced Life Support Patient Contacts as Possible, Preferably Where They Are in Charge

As one participant stated, "Patient contact matters." In particular, the group agreed that the most important and valuable learning experience for developing a paramedic is the opportunity to serve as team leader on actual emergency calls, under the supervision of an experienced preceptor.

It was universally agreed that a formal, evaluated field internship is essential for a high-performing program. It was also agreed that using length of time, a common criterion for completion of a field internship, was a poor method of determining the adequacy of a field experience. A number of participants recognized that the amount of experience to be gained in a set number of hours is not the same everywhere. Everybody agreed that completion of the field internship should be based on achievement, not the accumulation of "hours."

This led to a discussion regarding the number of calls necessary to demonstrate competence. It was determined that "the numbers are less important than the continuous demonstration of competency." In fact, some pointed out that the process of setting a numerical standard was the beginning of the quality improvement process. Specifically, a program should establish a number of calls required, measure whether that standard produced the desired outcomes, and adjust the standard accordingly.

While it was agreed that sufficient experience can be obtained even in rural settings, the participants recognized the challenge facing programs that have access only to low-volume agencies as clinical sites.

Student Evaluation

Create and Administer Valid Examinations that Have Been through a Review Process (Such as Qualitative Analysis)

Considerable discussion ensued regarding time and energy placed in validating and continually

improving examinations. In general, it was felt that major in-class examinations should undergo considerable preadministration review by multiple subject matter experts as well as pilot testing. In addition, many participants emphasized the need to incorporate postadministration review of the examination into a quality improvement process. This process is used to continually improve examinations over time. The postexamination analysis should be both qualitative (identifying trends and instructional omissions/commissions as well as grammatical, stylistic, and formatting flaws) and quantitative (item analysis, reliability determination, discrimination indices, etc.). Analysis should result in continuously increased validity and defensibility of examinations over time.

Provide Students with Frequent Detailed Feedback Regarding Their Performance (Such as Formal Examination Reviews)

The focus-group members felt strongly that a major factor in their program's success is providing regular and honest feedback to students regarding their progress and ability relative to the standards. This feedback is necessary in all aspects of the program (classroom, laboratory, clinical, and field) and in all domains (cognitive, psychomotor, and affective). To be effective, the feedback needs to be frank and candid regarding strengths, weaknesses, and areas necessary for improvement. While informal feedback is valuable, regular formal feedback was considered essential. Some participants identified the need for formal and documented feedback to ensure that students have a realistic assessment of their progress, likelihood of success, and necessary remediation.

A number of strategies for providing feedback were discussed. In particular, online tools that enable students to monitor progress were deemed particularly useful. Another novel idea was to provide a video record of practical performance for self-review and analysis.

Incorporate Critical Thinking and Problem Solving into All Testing

Participants recognized that certification testing focuses on application, problem solving, and critical thinking rather than the simple recall of knowledge or information. Discussion revolved around the need to incorporate such questions into classroom testing. One comment, "Don't make the NREMT test the hardest test [your students] take" encapsulated the group opinion.

Deploy Predictive Testing with Analysis Prior to Certification

The focus-group participants recognized the difficulty of developing quality assessment tools with sufficient predictive validity to satisfactorily determine the probability of success on the NREMT paramedic examination. The difficulty of developing application/problem-solving-level questions and examination validation at a program level were cited as significant challenges. As one focus-group participant summarized, "Having a test that gives you a prediction of passing the NREMT [is essential to ensuring success]." Unfortunately, most "commercial test banks [that are free with the adoption of textbooks] have lots of knowledge questions" and are notoriously unreliable predictors of success.

A number of programs represented in the focus group use externally developed and validated comprehensive knowledge-assessment tools. A number of services are commercially available and at least one is a community-based initiative. Participants felt that products that provide detailed feedback to the program and candidate regarding content areas of difficulty as well as the level of cognition (knowledge, application, and problem solving) were most valuable. One program used an external comprehensive examination as an addition to the program final examination and had such success that it became required for graduation. It was recognized that a program final examination, with sufficient analysis and validation, can serve as the predictive test; however, it was noted that "If 50% of the students who pass your final fail the National Registry [test], your final exam does not work."

LIMITATIONS

The participant selection process may have introduced bias into this study. Participants were selected based on program performance on the NREMT examination and the number of graduates per year. Pass rates, however, are not the only indicator of program success. Unfortunately, pass rate on the national certification examination was the only constantly applied standard and consequently was used as a surrogate indicator of educational quality. Also, the focus-group participants came from educational institutions graduating 20 or more paramedic students per year. Thus, smaller educational programs with high pass rates were not included.

It is also important to note that program information was abstracted from the NREMT database. The NREMT database is the only national database of EMS educational programs. Graduation data for all programs in the study period may not be 100% accurate. Specifically, some programs have multiple names

or site codes or may not rigorously track and ensure that all graduates are accurately represented. This may have resulted in inaccurate calculation of program pass rates and/or omission of eligible programs.

When collecting data in a focus group, it is important to recognize the effects of group dynamics on participants. While the NGT minimizes the effect of a persuasive or influential individual on the opinions of others, this phenomenon cannot be eliminated.

CONCLUSIONS

Twelve specific strategies were identified by high-performing paramedic education programs: 1) achieve and maintain national accreditation; 2) maintain high-level entry requirements and prerequisites; 3) provide students with a clear idea of expectations for student success; 4) establish a philosophy and foster a culture that values continuous review and improvement; 5) create your own examinations, lesson plans, presentations, and course materials using multiple current references; 6) emphasize EMT-Basic concepts throughout the class; 7) use frequent case-based classroom scenarios; 8) expose students to as many prehospital ALS patient contacts as possible, preferably where they are in charge; 9) create and administer valid examinations that have been through a review process (such as qualitative analysis); 10) provide students with frequent detailed feedback regarding their performance (such as formal examination reviews); 11) incorporate critical thinking and problem solving into all testing; and 12) deploy predictive testing with analysis prior to certification.

Further study should be conducted to determine whether implementation of these recommendations would improve program pass rates on the NREMT credentialing examination and improve entry-level paramedic field performance.

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