

Assessment of Emergency Physician Workforce Needs in the United States, 2005

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Abstract

Objectives: The objective was to estimate emergency physician (EP) workforce needs, taking into account the diversity of U.S. emergency departments (EDs) and various projections of EP supply and demand.

Methods: The 2005 National ED Inventory-USA (<http://www.emnet-usa.org/>) provided annual visit volumes for 4,828 U.S. EDs. The authors calculated annual supply based on existing emergency medicine (EM) board-certified EPs, adding newly board-certified EPs, and subtracting board-certified EPs who died or retired. Demand was estimated at each ED by dividing the number of visits by the average EP volume (based on 2.8 patients/hour, 40 hours/week, and 34% nonclinical time). The models assumed that at least 1 EP should be present 24/7 in each ED, which would require at least 5.35 full-time equivalents (FTEs) per ED. Based on annual EP attrition estimates, results for best-case, worst-case, and intermediate scenarios were calculated.

Results: In 2005, there were approximately 22,000 EM board-certified EPs, but 40,030 EPs would be needed to staff all 4,828 EDs (55% of demand met). A total of 2,492 (52%) EDs had a visit volume that required the minimum number (5.35) FTEs, of which 47% were rural. In the unrealistic (no attrition), best-case scenario, it would take until 2019 to staff all EDs with board-certified EPs. In the worst-case scenario (12% attrition), supply would never meet demand. Our intermediate scenario (2.5% attrition) suggested that board-certified EPs would satisfy workforce needs in 2038.

Conclusions: Supply of EM residency-trained, board-certified EPs is not likely to meet demand in the near future. Alternative EP staffing arrangements merit further consideration.

ACADEMIC EMERGENCY MEDICINE 2008; 15:1317-1320 © 2008 by the Society for Academic Emergency Medicine

Keywords: emergency physicians, board certification, workforce, rural, staffing

Analysis of physician workforce needs is essential to ensure adequate staffing and set targets for the number of new residents required. The 2006 Institute of Medicine report *The Future of Emergency Care in the United States* highlighted the mismatch between the demand for emergency physicians (EPs) and the number of board-certified EPs that can be supplied.¹

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Received May 8, 2008; revisions received August 1 and August 5, 2008; accepted August 6, 2008.

Presented at the 2007 American College of Emergency Physicians Research Forum, Seattle, WA.

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The report states that “although, ideally, all EDs [emergency departments] would be staffed by residency trained, board certified EPs, this is highly unlikely to occur in the near to middle term, if ever. Therefore alternative staffing models must be developed.”

Staffing EDs creates unique challenges due to the mandate to provide round-the-clock care and the inability to restrict patient demand for services. The most recent national EP workforce projection, based on 1999 data,² questioned the ability to supply an adequate number of emergency medicine (EM) residency-trained, board-certified EPs. Given the rising volume of ED visits, up to 115 million in 2005,³ and changes in the political landscape,⁴ a reassessment of EP workforce needs is warranted.

Our objective was to estimate EP workforce needs, taking into account the diversity of U.S. EDs and various projections of EP supply and demand. We hypothesized that the supply of EM residency-trained, board-certified EPs would be insufficient to meet demand for several decades.

METHODS

Study Design and Population

We used the 2005 National Emergency Department Inventories (NEDI)-USA database to obtain a comprehensive list and visit volumes of all nonfederal U.S. hospitals with EDs ($n = 4,828$). Methods for derivation of this database have been previously described.⁵ Briefly, NEDI-USA combines data from three sources: Verispan Marketing Group's Hospital Market Profiling Solution Database (Yardley, PA), the American Hospital Association Annual Survey of Hospitals (Chicago, IL), and information collected independently by Emergency Medicine Network staff (Boston, MA). Emergency departments (EDs) were defined as emergency care facilities that are open 24 hours per day, 7 days per week, and available for use by the general public; "urgent care" facilities known to be closed at certain hours or days were excluded. Consistent with prior work by our group, an ED was classified as "rural" if located in a county not included in a metropolitan statistical area.⁵

We evaluated several different scenarios to estimate the effects of changing conditions on the workforce projections: 1) best-case scenario, where there is no attrition; 2) worst-case scenario, where attrition is high; and 3) intermediate scenario, where attrition is based on best available data. We obtained institutional review board approval as exempt from informed consent requirements.

EP Supply

We based the projected supply of EPs on two inputs (the baseline pool of practicing EPs and the number of EPs who obtain new board certification, according to the American Board of Emergency Medicine [<http://www.abem.org/public/>] and the American Osteopathic Board of Emergency Medicine [<http://www.aobem.org/>]) and two outputs (EP retirements and deaths). We assumed that the number of EM residency-trained, board-certified EPs would remain at 2005 levels (i.e., 1,350 per year). The net supply is represented by the following formula, where CY is the current year:

$$\text{Supply}_{\text{CY}+1} = \text{Baseline}_{\text{CY}} + \text{New}_{\text{CY}+1} - \text{Retirements}_{\text{CY}+1} - \text{Deaths}_{\text{CY}+1}$$

For all estimates, we assumed that *all* newly board-certified, EM residency-trained EPs would: 1) work clinically in an ED and 2) be willing to distribute themselves according to national needs. In the best-case scenario, we assumed that no board-certified EP dies or retires. The worst-case scenario assumed a 12% annual attrition rate,⁶ while our intermediate scenario assumed a 2.5% annual attrition rate.⁷

EP Demand

We calculated demand for EPs from several factors, including the important assumption that the number of ED visits per ED would remain at 2005 levels (although national ED visit volume is rising, we chose a static value to test the workforce model under conditions that would, if anything, *shorten* the time until EDs achieved

100% coverage by board-certified EPs). To test the study hypothesis, we assumed that at least one EP should be present 24/7 in each ED. Moreover, based on the most recent workforce survey, a minimum of 5.35 full-time equivalents (FTEs) would be required to staff an ED with single coverage.² We also assumed that 3,548 visits will be seen annually by the average EP, based on 2.8 patients per hour⁸ and working 40 hours per week, of which 34% spent on nonclinical requirements.² We then calculated the demand for EPs for each ED from formula

$$\text{Demand} = \text{Number of ED visits in 2005} / 3,548 \text{ visits}$$

If demand for a given ED was <5.35 FTEs, we assigned 5.35 (minimum FTEs for 24-hour coverage) to that ED. In a sensitivity analysis, we evaluated the model based on an average EP volume of 2.0 patients per hour.

Data Analysis

We performed statistical analyses using Stata 10.0 (StataCorp, College Station, TX) and summarized data using basic descriptive statistics. We used linear mathematical models to project future EP demand and supply until workforce needs were met. We calculated percentage of workforce demand annually and time until overall supply of board-certified EPs equals demand, for the best-case, worst-case, and intermediate scenarios. We also created an Emergency Medicine Workforce Calculator (<http://www.emnet-usa.org/nedi/workforce.html>), which allows readers to evaluate how different assumptions (e.g., number of newly board-certified EPs, EP attrition rates, minimum FTEs required per ED, and average hourly patient volume per EP) affect the length of time to meet workforce needs.

RESULTS

In 2005, there were approximately 22,000 board-certified EPs, with an additional 1,350 newly board-certified, EM residency-trained EPs entering the workforce over the next year. Assuming that a minimum 5.35 FTEs are required to staff an ED, 40,030 EPs were needed to staff all 4,828 EDs. A total of 2,492 (52%) EDs had a visit volume that required no more than the minimum number of FTEs, of which 47% were rural. Overall, 6,450 (16%) EPs were needed in rural EDs and 33,580 (84%) EPs in nonrural EDs.

Under the 5.35 FTE assumption, only 55% of the current EP demand is being met. In the best-case scenario (no attrition), it would take until the year 2019 to staff all EDs with EM board-certified EPs. In the worst-case scenario (12% attrition), supply would never meet demand. Our intermediate scenario (2.5% attrition) was that workforce needs would be met in 2038. Figure 1 displays the estimated time to meet EP workforce needs in the three scenarios. If the assumption of average EP throughput changed from 2.8 to 2.0 patients per hour, EP demand would be met in 2027 in the best-case scenario, never in the worst-case scenario, and 2103 in the intermediate scenario.

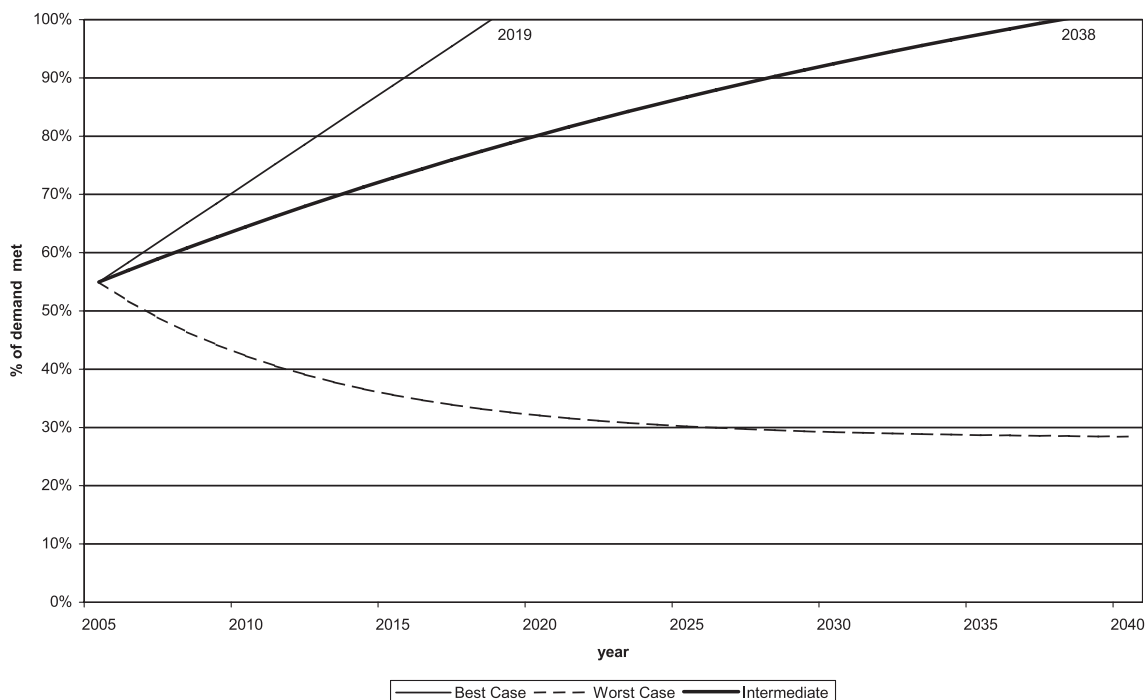


Figure 1. Time to meet emergency physician (EP) workforce demand with emergency medicine board-certified EPs. Scenarios: best case (thin solid line); worst case (dashed line); intermediate (thick solid line). Assumptions: 1) Each emergency department (ED) needs a minimum of 5.35 full-time equivalents (FTEs) to staff ED 24/7 (based on EPs seeing 2.8 patients per hour, working 40 hours per week, and spending 66% of time on clinical activities); 2) annual ED visit volumes remain stable; 3) annual number of emergency medicine (EM) residency graduates who pass boards remain stable; 4) EM residency graduates distribute themselves according to national needs; and 5) no attrition (best case), 12% annual attrition (worst case), or 2.5% annual attrition (intermediate).

DISCUSSION

Even under the unrealistic “best-case” scenario (e.g., EPs will not retire or die, all EM residents will distribute per U.S. staffing needs, and the number of ED visits will stay at 2005 levels), the supply of EM board-certified physicians would not meet demand until at least 2019. Under slightly more realistic scenarios, based on current best estimates of EP attrition, the workforce needs would not be met for about 30 years, if ever. Based on these estimates, we anticipate that the demand for EM residency-trained, board-certified EPs will remain high for decades to come and outlast the professional careers of current EM trainees.

In the most recent workforce survey, Moorhead et al.² found that only 58% of physicians practicing in EDs were board-certified in EM. This finding resembles our estimate that 55% of current demand is being met by board-certified EPs. The IOM report renewed the debate of who can and should practice EM.^{4,9,10} Although staffing all EDs with EM residency-trained, board-certified EPs would be ideal, this does not appear to be realistic, since almost half of the total demand for ED services require staffing by physicians without specialty training in EM.

Although rural EDs comprise only 16% of EP demand, significant disparities exist in workforce supply. For instance, prior data suggest that only 33% of physicians practicing in rural EDs are residency-trained or board certified in EM, compared to 72% in urban areas.² Additionally, we found that nearly half of EDs

that require no more than the minimum/single EP coverage are in rural areas. For 24/7 coverage of EDs, EP workforce estimates need to account for minimum staffing requirements at these lower-volume EDs and address the difficulty of their recruiting and retaining EPs. Rural access to EPs has gained recent attention and is an important component of workforce supply in EM.¹⁰

LIMITATIONS

We sought to predict if and when the entire patient demand being serviced in EDs across the country could be met solely using EM boarded-certified EPs. We did not address potential alternative staffing patterns, such as using family physicians, midlevel providers, or limiting hours of EP coverage in the most rural “frontier” hospitals. Although we believe that the NEDI-USA database is more accurate than any other available, it probably includes some inaccurate values. Frequent updates of NEDI-USA (and the current workforce estimates) are needed to keep pace with an evolving healthcare system and assist policy discussions. Either way, the workforce estimates are limited by their conservative bias (e.g., stable number of ED visits) and “one-size-fits-all” assumptions (e.g., 2.8 patients per hour). Although we assumed a stable number of EM residency graduates each year, and could not take into account all of the factors that affect EP workload (e.g., acuity, crowding), we examined several scenarios and found similar results.

We created the Emergency Medicine Workforce Calculator (<http://www.emnet-usa.org/nedi/workforce.html>) to allow readers the opportunity for sensitivity analyses beyond those presented here.

CONCLUSIONS

The supply of EM residency-trained, board-certified EPs is not likely to meet the demand in the near future. We remain strongly supportive of EM residency training but, in light of these findings, we believe that alternative EP staffing arrangements merit further consideration.

The authors thank Jessica M. Pang and Daniel J. Monego for their contributions.

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