The challenging Florida anesthesia workforce has 3 different types of anesthesia providers competing in the same market and a growing population ranked number 2 in the United States. This study attempted to forecast changes in supply and demand of nurse anesthetists in Florida between 2014 and 2018 by surveying hospitals and ambulatory surgical centers; 17% (87/511) responded. Current anesthesia workforce and projected needs in 1, 2, and 5 years were included in the survey. Projected numbers of nurse anesthetist graduates from 2014 to 2018 were obtained from nurse anesthesia programs and schools in Florida.

Respondents projected 73 new full-time openings through 2018, representing an 18% growth rate. Florida nurse anesthesia schools projected graduating 1,394 new Certified Registered Nurse Anesthetists (CRNAs) through 2018. This study estimated that 85% of new graduates will find full-time positions. A 22% growth in full-time positions would be required to absorb all new graduates expected to enter the Florida workforce. A projected surplus of 15% (114 positions) is in line with recent projected simulated models. The predicted CRNA surplus depends on current staffing models. Nonetheless, 633 new full-time positions would represent an increase in the proportion of full-time CRNAs in the Florida workforce.

Keywords: Certified Registered Nurse Anesthetist, Florida, predicted staffing, workforce.

Economic and demographic challenges across the country and especially in Florida have made predicting supply and demand of anesthesia providers difficult. Anesthesia does not follow true competitive markets, leading to periods of surpluses and shortages.1 With 3 types of anesthesia providers in Florida, and anticipated population and demographic changes, detailed workforce studies are needed to predict current and future trends to provide optimal anesthesia service to Florida’s population. Prediction of the anesthesia workforce supply and demand is confounded by many diverse and often overlapping practice arrangements available for practitioners,1 making such workforce studies even more important in understanding impending demand in the context of current and projected supply.2 The purpose of this study was to identify the current and future supply of the nurse anesthetist profession in the state of Florida from 2014 to 2018.

• **Nurse Anesthesia Workforce Research.** The first national Certified Registered Nurse Anesthetist (CRNA) workforce study was conducted by the American Association of Nurse Anesthetists (AANA) in 1982, citing the “need for dynamic long range planning” as reasoning for the study.3(p240) Several national and state studies of the nurse anesthesia workforce followed that study, with the last national AANA workforce study conducted in 2007.4 The 2007 study reported substantial estimated CRNA position vacancy rates for hospitals compared with a 2002 study, with Florida reporting one of the highest CRNA position vacancy rates for hospitals and ambulatory surgery centers in the country.4 Between the 2007 study and its publication in 2009, a serious economic downturn occurred in the United States, altering the generalizability of the results regarding demand for CRNAs.

According to Lorraine Jordan, PhD, CRNA, FAAN, senior director of AANA Quality and Research (written communication, August 4, 2014), the AANA subsequently began collecting CRNA supply data through an annual survey; however, the demand side of nurse anesthesia services remains elusive. Additionally, from 2007 to 2009, a flurry of unpublished state workforce studies were conducted as master’s thesis projects, identifying regional shortages of CRNAs. Various states have undoubtedly conducted local unpublished studies for internal use. This article describes methods and results of a statewide nurse anesthesia study involving supply, demand, and future projections for nurse anesthesia services.

• **Anesthesia Supply and Demand History.** In the 1990s, a study conducted by the American Society of Anesthesiologists (ASA) reported an increased demand for anesthesia services.5 Concurrently, there was a large decrease in CRNA training programs and graduates, leading to a major shortage of anesthesia providers. By the mid-1990s, managed care penetration slowed hiring...
because of lower compensation concerns, and increases in anesthesia residencies tempered the shortage for anesthesiologists, yet CRNA programs continued to diminish. By 2000, the increase in anesthesia residencies slowed, CRNA program numbers stabilized, and CRNA graduates slowly increased, but a tremendous increase in surgical demand along with mandated resident work rules led to a well-publicized anesthesia provider shortage. The nurse anesthesia profession responded with a substantial increase in both graduates and programs, and by 2005, 10 new programs were added and graduate numbers doubled. Anesthesia assistants were also introduced as a solution to the shortage, and new programs and graduates increased precipitously during this time. The years from 2008 to 2010 were years of economic turmoil resulting in decreased surgical demand and marked anesthesia practice consolidation, yet numbers of anesthesia residencies, anesthesia assistant programs, and CRNA programs and graduates continued on the steep upward trajectory. This increase in providers with unstable demand has led to a moderation of CRNA utilization and compensation.

Recent and Future Workforce Predictions. In 2010, Ethicon Endosurgery commissioned a RAND Corporation study analyzing the US anesthesia workforce. The overall conclusion was that national labor markets are roughly in equilibrium, with marked regional shortages probable. Florida fell into the category of having both anesthesiologist and CRNA shortages on all measures. In 2011, Schubert and colleagues, in an anesthesia workforce study focused on anesthesiologists, detailed a decrease in surgical services, hiring, and compensation for both anesthesiologists and CRNAs, but they predicted that, because of the aging of America and the Affordable Care Act (ACA), the current provider supply cannot be relied on to meet future needs. However, Schubert et al articulated that many contributing factors make predictions difficult. Both the studies from RAND and Schubert et al predicted a possible national CRNA oversupply by 2020; however, Florida, with its large number of aging Americans and overall population growth, was predicted to experience a regional CRNA shortage in these anesthesia workforce studies. A 2014 study from IHS Global Inc of the Florida physician workforce commissioned by the Safety Net Hospital Alliance of Florida reported findings consistent with those of the RAND and Schubert studies regarding anesthesiologists. A 620-anesthesiologist shortfall was predicted by 2025 (23%); however, this study predicted a surplus of CRNAs for Florida in contradiction to all previous anesthesia workforce studies for the state. This study drilled down into the anesthesia demand issue with a fine-grained, computer-generated analysis that combined national health care use and delivery patterns layered onto state demographics, population health risk factor data, and medical insurance changes associated with the ACA. It is predicted that Florida’s population will increase by 3.3 million between 2012 and 2025 (17%) and will experience a 45% increase in the over 65-year-old population and a 42% increase in the over 75-year-old population. These population shifts are projected to increase anesthesia services by 20%, leaving a 1.6% increase attributed to the ACA.

Additionally, the planned move to the doctor of nursing practice (DNP) for CRNAs is a factor that creates an unknown effect on CRNA supply. Concerns have been expressed that the move to a practice doctorate by 2015 will decrease the number of applicants applying to nurse anesthesia school; however, the true impact is unknown. In aggregate, these studies suggest that Florida will experience a severe shortage of anesthesiologists during a time of increasing demand for anesthesia services. The question of CRNA supply is less conclusive, with older studies predicting a nurse anesthesia shortage and a more recent study (Safety Net Hospital Alliance of Florida) suggesting an oversupply.

The current and near-future anesthesia workforce supply data are well described through AANA workforce and compensation data collection, nurse anesthesia school enrollment, and graduation data. As per a conversation with K. Berry (June 2015), from the National Board of Certification & Recertification for Nurse Anesthetists (NBCRNA), Florida saw an increase in nurse anesthesia schools from 3 to 9 between 2000 and 2010, with a resultant increase in graduates from 46 to 252. Also, according to Tina Kautter, CAE, business manager from the Florida Association of Nurse Anesthetists (communication, December 8, 2015), Florida CRNAs frequently voice concerns of CRNA overproduction, diminished compensation, and job market tightening. Recent anesthesia workforce studies predict a national oversupply of CRNAs, with Florida experiencing conflicting results. Only one study attempted to predict the effects of health-care reform efforts on demand using national data in a computer simulation model. The current study was conducted by surveying Florida hospitals and ambulatory surgical centers providing anesthesia services to determine current and future nurse anesthesia job market trends from the employer standpoint.

Methods
The study was conducted following institutional review board approval. A convenience sample of hospitals and ambulatory surgical centers, 87 of 511 (17%), in the state of Florida participated in this descriptive cross-sectional research study. A survey was sent to all hospitals and surgical centers in the state of Florida that utilized anesthesia services. The numbered surveys were sent to the directors of nursing and included a return envelope addressed with a first-class (Forever) stamp. The nursing directors were instructed to distribute the survey to the
chief nurse anesthetist or chief anesthesiologist. The survey questioned the current status of their anesthesia workforce and projected needs in 1, 2, and 5 years. Facilities were excluded if they did not return the survey. The return of the survey implied consent. Florida nurse anesthesia programs and schools were surveyed for projected nurse anesthetist graduates from 2014 to 2018. Out-of-state students were considered plausible to leave the state on graduation and return to their home state. Data on employers’ projected CRNA demand were compared with data from schools on projected CRNA supply.

**Results**

- **Growth of CRNA Positions in Florida, 2014 to 2018.** Among the responding facilities (N = 87), 74% of current CRNA positions are full-time, 12% of positions are part-time, and 14% of positions are per diem. Respondents were asked to project the number of new full-time CRNA positions they expect their facility to add in the next 5 years from 2014 to 2018 inclusive. In aggregate, respondents projected 73 new full-time openings through 2018. Respondents reported that 396 full-time positions are currently filled. Full-time positions are expected to grow by 18.4% (73/396 = 0.184).

  In 2013, there were 2,817 AANA members employed full-time according to the AANA member profile of 2013. It is estimated that 82% of all full-time CRNAs are members of AANA. Consequently, we estimate there were 3,435 (2,817/0.82) CRNAs employed full-time in Florida. An 18.4% growth rate implies there will be approximately 633 new full-time positions for CRNAs through 2018. The nurse anesthesia schools were also asked to identify the proportion of currently enrolled students who were from out of state. Currently, 54% of Florida student registered nurse anesthetists (SRNAs) come from Florida. The assumptions made were as follows: the proportion of graduates from out of state will leave Florida within 1 to 2 years and not be permanent members of the Florida labor pool. Therefore, graduates from out of state were excluded from this study. The survey predictions included in aggregate were attrition, retirement, and unexpected changes in surgical volume. Projecting 633 new full-time positions and 747 new graduates entering the Florida labor pool, we concluded that 85% of the new graduates will find full-time positions. In 2013, 83% of AANA members in Florida worked full time; consequently, this projection suggests that the proportion of full-time CRNAs will remain relatively constant. The number of full-time positions would have to grow 22% to absorb the projected number of new graduates in the Florida labor pool (Figure 1).

  By 2018, all the facilities in the sample that do not currently employ CRNAs full time expect to employ full-time CRNAs. Region 4 (Tampa-St Petersburg) is expected to grow substantially faster, 31%, than other regions, collectively at 16%. Also, ambulatory surgery centers are expected to grow much faster, 36%, than other types of facilities, at 14%. Facilities that reported decreased salaries over the past 2 years are expected to grow much more slowly, 8%, than facilities that reported increased or stable salaries, at 24%. As expected, facilities that reported an increase in the “oversupply” of CRNAs over the past 2 years are expected to grow much more slowly, 5%, than facilities that did not report an “oversupply” (23%). However, only 23% of facilities that reported salary decreases attributed that decrease to an oversupply of CRNAs.

- **Distribution of Certified Registered Nurse Anesthetist Positions.** Across the 39 facilities that employ at least 1 full-time CRNA, the distribution of positions is very skewed. Nearly 40% of all full-time positions are in the largest 5 facilities that participated in this study (Figure 2).
Similarly, across the 18 facilities that employ at least 1 part-time CRNA, the distribution of positions is also skewed (Figure 3).

The number of part-time positions in the facility is significantly correlated \((r = 0.35, P = .001)\) with the number of full-time positions in the facility. This finding suggests that part-time positions are used to complement full-time positions rather than being a lower cost substitute for full-time positions. Among facilities that currently employ CRNAs, the number of per diem positions is uncorrelated \((r = 0.07)\) with the total number of regular positions (including both full time and part time). This suggests that per diem positions are not used as a substitute for regular positions, which would lead to a negative correlation, that is, more per diem positions are associated with fewer regular positions.

**Discussion**

To the authors’ knowledge, this study was the first to predict a Florida CRNA surplus from an employer standpoint, which is in line with results of a 2014 study using computer simulation models accounting for healthcare reform and population changes.\(^8\) The increased growth predicted in ambulatory surgical centers vs hospitals is in line with the growing national trend of healthcare movement from acute care to ambulatory care settings.

Wage and benefit data may be explained by increased consolidation of anesthesia services under large provider groups. Smaller facilities with primarily per diem/1099 (independent contractor) CRNAs may now provide wages and benefits previously unavailable, while other facilities may experience contracture of wages and benefits when consolidated into larger groups. The predicted CRNA surplus in Florida is dependent on current staffing models and restriction by federal and state physician supervision language. Given projected anesthesiologist shortages, changes in staffing models such as substitution of anesthesiologists by CRNAs or changes in supervision restrictions may mitigate this projected surplus.\(^8\)

Several limitations of this study must be considered. There was only a convenience sample response rate of 17%, however; there was representation for all 8 Florida regions. Variables in the current healthcare market exist: Medicaid expansion would increase access to the uninsured Floridians, and a population rise due to migration from other states and countries could directly affect the Florida CRNA workforce. Nurse anesthesia schools will be shifting their curriculums to doctoral status to meet the Council on Accreditation of Nurse Anesthesia Educational Programs doctoral mandate by 2022. This could affect the total number of admissions to nurse anesthesia schools if many faculty are not doctorally prepared for this curriculum change.\(^1^0\) A decrease in the number of new graduates would alter the projected increase in new CRNAs entering the Florida workforce. Another limitation to consider is whether the 17% of CRNAs who work part time or per diem would want to work full time if there were more full-time positions (there would be a surplus of CRNAs and a shortage of full-time positions), or if the 17% of new graduates want only part-time employment, that would dramatically affect our projection of a shortage of full-time jobs (there would neither be a surplus nor shortage of full-time positions). This research made the assumed that the out-of-state SRNAs would move back to their place of origin. Additionally, employers completed the surveys with the inclusion of attrition, retirement, and unexpected changes in surgical volume in aggregate without separately addressing these variables. However, according to the AANA 2013 member profile survey, only 14 full-time CRNAs plan to retire between 2014 and 2017, and 21 CRNAs plan to retire between 2018 and 2020.

The distribution of CRNA positions is growing faster in ambulatory facilities, a small number of large facilities employ a large portion of CRNAs, and part-time CRNAs appear to complement full-time CRNAs rather than being a substitute for full-time CRNAs. A projected shortage in full-time jobs could halt salary increases or even perhaps result in a salary decrease.

**Conclusion**

Historically, the CRNA job market has been fruitful and abundant. Florida increased the number of CRNA graduates annually to meet the demand of anesthesia care needed. In addition to the increase of new CRNA graduates, anesthesia assistants were introduced into the job market. Not until 2014 was a surplus of anesthesia providers predicted. Even though the sample in this study was small (17%), it does coincide with the latest predictions that 85% of the new graduates will find full-time positions.
positions. In 2013, 83% of AANA members in Florida worked full time; consequently, this projection suggests the proportion of full-time CRNAs will remain relatively constant. In May 2015, a Florida Board of Governors “Supply/Demand Workforce Analysis on Health-Related Programs” report gave similar workforce estimates using different methods. The number of full-time positions would have to grow 22% to absorb the projected number of new graduates in the Florida labor pool. The only change for certain is that healthcare reform and population growth will directly affect the workforce status of the Florida CRNAs. Therefore, follow-up research on the Florida workforce initiative is imperative.

REFERENCES

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DISCLOSURES
The authors declare they have no financial relationships with any commercial entity related to the content of this article. The authors did not discuss off-label use within the article.