Several forecasts of registered nurse (RN) supply and demand have been published in the past few years, with wildly varying projections. Juraschek, Zhang, Ranganathan, and Lin (2012) forecasted a national shortage of nearly one million RNs by 2030, the U.S. Health Resources and Services Administration (HRSA, 2014) estimated a surplus of RNs of 340,000 by 2025, and Carnevale, Smith, and Gulish (2015) at Georgetown University projected a shortage of 92,810 RNs by 2020. Together, these forecasts are incredibly confusing for nurse leaders, nurse educators, and policymakers. Which is right? And why do the forecasts vary so much?

The Purpose of Forecasts
Forecasts of future supply and demand of health professionals are tools to guide policy, not a final statement about how the world will be in the future. When a substantial shortage is forecast, as it was by HRSA in 2002, policies change. The forecast was based on historical data, and thus estimated future supply and demand as if past patterns of utilization of RNs, graduations, and decisions to work would continue to prevail. Of course, we know those patterns did not persist. Wages rose dramatically during the shortage of the early 2000s, which attracted more people to nursing schools. Nursing schools expanded, so that between 2002 and 2010 there was a doubling of the number of RN graduates (HRSA, 2014). And then, in late 2007, the nation was hit by a deep recession, which both reduced demand for RNs and increased the hours worked by already-employed RNs (Buerhaus & Auerbach, 2011). By 2008, the HRSA forecasts of 2002 were widely divergent from actual supply and demand. But, that is not surprising; forecasts project the future world with the assumption there are not substantial changes in key variables.

Thus, one should treat all forecasts cautiously, and use them as guides to policy rather than definitive future outcomes. And, to incorporate forecasts into policy and planning effectively, one must understand the structure of the forecasts and underlying assumptions. It may be tempting to judge the forecasts by the gravitas of their publication venue – Juraschek and colleagues (2012) was in an academic journal, HRSA (2014) was a government report, and Carnevale and associates (2015) was an institutional report with gender-biased pastel-colored infographics – but this is not the correct way to assess the plausibility of each. I'll describe each of these national forecasts, and provide some critique so you can better assess future forecasts that might be published.

Estimates of Future Supply
Juraschek and colleagues (2012) built their team’s work on a prior “report card” describing supply and demand in California (Lin, Lee, Juraschek, & Jones, 2006; Lin, Juraschek, Xu, Jones, & Turek, 2008). To estimate supply, they assumed RN education and the propensity of people to work as nurses would remain at 2009 levels. They calculated the propensity of people to work as nurses using data from the U.S. Current Population Survey (CPS), which is a survey conducted by the Bureau of Labor Statistics. Using data from 2000 to 2009, they divided the number of working RNs in each of seven age groups by the total population of each age group, to get the percentage of people in each age group that works as RNs. They then forecasted future supply by multiplying this percentage by forecasts of the future population in each age group. This method is a “straight line” approach, assuming current ratios will apply uniformly in the future. The authors did not account for the growth in graduations that occurred from 2000 to 2009 (and persisted through 2015), or any other changes in employ-
ment patterns that may have occurred since 2009. The authors did not publish a total projected supply of RNs in 2030.

The new HRSA model (2014) was developed de novo, and is not simply an update of prior forecasts. It is described as a micro-simulation model, which uses data on individuals to develop forecasts. The model uses data from the American Community Survey (ACS), which is a product of the U.S. Census Bureau, to examine the employment of RNs. Employment in 2012 for each state was computed using the ACS. It’s important to note the number of nurses in the ACS data file is small for smaller states, and thus, for small states the estimated employment in 2012 may be subject to substantial error. For each year after 2012, the model adds the number of new entrants (both new graduates and international migrants) and subtracts people who are expected to have retired, changed careers, or died. The estimates of entrants and attrition are modified by data on employment of RNs from the ACS. Multivariate regressions were estimated with explanatory variables including demographic characteristics of each individual, characteristics of the local and national economy, and characteristics of the labor market. This model is much more sophisticated than that of Juraschek and associates, and accounts for both differences in employment rates across demographic groups and more recent growth in RN graduations. The model projects RN supply in 2025 will be 3,849,000. It’s important to note the model assumes (a) supply and demand in 2012 were balanced, (b) graduations will remain stable at the 2012 rate, and (c) employment patterns will not change notably from those estimated in the multivariate regression.

The Georgetown supply model is reported to be similar to that used by HRSA (Carnevale et al., 2015). They used data from the Bureau of Labor Statistics’s CPS to estimate supply in 2013; the CPS has a smaller sample size than the ACS and thus might be more prone to error in the estimates. To estimate future supply, they “age” the supply of each age group forward, add new graduates, and subtract those who leave the workforce due to mortality, disability, career changes, and retirements. They assume future graduations match the number reported to the Integrated Post-secondary Education Data System (a product of the U.S. Department of Education) in 2013, but assume only 95% of those who graduate will enter the nursing profession. They do not account for migration of internationally educated RNs to the United States. In the Technical Report, the authors attempt to explain their lower supply estimate by noting they account for the fact 70% of licensed nurses (including both RNs and licensed practical/vocational nurses) do not work in nursing. They do not provide specific estimates of how the employment rate of RNs affects their overall supply estimates. Thus, in addition to the notes about the HRSA model that apply as well to this model, it also is important to note the authors provide little information about their technical method and have some inconsistencies across tables and text in the report; thus, the model is really a “black box.” Moreover, they include advanced practice RNs (APRNs) in their estimates of future supply, while the HRSA model considers APRNs to be part of the primary care and physician workforce; if APRNs were excluded, their forecasts would be even smaller. They estimate there will be 3,350,000 RNs in 2020, according to Table 10, although elsewhere in the report they state there will be 3,248,390 million employed RNs.

Estimates of Future Demand

Juraschek and colleagues (2012) projected demand using data on RN employment published by the U.S. Bureau of Labor Statistics, personal health expenditures published by the Centers for Medicare & Medicaid Services, and U.S. Census Bureau data. The authors used data from 2000 and 2004-2009 to estimate a simple linear regression equation for which the number of RNs was the dependent variable, and historical personal health expenditures was the only explanatory variable. The result of this regression was used to “convert” personal health expenditures to RN jobs for each state. The authors then assumed the national average of 844 RN jobs per 100,000 in 2009 should be maintained in the future, and calculated the future number of RN jobs that would be needed based on projected personal health expenditures. This is, essentially, a “straight line” projection, which assumes (a) the baseline employment level is adequate, (b) there will not be any changes in health care utilization patterns that might shift demand toward or away from settings in which RNs predominantly work, and (c) there will not be shifts in the use of RNs or other health professionals within care settings.

The HRSA (2014) model uses a micro-simulation approach to forecasting demand. The demand projections begin by estimating future demand for health care services in different care settings. Multivariate regression equations were estimated using data from multiple sources to identify factors that affect individuals’ health care use. Future health care use was projected by applying the results of the multivariate analysis to population data that include information about demographic, socioeconomic, and health risk factors. This complex model thus accounts for how changing rates of chronic illness and the age distribution will impact use of hospital, ambulatory, and long-term care services. Current nurse staffing patterns by care setting were then used to forecast the future demand for nurses that will arise due to growth in demand for health care services. This complex model has been applied to other health professions, in addition to nursing. The main shortcoming of this model is that it is based on historical data, and unan-
ticipated changes in the underlying health of the population or in patterns of health service use will impact the demand projections. HRSA projects demand in 2025 will be 3,509,000 RNs.

The Georgetown demand forecast for 2020 was based on the HRSA model; they simply used the HRSA data to estimate what demand would be predicted for 2020 – 3,341,200.

From Supply and Demand to Shortage

How do these three models reach conclusions about future shortages and surpluses? Juraschek and colleagues did not provide estimates of future supply and demand, only estimates of future shortage nationally and for each state. Their estimated deficit by 2030 is 918,232, with a confidence interval ranging from 725,619 to 1,112,112. This would be a 26% shortage relative to HRSA’s 2025 forecast of demand. However, this model was based on old data and used very crude methods. RN graduates were more than 20,000 greater in 2013 than in 2009; it is not known how this adjustment would affect Juraschek and colleagues’ forecasts nationally or for each state. They estimated California would have a shortage of 193,100 RNs by 2030. In contrast, using a simple model, Spetz (2013) forecasted a surplus of about 50,000 RNs in 2030.

The HRSA model assumes supply and demand were balanced in 2012, and projects future supply and demand in comparison to 2012 employment. This assumption may not be valid nationally, or for specific states. For example, data from California suggest in 2012 some regions of the state had a surplus of RNs (Bates, Lela, Keane, & Spetz, 2013). HRSA forecasted supply would be 3,849,000 in 2025, and demand would be 3,509,000, resulting in a surplus of about 9.7% (340,000). The HRSA forecast for California projects a surplus of 3,700 RNs, with demand at 393,600 and supply at 389,900. The Spetz model for California projected there would be 330,707 full-time equivalent (FTE) RNs available to work in 2025. If one assumes one employed RN equates to about one FTE (Juraschek et al., 2012), then this equates to 393,699 employed RNs in California, which is within 1% of the HRSA forecast.

The Georgetown model assumes HRSA’s demand model is the right one, but makes different and unexplained assumptions about parameters that affect supply. Their estimates of future supply are likely lower than what the HRSA model would obtain for 2020, at 3,248,390. This leads to a projected shortage of 92,810 RNs, or 2.8%. This is, in fact, a small difference relative to the HRSA forecasts: a range of 2.8% shortage to 9.7% surplus is fairly tight given all the uncertainties involved in forecasting. In comparison with Spetz, the Georgetown supply forecasts for California are lower. Georgetown forecasts 309,010 jobs, which is within the range of “low” and “high” estimates published by Spetz but closer to the “low” end.

What Can We Conclude?

It is easy to dismiss the forecasts published by Juraschek, due to the age of the data upon which they rely and their comparatively crude forecasting methods. Moreover, the magnitude of the shortage they project – 26% – is implausible. The HRSA and Georgetown models share the same demand projections, and thus their supply projections are where their difference lies. While the cute, gender-biased graphics make it easy to dismiss the Georgetown report, it is plausible that future employment rates will be lower than estimated by HRSA. HRSA based their forecasts of supply on the American Community Survey, while the Georgetown report used the Current Population Survey; the ACS is larger and more likely to produce good estimates at the state level. Numerous examples of the subtle differences between these reports can be found, and thus it is not possible to firmly recommend one over the other.

So what is a nurse leader or educator to do? Both the HRSA and Georgetown forecasts suggest a nearly balanced labor market for RNs in the future; and both demonstrate that whether there is a future surplus or shortage will depend on graduations, international migration, and the extent to which licensed RNs choose to work. These three things are highly dependent on public policy, wages, and job opportunities. By the latter, I mean that if there is a small surplus of RNs, this provides an opportunity for employers to use RNs in even more roles than they do now, as well as perhaps to enrich nurse-to-patient ratios. It is easy to imagine small changes in the use of RNs by employers could quickly absorb a surplus. Similarly, a small shortage of RNs could quickly be remedied by wage increases, which would draw more licensed RNs to work. Nurse leaders should track their local labor market and think about how they can creatively utilize the nursing resources available to them, while advocating that nursing graduations are maintained so the retiring Baby Boomer cohort will be adequately replaced.

REFERENCES


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