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MODELING THE US HEALTH WORKFORCE: SUMMARY OF THE RN SUPPLY AND DEMAND FORECASTING MEETING (MONTANA, 2016) AND IMPLICATIONS FOR MODELING

IHWC 2016 TECHNICAL SKILLS DAY

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RN Supply and Demand Forecasting Meeting

Big Sky, Montana, July 2016

- Meeting hosted by Montana State University, Center for Interdisciplinary Health Workforce Studies
- Funding from the U.S. Bureau of Health Workforce, Health Resources and Services Administration
- Meeting brought together ~20 health workforce researchers and nurse workforce experts
- Goal: improving nurse workforce forecasts to provide information needed by policy makers, employers, educators, researchers and others working to assure a strong, appropriately sized, and capable nursing workforce
 - One day focusing on modeling nurse supply
 - One day focusing on modeling nurse demand
 - Opportunities to share methods and data, and **provide constructive criticism**

Two Demand Modeling Approaches Presented

- Adjusted Risk Choice & Outcomes Legislative Assessment (ARCOLA) model
 - Microsimulation model used to simulate insurance enrollment patterns under the Affordable Care Act
 - Estimated demand for services based on insurance changes → estimate demand for nurses based on service demand
 - Main challenge with this approach is the ARCOLA model is designed to model changes in insurance coverage; this study was a workforce application
- Health Workforce Simulation Model (HWSM)
 - Microsimulation model that simulates health care use for a representative sample of the population, then simulates demand for health workforce based on projected demand for services
 - Main challenge with this approach is projecting future changes in care use and delivery patterns under emerging care delivery models

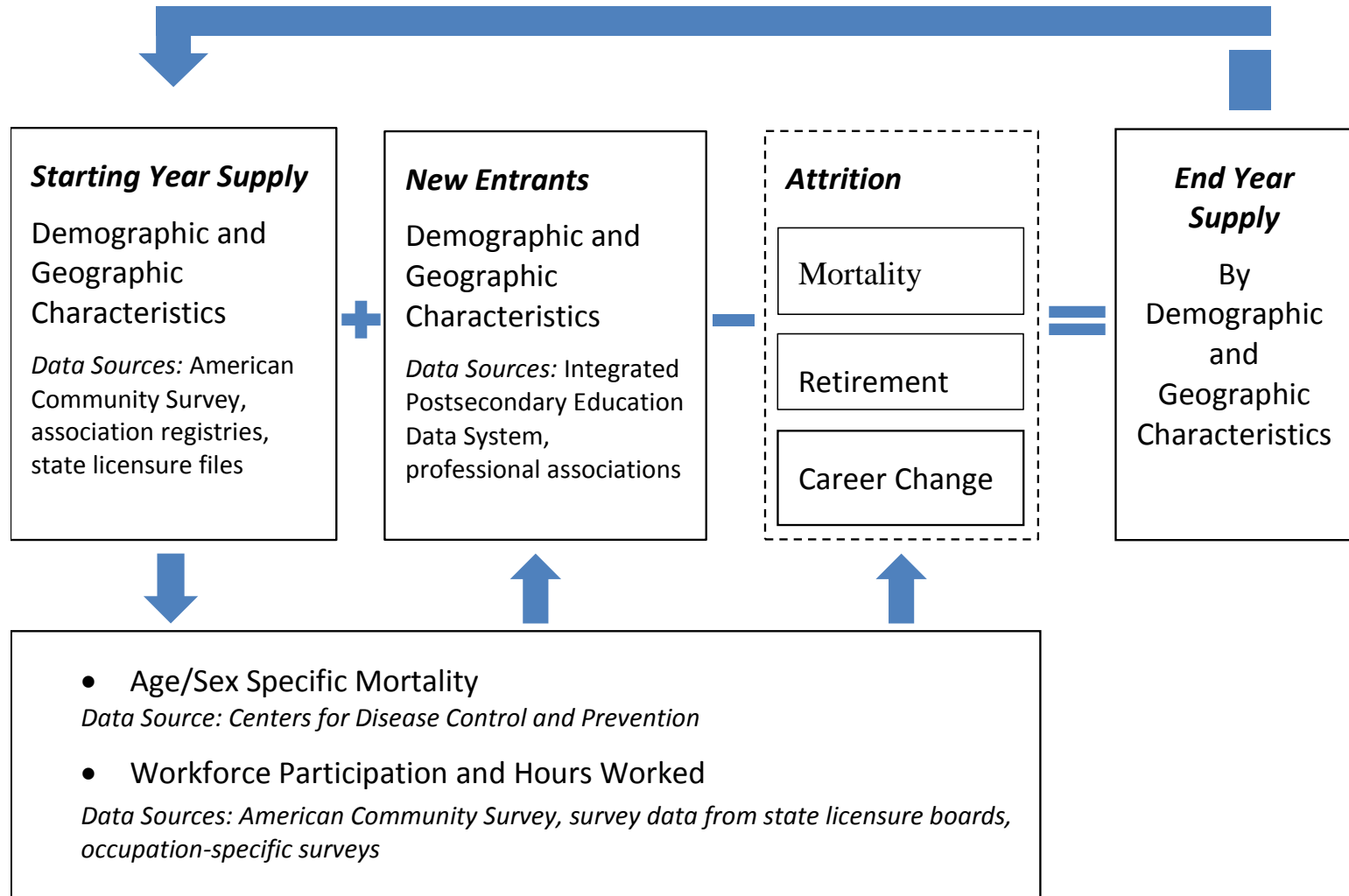
Two Supply Modeling Approaches Presented

- Cohort-based model
 - Approach models how many nurses from a cohort (specified by birth year) will remain in the workforce over time
 - Approach provides insights to workforce participation rates over time within a cohort of nurses
 - Main challenge of this approach is it does not capture large variation across cohorts in number of individuals entering nursing as a profession
 - Microsimulation-based approach
 - Starts with a database of nurses and simulates individual career choices
 - Approach to modeling workforce decisions (active in the labor force, hours worked, retirement) appears to produce aggregate patterns similar to the cohort-based approach
 - Faces many of the same challenges of the cohort-based model: external “shocks” can cause nurse workforce behavior to deviate from historical patterns
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Summary of Goals and Criteria for Building Workforce Models

- Provide the most accurate projections possible
- Provide flexibility to model wide range of scenarios reflecting new policies, emerging trends in care delivery, and other (e.g., economic) factors
- Build on solid theoretical underpinnings
- Build dynamic model: integrate professions and specialties
- Adaptable to different geographic units (national, state, local level)
- Provide platform for continued model improvement; incorporate new research as it becomes available
- Make model transparent (through reports and presentations)

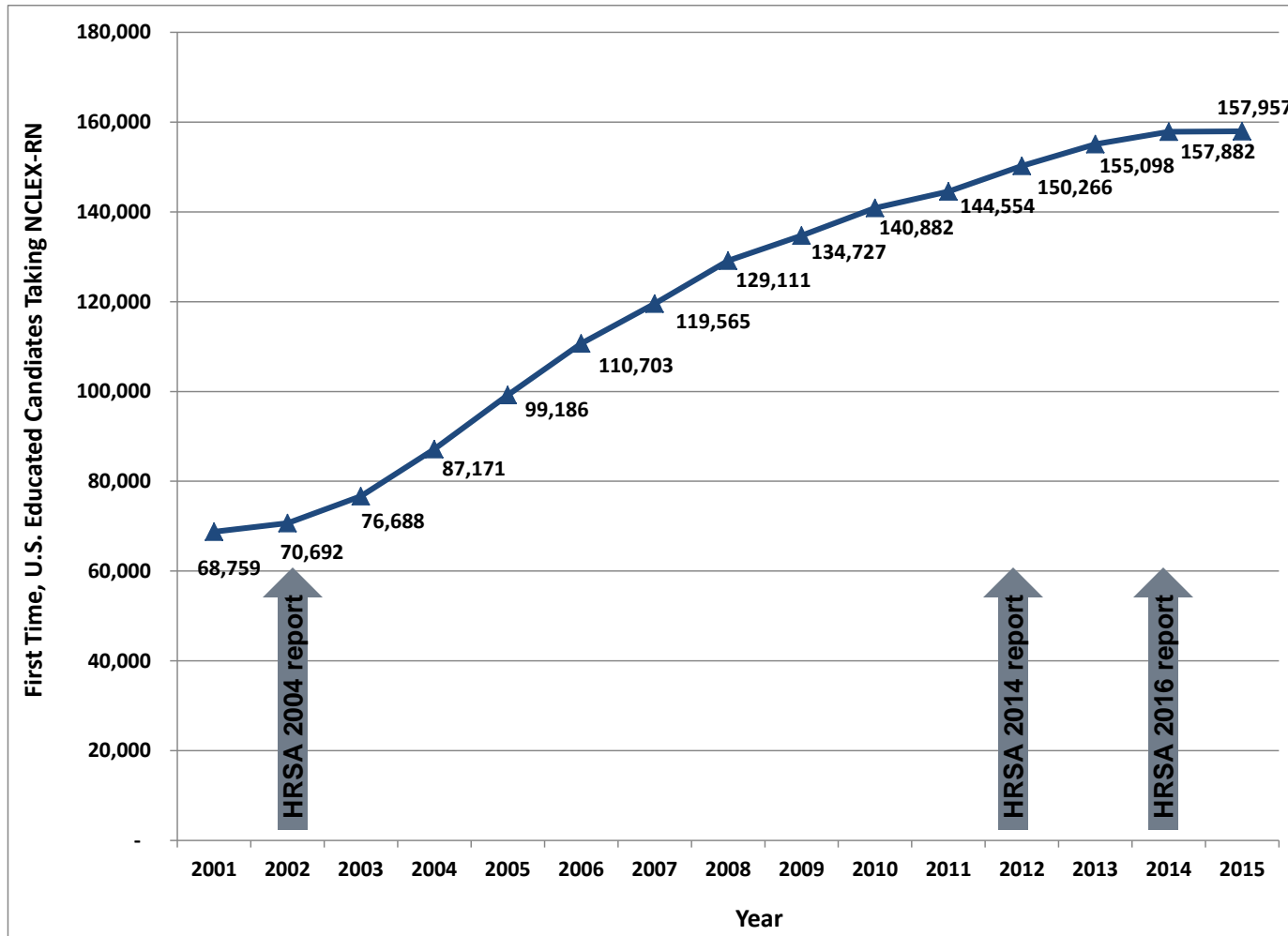
Flow Diagram for the Supply Component of HWSM



Data Sources: Starting Supply

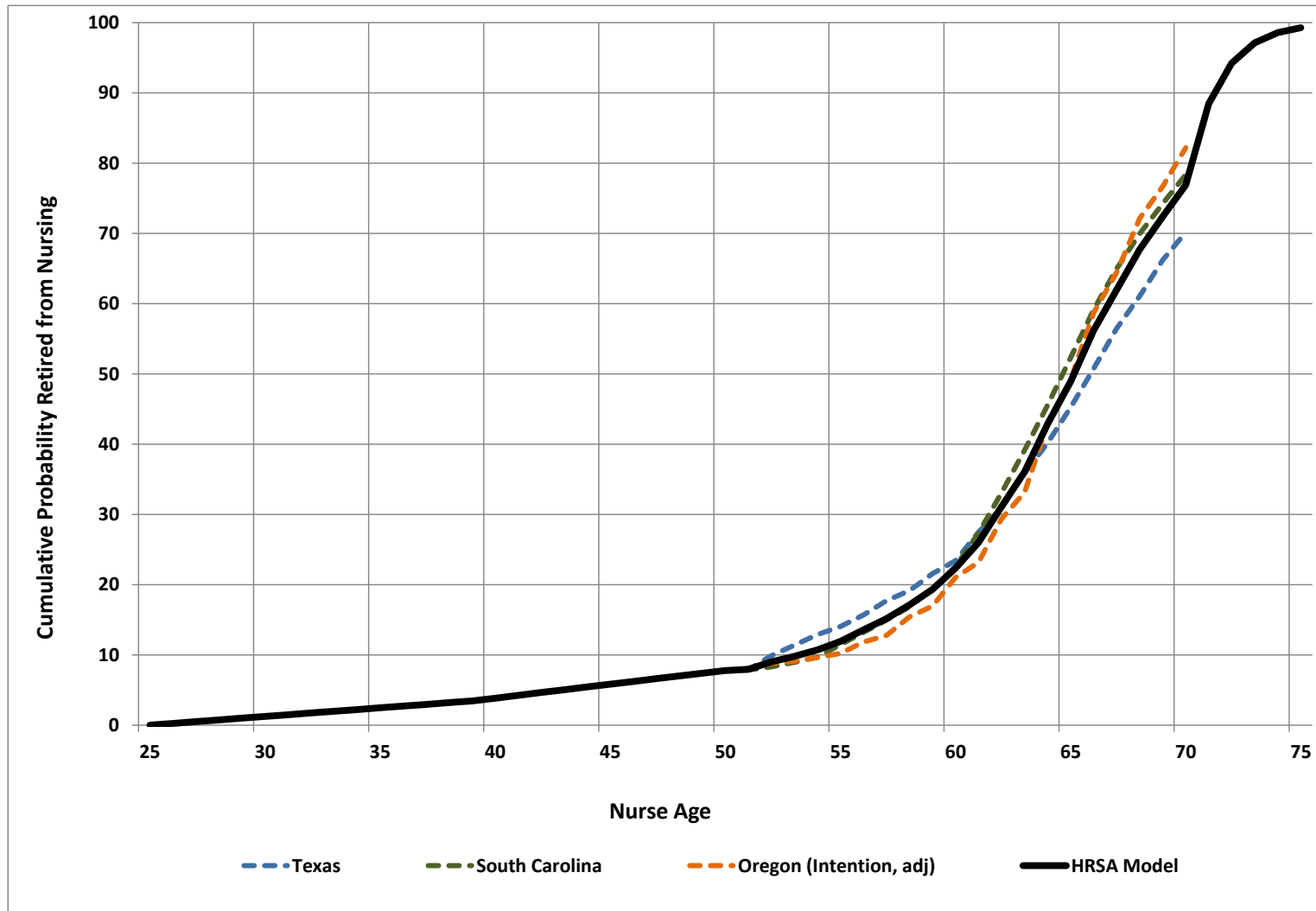
- American Community Survey (ACS)
 - Active supply defined as nurses working or seeking employment
 - Multiple years data used
 - Current work using 2014 ACS, with 5-year file (2010-2014) used for some analyses
 - Distribution by state, age, sex and education level
- For current work, using licensure data from states that have voluntarily provided data (GA, OR, SC, TX); ACS data for all other states
- Data strength and weakness
 - ACS: Cannot distinguish between nurses working in nursing positions and in positions that do not require a nursing degree
 - ACS: Information on patient care hours not available
 - ACS: Small sample size for smaller states
 - Licensure files: most states have 'cleaned' their data so the data are in good shape; desire for HRSA supply estimates to use best available source of data and consistent with numbers published by individual states; shorter time lag between when data are generated and used

Trends in Number of US Educated First Time NCLEX-RN Takers, 2001-2015



Data Source: National Council of State Boards of Nursing, Exam Statistics and Publications, 2001 to 2015 data from various reports.

RN Retirement Patterns



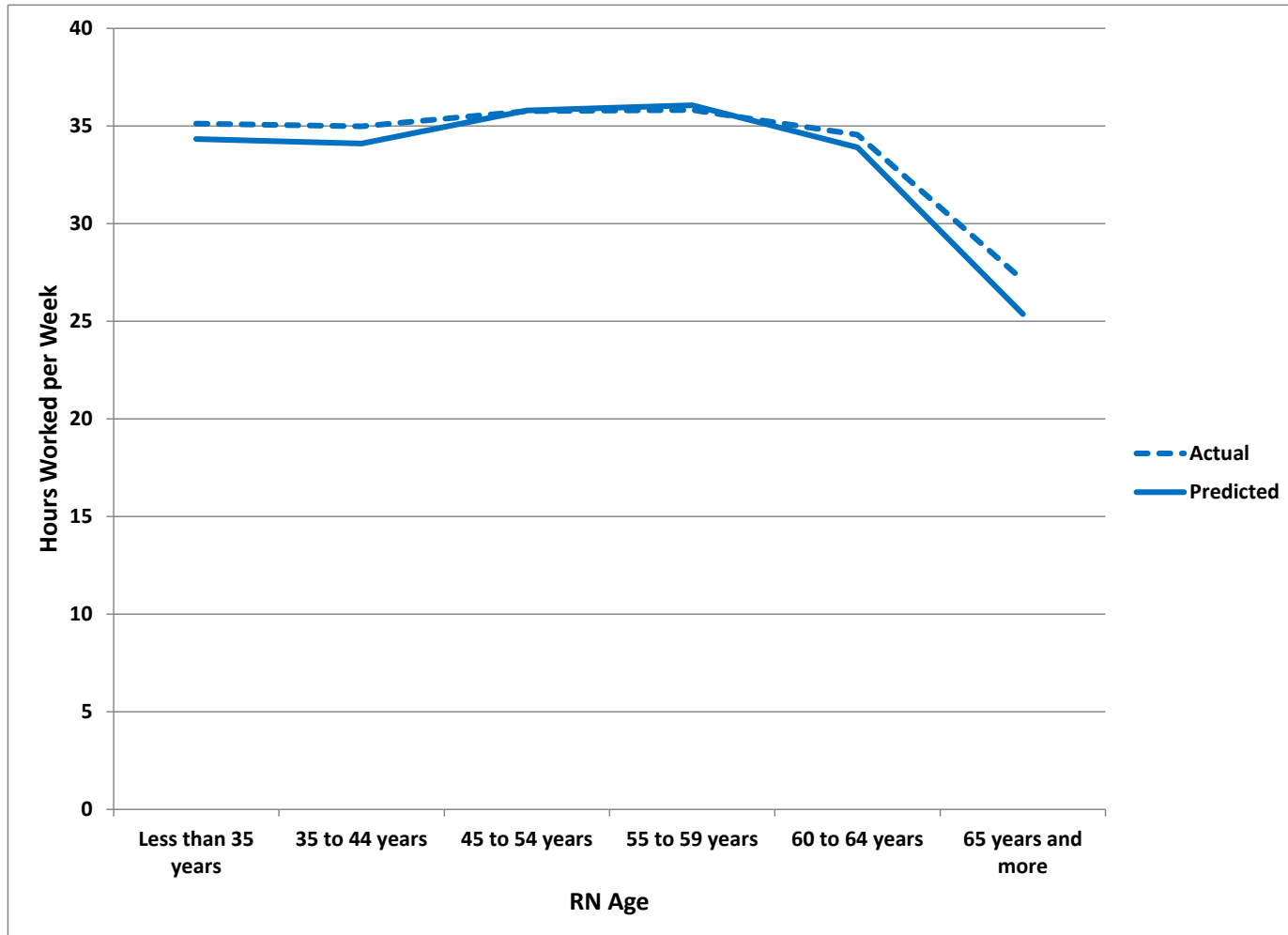
Estimated patterns using 2010-2015 licensure data from Oregon, South Carolina, and Texas; and 2008 Sample Survey of RNs (for nurses under age 50).

Summary Regression Results for RNs

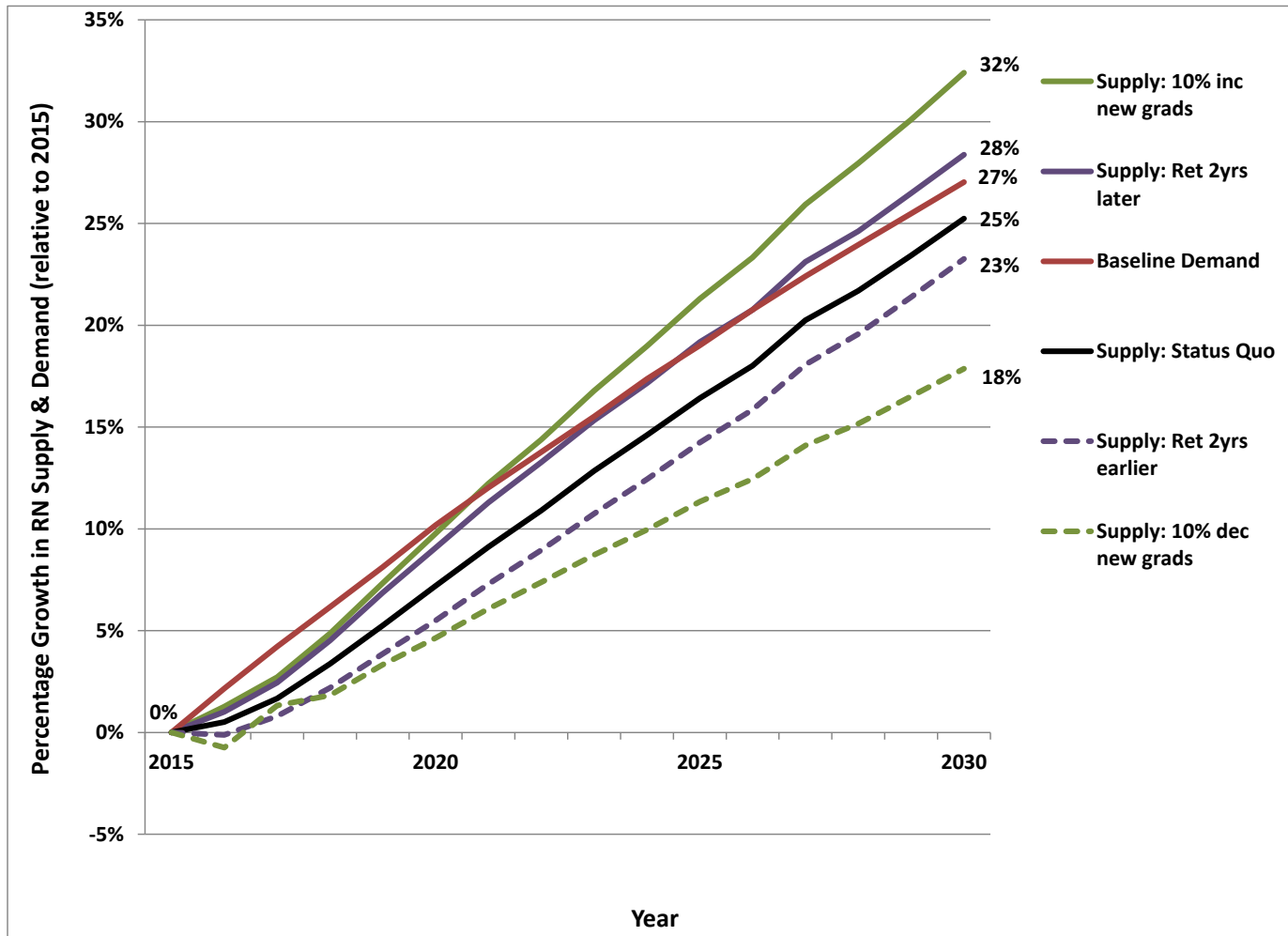
Parameter	Predicting Hourly Wage ^a		Predicting Hours/Week ^a		Predicting Labor Force Participation, age <50 (CI) ^b		
Intercept	-2.67	**	35.15	**			
Unemployment rate (state, year)	-0.15	**	0.05	*	1.03	1.01	1.05
State occupation mean hourly wage	0.85	**					
Predicted hourly wage			0.01		0.97	0.96	0.99
Age 35 to 44	3.87	**	0.26	**			
Age 45 to 54	5.21	**	1.20	**			
Age 55 to 59	5.79	**	0.88	**			
Age 60 to 64	5.74	**	-0.31	**			
Age 65 to 69	4.70	**	-4.54	**			
Age 70+	2.07	**	-8.57	**			
Age 30-34					0.69	0.63	0.77
Age 35-39					0.89	0.79	1.00
Age 40 to 44					0.97	0.86	1.08
Age 45 to 49					1.12	0.99	1.27
Male	1.18	**	2.78	**	0.71	0.58	0.87
Age 30-34 * male					2.20	1.59	3.06
Age 35-39 * male					2.81	1.96	4.02
Age 40 to 44 * male					2.63	1.87	3.70
Age 45 to 49 * male					1.94	1.38	2.74
Year 2011	-0.38	**	0.14		0.93	0.84	1.03
Year 2012	0.39	**	0.21	*	0.92	0.83	1.02
Year 2013	0.14		0.30	**	0.93	0.84	1.05
Year 2014	-0.29	**	0.38	**	0.97	0.85	1.10
Non-Hispanic black	-0.15		2.28	**	1.32	1.17	1.49
Non-Hispanic other	-0.66	**	1.43	**	1.23	1.10	1.37
Hispanic	1.12	**	1.43	**	1.38	1.19	1.60
Have nursing baccalaureate degree	2.55	**	-0.24	**	0.98	0.91	1.05
Having nursing graduate degree	4.10	**	1.56	**	0.91	0.80	1.03
Population % suburban	12.99	**	0.73		2.27	1.33	3.89
Population % rural	0.56		1.41	**	0.77	0.52	1.15
Sample size	150,504		150,504				89,370
R-squared	0.12		0.04				

Notes: Analysis of the American Community Survey; ^a Ordinary least squares regression coefficients. Statistically significant at the 0.01 (**) or 0.05 (*) level. ^b Odds ratios and 95% confidence interval (CI) from logistic regression. Comparison groups are female, year=2010, non-Hispanic white, age <35 (for wages and hours) or age <30 (for labor force participation). Labor force participation regression uses only clinicians under age 50.

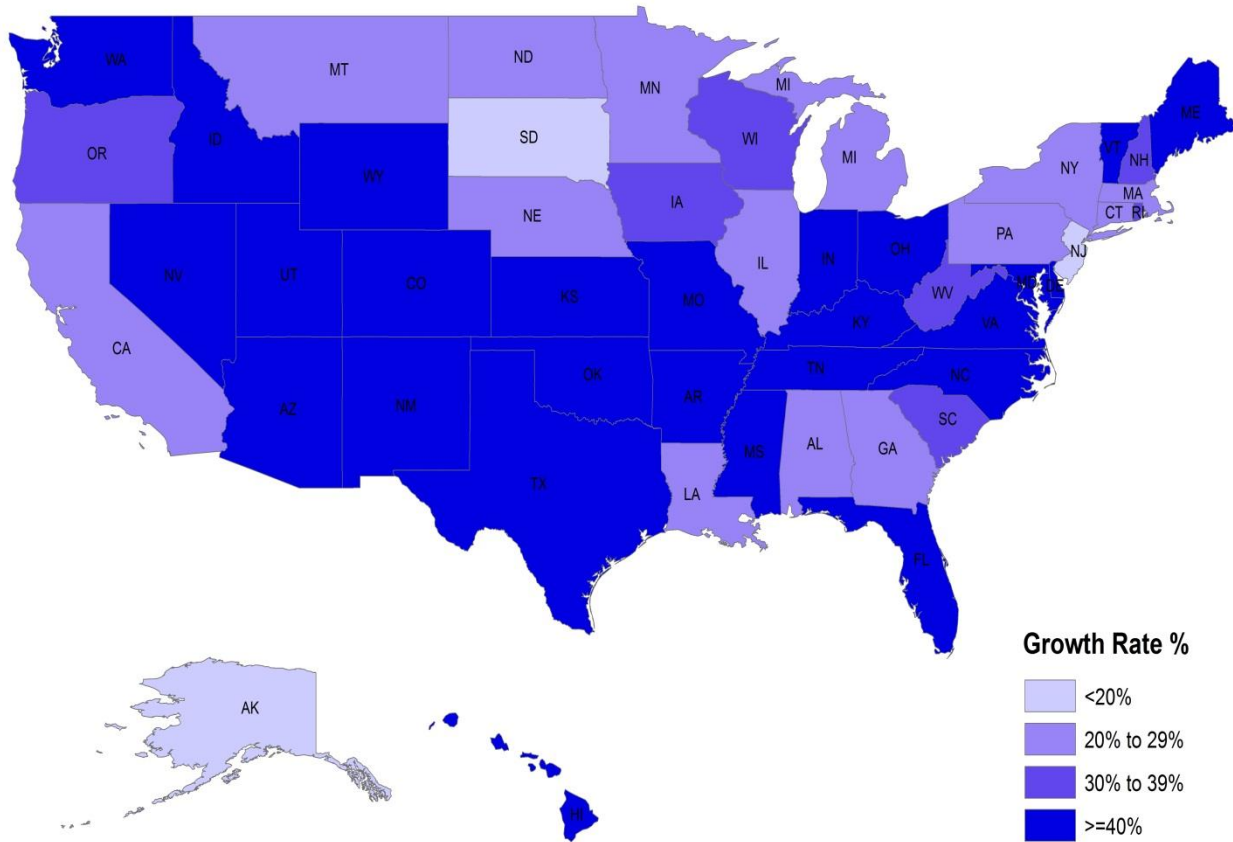
Comparison of Actual to Predicted Hours Worked by RNs: Example: Data for the State of South Carolina



Projected Percentage Growth in RN Supply & Demand: Example: Data for the State of Georgia



Growth Rate in RN Supply, 2014 to 2030



Published RN Supply and Demand Projections Forthcoming