Nursing Workforce Models: What we can learn from state and national efforts (and the Kiwis)

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The infamous disclaimer

- Some of this work was supported by RWJ and the National Center for Health Workforce Analysis (NCHWA), Health Resources and Services Administration (HRSA) under cooperative agreement #U81HP26495
- The information, conclusions and opinions expressed in this presentation are mine and no endorsement by RWJ, NCHWA, HRSA, HHS, or The University of North Carolina is intended or should be inferred

This presentation in one slide

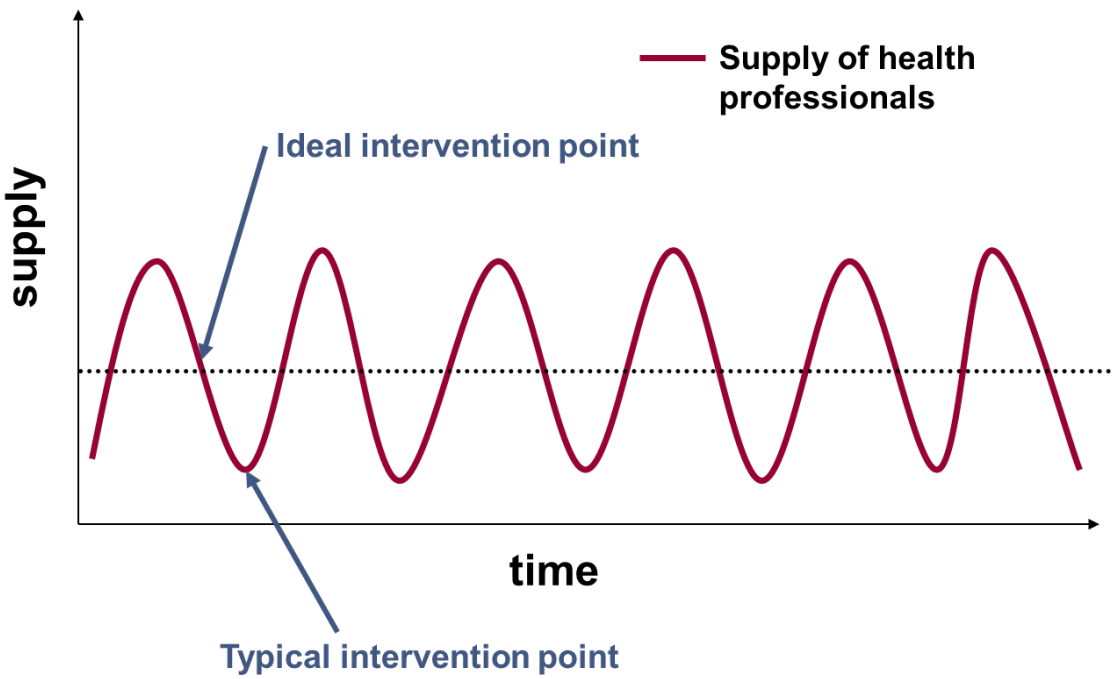
- Nursing workforce is critical to health system transformation
- Sometimes (often?) models don't agree. Why?
- Why is modeling demand so difficult?
- What would the modeling field look like with fewer economists and more sociologists?
- Messaging your findings: is anyone listening?
- What have we learned from modeling physicians?
- What can we learn from abroad?

We spend a lot of time and money modeling physician supply but…

- There are 2.9 million nurses (4x as many as physicians!) in active practice
- Nursing care linked to quality and satisfaction measures that will increasingly be tied to value-based payments
- Nurses provide whole-person care across health and community based settings
- Nurses are the ultimate "flexible" workforce taking on new roles in transformed health system

And we spend a lot of time and money worrying about new care and payment delivery models—not enough focus on workforce

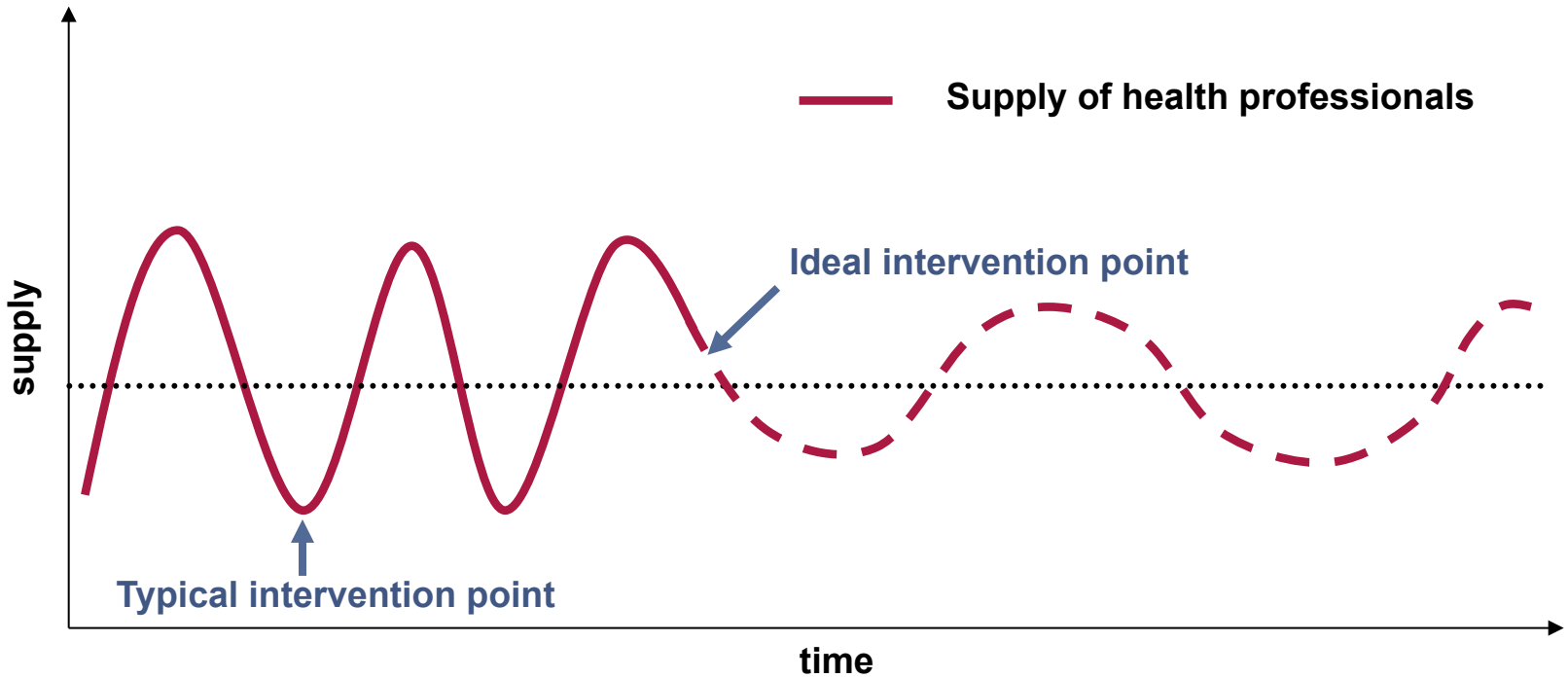
- Workforce is expensive: of **$2.6 trillion** spent on healthcare, **56%** attributed to wages*
- Expensive and inefficient to lurch from oversupply to shortage
- New models of care dependent on having right skill mix



*Dunn L. Getting a Handle on Hospital Costs. *Hospitals and Health Networks.* 2015

Better workforce data and models can "smooth" the cycle

"Workforce planning needs to be a standing component of strategic planning for hospitals/health systems and not just a response to a crisis situation" - *AHA, 2016*



AHA Committee on Performance Improvement. The Imperative for Strategic Workforce Planning and Development: Challenges and Opportunities? Chicago, IL: American Hospital Association. 2016. http://www.aha.org/content/17/cpi-report.pdf.

Great in theory but nursing models disagree: surplus or shortage?

- National nursing models mixed: some suggest overall supply will outpace demand, others find that demand will exceed supply
- Variation between (and within!) states
- Nursing enrollments are increasing rapidly
- But on the ground, we hear about shortages?

Could it be that our models are not accurate?
(*GASP*)

Why don't models agree (1)?

On the supply side alone, there are many reasons for differences…

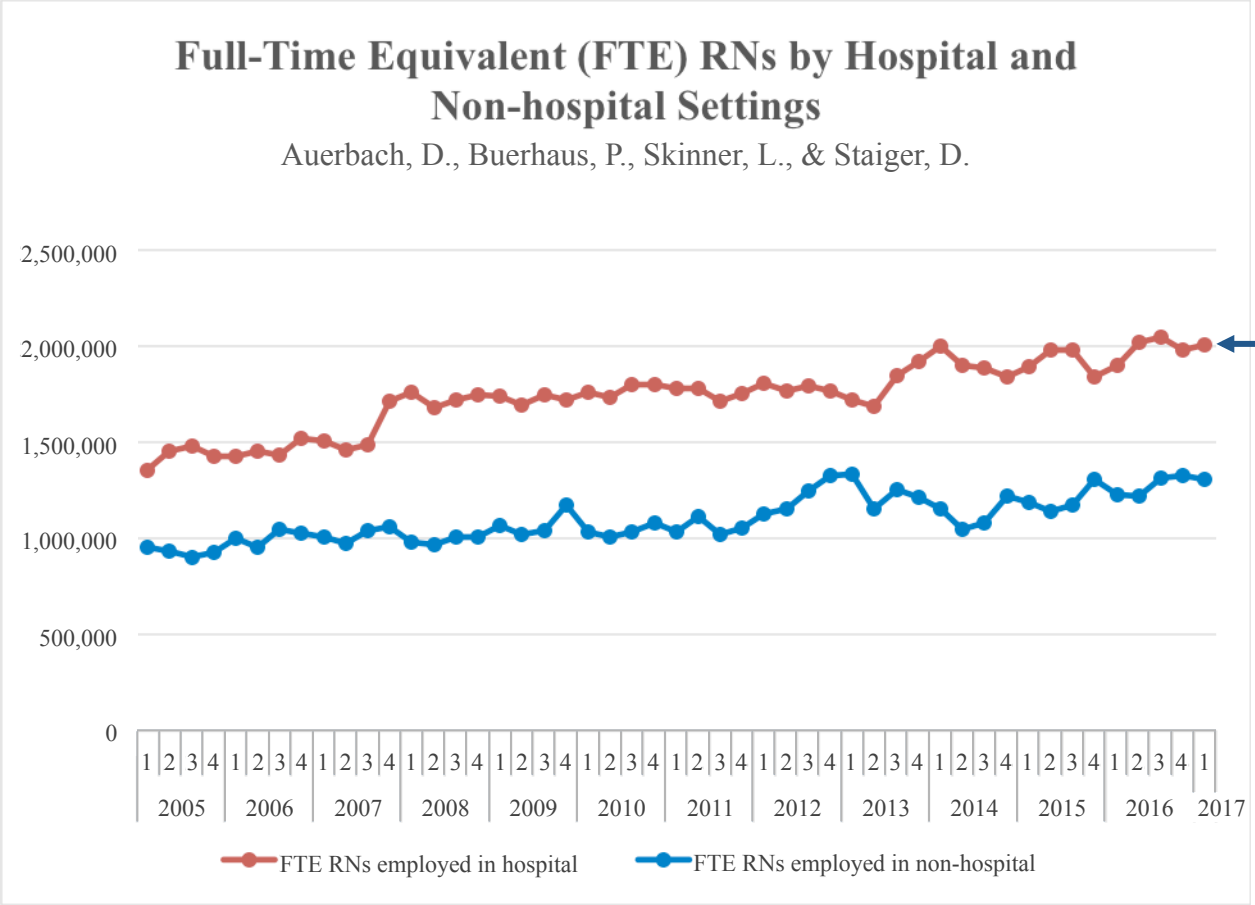
Model Attributes	Potential sources of differences
How many nurses at baseline?	Which nurses? (LPNs, RNs, APRNs) Headcount, licensed, active, FTE?
What is unit of geography?	National, state or sub-state? How to deal with nursing compact and tele-nursing?
When do nurses exit workforce?	Is probability of exiting workforce adjusted by age and cohort? Does model account for economic and other period effects?
How does model handle new entrants?	Does model allow for geographic migration of new graduates and actively practicing nurses?

Why don't models agree (2)?

On the supply side alone, there are many reasons for differences…

Model Attributes	Potential sources of differences
How is FTE calculated?	Total hours worked? In patient care? How is productivity measured?
How are specialties modeled?	Is S/D modeled by specialty?
How are employment settings modeled?	Does model distinguish between hospital inpatient, outpatient and ambulatory care?
How does the model handle uncertainty?	Does model have confidence intervals? "What if" scenarios?
Data sources	National or state level data? Survey or licensure data?
Modeling approach	Per population trend, stock and flow, microsimulation, system dynamics

A Case Study: Analysis of CPS data shows hospital employment on the rise

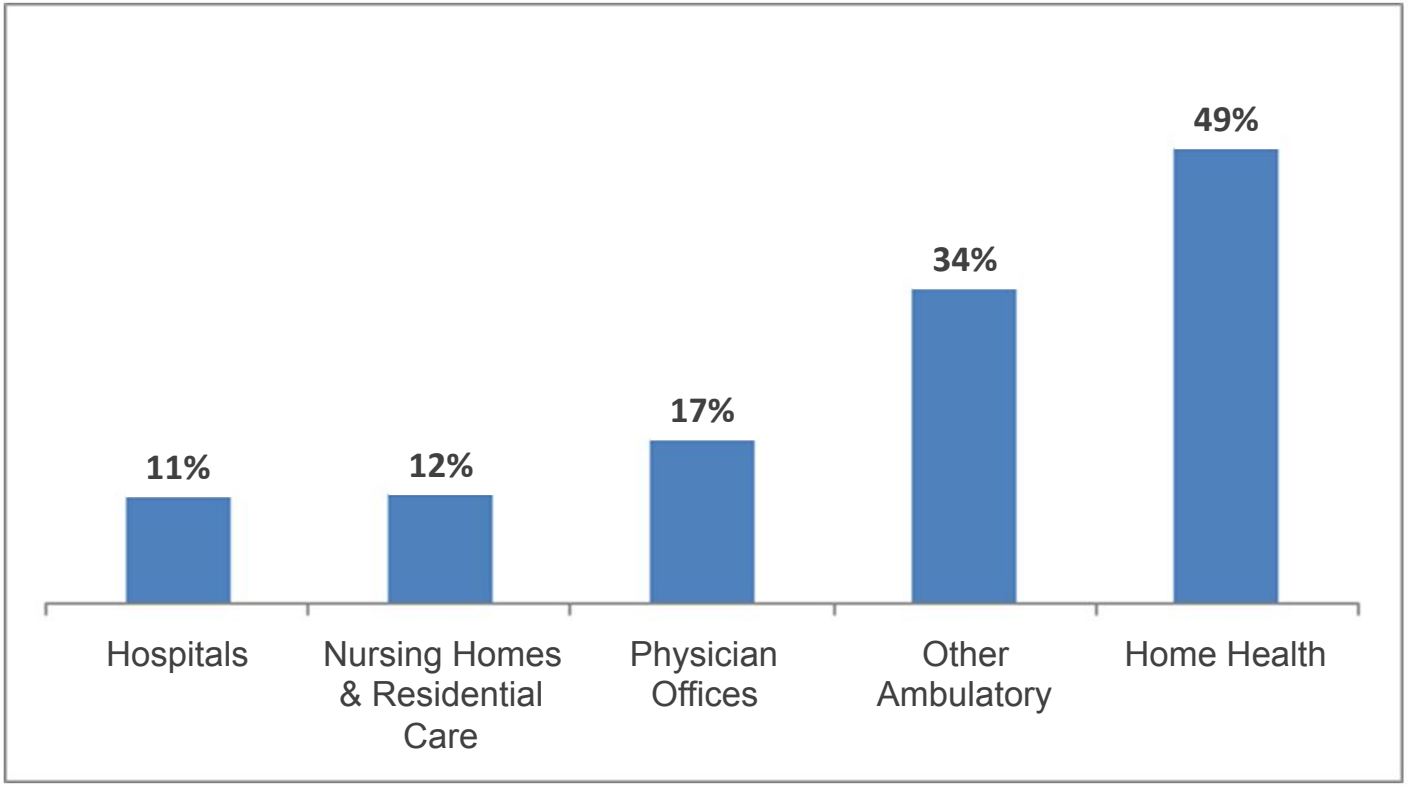


Hospital employment
"edged up by about 26,000 FTE RNs during the 1st quarter of 2017"

Source: Auerbach D, Buerhaus P, Skinner L, Staiger D. First Quarter 2017 RN Quarterly Employment Data Brief. Center for Interdisciplinary Health Workforce Studies. May 2, 2017. http://healthworkforcestudies.com/publications-data/2017-first-quarter-rn-employment-data.html.

Yet CES data show fastest job growth is in ambulatory care and home health

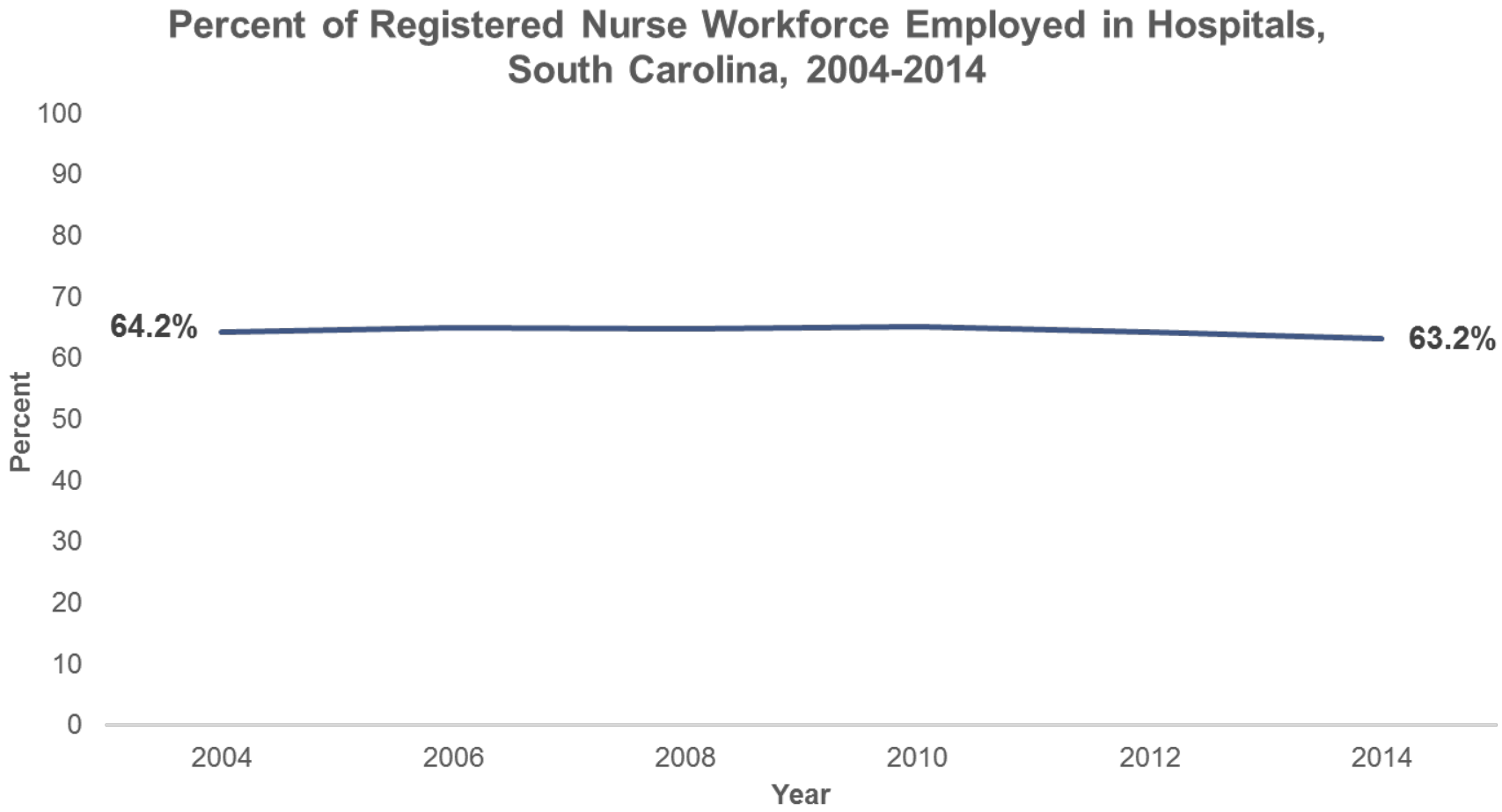
Exhibit 1: Health Care Job Growth by Setting: December 2007–January 2017



Source: Authors' analysis of BLS Current Employment Statistics data.

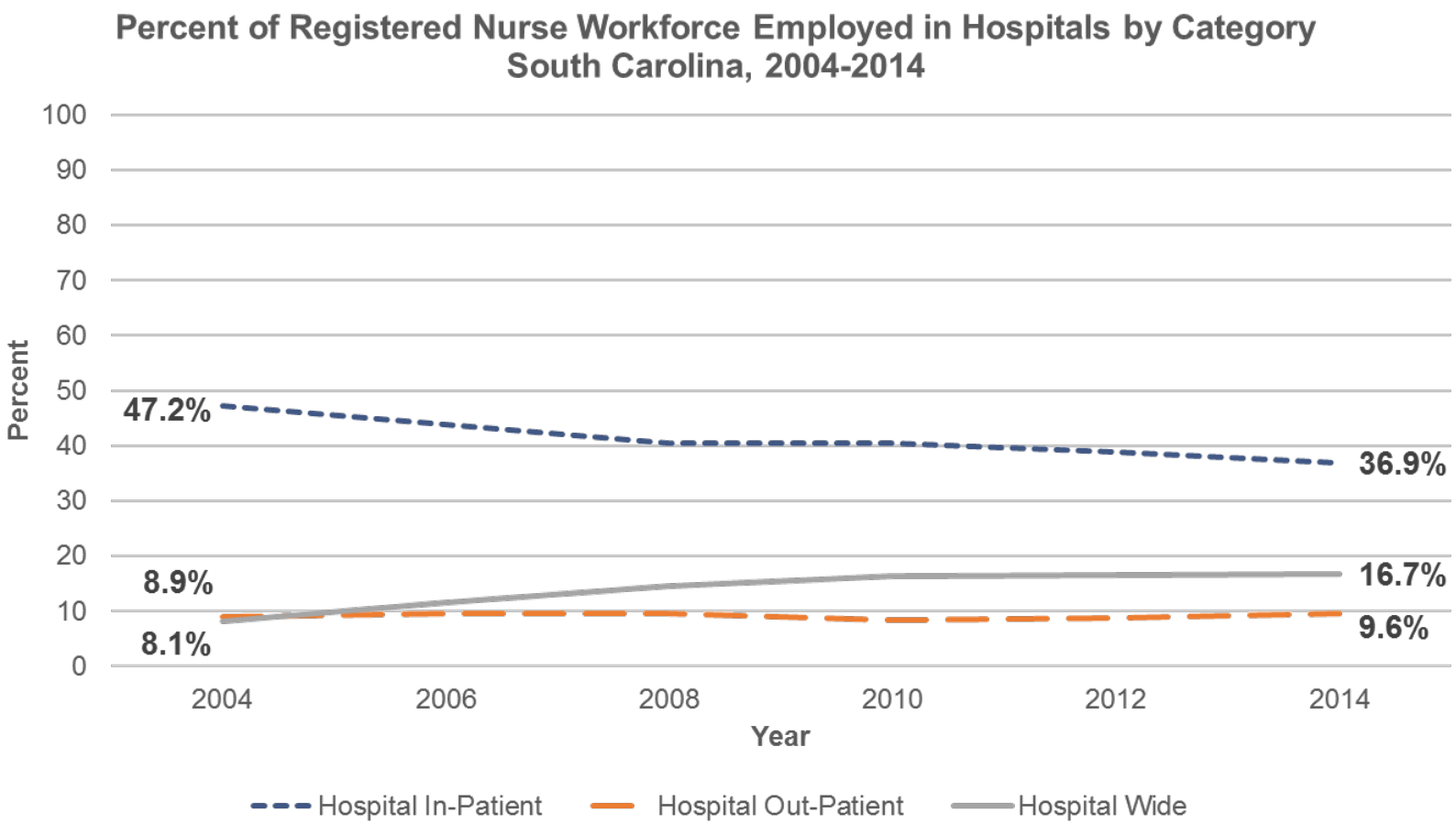
Source: Turner A, Roehrig C, Hempstead K. What's Behind 2.5 Million New Health Jobs? *Health Affairs* Blog. March 17, 2017.
http://healthaffairs.org/blog/2017/03/17/whats-behind-2-5-million-new-health-jobs/

South Carolina's state-level licensure data show steady hospital employment



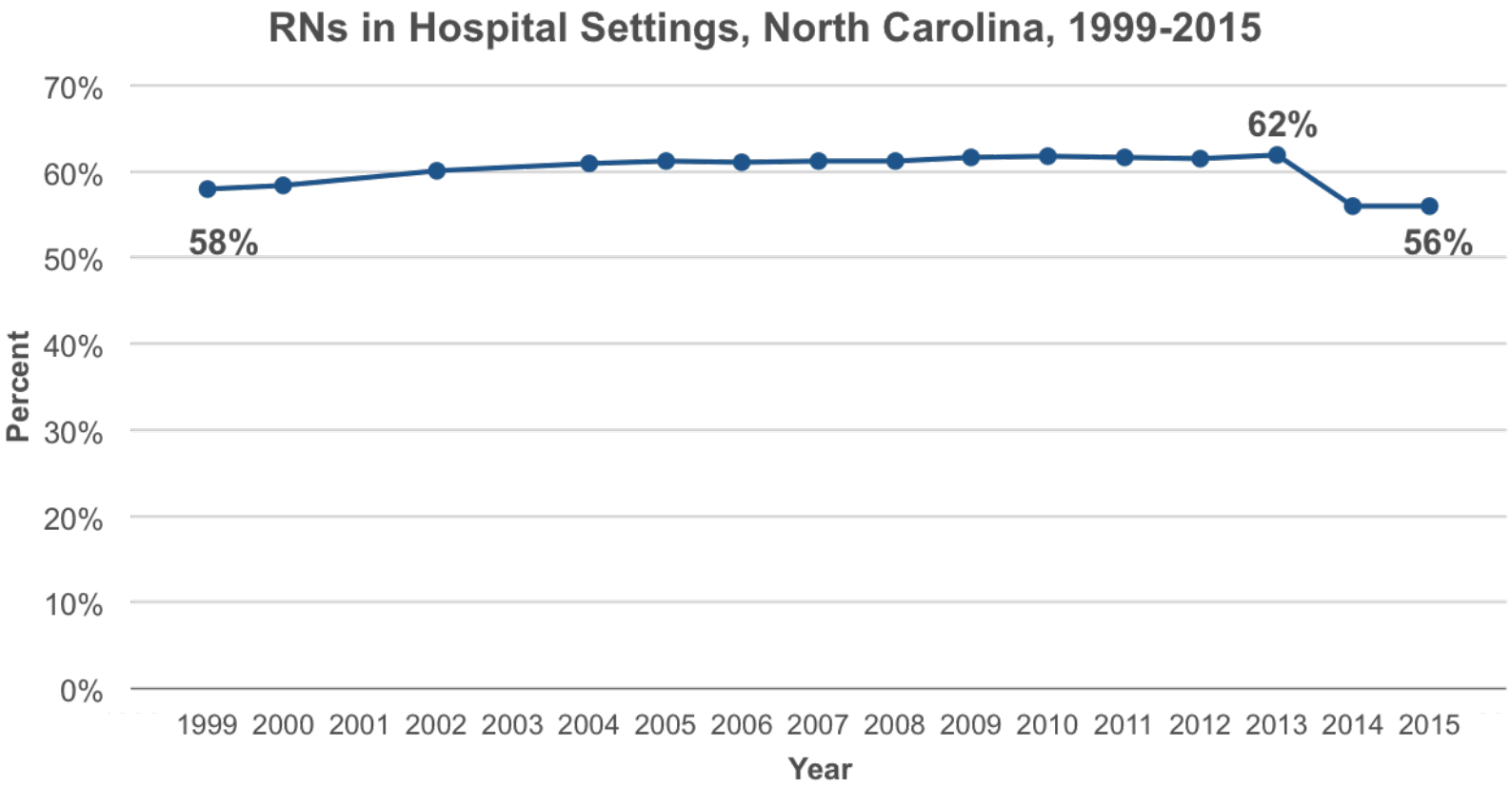
Source: SC Office for Healthcare Workforce, RNs active in the South Carolina workforce based on self-reported employment information provided during the biennial license renewal period, years 2004 – 2014.

But percent working inpatient decreased, while "hospital-wide" roles increased



Source: SC Office for Healthcare Workforce, RNs active in the South Carolina workforce based on self-reported employment information provided during the biennial license renewal period, years 2004 – 2014.

Meanwhile in NC (where the bbq is better), looks like nurses are exiting hospital employment



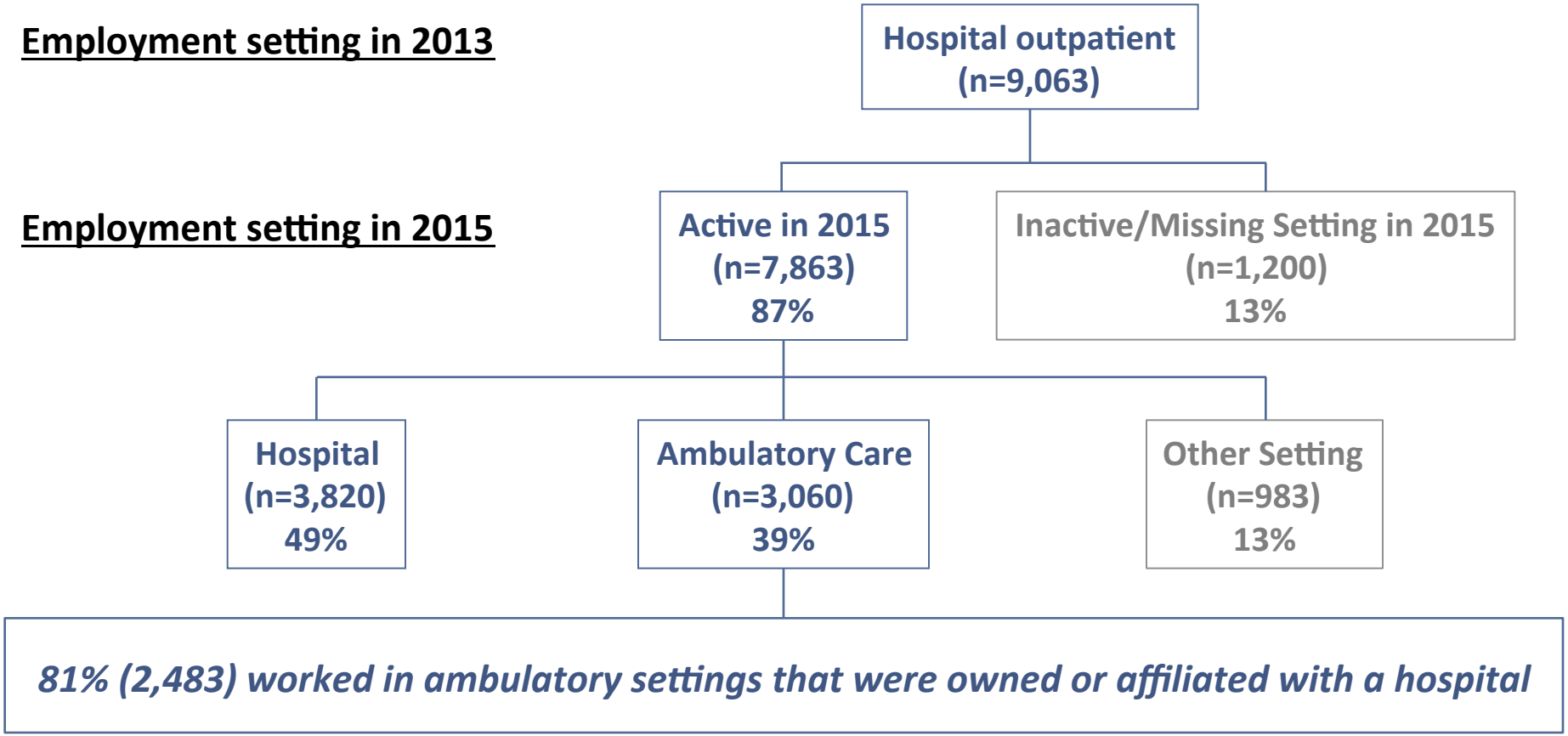
Note: Data include active, instate RNs licensed in North Carolina as of October 31 of the respective year.
Source: NC Health Professions Data System, with data derived from the NC Board of Nursing, 1999-2015.
Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

But that's because the NC Board of Nursing changed data collection methods to match the NCSBN's Nursys Minimum Data Set

Employment Settings, North Carolina

2006 – 2013	2014 – 2015
1. **Hospital in-patient**	1. **Hospital**
2. **Hospital out-patient**	2. **Ambulatory care**
3. Long term care	3. Public Health
4. Medical practice	4. Occupational Health
5. HMO/insurance	5. Insurance
6. Home care/hospice	6. Nursing home, assisted living
7. Health department/public clinic	7. Home health/hospice
8. **Mental health facility**	8. Academia
9. Student health	9. Correctional facility
10. Industry/manufacturing	10. School health
11. Private duty	11. Other
12. School of nursing/medicine	12. Community Health
13. Other	13. Policy/Regulatory Licensing

Change highlights confusion about how nurses working in hospital outpatient settings report setting



Note: Data include active, instate RNs licensed in North Carolina as of October 31, 2013 and 2015.
Source: NC Health Professions Data System, with data derived from the NC Board of Nursing, 2013 and 2015.
Produced by: Program on Health Workforce Research and Policy, Cecil G. Sheps Center for Health Services Research, University of North Carolina at Chapel Hill.

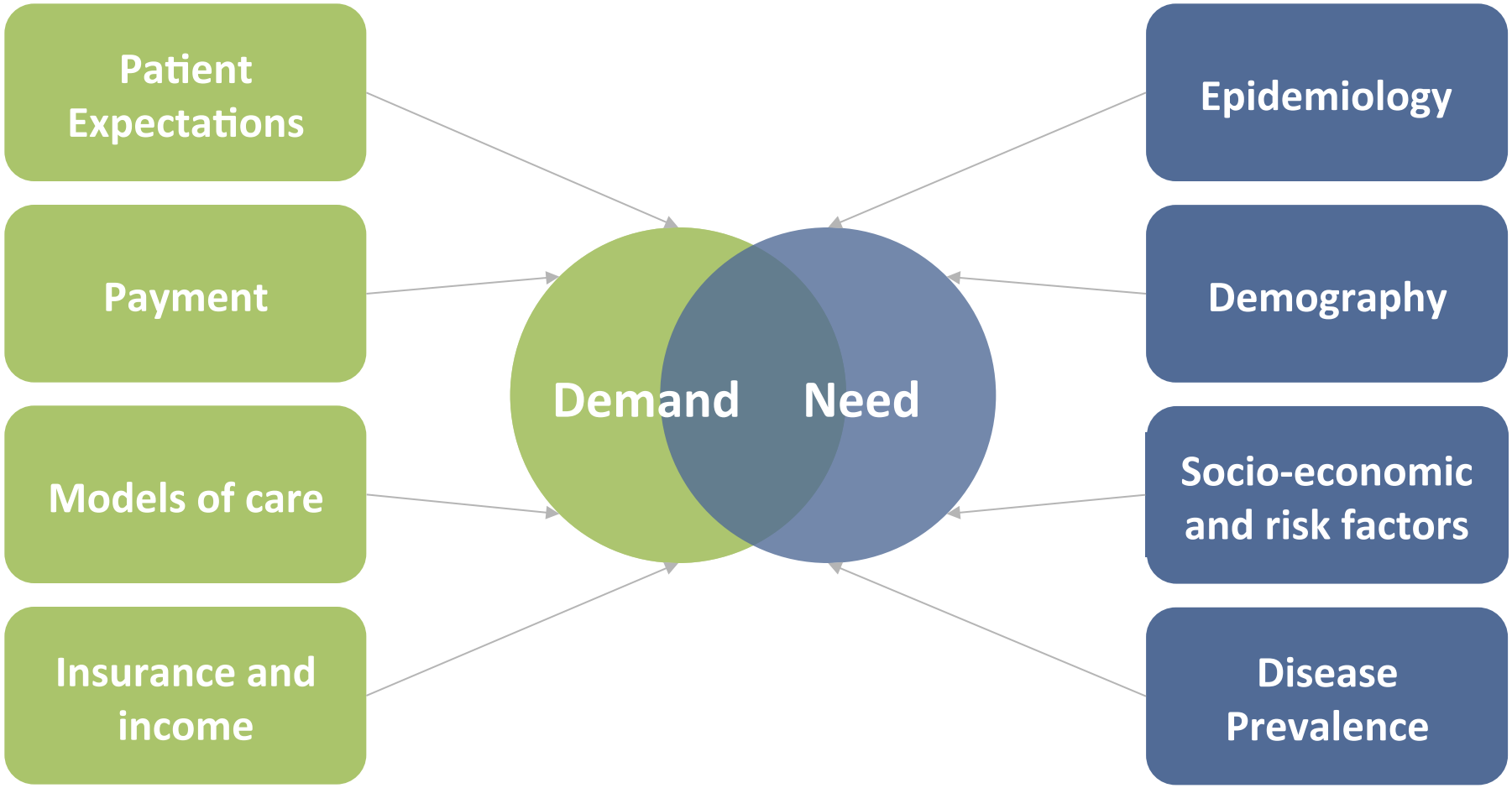
But why do we care about collecting data on setting? What are we trying to understand?

- **Employment setting**—so we can forecast demand in different settings?
- **Patient population**—so we can understand specialties needed to deliver services?
- **Content of care**—so we can quantify how nursing roles are changing?
- **Employer**—so we can understand how practice ownership might affect nurse deployment?

But where is the patient in all this?

(hold that thought… we're going to get there)

And if you thought that was confusing, what about modeling demand?



We model utilization based on historical patterns, need better "real time" data

To help us understand changes in:

- **Demand in different settings** — is demand in ambulatory settings increasing?
- **Demand in different specialties** — is demand greater in some practice areas (ICU, ER, L&D and OR)?
- **Demand in different geographies** — is demand higher in certain geographic areas?
- **Roles for nurses** — how are roles changing?

Better engagement with employers is needed to inform our modeling efforts

To help us understand changes in:

- **Retention in workforce** — attrition of new nurses seems to be on the rise
- **Hours worked** — do millennials have different labor force participation rates?
- **Substitution** — how is deployment of MAs, LPNs, RNs, APRNs, physicians, social workers changing?
- **Effect of payment policy** — how are nurses employed under different payment models?

Maybe we need more sociologists engaged in workforce modeling?

"THE only function of economic forecasting is to make astrology look respectable."

—John Kenneth Galbraith

Perhaps the modeling field needs more sociologists to infuse new conceptual models and analytic approaches?

For Example:

The life course model emphasizes that individuals, institutions and social structures ***change over time*** *and that human lives are embedded in* ***specific historical times*** *and* ***places*** *that shape their content, pattern and direction.*

Glen H. Elder Jr, "The Life Course and Human Development: Contributions, Challenges, and New Directions", April 7, 2006

Life Course Theory: A lens for examining nursing careers

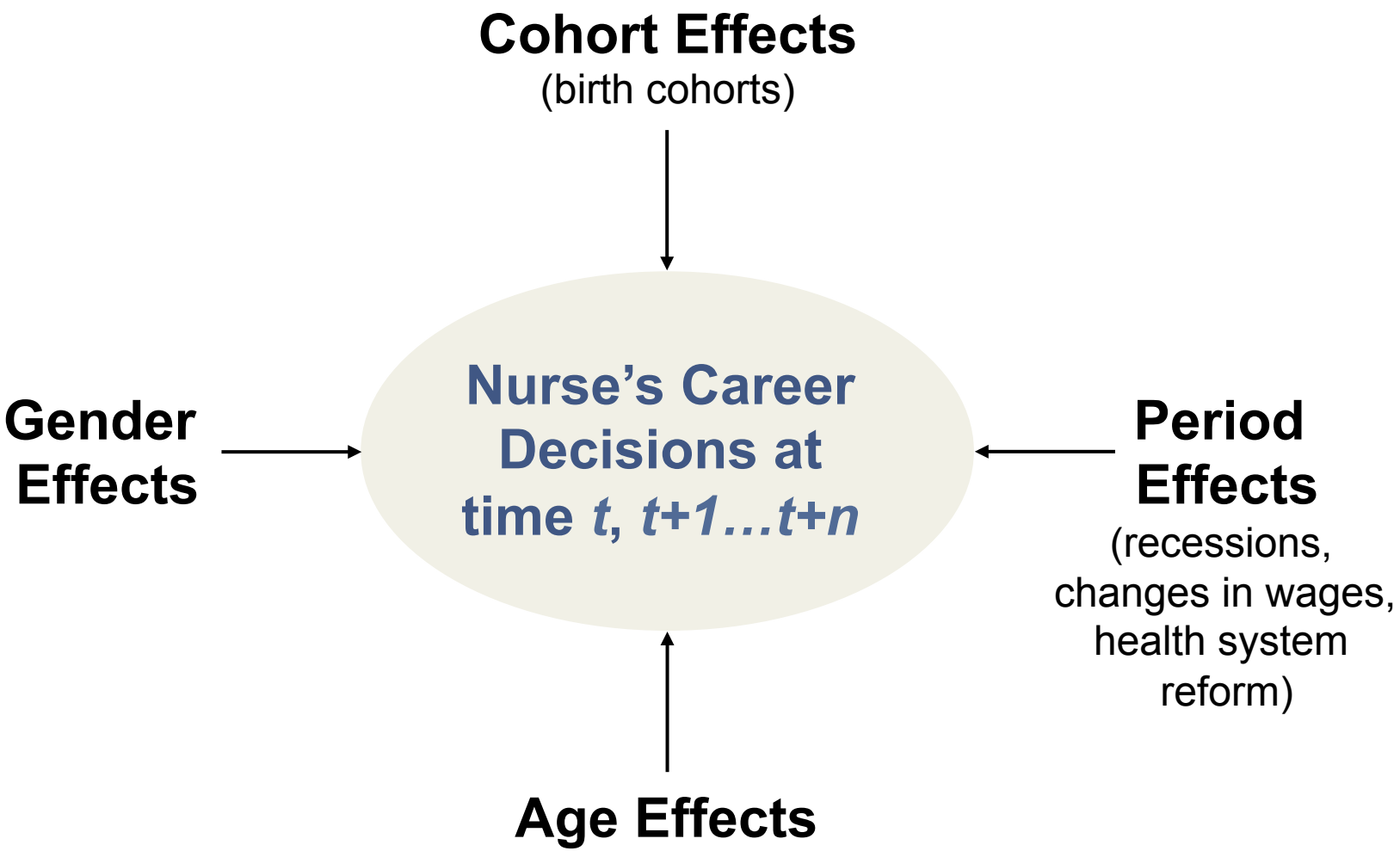
Life course methodologies could be used to capture dynamic forces shaping nursing careers:

1. **Longitudinal** analyses that characterize how individual nurses' careers unfold over time

2. A better understanding of how nurses' career decisions are "a joint function of the characteristics of **the person and the environment**"[1]

3. More **temporally sensitive analyses** that investigate the interaction of period, age, gender and cohort effects on career decisions.

Conceptual Model: Factors influencing nurses' career decisions



Nurses in different cohorts and career stages affected differentially by period effects

- Health care system and social structures have undergone dramatic change
- Economic "shocks" have large impact on nursing workforce
- Need to identify relationship between nurses' career decisions and the changing **context** of health care, social structures and care delivery/payment models
- Will uncover "a path whose twists and turns are a result of the complex interactions between a 'minded self' and the environment."[2]

[2] Clausen JA (1998). "Life Reviews and Life Stories" pgs 189-212, in *Methods of Life Course Research: Qualitative and Quantitative Approaches.* Janet Z. Giele and Glen H. Elder (eds), Thousand Oaks, CA: Sage.

Methodological approaches

- Requires longitudinal, panel data
- Create nurse-specific career histories to illuminate the dynamic nature of transitions into and out of various states
  - Activity status, hours worked, position type, changes in employment setting, specialty, educational progression, geographic migration, etc.
- Work by Kovner & Brewer and Auerbach, Buerhaus & Staiger has begun to do this but more work needed

If you build it (a model), will they come?

I've learned the hard way:
the answer is NO!

Image from JoeyBLS at en.wikipedia

We built a Mazzerati that no one knew how to drive

- In July 2014, launched interactive, web-based physician model
- Allows users to customize national, state and substate views of supply, utilization and shortage
- Lots of hits (by consultants and health systems) but didn't reach policy audience
- Now releasing series of policy briefs

FutureDocs: Nation has Enough Physicians to Meet the Nation's Overall Needs – For Now. Distribution to Worsen

Issue Brief 1# : April 26, 2017

Emily K. Tierney, Thomas C. Ricketts, Andy Knapton, Erin P. Fraher

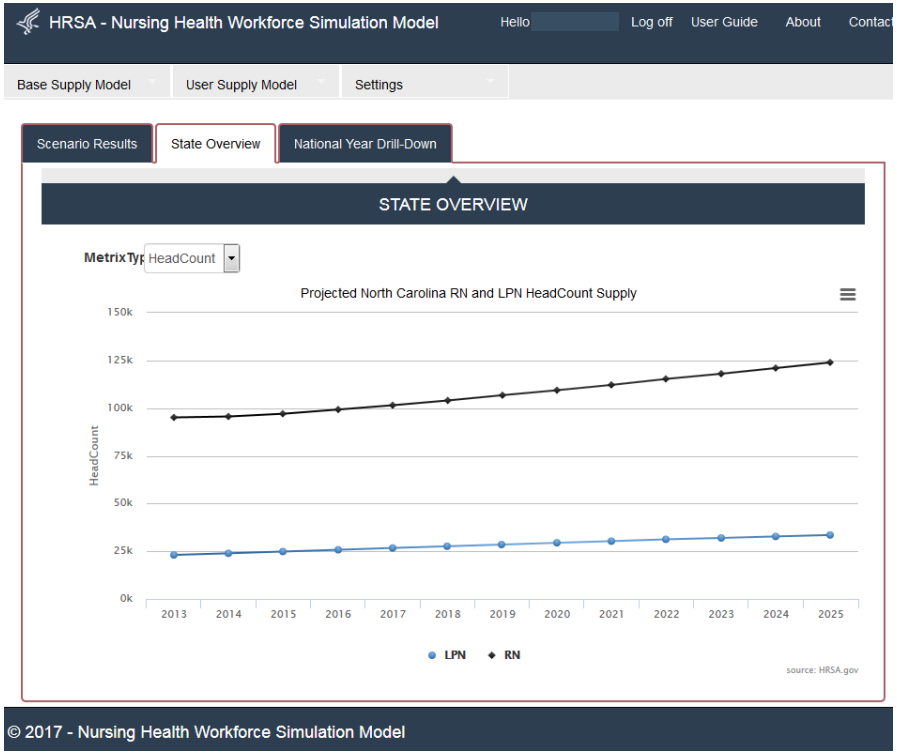
As the US healthcare system grapples with uncertainty over the future of the *Affordable Care Act*, the demand for health care services will continue to grow. Debate continues over whether there is an adequate supply of physicians to meet the current demand for healthcare services, and how the balance of demand and supply may change in the future due to new payment and care delivery models. The Association of American Medical Colleges (AAMC) forecasts a shortage of 40,800 to 104,900 physicians by 2030[1], while a 2014 Institute of Medicine (IOM) report on the physician workforce and graduate medical education (GME) finds no shortage, but a maldistribution of physicians both geographically and by specialty[2]. A *New York Times* article emphasized that geographic distribution may be the more important challenge, suggesting that better deployment of nurse practitioners (NPs) and physician assistants (PAs) and use of new technology could increase efficiency, freeing up physicians to see more patients[3]. This *Brief* uses data from the FutureDocs Forecasting Tool (FDFT) to assess whether the supply and distribution of physicians in the United States will be sufficient to meet the future demand for healthcare services.

FutureDocs Forecasting Tool

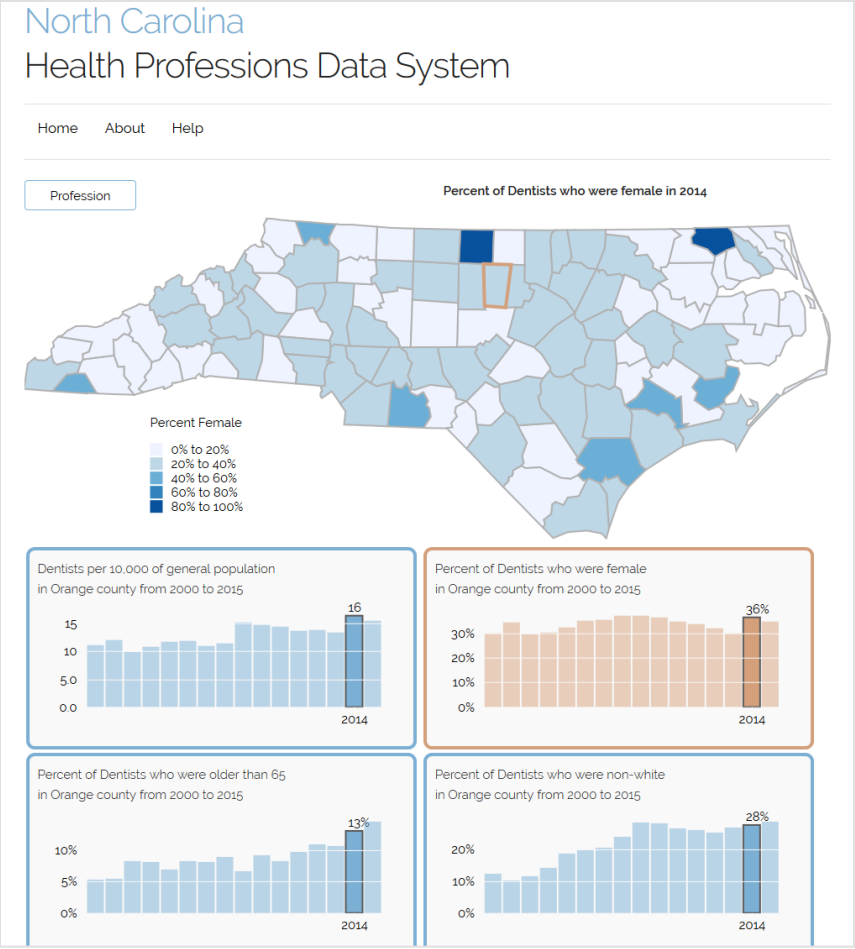
The Cecil G. Sheps Center for Health Services Research at The University of North Carolina-Chapel Hill (UNC-CH) and the Physicians Foundation developed an innovative tool to help policy makers, physicians and health systems plan for what type of practitioners will be needed to meet the growing utilization of healthcare in the United States. The FutureDocs Forecasting Tool is an interactive, user-friendly, web-based model that estimates the supply of physicians, use of physician services, and capacity of the physician workforce to meet future use of health services at the sub-state, state and national levels from 2013 to 2030. The tool provides much needed evidence to guide healthcare workforce policy by providing customizable scenarios and visualizations.

http://www.shepscenter.unc.edu/wp-content/uploads/2017/04/FutureDocs_IssueBrief1_April2017.pdf

Field is moving toward greater use of data visualization tools



https://webnursingmodel.hrsa.gov/



nchealthworkforce.sirs.unc.edu

But even sexy visualizations require messaging

Messaging findings requires courage and savvy because models sometimes:

- reveal "uncomfortable truths"
- highlight inequities
- highlight uncertainty about future
- run counter to advocacy agendas

At their best, models challenge status quo, create new knowledge, spur policy action and disrupt the prevailing narrative

Here's one of my favorites, challenging the "jaws of death"

The NEW ENGLAND JOURNAL of MEDICINE

Perspective

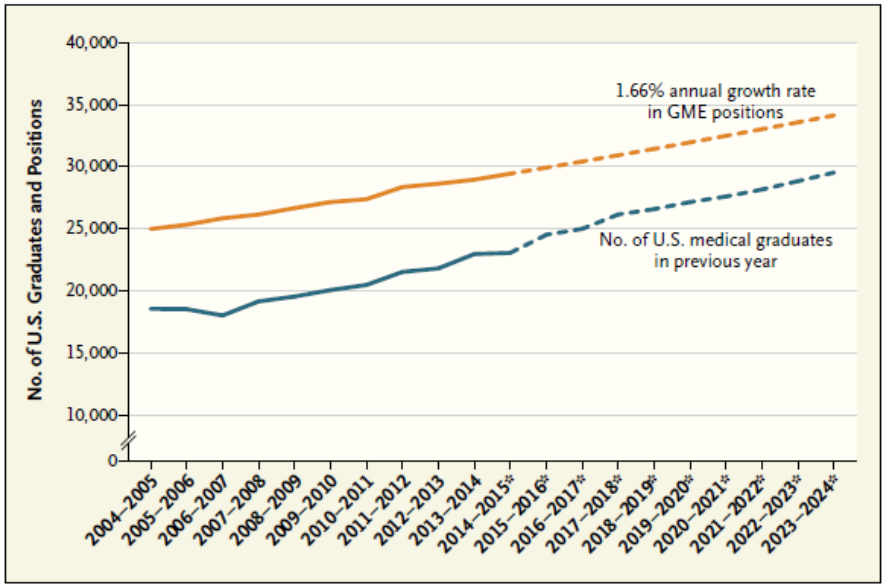
Why a GME Squeeze Is Unlikely

Fitzhugh Mullan, M.D., Edward Salsberg, M.P.A., and Katie Weider, M.P.H.

Between 2002 and 2014, a total of 16 new allopathic and 15 new osteopathic medical schools opened in the United States and many existing schools increased their class sizes,[1,2] for an estimated 49% increase in first-year enrollment nationwide. This explosion in the number of medical students after a long period of level numbers of graduates has raised concerns about the adequacy of the U.S. system of graduate medical education (GME) to provide residency positions for all U.S. medical school graduates. Apprehension about the availability of GME positions is also fueled by the cap on Medicare-funded residency positions, which has been in place since 1997. The specter of insufficient residency slots for U.S. graduates, which would leave some of them unable to obtain licenses to practice medicine, is troubling. What does past growth in numbers of both medical school graduates and residency positions in fact tell us about the future adequacy of GME positions?

Traditionally, there have been many more entry-level positions available than there have been U.S. medical graduates (M.D. and D.O.) to fill them. Large numbers of graduates from international medical schools (international medical graduates, or IMGs) also compete for positions; they include U.S. citizens who study abroad as well as foreign nationals. According to our analysis of data from the Accreditation Council for Graduate Medical Education (ACGME), the Association of American Medical Colleges (AAMC), and the American Association of Colleges of Osteopathic Medicine (AACOM), between 2004–2005 and 2013–2014, the number of filled entry-level GME positions grew from 24,982 to 28,962, an increase of 3980 positions, or a 1.66% annual rate of growth. During the same period, the number of U.S. graduates with M.D. and D.O. degrees grew from 18,542 to 22,960, an increase of 4418, or a 2.40% annual growth rate. According to the ACGME, there were 6846 entry-level positions filled by IMGs in 2014–2015.

Assuming that the number of GME positions will continue to grow for the next 10 years at the same rate as it has over the past decade, there will be about 34,000 positions available for first-year



Actual and Projected Growth in Numbers of U.S. Medical School Graduates and Graduate Medical Education (GME) Entrants, Based on 1.66% Annual Growth in GME Positions.
Asterisks indicate projections. Data are from the ACGME, the AAMC, and the AACOM.

Source: Mullan F, Salsberg E, Weider K. Why a GME Squeeze Is Unlikely. *NEJM.* Online First, November 4, 201510.1056/NEJMp1511707. http://www.nejm.org/doi/pdf/10.1056/NEJMp1511707, accessed 11/20/15.

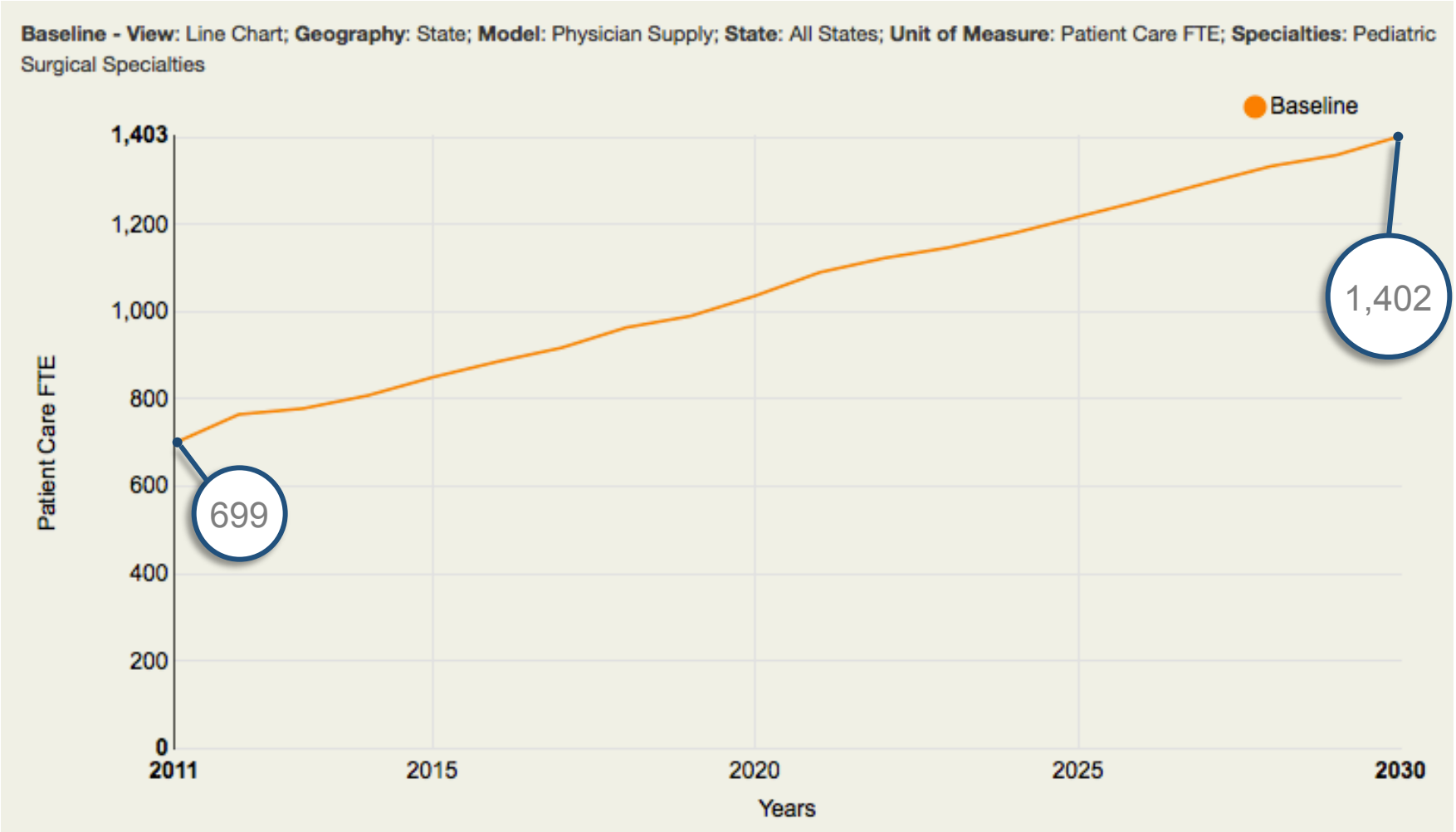
Modelers need to engage clinicians to help with interpretation and messaging

Clinicians are critical to:

- Identify when data don't smell right
- Give input on analysis plan
- Develop "what if" scenarios that reflect best guesses about future models of care
- Help interpret model findings in "real world" context

Actually use model findings to implement change

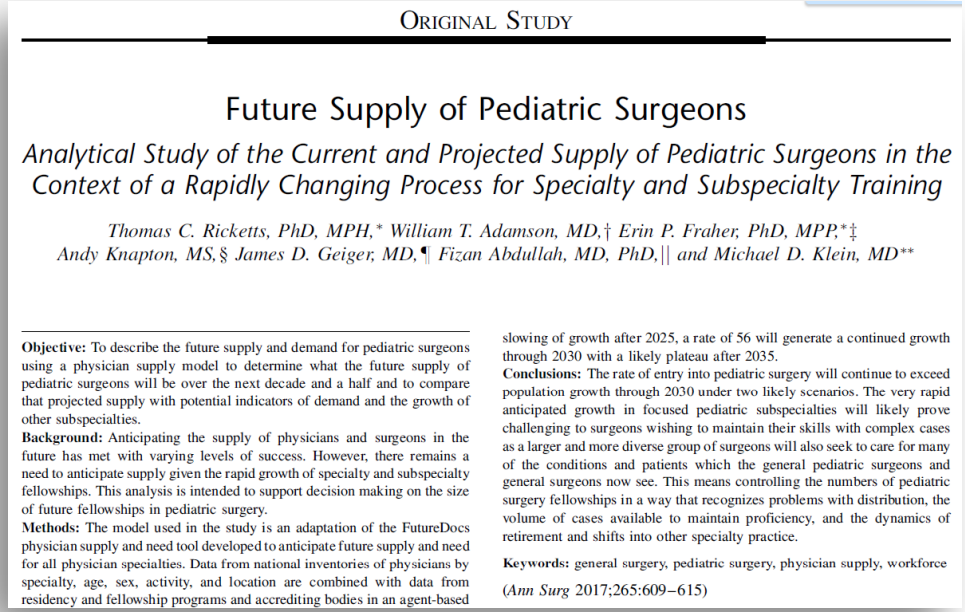
Example: Our model projected that pediatric surgical FTEs would double between 2011 and 2013



Source: FutureDocs Forecasting Tool, Program on Health Workforce Research and Policy, Sheps Center for Health Services Research, UNC-CH. https://www2.shepscenter.unc.edu/workforce/

Worked with American Pediatric Surgical Association to interpret meaning of findings

- Likely oversupply of pediatric surgeons means there would not be volume of cases needed to train new residents and maintain skills of existing surgeons
- Recommended decreasing number of ped surgery fellowships
- And shift in focus to geographic imbalances



ORIGINAL STUDY

Future Supply of Pediatric Surgeons

Analytical Study of the Current and Projected Supply of Pediatric Surgeons in the Context of a Rapidly Changing Process for Specialty and Subspecialty Training

Thomas C. Ricketts, PhD, MPH, William T. Adamson, MD,† Erin P. Fraher, PhD, MPP,*‡ Andy Knapton, MS,§ James D. Geiger, MD,¶ Fizan Abdullah, MD, PhD,|| and Michael D. Klein, MD***

Objective: To describe the future supply and demand for pediatric surgeons using a physician supply model to determine what the future supply of pediatric surgeons will be over the next decade and a half and to compare that projected supply with potential indicators of demand and the growth of other subspecialties.

Background: Anticipating the supply of physicians and surgeons in the future has met with varying levels of success. However, there remains a need to anticipate supply given the rapid growth of specialty and subspecialty fellowships. This analysis is intended to support decision making on the size of future fellowships in pediatric surgery.

Methods: The model used in the study is an adaptation of the FutureDocs physician supply and need tool developed to anticipate future supply and need for all physician specialties. Data from national inventories of physicians by specialty, age, sex, activity, and location are combined with data from residency and fellowship programs and accrediting bodies in an agent-based

slowing of growth after 2025, a rate of 56 will generate a continued growth through 2030 with a likely plateau after 2035.

Conclusions: The rate of entry into pediatric surgery will continue to exceed population growth through 2030 under two likely scenarios. The very rapid anticipated growth in focused pediatric subspecialties will likely prove challenging to surgeons wishing to maintain their skills with complex cases as a larger and more diverse group of surgeons will also seek to care for many of the conditions and patients which the general pediatric surgeons and general surgeons now see. This means controlling the numbers of pediatric surgery fellowships in a way that recognizes problems with distribution, the volume of cases available to maintain proficiency, and the dynamics of retirement and shifts into other specialty practice.

Keywords: general surgery, pediatric surgery, physician supply, workforce

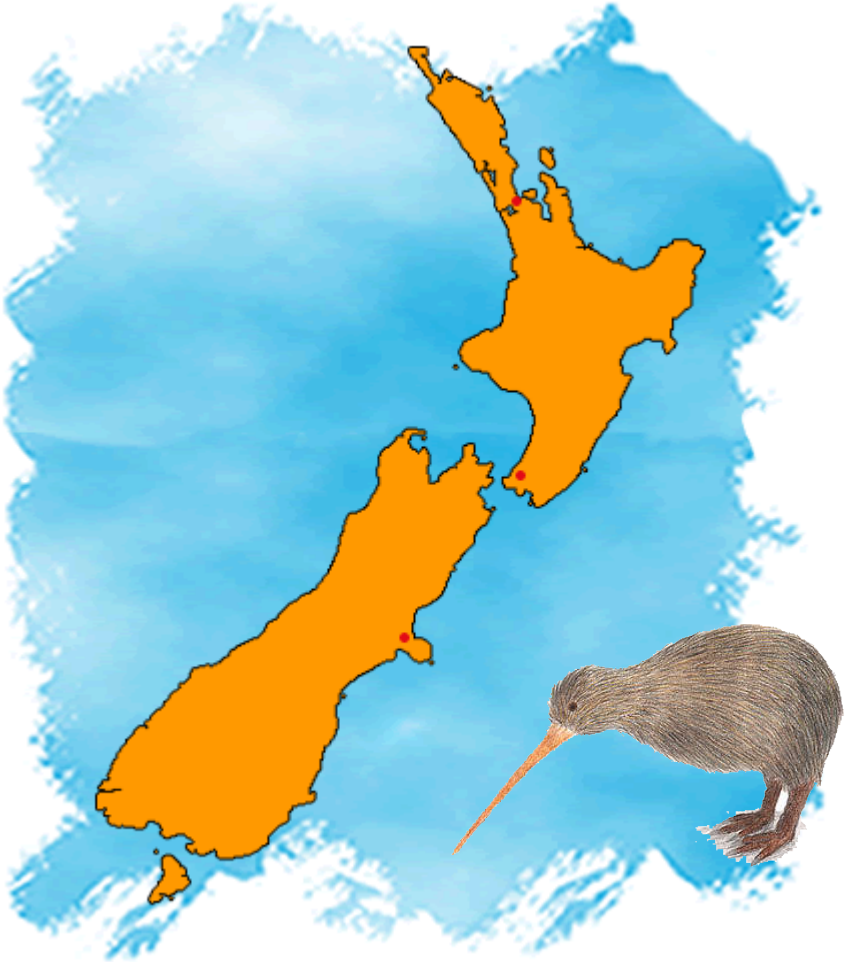
(*Ann Surg* 2017;265:609–615)

Ricketts TC, Adamson WT, Fraher EP, Knapton A, Geiger JD, Abdullah F, Klein MD. Future Supply of Pediatric Surgeons: Analytical Study of the Current and Projected Supply of Pediatric Surgeons in the Context of a Rapidly Changing Process for Specialty and Subspecialty Training. *Ann Surg*. 2017:265;609-615.

Other things I've learned from modeling physicians

- We tried to ask a different question: what services will patients need versus how many doctors will we need?
  - ***People still asked us "how many doctors will we need?"***
- We sought to develop a tool, not an answer
  - ***People wanted an answer***
- Developed plasticity matrix to map services provided by physicians, NPs and PAs to patients' visits
  - ***(Some) people have allergic reactions to talk of substitution***
- Our model found overall supply sufficient, major issues of distribution by specialty and geography
  - ***People, especially the press, like shortage headlines***

So I asked myself, "What Would the Kiwis Do?"



http://inspiredbyaustralasia.co.uk/maps.htm

New Zealand Stats:

4.6 million people

71% European
15% Maori
12% Pacific peoples

Life expectancy

81.6 years (US 78.8)

Health costs:

9.4% of GDP (US 17%)

Nurses per 10K pop

108 (US 86)

Public funds as % of total health expenditures:

80% (US 49%)

Annual physician visits per pop

3.7 (US 4.0)

Health workforce challenges in New Zealand (sound familiar?)

- Current health workforce:
  - not sustainable
  - less productive than in past
  - too many workers not practicing anywhere near top of scope of practice
  - not meeting quality outcomes
  - poorly distributed against need
  - large proportion of workforce nearing retirement
- Primary care, mental health, oral health, and rehabilitation systems "not up to scratch"

New Zealand's Approach: The Workforce Service Forecast (WSF)

- NZ asks "**What are patient's needs for care and how might health professional roles, regulation, education and practice be redesigned to meet those needs?**"
- Goal of WSFs: envision workforce needed to meet doubling of demand, with 15% increase in funding, maintaining (or improving) patient satisfaction
- Approach encourages outside-the-box thinking about what care pathways and workforce *should be*
- Instead of retrofitting care delivery models to meet the competencies and roles of the existing workforce

Health Workforce New Zealand's Workforce Service Forecasts

Health service areas

- Aged Care
- Anesthesia workforce
- Dermatology
- Diabetes
- Eye health
- Gastroenterology
- Mental health
- Musculoskeletal
- Palliative care
- Plastic surgery
- Rehabilitation

Populations

- Youth health
- Maori health
- Pacific health
- Mothers, fathers and babies

How NZ is Addressing Workforce Challenges: *Clinician-Led Change*

- Transforms from ground up, rather than top down
- Asks clinicians to design ideal patient pathways by disease area and identify changes that enable new models of care
- Making it personal: "How should we care for Aunt Susie with dementia?"
- Engaging "coalitions of the willing" to overcome professional resistance and "tribalism"

How NZ is Addressing Workforce Challenges: *Engaging Employers*

- Are new grads ready for practice?
- Where are biggest skill gaps and in which professions?
- What curriculum changes are needed for future?
- What new or retooled workforce is needed to avoid readmissions and integrate health and social care?
- In what professions, and for which areas of patient care, is the workforce over- and under-skilled?

How a focus on patients' needs has enabled NZ to redesign nursing roles

NZ has enhanced role for RNs (not just APRNs)

- Visited practice with 17,000 patients, 10 RNs, 10 GP FTEs, and 1 Health Care Assistant (think MA)
- RNs run clinics—wound care, cervical screening, immunizations, removal of lesions, etc. "Duty nurse" handles acute cases and sees patients with chest pains, asthma and broken limbs. RNs refer and collaborate, as needed, with GP.
- Since 2011, diabetes nurse prescribers have been in practice. Evaluations show good outcomes.
- As of 20 September 2016, prescribing authority extends beyond diabetes nurses to RNs working in primary health and specialty teams (already in place in the UK and Ireland)

Taking a more pragmatic, and less academic, approach to modeling

- Patient-centered, not profession-centered
- Workforce planning within defined budget
- Planning for a workforce for health, not a health workforce
- Modeling findings need to be directly connected to employers, educators, regulators, payers and clinicians

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