

## Strategic modeling of the neonatal nurse practitioner workforce

Greggory J. Schell, PhD<sup>a,\*</sup>, Mariel S. Lavieri, PhD<sup>b</sup>, Filip Jankovic, BSE<sup>b</sup>, Xiang Li, BSE<sup>b</sup>, Alejandro Toriello, PhD<sup>c</sup>, Kristy K. Martyn, PhD, RN, CPNP-PC<sup>d</sup>, Gary L. Freed, MD, MPH<sup>e</sup>

<sup>a</sup> Center for Naval Analyses, Arlington, VA

<sup>b</sup> Department of Industrial and Operations Engineering, University of Michigan, Ann Arbor, MI

<sup>c</sup> School of Industrial and Systems Engineering, Georgia Institute of Technology, Atlanta, GA

<sup>d</sup> School of Nursing, Emory University, Atlanta, GA

<sup>e</sup> Child Health Evaluation and Research Unit, University of Michigan, Ann Arbor, MI

### ARTICLE INFO

#### Article history:

Received 11 October 2015

Revised 19 March 2016

Accepted 24 March 2016

Available online 1 April 2016

#### Keywords:

Workforce

Neonatal nurse practitioner

### ABSTRACT

**Background:** Neonatal nurse practitioners (NNPs) play a vital role in the medical care of newborns and infants. There is expected to be a shortage of NNPs in the near future.

**Purpose:** To assess the present NNP workforce and study the impact of potential policy changes to alleviate forecasted shortages.

**Methods:** We modeled the education and workforce system for NNPs. Forecasting models were combined with optimal decision-making to derive best-case scenario admission levels for graduate and undergraduate programs.

**Discussion:** Under the best-case scenario for the current system, the shortage of NNPs is expected to last 10 years. We analyzed the impact of improving the certification examination passing rate, increasing the annual growth rate of master's programs, and reducing the workforce annual attrition rate. We found that policy changes may reduce the forecasted shortage to 4 years.

**Conclusion:** Present forecasts of demand for NNPs indicate that the existing workforce and education system will be unable to satisfy the growing demand. Policy changes may reduce the expected shortage and potentially improve access to care for newborns and infants.

**Cite this article:** Schell, G. J., Lavieri, M. S., Jankovic, F., Li, X., Toriello, A., Martyn, K. K., & Freed, G. L. (2016, AUGUST). Strategic modeling of the neonatal nurse practitioner workforce. *Nursing Outlook*, 64(4), 385–394. <http://dx.doi.org/10.1016/j.outlook.2016.03.007>.

### Introduction

Neonatal nurse practitioners (NNPs) have played a vital role in the medical care of newborns and infants since the inception of the profession in the 1970s (National Association of Neonatal Nurses, 2014b). The neonatal

population cared for by NNPs is not limited to infants in the Neonatal Intensive Care Unit (NICU) but also encompasses those with chronic conditions resulting from prematurity and neonatal pathophysiology (National Association of Neonatal Nurses, 2014a). NNPs provide clinical care to newborns through toddlers of age 2. NNPs can practice in academic and private hospital and clinic

\* Corresponding author: Greggory J. Schell, Center for Naval Analyses, 3003 Washington Blvd, Arlington, VA 22201.

E-mail address: [schellg@umich.edu](mailto:schellg@umich.edu) (G.J. Schell).

0029-6554/\$ - see front matter © 2016 Elsevier Inc. All rights reserved.

<http://dx.doi.org/10.1016/j.outlook.2016.03.007>

settings, primarily those with NICUs. Because of a current shortage of NNPs, exacerbated by recent trends in NNP program graduation rates and NNP demand, the future stability of the NNP workforce has come into question (Timoney & Sansoucie, 2012). The number of NNP education programs and new NNPs entering the practice has been in steady decline over the past several years (Bellini, 2013). This decline has been coupled with an increasing demand for NNPs due to growth in the number of community hospital NICUs (Freed et al., 2010) as well as more preterm births and chronic conditions requiring increased staffing (Honeyfield, 2009), leading to a forecasted shortage of NNPs and casting the sustainability of the NNP workforce into doubt (Reynolds & Bricker, 2007). This forecasted shortage of NNPs may lead to a lower quality of care for the neonatal population (Freed et al., 2010). As an integral part of the NICU team-based care, a shortage of NNPs would reduce the effectiveness of these teams and the ability of NICUs to adequately care for patients (Bellini, 2013; Grumbach & Bodenheimer, 2004). Fewer NNPs would lead to a higher patient to caregiver ratio, which may compromise the quality of care each patient receives. The impact on care may be exacerbated in those clinical settings which already suffer from minimal staffing. Overburdened NNPs can lead to medical mistakes, high stress, and reduced job and workplace satisfaction. The results of overburdened NNPs can lead to higher attrition levels which would compound the shortage of NNPs. The preservation of this important role depends on the mitigation of the shortage, as well as ensuring a sustainable workforce that can meet future demand.

We developed a model for the United States' NNP workforce system (which includes the educational pipeline and currently employed registered nurses [RNs] and NNPs) to better understand the causes and potential solutions to the shortage of NNPs. First, we analyzed the current state of the NNP workforce system to evaluate the magnitude of the forecasted shortage. Next, we investigated the effect that different policy options may have on the size of the future populations of RNs and NNPs. Using this framework, we considered the following key parameters: (a) certification examination pass rate, (b) master's program enrollment growth, and (c) the annual NNP attrition rate. By

evaluating the impact of changes to these parameters on the forecasted NNP shortage, we are able to evaluate national strategies and interventions which could improve the NNP workforce system.

## Methods

A flow model of the workforce system is presented in Figure 1. The workforce was modeled starting with the admission of students into nursing baccalaureate programs, following them through the required two or more years as a RN required for NNP education, and on through master's programs in neonatal nursing. Baccalaureate students were categorized into four categories: traditional part-time students, traditional full-time students, part-time RN-to-baccalaureate students, and full-time RN-to-baccalaureate students. Traditional part-time students require 5 years to complete their degree on admission, traditional full-time students require 4 years, part-time RN-to-baccalaureate students require 2 years, and full-time RN-to-baccalaureate students require 1 year. After receiving the nursing bachelor's degree, the graduated student then enters the RN workforce on passing the RN examination. Employed RNs can exit the workforce after at least 2 years of experience and enroll in an nurse practitioner (NP) master's program. A percentage of the enrolled NP master's students then select NNP as their specialization (i.e., the NNP specialization rate) and become NNP master's students. NNP master's students are categorized into full-time students, who require 2 years to complete their degree and part-time students, who require 3 to 5 years to complete their degree. On receiving their master's degree, the graduated student can enter the NNP workforce after passing the national NNP certification examination in most states. Because the vast majority of states require certification, we used passing the NNP certification examination as a requirement for all newly trained NNPs in our model. Throughout the education and workforce system, the different categories are subject to various rates of attrition, that is, percentage of persons in that category who exit the system each year.

NNP Workforce System Flow Chart

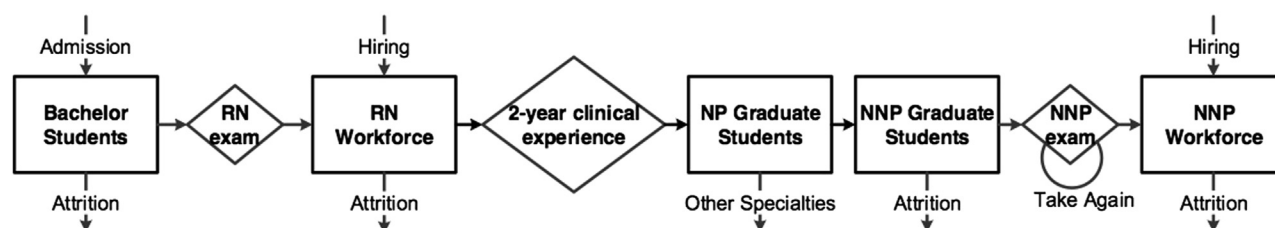


Figure 1 – Attrition is defined as the annual percentage of a stage's population leaving the system, e.g., the annual percentage of nursing baccalaureate students dropping out of the program. NNP, neonatal nurse practitioner; NP, nurse practitioner; RN, registered nurse.

Download English Version:

<https://daneshyari.com/en/article/2678078>

Download Persian Version:

<https://daneshyari.com/article/2678078>

[Daneshyari.com](https://daneshyari.com)