

# A Global SWOT Analysis of Advanced Practice Nursing: Policy, Regulation, and Practice

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## Research

**Keywords:** Advanced practice nursing, nurse practitioner, global health, health policy, nursing, regulation, scope of practice, education.

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# Abstract

**Background:** The advanced practice nursing role has been characterized as task sharing between physicians and nurses, and commonly is a part of national or health system schemes to expand healthcare access and/or to improve efficiencies. However, lack of regulatory uniformity can lead to inconsistent qualifications, competencies, and a limitation of expansion of healthcare services, based on regulated scope of practice.

**Methods:** The SWOT analysis technique (strengths, weaknesses, opportunities, threats) was used to assess the current state of advanced practice nursing worldwide, with specific focus on regulation, education, licensure, and practice. Data were collected broadly from peer reviewed, governmental and regulatory sources, as well as grey literature.

**Results:** Key regulatory elements that frame advanced practice nursing vary significantly by country and region and remain dynamic. However, practice and educational models are outpacing regulatory standards in all six WHO regions. Overall, advanced practice nursing is expanding at an accelerated pace in order to meet population and health system needs, despite weaknesses of the regulatory system, or threats from systems that are not ready to accept innovative strategies.

**Conclusion:** Advanced practice nursing is an innovative role that is progressing broadly in response to the global drivers of an aging population, workforce shortages, the increasing prevalence of non-communicable disease, and the need to develop system-based efficiencies for cost containment. The role is developing organically, driven by local needs, but still lags in terms of the formal regulatory legitimization in many countries. Notably, it is being buoyed by the global movement toward universal health coverage.

## Background

Advanced practice nursing is expanding rapidly around the globe. As defined by the International Council of Nurses (ICN), the advanced practice nurse (APN) is

*is a generalist or specialized nurse who has acquired, through additional graduate education (minimum of a master's degree), the expert knowledge base, complex decision-making skills and clinical competencies for Advanced Nursing Practice, the characteristics of which are shaped by the context in which they are credentialed to practice. The two most commonly identified APN roles are CNS and NP.<sup>1</sup>*

Advanced practice nursing roles are widely implemented across North America, the Caribbean, Europe, the Western Pacific, and are emerging in Africa, the Eastern Mediterranean, Southeast Asia, and South America.<sup>2-3</sup> The role of the nurse practitioner (NP) in particular has been characterized as task shifting or task sharing between physicians and nurses and incorporates broader capacity for leadership, education, and research. It is described as a strategy to expand access in primary care and/or to improve efficiencies in health systems.<sup>1, 4, 5</sup>

However, the regulations that permit this practice vary widely. They may be regulated by diverse types of organizations depending on the national jurisdiction, i.e. central governments, professional organizations, or by individual employers.<sup>6</sup> Lack of regulatory uniformity can lead to inconsistent educational qualifications, competencies, and a limitation of expansion of healthcare services, based on regulated scope of practice. Further, mismatches between professional capabilities and the legal authority to practice can lead to fragmented care delivery based on local exigencies that require professionals to provide services outside of their scope, especially in the Global South.<sup>7</sup> Efforts that seek to address regulatory and legal inconsistencies related to scopes of practice are often slow and fraught with adversity. Incumbent professions who have more resources can overpower emerging roles with more modest means, further complicating regulatory initiatives that seek to remove barriers to care.<sup>8</sup>

In light of the challenges that are posed to nations around the world related to the healthcare workforce in the context of aging populations and increasing rates on non-communicable disease (NCD), it is incumbent on healthcare organizations and governmental bodies to analyze policies that pertain to the nursing workforce in general, and the advanced practice nursing workforce in particular. Therefore, the objective of this analysis is to systematically review global evidence of advanced practice nursing regulation, education, licensure, and practice in order to inform key international policy and governmental stakeholders.

## Methods

Publicly available data was collected from government statutory and regulatory sources, Ministries of Health, national health system websites, international health organizations, national professional associations, peer-reviewed literature, and other grey literature that is available via Google searches. Additional peer-reviewed data was identified via the PubMed and CINAHL search engines using the following keywords: advanced practice nurse (APN), nurse practitioner (NP), mid-level provider, non-physician clinician, nurse prescribing, task shifting, task sharing, APN/NP scope of practice, licensure, title protection, and education. Documents were excluded if they were greater than ten years old, unless they contained original regulatory information or provided historical context. The data includes, but is not limited to, government and organization reports, policy statements, technical reports, working papers, newsletters and conference proceedings.

The analytic process was guided by the SWOT (strengths, weaknesses, opportunities, and threats) technique which provided a framework to organize and analyze the data. Healthcare organizations, in both the public and private sphere, commonly use the SWOT analytical model in order to strategically plan for future initiatives and improvement programs.<sup>9</sup> It provides a clear, concise blueprint of internal and external factors that may benefit or damage an initiative by listing strengths, weaknesses, opportunities, and threats. It also provides a robust foundation for a situation analysis of a national health policy, strategy, or plan, and can inform strategic stakeholders by illuminating both internal and external factors.<sup>10</sup> The geographic parameters were based on the World Health Organization's six world

regions: The Americas, Europe, Africa, Southeast Asia, Eastern Mediterranean, and the Western Pacific. We collected regulatory, practice, and educational data on 54 countries from these six world regions.

## **Summary Results:**

### **1) The Americas** (see Additional File 1\_NA and Additional File 2\_LA)

#### **North America:**

##### **Strengths/opportunities:**

Advanced practice nursing in the US has evolved over the past 50 years. It was largely standardized with the Advanced Practice Registered Nurse (APRN) Consensus Model in 2008.<sup>11</sup> The Consensus Model codified the four roles of Certified Nurse Practitioner (CNP), Certified Nurse Midwife (CNM), Clinical Nurse Specialist (CNS) and Certified Registered Nurse Anesthetist (CRNA). Recommendations were made by the working group which were directed at standardizing legislation, accreditation, certification, and education.<sup>11</sup> As of 2020, nurse practitioners have the statutory authority to practice and prescribe medications in all 50 states and the District of Columbia, with varying levels of practice authority and physician oversight, depending on state law. Twenty two states and the District of Columbia authorize autonomous practice.<sup>12</sup> Current opportunities are based on work force supply, especially in primary care. However, roles that focus on acute care are also common. Medical schools and Physician Assistant (PA) programs have not been able to produce sufficient clinicians based on the need which has largely provided an impetus for growth over the past decade.<sup>13</sup> The expansion of the NP workforce has further been supported by several prominent national organizations and governmental agencies, including the Institute of Medicine, National Governors Association, and the Federal Trade Commission.<sup>14-16</sup>

Canada has two recognized advanced practice nursing roles, the nurse practitioner (NP) and the clinical nurse specialist (CNS). Both roles have existed since the 1970s.<sup>17</sup> The Canadian Nurse Practitioner Initiative and related legislative and regulatory framework provided the impetus for NP role integration into the Canadian healthcare system.<sup>17-18</sup> Provincial and territorial regulatory bodies provide licensure and the NP title is protected nationwide.<sup>19</sup> Nurse practitioners are able to prescribe medication and have been enabled since 2012 to prescribe controlled substances.<sup>20</sup>

##### **Weaknesses/Threats:**

In the US, NPs have not received the same level of financial support that physicians have received from the government, especially in terms of education and training. Physician education in the United States has relied on Graduate Medical Education (GME) funding via the Medicare program and there are only small amounts of federal funding available for NP trainees. Also, generally, faculty are not well paid, and there are substantial faculty shortages.<sup>21,22</sup> In Canada, a variation in the scope of practice exists between the provinces/territories which may cause confusion on the part of the public.<sup>23</sup> Also, variation in NP specializations continues to exist across jurisdictions.<sup>17,19</sup>

## **Latin America/the Caribbean:**

### **Strengths/Opportunities:**

Advanced practice nursing in Latin America has made positive strides over the past decade, despite a number of professional and political challenges. In 2014, the Pan American Health Organization (PAHO) introduced a strategy for universal health coverage which included an increasing interest in implementing the role of the advanced practice nurse.<sup>24</sup> There are now two APN programs in Chile, at the University of the Andes, which offers a Master's program in Adult Acute Care, and at the University del Desarrollo.<sup>3,25</sup>

The Caribbean has experienced a steady development of the NP role over the past two decades. There are currently five nations, Monserrat, Trinidad and Tobago, Belize, St. Lucia, and St. Vincent and Grenadines which have regulations or statutes that authorize nurse practitioner practice as well as the authority to prescribe medicines.<sup>24,26-30</sup> Generally, they practice broadly in primary care settings, except for Belize, where nurse practitioners are only authorized to practice in psychiatric settings.<sup>31</sup>

Jamaica has been a leader in nurse practitioner education and practice since the inception of their first nurse practitioner program at the University of the West Indies in the 1970s.<sup>64</sup> It is currently considering an amendment to the Nurses and Midwives Act which would officially authorize nurse practitioner scope of practice and allow the prescription of medicines.<sup>32</sup> Additionally, Brazil, Mexico, Colombia, and Chile have been in discussions about how to integrate the advanced practice role into their national health systems.<sup>33</sup>

## **2) Europe (see Additional File 3\_Europe)**

### **Strengths/Opportunities:**

Regulation for the APN role is in place for nine of the 23 countries included in the European region: Austria, France, Greece, Hungary, Iceland, Ireland, Israel, the Netherlands and Norway.<sup>2,25,36-41</sup> Most recent developments include a legislative decree in Hungary that provides title protection for NPs in six different specialties; NP in anesthesia, primary care, emergency, acute care, gerontology and perioperative care.<sup>38</sup> In terms of educational directives, APN education at the Master's level is available in ten of the 23 countries including related clinical apprenticeship/residency programs in some countries. Masters level APN education programs are emerging in seven additional European countries.<sup>2,40,42-52</sup>

European advanced practice nurses with Master's level education enjoy title protection in the Netherlands (Dutch language equivalent to Nurse Specialist and NP), in Ireland (Registered Advanced Nurse Practitioner), in Iceland (Specialist Nurse), in France (Advanced Practitioner), and in Hungary (NP). Titles used without title protection include the Advanced Clinical Practitioner/Advanced Nurse Practitioner in the United Kingdom, NP in Israel, Advanced Clinical Nurse Specialist /Nurse Practitioner in Sweden, and APN/APNLC (APN in Lung Cancer) in Switzerland.<sup>2,25,37,38,40,53-55</sup>

Advanced Practice Nursing roles that align with the ICN NP/APN Network's role definition, role characteristics and with independent, advanced clinical activities are well established in Finland, Ireland, the Netherlands, and the United Kingdom (Scotland, Wales and Northern Ireland).<sup>50,51</sup> Other countries have implemented pilot programs or emerging specialty practice roles for APNs. In Southern Germany, APNs are in place within hospital settings, in Switzerland, an APN role in lung cancer care has recently been developed, and in Sweden, the surgical NP role has incorporated many of the activities typically performed only by physicians.<sup>25, 44, 55</sup> The NP role is also being developed in the emergency care context in Norway.<sup>56</sup> Advanced clinical activity roles are emerging in Spain where an Advanced Practice Nursing Competency assessment tool has been recently validated.<sup>49,57</sup> Nurse prescribing has been established in eleven of the 23 European countries included in this SWOT analysis with full prescriptive authority for APNs in place in the Netherlands.<sup>51</sup> In the United Kingdom, Advanced Nurse Practitioners who qualify as non-medical prescribers (NMP) are required to register with the NMP registry and can prescribe without restrictions.<sup>58</sup>

### **Weakness/Threats:**

Weaknesses identified in the regulatory arena include lack of national policies, regulation and legislation that would provide standardized authority to practice at the advanced level.<sup>3,6,40,49-51,59,60</sup> Lack of regulation contributes to role confusion, informal practice and limited availability of role related data.<sup>51</sup> Moreover, the identification and introduction of new categories of healthcare professionals can pose a possible threat to APN role development.<sup>61</sup> Poor country specific strategic plans for human resources for health and nursing shortages identified in the European Commission report (2017) also threaten the viability of APN role development and implementation.<sup>110</sup>

### **3) Africa** (see Additional File 4\_Africa)

#### **Strengths/Opportunities:**

Advanced practice nursing in the form of the nurse practitioner role is gradually expanding in Africa and, in particular, in Sub-Saharan Africa. Family nurse practitioners are now widely embedded in primary care throughout Botswana and are authorized to prescribe medicines.<sup>24</sup> South Africa (SA) has several official designations for advanced practice nurses that are defined by the South African Nursing Council: nursing specialist, and advanced nursing specialist. The advanced nursing specialist role parallels that of the nurse practitioner, that is, it is the first point of care, and includes "medical diagnosis" and treatment.<sup>62</sup> Ghana also has a nurse practitioner program at the University of Development Studies, Tamale Campus which is a three year BSc.<sup>63</sup> While the degree and the scope of nurse practitioner practice is not clear, the role is regulated by the Nursing and Midwifery Council of Ghana.<sup>64</sup> In eSwatini (formerly known as Swaziland), the University of eSwatini has recently started a MNSc Family Nurse Practitioner program and the eSwatini Nursing Council has adopted broad scope of practice regulations.<sup>63,64</sup> Tanzania has also implemented regulations and title protection for the advanced nurse practitioner, however the

educational preparation is at the Bachelor's level.<sup>65</sup> Most recently, Aga Khan University in Kenya has launched a MSc in Advanced Practice Nursing, however no regulation is in place as of yet to support the role.<sup>66</sup>

Increasingly, nurses in Africa who practice at the post-basic level, are participating in strategies that are designed to mitigate shortages of physicians in environments that have a high disease burden of HIV/AIDs. Nurse Initiated and Managed Anti-retroviral Therapy (NIMART) has been widely employed, especially in Sub-Saharan Africa.<sup>67-69</sup> Nurse prescribing, which is an element of advanced nursing practice, is increasingly being integrated into post-basic practice.

#### **Weaknesses/Threats:**

While some countries do have regulatory frameworks for advanced practice nursing (South Africa, Ghana, eSwatini, and Tanzania), the primary challenge for many countries in Africa is to establish clear regulations for nursing practice in general, and to broaden regulatory scope for advanced nursing practice in countries that are developing these roles.<sup>24,70</sup> Also, the educational infrastructure does not possess the adequate nursing faculty necessary to train future practitioners.<sup>24</sup> And, in many countries, there is a persistent lack of political will to establish APN roles in a substantive way.<sup>71</sup>

#### **4) Southeast Asia** (see Additional File 5\_Southeast Asia)

#### **Strengths/opportunities:**

Thailand has had a long history of training and integration of the advanced practice nursing role into the delivery of national health care services. The role of the advanced practice nurse has been successfully implemented throughout the country based on supportive government healthcare policies, engaged and qualified administrators and sufficient financial resources.<sup>72</sup> The authority to prescribe medicines by nurse practitioners via a formulary has helped to expand their scope of practice.<sup>73</sup> In India, the Indian Nursing Council approved the first national curriculum for the Nurse Practitioner in Critical Care (NPCC). This new program is currently being offered for study at the Master's (MSc) level.<sup>74</sup> This new role seeks to fill critical shortages in acute care and will contain education around the initiation and management of medications, based on an approved formulary.<sup>74</sup>

#### **Weaknesses/Threats:**

In Thailand, despite certification and education, many APNs do not function to the full extent of the advanced practice role.<sup>72</sup> Also, in some areas, poor administrative support for the APN role may lead to work assignments that are not reflective of APN practice.<sup>72</sup> In India, the role of the nurse practitioner is not established and there is a lack of awareness of the clinical responsibilities. Only a handful of universities have adopted the program due to physician lack of awareness and resistance to a role that encourages nursing practice with skills that overlap those of medicine.<sup>75</sup>

## **5) Western Pacific** (see Additional File 6\_Western Pacific)

### **Strengths/Opportunities:**

Regulatory authority over APN practice is generally robust throughout the region. These regulatory advances have occurred largely over the past two decades. Nurse practitioners have been registered in New Zealand by the New Zealand Nursing Council since 2002; in Australia since 2010 by the Australian Health Practitioner Regulation Authority (AHPRA); in Fiji through the Fiji Nursing Council since 2011; in South Korea via the Ministry of Health; in Singapore via the Ministry of Health since 2006; and Taiwan recently gained official legislative authority over practice in 2014.<sup>76-82</sup>

Scope of practice is broad in the region. In Fiji, nurse practitioners, who are trained based on a 13 month post-basic diploma, work extensively in community health centers and enjoy wide acceptance by communities and other health care providers.<sup>24,77</sup> Community Health Nurse Practitioners have had well established roles in South Korea since the 1980's. The Hong Kong SAR has implemented the Nurse Consultant role which demonstrates the competencies of the advanced practice nurse.<sup>83</sup> Also, prescriptive authority throughout the region has been widely implemented. Countries such as Australia, Fiji, New Zealand, Singapore, and Taiwan have clear statutory language around advance practice nurse prescribing.<sup>24,77,82,84-86</sup> The most recent development in the region occurred in July of 2018, when advanced practice nurses in Singapore gained the authority to independently prescribe medicines based on the Collaborative Prescribing Practitioners (CPP) program, which also includes pharmacists.<sup>85</sup>

### **Weaknesses/Threats:**

In Australia, nurse practitioner practice is limited based on differences between federal and state/territory requirements.<sup>86,87</sup> Other countries, such as South Korea, the Philippines, China, and the Hong Kong Special Administrative Region of the People's Republic of China do not have discrete legislation for advanced practice nursing, despite varying levels of active and/or developing practice.<sup>24,79,80</sup> In South Korea, there has been a lack of available positions, which may limit expansion of advance practice nurses within the national health system.<sup>80,88</sup>

## **6) Eastern Mediterranean** (see Additional File 7\_Eastern Mediterranean)

### **Strengths/Opportunities:**

In Jordan, the Jordanian Nursing Council has started to certify eleven advanced nursing specialties which are comparable to Clinical Nurse Specialists. The accepted term for the advanced practice nurse is Advanced Nurse Specialist and this term is protected by the government.<sup>89</sup> There are currently three programs that offer Master's degrees for the Advanced Nurse Specialist role and the Jordanian Nursing Council has developed the role at the national level.<sup>89</sup>



The State of Qatar and the Qatar Ministry of Public in 2013 developed a comprehensive regulatory document on all levels of nursing practice, including registered midwives (RM), clinical nurse specialists (CNS) and nurse practitioners (NP).<sup>90</sup> There are clear definitions, title protection, and scope of practice descriptions for the CNS and NP role.<sup>90</sup> Oman has also been moving toward establishing a more formal role for advanced practice. This is due to a shift of emphasis by the Sultanate of Oman toward the advanced practice role based on changing demographics and the increasing demand for high quality care.<sup>91</sup> The Sultan Qaboos University initiated the first Masters of Science program in nursing with a concentration in Acute Care Advanced Practice Nursing.<sup>92</sup> Regionally, a board of nursing will standardize licensing and will promote free movement throughout the Gulf Cooperation Council (GCC): Kingdom of Bahrain, Kuwait, Sultanate of Oman, Qatar, Kingdom of Saudi Arabia, and the United Arab Emirates.<sup>91</sup>

### **Weaknesses/Threats:**

In Qatar, while there are clear requirements for entry into practice for both CNS's and NP's, there currently are no active Master's programs that train nurse practitioners. Almost 98% of nurses in Qatar are expatriates and therefore challenges exist in implementing the APN role because of lack of standardization of educational backgrounds.<sup>91</sup> And, as in other regions of the world, resistance from medical societies remains a major threat to the development of APN roles. (See Figure 1)

## **Discussion**

The adoption of advanced practice nursing (APN) roles is accelerating rapidly worldwide in the context of escalating healthcare costs, changing burdens of disease, and the resultant need for innovative healthcare delivery models. This is occurring at a time when key international policy initiatives, such as the Sustainable Development Goals (SDGs), WHO's Global Strategy on Human Resources for Health: Workforce 2030, and Nursing Now seek to strengthen and expand the healthcare workforce in order to achieve universal coverage goals and to meet the SDG targets.<sup>93,94</sup>

The broad implementation of advanced practice nursing over the past several decades is being propelled by several key drivers that are impacting the delivery of healthcare worldwide. First, it is estimated the global shortage of health workers, and especially nurses and midwives who make up 50% of the global health workforce, will impede the achievement of SDG 3: Health and Wellbeing.<sup>95</sup> The related shortage of physicians suggests that nurses, especially advanced practice nurses, are poised to address local healthcare needs and introduce efficiencies into health systems, if allowed to work to their full potential.<sup>96,97</sup>

Second, it is well known that population factors have great bearing on how well a nation's health system is able to meet the needs of its citizens. Aging populations will test healthcare systems around the world. It is expected that between 2025 and 2050, the world's population of older adults will double to 1.6 billion, and approximately 80% of this growth will occur in non-industrialized nations.<sup>98</sup> The greater care needs of an older population, with the associated increased rates of chronic, non-communicable disease,

necessitates innovative strategies that will support both accessibility to care and cost containment. Recent data suggest that physician substitution by advanced practice nurses achieves healthcare quality that is comparable to that of physicians in the older adult population.<sup>99</sup> This supports broader research that has found that care provided by advanced practice nurses (nurse practitioners in particular) was equivalent to care provided by physicians based on standard quality indicators, and better in terms of prevention interventions such as smoking cessation and general education/counseling, resulting in positive health outcomes.<sup>100–106</sup>

Third, global momentum is building for universal healthcare coverage. Over 100 countries around the world have studied how to introduce government supported programs of healthcare, even in the populous countries of Indonesia, China, India, and South Africa, which comprise 40% of the world's population.<sup>107,108</sup> The United Nations is moving this work forward with the implementation of the Sustainable Development Goals (SDGs).<sup>109</sup> Goal three, to ensure healthy lives and wellbeing, includes the target of achieving universal health coverage, including access to quality essential health services.<sup>110</sup> This will have a substantial effect on the healthcare workforce and exacerbate shortages. Demand for healthcare workers is expected to surge from 48 million (in 2013) to 80 million by 2030. This will occur in the context of a supply gap during the same period that is anticipated to increase from 7 million to 15 million workers.<sup>111</sup>

Furthermore, many countries have expanded services over the past two decades, especially in response to epidemics (HIV) and increasing rates of non-communicable diseases. This has resulted in a proliferation in medical and public health programs, with varying levels of fragmentation, and disorganization. The increased demand and provision of services worldwide will lead to three essential requirements that most countries must consider: 1) the ability to provide services without causing severe economic hardship, 2) the need to absorb fragmented services while providing essential healthcare to the population, and 3) the obligation to provide a healthcare workforce of sufficient size and that demonstrates a deeper set of skills that can respond to greater health and organizational complexity.<sup>112</sup>

Our analysis demonstrates that advanced practice nursing continues to progress, in response to the global drivers of an aging population, workforce shortages, and the need to develop system-based efficiencies for cost containment. Key elements that frame the role, such as regulation, education, licensure, and scope of practice, vary significantly by country and region and remain dynamic. However, notably, practice and educational models are outpacing regulatory standards in all six WHO regions. This indicates the role is developing organically, driven by local needs, but still lags in terms of the formal legitimization of the role in many countries. While added regulation has its supporters and detractors, it codifies the role in a way that is difficult to refute.

Finally, we cannot ignore the transformational circumstances of 2020. This Year of the Nurse and Midwife, as designated by the WHO to coincide with the 200<sup>th</sup> anniversary of the birth of Florence Nightingale, has provided a laser focus to the critical role that nurses play, in not only health crises, but in

the provision of essential health services for all.<sup>113</sup> Nurses have always been immersed in increasing access and improving efficiency, whether it be at the basic or advanced level. It has become clear that governments will need to recalibrate their healthcare workforce, especially for APNs, in order to better address the need to reduce NCDs and to incorporate more effective prevention and disease management strategies.<sup>1</sup> And, this year especially, the Covid-19 pandemic has provided clear agency to a profession that will continue to sustain the essential framework of our health systems worldwide.

## Conclusion

Advanced practice nursing is a unique sector of the global healthcare workforce that has expanded healthcare access and contributed to health system efficiencies in both high income and low to middle income countries. This sector has grown rapidly, in response to aging populations, the increasing prevalence of non-communicable disease, and the global impetus toward universal health coverage. Our findings reveal that, while the role is highly variable based on the regulatory and practice environments in which it resides, it remains a growing phenomenon that shows no sign of abating.

## Declarations

**Ethics approval:** not applicable

**Consent for publication:** not applicable

**Availability of data and materials:** all data generated or analyzed during this analysis are included in this published article (and its supplementary information files).

**Competing interests:** EL, MM, KW, SW, FA, HM, SL, AN, AN, KC declare no competing interests.

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## References

1. International Council of Nurses. Guidelines on Advanced Practice Nursing 2020.  
[https://www.icn.ch/system/files/documents/2020-04/ICN\\_APN%20Report\\_EN\\_WEB.pdf](https://www.icn.ch/system/files/documents/2020-04/ICN_APN%20Report_EN_WEB.pdf)  
Published 2020. Accessed April 18, 2020.
2. Heale R, Rieck Buckley C. An international perspective of advanced practice nursing regulation. *Int Nurs Rev.* 2015;62(3):421-429. doi:10.1111/inr.12193
3. Bryant-Lukosius D, Valaitis R, Martin-Misener R, Donald F, Peña LM, Brousseau L. Advanced Practice Nursing: A Strategy for Achieving Universal Health Coverage and Universal Access to Health. *Rev Lat Am Enfermagem.* 2017;25. doi:10.1590/1518-8345.1677.2826
4. Maier CB, Aiken LH. Task shifting from physicians to nurses in primary care in 39 countries: A cross-country comparative study. *Eur J Public Health.* 2016. doi:10.1093/eurpub/ckw098
5. DiCenso A, Bryant-Lukosius D, Martin-Misner R, et al. Factors enabling advanced practice nursing role integration in Canada. *Nurs Leadersh (Tor Ont).* 2010.
6. King R, Tod A, Sanders T. Development and regulation of advanced nurse practitioners in the UK and internationally. *Nurs Stand.* 2017;32(14):43-50. doi:10.7748/ns.2017.e10858
7. Msuya M, Blood-Siegfried J, Chugulu J, et al. Descriptive study of nursing scope of practice in rural medically underserved areas of Africa, South of the Sahara. *Int J Africa Nurs Sci.* 2017;6:74-82. doi:10.1016/j.ijans.2017.04.003
8. Dower C, Moore J, Langelier M. It Is Time To Restructure Health Professions Scope-Of-Practice Regulations To Remove Barriers To Care. *Health Aff.* 2013;32(11):1971-1976. doi:10.1377/hlthaff.2013.0537
9. Harrison J. *Essentials of Strategic Planning in Healthcare.* 2nd ed. Chicago, Illinois; 2016.
10. Rajan D. Strategizing national health in the 21st century: a handbook. In: Geneva, Switzerland: World Health Organization; 2016.
11. APRN Consensus Group, National Council of Stat Boards of Nursing. Consensus model for APRN regulation: licensure, accreditation, certification & education.  
[https://www.ncsbn.org/Consensus\\_Model\\_for\\_APRN\\_Regulation\\_July\\_2008.pdf](https://www.ncsbn.org/Consensus_Model_for_APRN_Regulation_July_2008.pdf). Published 2008. Accessed February 7, 2019.
12. American Association of Nurse Practitioners. State practice environment.  
<https://www.aanp.org/advocacy/state/state-practice-environment>. Published 2018. Accessed February 7, 2019.
13. Mann S. Research shows shortage of more than 100,000 doctors by 2030. American Association of Medical Colleges News. <https://news.aamc.org/medical-education/article/new-aamc-research-reaffirms-looming-physician-shor/>. Published 2017. Accessed December 5, 2018.
14. Institute of Medicine. The Future of Nursing: Leading change, advancing health.  
<https://www.nap.edu/read/12956/chapter/1>. Published 2011. Accessed February 7, 2019.
15. Federal Trade Commission. Competition and the regulation of advanced practice nurses.  
<https://www.ftc.gov/system/files/documents/reports/policy-perspectives-competition-regulation-advanced-practice-nurses/140307aprnpolicypaper.pdf>. Published 2014. Accessed February 11, 2019.

16. National Governors Association. The role of nurse practitioners in meeting increasing demands in primary care. <https://www.nga.org/cms/home/nga-center-for-best-practices/center-publications/page-health-publications/col2-content/main-content-list/the-role-of-nurse-practitioners.html>. Accessed January 12, 2019.
17. Canadian Nurses Association. Advanced practice nursing: A pan-Canadian framework. <https://www.cna-aiic.ca/-/media/cna/page-content/pdf-en/apn-a-pan-canadian-framework.pdf>. Published 2019.
18. Canadian Nurse Practitioner Initiative. Canadian nurse practitioner initiative technical report: Legislative and regulatory framework. [https://www.cna-aiic.ca/~media/cna/page-content/pdf-en/01\\_legislation\\_regulation.pdf?la=fr](https://www.cna-aiic.ca/~media/cna/page-content/pdf-en/01_legislation_regulation.pdf?la=fr). Published 2006. Accessed February 12, 2019.
19. Canadian Nurses Association. Position statement: the nurse practitioner. [https://www.cna-aiic.ca/~media/cna/page-content/pdf-en/the-nurse-practitioner-position-statement\\_2016](https://www.cna-aiic.ca/~media/cna/page-content/pdf-en/the-nurse-practitioner-position-statement_2016). Published 2016. Accessed February 7, 2019.
20. Canadian Nurses Association. Nurse Practitioners: untapped resource. [https://www.arnpei.ca/data/nurse-practitioners\\_untapped-resource.pdf](https://www.arnpei.ca/data/nurse-practitioners_untapped-resource.pdf). Published 2017. Accessed December 5, 2018.
21. Fitzgerald C, Kantrowitz-Gordon I, Katz J, Hirsch A. Advanced Practice Nursing Education: Challenges and Strategies. *Nurs Res Pract*. 2012;2012:1-8. doi:10.1155/2012/854918
22. American Association of Colleges of Nursing. Nursing faculty shortage fact sheet. <http://www.aacnnursing.org/Portals/42/News/Factsheets/Faculty-Shortage-Factsheet-2017.pdf>. Published 2017. Accessed January 28, 2019.
23. Canadian Nurses Association. The Canadian nurse practitioner initiative: a 10-year retrospective. 2016. <https://www.cna-aiic.ca/-/media/cna/page-content/pdf-en/canadian-nurse-practitioner-initiative-a-10-year-retrospective.pdf?la=en&hash=406D8F34F947CFD94DA04AE0CF56A739514D01B7>. Accessed February 7, 2019.
24. Schoeber M, Green A. Global perspectives on advanced nursing practice. In: Joel L, ed. *Advanced Practice Nursing*. 4th ed. Philadelphia, PA: FA Davis; 2018.
25. Schober M. *Introduction to Advanced Nursing Practice: An International Focus*. Geneva, Switzerland: Springer International Publishing; 2016.
26. Laws of Montserrat. Nurses and midwives act and subsidiary legislation, revised edition. <http://moh.gov.ms/wp-content/uploads/2008/11/nurses-and-midwives-act.pdf>. Published 2002. Accessed January 7, 2019.
27. Republic of Trinidad and Tobago. An act to amend the nurses and midwives act Chap. 29:53, Act No. 8. <http://www.ttparliament.org/legislations/a2014-08.pdf>. Published 2014. Accessed January 7, 2019.
28. Carpio C, Fuller-Wimbush D. *The Nurse Workforce in the Eastern Caribbean: Meeting the Challenges of Noncommunicable Diseases*. The World Bank; 2016. doi:10.1596/978-1-4648-0830-2

29. Pan American Health Organization. St. Vincent and the Grenadines. [https://www.paho.org/hia2007/archivosvol2/paisesing/Saint Vincent and the Grenadines English.pdf](https://www.paho.org/hia2007/archivosvol2/paisesing/Saint%20Vincent%20and%20the%20Grenadines%20English.pdf). Published 2007. Accessed December 5, 2018.
30. Ministry of Health Trinidad and Tobago. Nursing. <http://www.health.gov.tt/sitepages/default.aspx?id=209>. Accessed January 7, 2019.
31. World Health Organization. Integrating mental health into primary care: a global perspective. [http://www.who.int/mental\\_health/policy/Integratingmhintoprimarycare2008\\_lastversion.pdf?ua=1](http://www.who.int/mental_health/policy/Integratingmhintoprimarycare2008_lastversion.pdf?ua=1). Published 2008. Accessed January 28, 2019.
32. Rattray G. Prescriptive rights for nurse practitioners. *The Gleaner*. <http://jamaica-gleaner.com/article/commentary/20170313/garth-rattray-prescriptive-rights-nurse-practitioners>. Published 2017. Accessed February 7, 2019.
33. Bryant-Lukosius D, Valaitis R, Martin-Misener R, Donald F, Peña LM, Brousseau L. Advanced Practice Nursing: A Strategy for Achieving Universal Health Coverage and Universal Access to Health. *Rev Lat Am Enfermagem*. 2017;25:e2826. Published 2017 Jan 30. doi:10.1590/1518-8345.1677.2826
34. Aguirre-Boza F. Enfermería de Práctica Avanzada en la atención primaria: Ahora es el momento. *Puntos Ref*. 2016;447.
35. Nigenda G, Magaña-Valladares L, Ruiz-Larios J. Recent Developments in Public Health Nursing in the Americas. *Int J Environ Res Public Health*. 2010;7(3):729-750.
36. Kleinpell R, Scanlon A, Hibbert D, et al. Addressing issues impacting advanced nursing practice worldwide. *OJIN Online J Issues Nurs*. 2014;19(2). doi:10.3912/OJIN.Vol19No02Man05
37. Aaron EM, Andrews CS. Integration of advanced practice providers into the Israeli healthcare system. *Isr J Health Policy Res*. 2016;5(1):7. doi:10.1186/s13584-016-0065-8
38. Mate O, Bethlem J, Olah A. Establishing an advanced practice nurse MSc (Nurse Practitioner) program with six specialties in Hungary. *ICN NP/APNN News!*. 2017.
39. Nursing & Midwifery Board of Ireland. Advanced practice (nursing) standards and requirements. <https://www.nmbi.ie/NMBI/media/NMBI/Advanced-Practice-Nursing-Standards-and-Requirements-2017.pdf?ext=.pdf>. Published 2017. Accessed December 5, 2018.
40. Schober M, Green A. Global perspectives on advanced nursing practice. In: Joel LA, ed. *Advanced Practice Nursing: Essentials for the Role Development*. 4th ed. Philadelphia, PA: F.A. Davis Company; 2018:54-89.
41. V&VN VS Professional Association for Healthcare Professionals. The Nurse Practitioner in the Netherlands Fact Sheet. <https://venvnvs.nl/wp-content/uploads/sites/164/2015/08/2015-10-30-Factsheet-Nurse-Practitioner-Netherlands-2015.pdf>. Published 2015. Accessed December 5, 2018.
42. Sheer B, Wong FKY. The Development of Advanced Nursing Practice Globally. *J Nurs Scholarsh*. 2008;40(3):204-211. doi:10.1111/j.1547-5069.2008.00242.x
43. Bergström P, Lindh V. Developing the role of Swedish advanced practice nurse (APN) through a blended learning master's program: Consequences of knowledge organisation. *Nurse Educ Pract*. 2018;28:196-201. doi:10.1016/j.nepr.2017.10.030

44. Jangland E, Yngman Uhlin P, Arakelian E. Between two roles – Experiences of newly trained nurse practitioners in surgical care in Sweden: A qualitative study using repeated interviews. *Nurse Educ Pract.* 2016;21:93-99. doi:10.1016/j.nepr.2016.10.005
45. Altersved E, Zetterlund L, Lindblad U, FAGERSTRÖM L. Advanced practice nurses: a new resource for Swedish primary health-care teams. *Int J Nurs Pract.* 2011;17:174-180.
46. Dury C, Hall C, Danan JL, et al. Specialist nurse in Europe: education, regulation, and role. *Int Nurs Rev.* 2014;61:454-462.
47. FAGERSTRÖM L. Developing the scope of practice and education for advanced practice nurses in Finland. *Int Nurs Rev.* 2009;56:269-272.
48. Gonzalez Jurado M. Advanced practice nurse in Spain. <https://fhs.mcmaster.ca/globalhealthoffice/documents/AdvancedPracticeNurseinSpain.pdf>. Published 2015. Accessed January 28, 2019.
49. Sevilla Guerra S, Miranda Salmerón J, Zabalegui A. Profile of advanced nursing practice in Spain: A cross-sectional study. *Nurs Health Sci.* 2018;20(1):99-106. doi:10.1111/nhs.12391
50. Jokiniemi K. Clinical Nurse Specialist role in Finnish health care. Dissertations in Health Sciences, Publications of the University of Eastern Finland. <https://core.ac.uk/download/pdf/32427141.pdf>. Published 2014. Accessed January 28, 2019.
51. Maier CB, Aiken LH, Busse R. Health Working Paper No. 98: Nurses in advanced roles in primary care. *Organ Econ co-operation Dev.* 2017. doi:10.1787/a8756593-en
52. Office of the Chief Nurse Department of Health. Developing a policy for graduate, specialist, advanced & midwifery consultation paper. *An Roinn Slainte Dep Heal Irel.* 2017. <https://health.gov.ie/wp-content/uploads/2017/11/Developing-a-Policy-for-Graduate-Specialist-and-Advanced-Practice-Consultation-Paper.pdf>. Accessed February 7, 2019.
53. National Health Service (NHS). Multi-professional framework for advanced clinical practice in England. Health Education England. <https://www.hee.nhs.uk/sites/default/files/documents/Multi-professional-framework-for-advanced-clinical-practice-in-England.pdf>. Published 2017. Accessed December 5, 2018.
54. NHS Greater Glasgow and Clyde. Advanced Nurse Practitioner Strategy 2016-2020. <http://www.nhsggc.org.uk/media/243255/advanced-practice-strategy-for-nhs-greater-glasgow-and-clyde-2016-2020-final-version.pdf>. Accessed November 11, 2018.
55. Serena A, Dwyer AA, Peters S, Eicher M. Acceptance of the Advanced Practice Nurse in Lung Cancer Role by Healthcare Professionals and Patients: A Qualitative Exploration. *J Nurs Scholarsh.* 2018;50(5):540-548. doi:10.1111/jnu.12411
56. Boman E, Ösp Egilsdottir H, Levy-Malmberg R, Fagerström L. Nurses' understanding of a developing nurse practitioner role in the Norwegian emergency care context: A qualitative study. *Nord J Nurs Res.* July 2018:205715851878316. doi:10.1177/2057158518783166
57. Sastre-Fullana P, Morales-Asencio JM, Sesé-Abad A, Bennasar-Veny M, Fernández-Domínguez JC, De Pedro-Gómez J. Advanced Practice Nursing Competency Assessment Instrument (APNCAI):

- clinimetric validation. *BMJ Open*. 2017;7(2):e013659. doi:10.1136/bmjopen-2016-013659
58. Cope LC, Abuzour AS, Tully MP. Nonmedical prescribing: where are we now? *Ther Adv Drug Saf*. 2016;7(4):165-172. doi:10.1177/2042098616646726
59. Carney M. Regulation of advanced nurse practice: its existence and regulatory dimensions from an international perspective. *J Nurs Manag*. 2016;24(1):105-114. doi:10.1111/jonm.12278
60. Kotila J, Axelin A, Fagerstrom L, et al. New roles for nurses: quality to future social welfare and health care services. Finnish Nurses Association. [https://sairaanhoitajat.fi/wp-content/uploads/2018/06/apn\\_raportti\\_eng\\_valmis\\_pieni.pdf](https://sairaanhoitajat.fi/wp-content/uploads/2018/06/apn_raportti_eng_valmis_pieni.pdf). Published 2018. Accessed January 28, 2019.
61. Schober M. *Strategic Planning for Advanced Nursing Practice*. Cham, Switzerland: Springer International Publishing; 2017.
62. Duma S, Dippenaar J, Bhengu B, et al. SPECIALIST AND ADVANCED SPECIALIST NURSING AND MIDWIFERY PRACTICE. *Trends Nurs*. 2014;1(1):102. doi:10.14804/1-1-28
63. University for Development Studies Ghana. School of Allied Health Sciences. <https://beta.uds.edu.gh/#>. Published 2018. Accessed December 5, 2018.
64. Nursing and Midwifery Council of Ghana. Nurse Practitioners. <http://www.nmcgh.org/t3f/en/training-institutions/80-professionals/13-workshop-for-nurse-practitioners>. Published 2018. Accessed December 5, 2018.
65. Tanzania Nursing and Midwifery Council. Scope of practice for nurses and midwives in Tanzania. [www.tnmc.go.tz](http://www.tnmc.go.tz). Published 2014. Accessed November 11, 2018.
66. Aga Khan University. No Title. Master of Science in Advanced Practice Nursing.
67. Chimbwandira F, Mhango E, Makombe S, et al. Impact of an innovative approach to prevent mother-to-child transmission of HIV - Malawi, July 2011-September 2012. *CDC Morb Mortal Wkly Rep*. 2013;62(8):148-151.
68. Fairall L, Bachmann MO, Lombard C, et al. Task shifting of antiretroviral treatment from doctors to primary-care nurses in South Africa (STRETCH): a pragmatic, parallel, cluster-randomised trial. *Lancet*. 2012;380(9845):889-898. doi:10.1016/S0140-6736(12)60730-2
69. Kredo T, Adeniyi FB, Bateganya M, Pienaar ED. Task shifting from doctors to non-doctors for initiation and maintenance of antiretroviral therapy. *Cochrane Database Syst Rev*. July 2014. doi:10.1002/14651858.CD007331.pub3
70. Kelley M, Spangler S, Tison L, et al. Promoting regulatory reform: the African Health Profession Regulatory Collaborative (ARC) for nursing and midwifery year 4 evaluation. *J Nurs Regul*. 2017;8(3):74-82.
71. East LA, Arudo J, Loeffler M, Evans CM. Exploring the potential for advanced nursing practice role development in Kenya: A qualitative study. *BMC Nurs*. 2014;13(33). doi:10.1186/s12912-014-0033-y
72. Wongkpratoom S, Srisuphan W, Senaratana W, Nantachaipan P, Sritanyarat W. Role Development of Advanced Practice Nurses in Thailand. *Pacific Rim Int J Nurs Res*. 2010;14(2):162-177.



- <https://www.tci-thaijo.org/index.php/PRIJNR/article/download/6302/5501/>. Accessed February 7, 2019.
73. World Health Organization. Medicines in Healthcare Delivery: Thailand, February 2016. 2016. [http://www.searo.who.int/entity/medicines/thailand\\_situational\\_assessment.pdf?ua=1](http://www.searo.who.int/entity/medicines/thailand_situational_assessment.pdf?ua=1). Accessed February 7, 2019.
74. Indian Nursing Council. Indian Nursing Council, Nurse practitioner in critical care (post graduate-residency program). 2016. [https://mohfw.gov.in/sites/default/files/57996154451447054846\\_0.pdf](https://mohfw.gov.in/sites/default/files/57996154451447054846_0.pdf). Accessed January 28, 2019.
75. Putturaj M, NS P. Enhancing the autonomy of Indian nurses. *Indian J Med Ethics*. 2017;2(4). doi:10.20529/IJME.2017.058
76. Nursing and Midwifery Board of Australia. Registration Standard: Endorsement as a Nurse Practitioner. 2016. <http://www.nursingmidwiferyboard.gov.au/Registration-Standards/Endorsement-as-a-nurse-practitioner.aspx>. Accessed February 7, 2019.
77. Roberts G, Irava W, Tuiketee T, et al. The Fiji Islands Health Systems Review. 2011;1(1):1-150. [http://iris.wpro.who.int/bitstream/handle/10665.1/5534/9789290615439\\_eng.pdf](http://iris.wpro.who.int/bitstream/handle/10665.1/5534/9789290615439_eng.pdf). Accessed February 7, 2019.
78. Oita University of Nursing and Health Services. *Development of the First Nurse Practitioner Graduate Program in Japan.*; 2016. [http://www.oita-nhs.ac.jp/English/nurse\\_practitioner\\_project](http://www.oita-nhs.ac.jp/English/nurse_practitioner_project). Accessed January 28, 2019.
79. Guevarra Estrada M, Tan C. Professional Ambivalence: Understanding of the Eminence of Advanced Clinical Nursing Specialization in the Philippines. *J Nurs Care*. 2014;3(151). doi:10.4172/2167-1168.1000151
80. Jeong JS. The current situation of nurse practitioner education focusing on clinical practicums in Korea. *Internet J Nurs Sci Res*. 2016;14:43-47. [http://www.oita-nhs.ac.jp/journal/PDF/14\\_2/14\\_2\\_3.pdf](http://www.oita-nhs.ac.jp/journal/PDF/14_2/14_2_3.pdf). Accessed February 7, 2019.
81. Ayre TC, Bee TS. Advanced Practice Nursing in Singapore. *Proc Singapore Healthc*. 2014;23(4):269-270. doi:10.1177/201010581402300401
82. Chiu H, Tsay S, Tung H. A giant leap in the development of nurse practitioners in Taiwan. *J Am Assoc Nurse Pract*. 2016;28(11):622-627. doi:10.1002/2327-6924.12405
83. Wong FKY, Lau ATY, Ng R, et al. An Exploratory Study on Exemplary Practice of Nurse Consultants. *J Nurs Scholarsh*. 2017. doi:10.1111/jnu.12324
84. Nursing Council of New Zealand. Nurse practitioners: scope of practice for nurse practitioners. <http://www.nursingcouncil.org.nz/Nurses/Scopes-of-practice/Nurse-practitioner>. Accessed January 28, 2019.
85. Liew I. First pharmacists, advanced practice nurses certified to prescribe medicines. *The Straits Times Singapore*. <https://www.straitstimes.com/singapore/first-pharmacists-advanced-practice-nurses-now-certified-to-prescribe-medicines>. Published 2018. Accessed February 7, 2019.

86. Australian Government Department of Health. Pharmaceutical benefits scheme: nurse practitioner PBS prescribing. <https://www.pbs.gov.au/browse/nurse>. Accessed February 7, 2019.
87. Gardner G, Gardner A, Middleton S, Della P, Kain V, Doubrovsky A. The work of nurse practitioners. *J Adv Nurs*. 2010;66(10):2160-2169.
88. Parker JM, Hill MN. A review of advanced practice nursing in the United States, Canada, Australia and Hong Kong Special Administrative Region (SAR), China. *Int J Nurs Sci*. 2017;4(2):196-204. doi:10.1016/j.ijnss.2017.01.002
89. Jordanian Nursing Council. Advanced Nurse Specialist. <http://jnc.gov.jo/en/certificates/Pages/default.aspx>. Accessed February 7, 2019.
90. State of Qatar/Ministry of Public Health. Nurse regulations in the State of Qatar. [http://www.qchp.org.qa/en/Documents/Nursing Regulations in the State of Qatar.pdf](http://www.qchp.org.qa/en/Documents/Nursing%20Regulations%20in%20the%20State%20of%20Qatar.pdf). Published 2013. Accessed February 7, 2019.
91. World Health Organization. The future of nursing and midwifery workforce in the context of the Sustainable Development Goals and universal health coverage: report of the seventh global forum for government chief nurses and midwives. 2017. <https://apps.who.int/iris/bitstream/handle/10665/255045/9789241511919-eng.pdf;jsessionid=1751DE51A1F60E96678AC1AE3CDC2606?sequence=1>. Accessed February 7, 2019.
92. Almukhaini SJ, Donesky D, Scruth EA. OMAN: the emergence of the clinical nurse specialist. *Clin Nurse Spec*. 2016;30(2):71-73. doi:10.1097/NUR.000000000000181
93. World Health Organization. Global strategy on human resources for health: Workforce 2030. [http://www.who.int/hrh/resources/global\\_strategy\\_workforce2030\\_14\\_print.pdf?ua=1](http://www.who.int/hrh/resources/global_strategy_workforce2030_14_print.pdf?ua=1). Published 2016. Accessed February 7, 2019.
94. NursingNow. Who we are. <https://www.nursingnow.org/who-we-are/>. Accessed February 23, 2019.
95. World Health Organization. Nursing and midwifery: fact sheet. <https://www.who.int/mediacentre/factsheets/nursing-midwifery/en/>. Published 2018. Accessed February 23, 2019.
96. Barnes H, Richards MR, McHugh MD, Martsolf G. Rural And Nonrural Primary Care Physician Practices Increasingly Rely On Nurse Practitioners. *Health Aff*. 2018;37(6):908-914. doi:10.1377/hlthaff.2017.1158
97. Maier CB, Aiken LH. Expanding clinical roles for nurses to realign the global health workforce with population needs: a commentary. *Isr J Health Policy Res*. 2016;5(1):21. doi:10.1186/s13584-016-0079-2
98. He W, Goodkind D, Kowal P. *An Aging World: 2015*; 2016. <https://www.census.gov/content/dam/Census/library/publications/2016/demo/p95-16-1.pdf>. Accessed February 23, 2019.
99. Lovink MH, Persoon A, Koopmans RTCM, Van Vught AJAH, Schoonhoven L, Laurant MGH. Effects of substituting nurse practitioners, physician assistants or nurses for physicians concerning healthcare

- for the ageing population: a systematic literature review. *J Adv Nurs*. 2017;73(9):2084-2102. doi:10.1111/jan.13299
100. Kurtzman ET, Barnow BS. A Comparison of Nurse Practitioners, Physician Assistants, and Primary Care Physicians' Patterns of Practice and Quality of Care in Health Centers. *Med Care*. 2017;55(6):615-622. doi:10.1097/MLR.0000000000000689
101. Mafi JN, Wee CC, Davis RB, Landon BE. Comparing Use of Low-Value Health Care Services Among U.S. Advanced Practice Clinicians and Physicians. *Ann Intern Med*. 2016;165(4):237. doi:10.7326/M15-2152
102. Day L, Siao D, Inadomi J, Somsouk M. Non-physician performance of lower and upper endoscopy: a systematic review and meta-analysis. *Endoscopy*. 2014;46(05):401-410. doi:10.1055/s-0034-1365310
103. Stanik-Hutt J, Newhouse RP, White KM, et al. The Quality and Effectiveness of Care Provided by Nurse Practitioners. *J Nurse Pract*. 2013;9(8):492-500.e13. doi:10.1016/j.nurpra.2013.07.004
104. Kuo Y-F, Chen N-W, Baillargeon J, Raji MA, Goodwin JS. Potentially Preventable Hospitalizations in Medicare Patients With Diabetes. *Med Care*. 2015;53(9):776-783. doi:10.1097/MLR.0000000000000406
105. Laurant M, Reeves D, Hermens R, Braspenning J, Grol R, Sibbald B. Substitution of doctors by nurses in primary care. *Cochrane database Syst Rev*. 2005;(2):CD001271. doi:10.1002/14651858.CD001271.pub2
106. Virani SS, Maddox TM, Chan PS, et al. Provider Type and Quality of Outpatient Cardiovascular Disease Care. *J Am Coll Cardiol*. 2015;66(16):1803-1812. doi:10.1016/j.jacc.2015.08.017
107. Huang Y. World momentum builds for universal health coverage. In: *The New Global Health Agenda: Universal Health Coverage*. Washington, D.C.: Council on Foreign Relations; 2012.
108. Tediosi F, Finch A, Procacci C, Marten R, Missoni E. BRICS countries and the global movement for universal health coverage. *Health Policy Plan*. 2016;31(6):717-728. doi:10.1093/heapol/czv122
109. Sustainable Development Goals. <https://sustainabledevelopment.un.org/sdgs>. Accessed March 5, 2019.
110. Sustainable Development Goals: Goal 3 Good Health and Well Being. <https://www.un.org/sustainabledevelopment/health/>. Accessed March 5, 2019.
111. Liu JX, Goryakin Y, Maeda A, Bruckner T SR. Global Health Workforce Labor Market Projections for 2030. *Hum Resour Health*. 2017;15(1):11. doi:doi:10.1186/s12960-017-0187-2
112. Garrett L. Preface. In: *The New Global Health Agenda: Universal Health Coverage*. Washington, D.C.: Council on Foreign Relations; 2012.
113. World Health Organization. State of the world's nursing report 2020. <https://www.who.int/publications-detail/nursing-report-2020>. Published 2020. Accessed April 7, 2020.

# Figures



Figure 1

Global Regulation for APN Practice. APN: Advanced practice nurse. NP: Nurse practitioner. CNS: Clinical Nurse Specialist. Note: The designations employed and the presentation of the material on this map do not imply the expression of any opinion whatsoever on the part of Research Square concerning the legal

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