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Nurse practitioner students as an essential workforce: The lessons of coronavirus disease 2019

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ABSTRACT

Background: The coronavirus disease 2019 (COVID-19) disrupted the education and clinical training of nursing students. Clinical sites shut out students over low equipment supplies, physical distancing requirements, and redeployment of staff.

Purpose and Methods: The purpose of this paper is to highlight a progressive solution to engage nurse practitioner students as part of the COVID-19 response given the disruption of their traditional clinical training environments so that student could continue to matriculate and graduate in a timely manner.

Findings: Nurse practitioner students swiftly responded and were deemed an essential part of the nursing workforce.

Discussion: Policy implications for advanced nursing practice and education for telehealth and simulation research moving forward is also provided.

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Introduction

By early March 2020, the likely effects of a novel corona virus were becoming obvious in the United States and across the globe. Academic health systems launched initiatives to proactively address the threats to the health of the public, and the related threats to the health care workforce. The San Francisco Bay Area was the first of a series of communities to issue a "shelter in place" emergency order (San Francisco Mayor's Office, 2020). Preparations immediately began in support of preparing for a surge of persons who were coronavirus disease 2019 (COVID-19) positive or presumed to be, building systems to protect and screen the health care delivery workforce and those working in supportive roles in the health care environment, and addressing the immediate consequences of this altered environment for the nursing students enrolled in campus programs.

As area hospitals prepared for the surge in expected patients and took stock of the limited personal protective equipment (PPE) available, nursing students at the pre-licensure and advanced practice (APRN)- nurse practitioner (NP) levels were denied permission to attend their contracted clinical training experiences. This national phenomenon, which included trainees in other health professions as well, called for creative solutions to the development of clinical training experiences that would enable students to complete their programs and graduate on the expected time table (Ostrov, 2020).

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Recognizing that students could not be put in harm's way through known or risky exposures, and that they needed direct care experiences to substitute for the clinical access that had been temporarily denied, we redirected students to serve as the reliable workforce in several of the services that were being developed. This rapid education innovation, a collaboration between an academic medical center, community partners, and a school of nursing, resulted in successful establishment of several services that has served the greater community to prevent the spread of COVID-19, while providing the needed educational experiences for many of our students.

The most obvious educational need for the students expecting to complete their degrees was the completion of required clinical hours, in some cases as many as 100 hours. Additionally, few NP students had experience with community-based infectious disease specialty rotations but certainly not pandemics. The opportunity to treat our students as "essential" members of the health care workforce and teach them about pandemics and how to "stand up" services was truly a once in a lifetime opportunity. This was a chance for students to be part of leadership in action (Spetz, 2020). This manuscript reports the clinical rotations established with advanced practice registered nursing students and the impact of those rotations on both students and client outcomes during the first 3 months of the COVID-19 pandemic (mid-March 2020 to June 2020).

In preparation for the surge, academic health centers reduced non-emergency services, canceled elective surgical cases, transitioned ambulatory services to telehealth care delivery modalities and redeployed many employees to care for patients in units dedicated to the treatment of COVID infected individuals. In a very short period of time, systems needed to be developed to communicate across provider groups, to gather needed equipment, to create COVID-19 specific care units, to screen both patients and employees who were symptomatic or had been exposed, and to test those persons suspected of being COVID-19 positive (PUIs). The highlight of these rotations was active NP student participation in the COVID-19 response in an academic medical center, with an opportunity to participate in a telehealth clinical rotation, as well as participation in the community to prevent the spread of infection to those at highest risk.

Academic Medical Center Innovations

NP students Triaging COVID-19 symptoms. Almost immediately following the order to shelter in place, patients and employees sought advice on the evaluation and management of their symptoms. Under the aegis of the UCSF health system's Vice President of the Office of Population Health (OPH), who also serves as the School's Associate Dean for Clinical Affairs, a remote triage center was established for the UCSF community. Initially launched in mid-February 2020, the "COVID-19 Hotline" is a single entry point for all UCSF patients with questions or concerns surrounding coronavirus and those experiencing symptoms related to COVID-19.

The triage center was initially staffed by OPH team members who were pulled from their usual job responsibilities and redeployed for the UCSF COVID-19 Response. Using a comprehensive and standardized triage algorithm (Judson et al., 2020) the Hotline's frontline is staffed primarily by unlicensed Health Care Navigators who collect key demographic and clinical triage variables and escalate symptomatic or complicated patients to the Escalation Triage Team. The Escalation Triage Team is led by a Nurse Practitioner and is staffed by RNs and NPs from OPH, as well as other nurses redeployed from other areas of the health system. When the COVID-19 crisis led to a shelter in place order and the volume of inquiries from symptomatic patients surged at the triage center, an opportunity to partner with the School of Nursing NP faculty was recognized.

A collaborative program was quickly assembled, allowing the NP students to join the triage team, providing telephonic assessment and treatment plans for UCSF patients following the established triage algorithms. Once trained, the work leveraged Epic Pools, Jabber, and Zoom as the functional technologies. Learning objectives were created for this rotation and included: (a) Gaining expertise in the clinical presentation of COVID-19, including symptomatology assessment and recognition, COVID-19 exposure scenarios and testing logistics and prioritization schema; (b) Applying triage protocols to determine the appropriate level of needed care, including low severity testing, or referral to a higher acuity provider assessment. This included care coordination for patients to access video acute care, in-person visits to our respiratory care centers or advice to seek care immediately at an emergency department. On several occasions, patients were so seriously ill, the team coordinated EMS services.

Over 20 nurse practitioner students across three programs (Family Nurse Practitioner, Adult Gerontology Primary and Acute Care Nurse Practitioner) participated in the rotation providing direct care to patients who needed to either self-manage their symptoms and shelter in place (21% of encounters), be referred to a video acute care visit with a medical provider (39% of encounters), be referred to a newly erected, respiratory special care assessment center (17% encounters), or be sent to the emergency department (4% encounters). Over 748 visits were provided by the NP students across a 3-month period. Students reported using advanced health history skills to differentiate between normal, variations of normal, and abnormal findings. Students gained experience in using evidence-based protocols that were frequently being updated with the

changing symptomology of COVID-19 clinical presentations and emerging evidence that linked certain comorbid conditions or health behaviors to concerning outcomes (i.e., obesity, pregnancy, vaping). Furthermore, given the high levels of anxiety faced by patients, NP students learned to create a climate of patient- centered care to include confidentiality, privacy, comfort, emotional support, mutual trust, and respect (National Organization of Nurse Practitioner Faculties, 2016).

NP Students Providing Occupational Health Triage, Return to Work Clearance, and Contact Tracing

To develop a comprehensive population health approach for the management of COVID-19 exposure in our employed population, the COVID-19 Hotline was expanded to all employees and offered screening, triage and timely access to testing, as well as "return to work" assessments and clearance in COVID negative employees (Judson et al., 2020). The Hotline referred all employees who were COVID positive or had significant exposures to Occupational Health Services (OHS) for index case interviews, exposure assessment, case classification, and contact tracing. NP students were involved in both settings. In an effort to strengthen the team and improve the learning experience, we recalled a recently retired professor who was both a fully credentialed nurse practitioner and an occupational health expert. Utilizing the organization's "emergency credentialing process" she was rapidly credentialed to provide full services and served as the lead faculty preceptor for the 16 students.

Nine NP students completed the clinical rotation at the COVID-19 Hotline Triage Center, focusing on employee questions, symptoms and return to work for those with negative test results. Approximately 50% of these NP students were also in the specialty graduate program of Occupational and Environmental Health. In consultation with their on-site preceptor, learning objectives for this rotation included those from the patient hotline (Response #1), as well as, applying return to work guidance for those with negative testing. This clinical rotation was supported by a weekly optional hourly clinical seminar scheduled from 5-6 PM for 5 weeks during the 10-week Spring 2020 quarter. Each student participated in an average of 4 calls/-shift, in consultation with their on-site NP preceptor. Unlike the patient triage center total numbers of employee calls handled by the APRN students during the employee health rotation were not tracked, as data systems for the employee workflows were newly emerging.

For positive results and contact tracing, 6 NP students participated in contact tracing through the OHS, and 1 NP student joined the case classification team (which determined the likelihood of occupational or community acquisition). The majority of these nurse practitioner students were also in the specialty graduate program of Occupational and Environmental Health. Learning objectives for this rotation included: (a) Gaining expertise in the clinical presentation of COVID-19, including symptoms and testing; (b) Participating in index case interview for employees testing positive to determine if contact tracing was indicated; (c) Interviewing employees from the contact list to determine if they had exposure to the index case; and, (d) Educating contacts regarding exposure, testing, symptom monitoring and return to work or home quarantine, if indicated, in consultation with their on-site preceptor.

In both rotations, students expanded their knowledge base in COVID clinical management, exposure assessment, and contact tracing methods. Learner outcomes from this rotation included a greater understanding of standardized procedures; holistic assessment and goal setting; the primary care provider's role in ensuring an employee's readiness to safely return to work; and providing employees with a treatment plan including COVID-19 testing and comfort measures and/or symptom management. Preceptors observed that this rotation provided opportunities for the students to conduct a comprehensive chart review, to refine interviewing and oral presentation skills, and to perfect their exposure assessment skills. Clinical seminars and the clinical huddles supported clinical decision making, and presented an opportunity for students to ask questions, present their cases, and discuss changes in CDC guidance, for example. NPs in the health system noted the following about the new partnership:

> "We were grateful for the ease with which the NP students integrated into our team during a time of uncertainty secondary to the first wave of COVID-19. We quickly learned how valuable their input was to creating our workflows and refining the triage process. Additionally, their drive to develop and hone their clinical skills with each patient encounter was inspiring. They were a fun and enthusiastic part of our team!"

Community Health Partnership Innovations

Responding to a pandemic outside of an acute care setting requires innovative and creative methods to increase the skills and types of individuals providing care on the frontlines and the launch of alternative care settings (Healthforce Center at UCSF, 2020). There were a number of changes in care delivery in community-based settings to prevent the spread of infection due to COVID-19. Our students and faculty participated in newly created formalized clinical opportunities and volunteer experiences aimed to prevent the spread of COVID-19 in the community.

NP Students Conducting N95 Fit Testing of Home Care Workers

While hospitals struggled to procure adequate PPE, the shortage of adequate and appropriate equipment in the home care setting was an even greater challenge. Given the frailty of elders living in their homes, they are at high risk for contracting the virus as well as becoming further isolated given the shelter in place and physical distancing recommendations. A survey of more than 1,000 home health agencies (HHAs) across the U.S. found that more than half had laid off staff — and 96 percent reported that at least some patients refused services during the pandemic (Ollstein & Kenen, 2020). Furthermore, home care workers themselves are at high risk of contracting the virus, secondary to their demographic characteristics. The home care workforce is an aging workforce, with a high percentage of workers being immigrants or women of color (Drake, 2020).

Unfortunately, home care workers may also be a source for the virus and may place elders at risk for exposure. There is strong evidence that persons are contagious 48 hours before symptoms present, and, regular surgical or cloth face masks may not afford protection from aerosols, i.e. smaller particles, when providing close contact care such as that which is done in a homecare setting, thus an effort to supply home care workers with N95 masks was a key initiative. In order for an N95 mask to be effective, health care workers must undergo a customized mask fitting. Performing N95 mask fittings for frontline workers in an under-resourced setting, directly helps protect vulnerable frail home bound seniors from contracting COVID-19 by allowing them to get the care they need at home and continue sheltering in place and staying out of hospitals or institutions.

In order to minimize the exposure to the virus, adult gerontology nurse practitioner students were trained to conduct sessions to appropriately fit the N95 masks being used by home care workers visiting aging clients. In collaboration with a large not-for-profit senior care provider/partner, two AGPCNP students and their preceptor, an AGPCNP trained in occupational and environmental health, conducted N95 qualitative fit testing assessments for over 70 home care workers. During these fitting assessments students reviewed participant's medical history and contraindications for the mask, conducted a physical exam (e.g., lung assessment if history of asthma), and performed the qualitative fit testing protocol (McLellan & Schusler, 2000; Occupational Safety and Health Administration, 2015; 2020). The NP students provided the HCWs with not only properly fitted PPE so they could continue to serve and care for those who are home bound but they also provided education and training about safely caring for their clients in the midst of a pandemic.

NP Students Caring for People Experiencing Homelessness

People experiencing homelessness or living in large shelter settings are particularly vulnerable to COVID-19 and those with underlying medical conditions are susceptible to the critical impact of the virus, including higher mortality rates (Centers for Disease Control and Prevention, 2020b). In relation to COVID-19 disease spread and transmission in this population, there are two considerations worth noting. While the risks with sleeping on the streets or in an encampment setting are different than staying indoors in a shelter or other congregate settings, the lack of housing contributes to their poor physical and mental health outcomes. Living outside, for example, may allow unsheltered persons to physically distance, however, it does not allow them to be protected from inclement weather or other environmental conditions and limits access to appropriate hygiene or water.

Recognizing the potentially devastating impact COVID-19 would have on this high-risk population; on March 18, 2020, California Governor Gavin Newsom (2020) allocated $150 million to local governments to provide emergency housing for individuals experiencing homelessness. Other governments across the country did the same (Mackenzie, Trimbur, Vanjani, 2020). In collaboration with Alameda County Healthcare for the Homeless (AHCH) medical staff, over 20 family, women's health and/or midwifery, and adult gerontology primary care nurse practitioner students and six UCSF faculty from these programs provided onsite medical care for up to four days per week at two separate hotel sites.

The goal of this initiative, coined Operation Safer Ground, was to ultimately provide linkages to permanent housing for people experiencing homelessness. NP students and faculty provided care to a population whose health promotion needs are poorly met even when there is no pandemic present. Students and faculty triaged COVID-19 screenings, provided health promotion and maintenance counselling, conducted medication reconciliation and ensured clients were receiving their prescriptions, provided referrals to substance use and mental health counselling, and (re-) connected clients to primary care. Notably, they worked with medical providers (Nurse Practitioners, Physicians, and a Pharmacist) to manage clients' chronic illnesses that place them at highest risk.

The success was evidenced by the NP students and faculty providing primary care over a 3-month period (and counting) to over 350 unsheltered clients several times per week beginning in April 2020. Most of the clients are over 60, yet some are younger with chronic health conditions such as HIV, cardio-pulmonary conditions or diabetes that put them at high risk for critical outcomes in the event of a COVID-19 infection. The

women's health and/or midwifery nurse practitioner students focused on providing primary care to unsheltered female identifying clients, pregnant persons, or those who experienced domestic violence.

Discussion

The impact of COVID-19 pandemic on the healthcare system will have long-lasting effects. The industry transition to telehealth, the mobilization of every type of health care worker, practicing at the top of their scope and the population health oriented functional solutions were changes that were needed but had been slow to emerge before the pandemic. In our experience the roles our NP faculty and NP students played in COVID-19 response has added a rich dimension to practice and will be felt for years to come.

Nurse Practitioner students are an essential emergency workforce in the face of a pandemic. Our school swiftly responded to a public need and offered a progressive solution to a challenge facing both nursing education and practice across the U.S. This paper describes a number of academic medical center and community health deployments we swiftly created to minimize the public health impacts of COVID-19, while also providing an opportunity for students to progress and successfully graduate on time in their programs.

As a result of the pandemic, a number of important temporary policy changes occurred that are worth noting for nurse practitioners. Numerous states created emergency proclamations to lift NP scope of practice restrictions (e.g., practice agreements requirements and physician supervision) (American Association of Nurse Practitioners, 2020). The Centers for Medicare and Medicaid Services waived a number of requirements to expand NP's scope of practice in skilled nursing facilities (CMS, 2020a) and provided an expansion of telehealth coverage (2020b).

In addition, NP licensing and certification bodies have also made important policy changes to respond to the increase demand for workforce expansion. Moving forward, states may offer interim or temporary licenses to NP students who are almost finished with their program. NP students working in the capacity of disaster relief workers should receive credit for clinical hours commensurate with their roles so that they can continue to advance toward the goal of obtaining permanent licensure and national certification after the emergency ends (Spetz, 2020). In addition, early in the pandemic, the National Organization of Nurse Practitioner Faculties with support from a number of stakeholders released guidance that NP students are required to complete a minimum of 500 hours of supervised direct patient care experience (National Organization of Nurse Practitioner Faculties, 2020). Notably, while prelicensure training programs have been able to successfully lobby for integration of simulation hours to be substituted for traditional clinical experiences based on landmark research (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014), this has not yet happened at the APRN level. Nurse and government leaders need to monitor and collect outcomes data in their jurisdictions that have relaxed NP restrictions or are modifying learning delivery modalities during the pandemic to allow us to demonstrate the value of NPs. Further discussion is needed as we move forward in how to sustain and ensure these policies are a permanent fixture in NP workforce and education endeavors.

As a result of the sheltering in place mandates, telehealth visits substantially increased and are now fully integrated as a care delivery modality, which will persist beyond the pandemic. In addition to the four programs we highlighted, many of our other NP students had opportunities to work with their preceptors during telehealth visits and we now have a wave of new providers who are savvy with providing tele-healthcare. The bulk of the care delivery described utilized the sharp assessment skills of NPs to accurately assess COVID-19 symptoms and quickly make care and testing decisions.

An area of growth for nursing education will be in the preparation for nurses at all levels to be able to deliver high quality, patient centered care via video or by phone. Before the pandemic, telehealth use at our organization comprised 2% of all ambulatory visit encounters and peaked at 68% at the height of the first surge. However, there is clearly a need to teach our students (and providers) how best to conduct telehealth encounters using high quality and standardized health history and physical assessment, professional comportment, and patient engagement techniques.

Students who participated in clinical rotations during this time were given the opportunity to rapidly increase their knowledge of COVID-19 specific to evidence-based primary, secondary, and tertiary prevention strategies. NP students quickly learned about the epidemiology and virology of the Sars-Cov-2 virus, Polymerase Chain Reaction (PCR) testing requirements and procedures, the use of antibody serologies, and the emerging evidence surrounding diagnostic testing and vaccine development. Our school of nursing mobilized quickly to incorporate didactic content into required coursework, so that students could learn about these concepts. The content also included the importance of public health infrastructure and the policy implications of a pandemic as well as the health equity and social justice impacts especially among communities of color.

The pandemic is preparing new graduate NPs for the future. Given COVID-19 is the third serious coronavirus that has spread from an animal reservoir to people in the past 20 years (severe acute respiratory syndrome [SARS], Middle East respiratory syndrome [MERS], and COVID 19), scientists are concerned that future pandemics are inevitable (NIAID, 2020). The world is not ready. Nursing education must prepare

prelicensure and graduate student nurses to lead in a disaster situation. This project was comprehensive and grounded in solid public health principles and could easily be replicated among other schools of nursing. Other disasters nursing students can participate in caring for communities include other current situations such as the wildfires in the west or hurricanes in the south or earthquakes. When the public has high levels of trauma, nurses are well-suited to successfully implement trauma-informed care (Fleishman, Kamsky, & Sundborg, 2019).

The implementation of population health management structures offered the students and faculty the opportunity to utilize standardized evidenced based protocols, data driven quality and performance improvement methodologies, and experience rapid scaling of systematic structures to meet the significant patient and employee demand for symptom assessment and access to care. Students worked in synchrony and collaboratively with interprofessional teams across varied settings to perform a standardized assessment, triaging patients, employees and clients to the appropriate next level of care.

Furthermore, the pandemic may have provided an opportunity for the revitalization and rediscovery of the occupational health nursing specialty (American Association of Occupational Health Nurses, n.d.). NP students gained first-hand experiential learning in exposure assessments, contact tracing, the hierarchy of controls, and the conversion of regulatory guidance from state OSHA standards and CDC guidance into policies and procedures that were implemented rapidly. Occupational health nurses are the professional backbone for keeping our employees safe and working, especially in the health care setting. These nursing professionals must perform their contact tracing and exposure assessment work quickly, accurately and with deep compassion for individuals who are anxious about their own safety as well as for their co-workers, families and patients. This advanced practice OHS nursing team exploded from 1 to 2 contact tracing and exposure cases per month to 2 to 3 per day; necessitating the rapid incorporation of redeployed nursing staff and the opportunity for integration of NP students.

The common thread through all of these programs was the need for the NP students to utilize their patient engagement and counselling skills. Many patients and employees were anxious and fearful, not only about the health implications of the COVID-19 virus but also about common questions that were not being answered elsewhere (e.g., household risk, quarantine instructions, exposure implications on their family and/or friends). NP students doing this work, reported that this was one of the most satisfying parts of the role, to be able to provide answers and allay fears and anxiety.

This effort has forged new relationships between our academic medical center, community partners, and our School of Nursing, opening up the pathway for programmatic integration of students into these care delivery models, and for us to develop creative formalized clinical rotations for NP students to gain the skills sets and competencies for standardized assessment, telehealth and pandemic management. Schools of nursing should think more deliberately about integrated programmatic approaches within the health systems partnerships given the benefits of having students as a reliable labor workforce. It is clear that students can be integrated into care delivery structures as part of a vital essential workforce.

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Authors' Contributions

The senior author, Catherine Gilliss, conceptualized the manuscript. The first and second authors facilitated collection of the contents and provided continuous feedback. All authors wrote, read, and provided critical revisions of the manuscript.

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