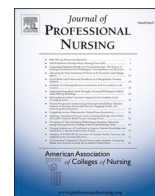Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Nurse faculty perceptions of readiness for practice among new nurses graduating during the pandemic

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ABSTRACT

Background: The COVID-19 pandemic caused major changes in nursing education, namely a shift to remote learning and significant reduction of clinical practice experience. It is not known how these changes will affect new graduate nurses transitioning to practice.
Purpose: To provide guidance to transition-to-practice programs, this study quantitatively described and compared nurse faculty perceptions of readiness for practice among students who graduated pre-pandemic and those who will graduate during the pandemic.
Methods: A convenience sample of 116 nurse faculty across North Carolina completed surveys online. Surveys collected information on demographics, professional experience, and teaching changes experienced during the pandemic. The Nursing Practice Readiness Tool was used to measure perceptions of readiness for practice.
Results: Nurse faculty reported a wide range of changes due to the pandemic, with limitations in clinical learning prevalent. There was a statistically significant decrease in practice readiness scores for the total scale, six sub-scales, and all tool items at $p < 0.001$ for all paired comparisons.
Conclusions: While there was an overall significant decrease in scores for all competency areas, further analysis of the tool subscales and items can provide guidance for clinical nurses working with new graduates and nurse faculty working with continuing students.

Introduction

The COVID-19 pandemic resulted in unprecedented changes to pre-licensure nursing education. In March 2020, nursing programs across the United States (US) had to quickly transition from in-person classes, simulations, and clinical experiences to offering comparable remote learning experiences. During the Fall 2020 semester, many programs had to continue offering didactic classes online. For those that were able to hold some in-person classes and/or simulations, modifications were often needed to adhere to social distancing and room capacity requirements. For clinical learning, the number of hours were often reduced (National Council of State Boards of Nursing, 2020; North Carolina Area Health Education Centers [NC AHEC], 2021). As the Spring 2021 semester began, a surge in COVID-19 cases occurred, and many schools continued to experience limitations to in-person learning. While there was disruption of in-person learning for the final weeks of the May 2020 graduates' education, it is the May 2021 graduates who experienced a much larger loss of in-person learning. It is not known how this will impact their transition-to-practice (TTP) following graduation.

Background

Nursing education is unique in that it is primarily offered in-person, with a reliance on hands-on learning (Michel et al., 2021; Wallace et al., 2021). When the COVID-19 pandemic began in Spring 2020, nursing programs had to rapidly shift from in-person to remote learning due to infection fears and limited personal protective equipment (PPE). Depending on the surge in COVID-19 cases in different geographical areas, complete or partial use of remote learning persisted in Fall 2020 and into Spring 2021. Thus, students graduating in May 2021 could potentially have had reduced in-person learning for three of their four nursing school semesters. The ongoing pandemic trajectory could require continued disruptions in learning for future graduates as well.

Currently, there are few published studies on the impact of these changes in nursing education within the US (Michel et al., 2021). A study conducted in December 2020 with undergraduate nursing students from five schools in the US found that students reported high levels of stress (due to school and personal reasons), difficulty learning online, and missed opportunities for hands-on clinical learning (Michel et al., 2021). Another study of new graduate nurses (NGNs) who began a TTP program in July 2020 at a US medical center found that NGNs reported anxiety and feeling less competent due to their several month gap in clinical experience (Smith et al., 2021). These findings suggest a decreased level of practice readiness is likely to be present, and perhaps magnified, for those NGNs who experienced pandemic-related changes to their education for multiple semesters.

Even pre-pandemic, the TTP period was known to be a challenging and demanding time (Powers et al., 2019), and the differences between nursing school and professional practice can cause NGNs to experience transition shock (Boychuk Duchscher, 2009). Prior to the pandemic, approximately 25% of NGNs were leaving their position within the first year of practice (NCSBN, n.d), resulting in considerable cost burden for hospitals (Asber, 2019). In response to negative outcomes during the TTP period, the NCSBN conducted a large study to evaluate the effectiveness of a TTP program for NGNs. The sample consisted of over 1000 NGNs at 105 hospitals in three states. Results showed that NGNs participating in a TTP program had fewer negative safety practices, and the turnover rate was significantly lower (Spector et al., 2015). There is a continued need for more research to determine the most effective strategies for bridging the academia-practice gap to promote successful transition of NGNs (Hampton et al., 2020; Kenny et al., 2021). Further, effective TTP programs are even more paramount now due to the ongoing nurse shortage which is being exacerbated by the pandemic because nurses have left their positions due to stress, work conditions, family responsibilities, higher salaries for travel nursing, etc. (Associated Press, 2020; International Council of Nurses, 2021).

To help TTP programs meet the needs of NGNs who experienced pandemic-related education modifications, it is essential to determine areas that would benefit from continued learning post-graduation. This requires nurse leaders in academia and practice to share insights and outcomes. We formed a team of nurse faculty and hospital nurse leaders to identify strategies to help promote successful transition of NGNs who learned during the pandemic. The ultimate goal of our partnership is to augment the hospital's TTP program by focusing on specific areas where NGNs may have gained less experience as a result of limitations placed on academia. Due to the recency of the pandemic, there is a lack of literature to guide augmentation of TTP programs; therefore, we sought to first gain the insight of nurse faculty on NGNs' preparedness for professional practice and particular areas of opportunity.

Methodology

Design and purpose

Using a survey design, this descriptive, correlational study sought to compare nurse faculty perceptions of readiness for practice among NGNs who graduated pre-pandemic and those who will graduate during the pandemic. We also administered open-ended questions to further explore faculty perceptions of the impact of the pandemic on learning outcomes and recommendations for TTP programs, and these findings will be published separately.

Sample and setting

Convenience sampling was used to obtain a sample of faculty teaching in prelicensure nursing programs across the state of North Carolina. There were no exclusion criteria with regard to faculty employment status (full-time, part-time), program type (BSN, ADN, LPN), content areas taught (medical, surgical, pediatrics, maternity,

etc.), or teaching settings (classroom, online, laboratory, simulation, clinical). Recruitment occurred by emailing all directors of prelicensure nursing programs in North Carolina. The email contained a short description of the study with a survey link and a statement requesting they forward the email to all nurse faculty teaching prelicensure students in their program. A priori power analysis calculation using G*Power software for *t*-test analysis, medium effect size, alpha 0.05, and power 0.80 revealed a sample of 128 participants was needed to detect statistically significant differences. Recruitment was aided by offering the first 100 participants who fully completed the survey the option to enter their email address to receive a $25 gift card.

There were 136 individuals who accessed the survey site, and 135 consented to participate. An overall response rate could not be calculated, as it is unknown how many directors forwarded the recruitment email to nurse faculty in their programs. However, one survey item did identify that nurse faculty from across the state participated. Of the 135 who consented to participate, 116 nurse faculty completed items to collect data on readiness for practice, resulting in a final sample of $N = 116$ (85.9% completion rate).

Measurement tools

The survey began with items to collect demographic, professional, and pandemic teaching experience information. Three items collected basic demographic information (age, gender, race/ethnicity), and one item was administered to determine geographic area of participants (to assess for statewide representation). Next, seven items collected professional information (years of nursing and teaching experience, degree and certifications, faculty position title, employment status, and additional work in a clinical setting). Remaining items asked for information about teaching in the past year. Participants reported type of program, level of students, teaching settings, and courses they taught (could select more than one response). Three items then collected data on the amount of student absenteeism in the past year (due to illness, quarantine, etc.) in didactic, laboratory/simulation, and clinical courses. Response options were no issue, students absent infrequently, sometimes, often, and very often. Lastly, four items asked participants to select options to describe changes that occurred due to the pandemic in their didactic, laboratory, simulation, and clinical courses. The response options varied for each item and were created based on changes observed by the research team and changes discussed in online nurse faculty listservs/discussion boards. Examples of response options were didactic classes moved from classroom to online, laboratory classes repeated so small amount of students attend at one time, simulations moved from simulation lab to online/virtual simulations, and clinical rotations changed to have less hours per clinical day. Participants could also type in specific changes not captured in the provided response options.

To collect nurse faculty perceptions of readiness for practice among NGNs, the Nursing Practice Readiness Tool (NPRT) was administered with permission received from the Nursing Executive Center, The Advisory Board Company (www.advisory.com). The NPRT asks participants to report satisfaction with their graduating students' proficiency level for 36 entry-level nursing competencies using a 6-point Likert scale (response options: 1 = *Strongly disagree*; 2 = *Disagree*; 3 = *Tend to disagree*; 4 = *Tend to agree*; 5 = *Agree*; 6 = *Strongly agree*). The 36 tool items are grouped into six subscales: clinical knowledge, technical skills, critical thinking, communication, professionalism, and management of responsibilities. Thus, mean scores can be calculated for each item, the six subscales, and the total scale, with higher mean scores indicating greater satisfaction with NGN competency proficiency level and readiness for practice. The original NPRT had a Cronbach's alpha coefficient of 0.97, and a revised version was reported to have a reliability coefficient of 0.98, indicating high reliability of the tool (Gregg, 2020). For this study, the NPRT was administered twice. Participants were first asked to rate their satisfaction with the proficiency level of their pre-pandemic graduates and then to rate those who will graduate during

the pandemic (example provided was May 2021 graduates).

Procedures

Ethics review approvals were granted by Atrium Health and the University of North Carolina at Charlotte, and completion of surveys conveyed consent to participate. The survey was distributed online in Qualtrics. The email invitation, with a brief description of the study and request to forward the survey link to faculty, was sent to directors of nursing programs across North Carolina on March 24, 2021. A second reminder to forward the email invitation to faculty was sent on April 7, 2021. Data were collected for 1 month after the first email was sent. Upon receiving the email, interested nurse faculty clicked on the link to open the Qualtrics site where the study was explained in detail. Those who chose to participate clicked forward to complete survey items. Upon completion of all survey items, participants could opt to enter their email address for a gift card.

Data analysis

After 1 month of data collection, the data were transferred from Qualtrics to SPSS version 26 for statistical analyses, which were conducted by the two nurse faculty on the research team. Descriptive statistics were used to describe sample demographics, professional information, and teaching experiences within the past year. Analysis of the NPRT data used descriptive statistics to evaluate item, subscale, and total scale mean scores. The data were determined to violate assumptions of normality; therefore, Wilcoxon signed rank tests were used to evaluate for differences in NPRT scores for students who graduated prepandemic and during the pandemic. Mann-Whitney and Kruskal-Wallis tests were used to determine differences in NPRT scores according to demographic and professional variables. Spearman rho correlation was used to determine the relationship of demographic and professional variables and NPRT scores. Significance was set at $p < 0.05$.

Results

Demographic and professional information

Most of the 116 participants were female (91.4%), white, non-Hispanic (87.9%), and 40–59 years old (52.6%). Almost half (44.8%) reported 21 to 40 years of nursing experience, and more than 70% had less than 10 years of teaching experience. For highest degree earned, the majority of participants (67.3%) held a Master's Degree in Nursing and 25.9% held a Doctorate Degree in Nursing and other related disciplines. Almost all reported being full-time faculty members (89.3%) and about half reported no additional work in a clinical setting (50.9%) (see Table 1). There were no significant differences in NRPT scores when participants were grouped according to highest degree held [H(6) = 1.49, $p = 0.960$], title or position [H(8) = 7.98, $p = 0.436$], employment (U = 587, $p = 0.384$), and additional work in a clinical setting [H(2) = 4.14, $p = 0.126$].

Teaching experience in the past year

The majority of participants taught in an Associate Degree in Nursing program (60.4%), and 35.3% taught in a traditional Bachelor of Science in Nursing program. Most taught students at the beginning of the program (64.7%) and taught didactic (82.8%) and clinical (77.7%) courses. The most frequently taught courses were medical-surgical nursing (69%) and nursing care - concepts focused (46.6%) (see Table 2).

Changes due to the pandemic

More than half of the participants reported student absenteeism as very often, often, and sometimes during the pandemic. Absenteeism was

Table 1
Demographic and professional information.

	n	%
Age		
Less than 30 years old	6	5.2%
30–39 years old	24	20.7%
40–49 years old	29	25.0%
50–59 years old	32	27.6%
60–69 years old	24	20.7%
70 years or older	1	0.9%
Gender		
Male	10	8.6%
Female	106	91.4%
Race/Ethnicity		
White, non-Hispanic	102	87.9%
Hispanic or Latino	3	2.6%
Black/African American	8	6.9%
Asian	1	0.9%
American Indian & Alaska Native	0	0.0%
Native Hawaiian & Other Pacific Islander	0	0.0%
Multiple or Other Race	1	0.9%
Years of nursing experience		
Less than 5 years	3	2.6%
5–10 years	14	12.1%
11–15 years	20	17.2%
16–20 years	16	13.8%
21–30 years	29	25.0%
31–40 years	23	19.8%
More than 40 years	11	9.5%
Years of teaching experience		
Less than 5 years	37	31.9%
5–10 years	33	28.4%
11–15 years	25	21.6%
16–20 years	8	6.9%
21–30 years	11	9.5%
31–40 years	1	0.9%
More than 40 years	1	0.9%
Highest degree held		
Associate Degree in Nursing (ADN)	1	0.9%
Bachelor of Science in Nursing (BSN)	7	6.0%
Master of Science in Nursing (MSN)	78	67.3%
Doctor of Nursing Practice (DNP)	16	13.8%
Doctor of Philosophy (PhD)	10	8.6%
Doctor of Education (EdD) or PhD in Education	4	3.5%
Certifications[a]		
Certified Nurse Educator (CNE)	23	19.8%
Certified Nurse Educator-Clinical (CNE-Cl)	1	0.9%
Certified Healthcare Simulation Educator (CHSE)	6	5.2%
Nurse Practitioner Certification (FNP, AGACNP, etc.)	9	7.8%
Clinical Nurse Leader (CNL) or Clinical Nurse Specialist (CNS)	2	1.7%
Various clinical practice certifications	24	21.6%
Job position/Title		
Professor	15	13.0%
Clinical professor	3	2.6%
Associate professor	9	7.8%
Clinical associate professor	3	2.6%
Assistant professor	10	8.6%
Clinical assistant professor	5	4.3%
Lecturer	15	12.9%
Adjunct or part-time faculty member	11	9.5%
Nursing Program Director or Chair	7	6.0%
Faculty member or instructor or educator	29	26.1%
Simulation/Laboratory coordinator and instructor	5	4.5%
Other	4	3.5%
Employment status (in past year)		
Part-time	16	13.8%
Full-time	99	85.3%
Missing	1	0.9%
Additional work in clinical setting		
Yes, providing direct patient care	46	39.7%
Yes, not providing direct patient care	11	9.5%
No	59	50.9%

[a] Could select more than 1 option. Percentages do not total 100%.

Table 2
Teaching experience in the past year.

	n	%
Pre-licensure/Undergraduate degree program(s) taught[a]		
Licensed Practical Nurse (LPN) program	20	17.2%
Diploma in Nursing program	3	2.7%
Associate Degree in Nursing (ADN) program	70	60.4%
Bachelor of Science in Nursing (BSN) program (traditional)	41	35.3%
Accelerated Bachelor of Science in Nursing (BSN) program	8	6.9%
Level of students taught[a]		
Students at beginning of nursing program	75	64.7%
Students in middle of nursing program	72	62.1%
Students near end of nursing program	63	54.3%
Teaching settings[a]		
Didactic (i.e. classroom, may be currently online due to pandemic)	96	82.8%
Laboratory/Skills	77	66.4%
Simulation	73	62.9%
Clinical	90	77.7%
Online	68	58.6%
Courses taught[a]		
Pharmacology	33	28.4%
Pathophysiology	17	14.7%
Introduction to nursing/Fundamentals	48	41.5%
Health assessment	4	3.5%
Medical or Surgical adult nursing	80	69.0%
Pediatric nursing	17	14.7%
Maternity nursing	24	20.7%
Mental health nursing	27	23.3%
Community nursing	20	17.2%
Nursing care - concepts focused	54	46.6%
Other	8	6.9%

[a] Could select more than 1 option. Percentages do not total 100%.

mostly seen in clinical courses (54.3%), followed by didactic (53.4%) and laboratory or simulation courses (48.2%). Most reported their didactic courses moved to online/remote learning (86.2%), while laboratory (65.5%) and simulation courses (51.7%) were often taught in repeated sessions with a smaller number of students at one time. More than half of the participants reported that clinical courses were fully moved to online virtual simulations (51.7%); and interestingly, about 31% reported complete cancellation of clinical courses, without any alternate format provided (see Table 3).

Nursing practice readiness tool results

There was a statistically significant decrease in NPRT scores from pre-pandemic to during the pandemic for the total scale, all six subscales, and all 36 individual items, with all paired comparisons $p < 0.001$, indicating nurse faculty felt NGN competency proficiency level and readiness for practice had decreased for those who learned during the pandemic. The mean score for the total scale was high for pre-pandemic graduates at 5.10 (*Agree*) and dropped to 4.39 (*Tend to agree*) for those graduating during the pandemic. Faculty participants consistently rated NGN readiness higher on the technical, professionalism, and clinical knowledge subscales than on the management of responsibilities, critical thinking, and communication subscales, both before and during the pandemic. Although there was a significant drop in all subscale mean scores from pre- to during the pandemic, the largest differences were for technical skills, critical thinking, management of responsibilities, and communication (see Table 4).

As there was a statistically significant decrease in perceived NGN readiness for all 36 competency areas, further analysis of individual items was conducted to help provide tangible areas for augmentation in TTP programs. First, items with a decrease in mean scores to less than 4.50 for during the pandemic graduates were identified as areas of opportunity for TTP augmentation. There were 21 items in which mean scores decreased to <4.50, with "Communication with physicians" rated lowest. Next, items in which mean scores decreased the most (>0.70

Table 3
Changes due to the pandemic.

	n	%
Absenteeism: didactic courses		
Students absent very often	8	6.9%
Students absent often	15	12.9%
Students absent sometimes	39	33.6%
Students absent infrequently	21	18.1%
Absenteeism has not been an issue	21	18.1%
Did not teach didactic course	12	10.3%
Absenteeism: Laboratory/Simulation courses		
Students absent very often	7	6.0%
Students absent often	13	11.2%
Students absent sometimes	36	31.0%
Students absent infrequently	30	25.9%
Absenteeism has not been an issue	22	19.0%
Did not teach laboratory or simulation course	6	5.2%
Missing	2	1.7%
Absenteeism: clinical courses		
Students absent very often	3	2.6%
Students absent often	19	16.4%
Students absent sometimes	41	35.3%
Students absent infrequently	28	24.1%
Absenteeism has not been an issue	20	17.2%
Did not teach clinical course	4	3.4%
Missing	1	0.9%
Changes in didactic teaching[a]		
Didactic classes moved from classroom to online	100	86.2%
Didactic classes taught hybrid (half of students in classroom, the other half online)	50	43.1%
Didactic classes taught in more than 1 room (teacher in one classroom with students and video projection of teaching to students in another room)	20	17.2%
Didactic classes repeated so small amount of students attend at 1 time	21	18.1%
Other didactic class changes (written changes: moved to larger classrooms; classes online but testing on campus)	13	11.1%
Changes in laboratory teaching[a]		
Laboratory classes moved from lab to online	42	36.2%
Laboratory classes taught hybrid (half of students in lab, the other half online)	27	23.3%
Laboratory classes taught in more than 1 room (teacher in one lab room with students and video projection of teaching to students in another room)	23	19.8%
Laboratory classes repeated so small amount of students attend at 1 time	76	65.5%
Laboratory classes cancelled/not offered during pandemic	11	9.5%
Other laboratory changes (written changes: enhanced PPE)	13	11.2%
Changes in simulation teaching[a]		
Simulations moved from simulation lab to online/virtual simulations	56	48.3%
Simulations taught hybrid (half of students in simulation lab, the other half online)	21	18.1%
Simulations taught in more than 1 room (teacher in one simulation room with students and video projection of simulation to students in another room)	14	12.1%
Simulations repeated more frequently so smaller amount of students attend at 1 time	60	51.7%
Simulations conducted in-person but pre-brief and/or debrief changed to online	17	14.7%
Simulations cancelled/not offered during pandemic	15	12.9%
Other simulation changes (written changes: resumed simulation in lab in late Fall 2020; enhanced PPE; simulations to replace clinical hours)	12	10.3%
Changes in clinical teaching[a]		
Clinical rotations cancelled (not offered in another format)	36	31.0%
Clinical rotations changed to fully in-person simulations	17	14.7%
Clinical rotations changed to fully virtual/online simulations	60	51.7%
Clinical rotations changed to fully case study completion other non-simulation activity	31	26.7%
Clinical rotations changed to have smaller groups of students attend at 1 time	45	38.8%
Clinical rotations changed to have less hours per clinical day	20	17.2%
	39	33.6%

Table 3 (*continued*)

	n	%
Clinical rotations changed to have less clinical hours for semester, augmented by more simulation/laboratory time		
Other clinical changes (written changes: strict PPE; clinical evolved as the pandemic changed; returned to clinical in Fall 2020 or Spring 2021; moved to different units/facilities than originally assigned; unable to rotate to other hospital areas; post-conferences online; split groups so half in clinical or simulation for 4 h then switched; virtual simulation used in place of clinical for ill/quarantined students)	27	23.3%

[a] Could select more than 1 option. Percentages do not total 100%.

decrease in mean score) from pre- to during the pandemic were also identified as areas of opportunity for TTP augmentation. Again, there were 21 items that had a mean score decrease greater than 0.70, with the largest decrease noted for "Administration of medication" (see Table 5; an asterisk denotes items that both decreased to mean score < 4.50 and had a change in mean score > 0.70).

Correlations

The correlations between the participants' demographic and professional characteristics and the NPRT subscales and total scale means were *very weak* (0.012 to 0.092) and did not show any statistically significant correlations ($p = 0.260$ to 0.897). The NPRT post-scale means were not correlated with the participants' age ($r_s = -0.072, p = 0.447$), gender ($r_s = -0.046, p = 0.631$), race or ethnicity ($r_s = 0.025, p = 0.790$), years as a nurse ($r_s = -0.029, p = 0.757$), years as a nurse faculty member ($r_s = -0.085, p = 0.370$), highest degree held ($r_s = 0.026, p = 0.784$), job title or position ($r_s = 0.107, p = 0.260$), employment status ($r_s = -0.083, p = 0.386$), and additional work in a clinical setting ($r_s = 0.062, p = 0.515$).

Discussion

We gained a sample of 116 faculty who teach in various prelicensure nursing programs across the state of North Carolina. Faculty reported that students' education was modified or limited during the pandemic in several ways. Most didactic classes, simulations, and clinical experiences were initially moved online. To accomplish this, virtual simulation was often used to replace clinical learning time (51.7%) and laboratory-based simulation learning time (48.3%). For almost one-third of participants, clinical rotations were abruptly cancelled in Spring 2020 and were not replaced with comparable learning. When some in-person learning could resume in Fall 2020 and Spring 2021, modifications were prevalent. This often involved repeated simulation/laboratory sessions and smaller clinical groups to ensure adequate distancing and adherence to agency requirements. However, many also reported that clinical learning hours were reduced, and students spent more time in simulation. Experiential learning is paramount to helping students apply theoretical knowledge to patient care (Herron et al., 2016). Simulation provides experiential learning, and studies have shown it results in positive learning outcomes. Thus, even pre-pandemic, the NCSBN stated that high-quality simulation could be utilized for up to 50% of students' required clinical hours (Hayden et al., 2014). However, this statement was based on research that involved laboratory-based simulations (Hayden et al., 2014), and evidence on the effectiveness of using virtual simulation is still evolving (Foronda et al., 2020). Meanwhile, clinical learning is recognized as essential for developing nursing students' clinical reasoning and other vital competencies such as psychomotor skill performance, team communication, and time management (Oermann & Gaberson, 2017). Thus, students' loss of clinical learning during the pandemic is an important consideration when planning strategies to meet NGNs' needs in a TTP program.

According to our NPRT results, faculty felt students who learned during the pandemic will be overall less prepared for professional

Table 4
Nursing practice readiness tool results.

Items	Pre-pandemic mean (SD)	During pandemic mean (SD)	Mean difference	Z score
Clinical knowledge				
1 Understanding of the principles of evidence-based practice	5.25 (0.699)	4.80 (1.05)	−0.45	−5.02*
2 Knowledge of pathophysiology of patient conditions	5.21 (0.752)	4.77 (0.935)	−0.44	−5.78*
3 Knowledge of pharmacological implications of medications	5.07 (0.743)	4.59 (1.02)	−0.48	−5.32*
4 Interpretation of physician and interprofessional orders	5.17 (0.748)	4.55 (0.926)	−0.62	−6.64*
5 Compliance with legal/regulatory issues relevant to nursing practice	5.12 (0.751)	4.76 (0.919)	−0.36	−4.48*
6 Understanding of quality improvement methodologies	4.88 (0.870)	4.50 (0.927)	−0.38	−5.03*
Clinical knowledge subscale	5.12 (0.622)	4.66 (0.834)	−0.46	−6.86*
Technical skills				
7 Conducting patient assessments (including history, physical exam, vital signs)	5.37 (0.852)	4.55 (0.964)	−0.82	−7.53*
8 Documentation of patient assessment data	5.23 (0.872)	4.52 (0.992)	−0.71	−7.38*
9 Performing clinical procedures (e.g., sterile dressing, IV therapy, etc.)	5.14 (0.887)	4.17 (1.03)	−0.97	−7.46*
10 Utilization of clinical technologies (e.g. IV Smart Pumps, medical monitors, etc.)	5.12 (0.751)	4.17 (0.944)	−0.95	−7.32*
11 Administration of medication	5.39 (0.734)	4.41 (0.913)	−0.98	−8.17*
12 Utilization of information technologies (e.g., computers, EMRs, etc.)	5.37 (0.612)	4.56 (0.981)	−0.81	−7.30*
Technical skills subscale	5.27 (0.682)	4.40 (0.862)	−0.87	−8.42*
Critical thinking				
13 Recognition of changes in patient status	5.08 (0.774)	4.17 (1.03)	−0.91	−7.72*
14 Ability to anticipate risk	4.84 (0.904)	4.06 (1.05)	−0.78	−7.17*
15 Interpretation of assessment data (e.g., history, exam, lab testing, etc.)	5.02 (0.772)	4.26 (1.04)	−0.76	−6.77*
16 Decision making based on the nursing process	5.05 (0.759)	4.35 (1.07)	−0.70	−6.52*
17 Recognition of when to ask for assistance	5.27 (0.717)	4.57 (1.07)	−0.70	−6.53*
18 Recognition of unsafe practices by self and others	5.17 (0.741)	4.47 (1.05)	−0.70	−6.80*
Critical thinking subscale	5.07 (0.679)	4.31 (0.957)	−0.76	−8.12*
Communication				
19 Rapport with patients and families	5.36 (0.691)	4.59 (1.03)	−0.77	−6.80*
20 Communication with interprofessional team	5.22 (0.673)	4.38 (1.01)	−0.84	−7.21*
		3.97 (1.05)	−0.85	−7.00*

(continued on next page)

Table 4 (*continued*)

Items	Pre-pandemic mean (SD)	During pandemic mean (SD)	Mean difference	Z score
21 Communication with physicians	4.82 (0.812)			
22 Patient education	5.09 (0.812)	4.36 (1.04)	−0.73	−.87*
23 Conflict resolution	4.76 (0.833)	4.11(1.11)	−0.65	−5.95*
24 Patient advocacy	5.17 (0.783)	4.63 (1.03)	−0.54	−5.68*
Communication subscale	5.07 (0.656)	4.34 (0.911)	−0.73	−7.86*
Professionalism				
25 Ability to work independently	4.99 (0.884)	4.09 (1.18)	−0.90	−6.19*
26 Ability to work as part of a team	5.21 (0.755)	4.50 (0.992)	−0.71	−6.48*
27 Ability to accept constructive criticism	4.95 (0.907)	4.35 (1.13)	−0.60	−5.59*
28 Customer service	5.21 (0.707)	4.67 (1.04)	−0.54	−5.70*
29 Accountability for actions	5.06 (0.911)	4.33 (1.22)	−0.73	−6.46*
30 Respect for diverse cultural perspectives	5.30 (0.713)	4.89 (1.03)	−0.41	−5.04*
Professionalism subscale	5.12 (0.719)	4.47 (0.941)	−0.65	−7.77*
Management of responsibilities				
31 Ability to keep track of multiple responsibilities	4.90 (0.917)	4.14 (1.15)	−0.76	−6.43*
32 Ability to prioritize	4.91 (0.854)	4.10 (1.15)	−0.81	−6.99*
33 Delegation of tasks	4.72 (0.978)	4.11 (1.06)	−0.61	−5.80*
34 Completion of individual tasks within expected time frame	5.04 (0.788)	4.25 (1.09)	−0.79	−6.60*
35 Ability to take initiative	4.98 (0.795)	4.27 (1.15)	−0.71	−6.15*
36 Conducting appropriate follow-up	5.00 (0.795)	4.29 (1.08)	−0.71	−6.50*
Management of responsibilities subscale	4.93 (0.771)	4.19 (1.02)	−0.74	−7.37*
Total scale scores	5.10 (0.624)	4.39 (0.837)	−0.71	−8.59*

* Significant at *p* < 0.001 level.

practice upon graduating. Further, we found no statistically significant correlations between reported faculty work characteristics and NPRT scores, indicating the sample of nurse faculty uniformly felt NGNs' competency proficiency level and readiness for practice had decreased. There were significant decreases in mean scores for the NPRT total scale, all six subscales, and all 36 items. While we hypothesized there would be significant decreases for several of the items and subscales, we did not expect statistically significant decreases for all of them. On initial review, our results indicate that all areas require heightened attention in TTP programs; whereas, we'd hoped to provide more tangible results to help TTP programs prepare for the most pressing needs of their upcoming NGNs. Further examination of the results was then performed to help achieve this goal. The subscales that had the highest decrease in mean scores were technical skills, critical thinking, management of responsibilities, and communication. Thus, TTP programs may benefit from augmenting NGN learning in these areas. Conversely, subscale mean scores indicate that, overall, faculty felt knowledge and professionalism were less affected by the changes to students' education.

Our additional analysis of individual items may also provide helpful guidance to TTP programs. There were 21 items whose mean score decreased to less than 4.50. One of these items decreased to a mean score

Table 5
Items with lowest mean score and largest change in mean score

Items that decreased to mean Score < 4.50	During pandemic mean	Items with mean score decrease > 0.70	Mean difference
21 Communication with physicians[a]	3.97	11 Administration of medication[a]	−0.98
14 Ability to anticipate risk[a]	4.06	9 Performing clinical procedures (e.g., sterile dressing, IV therapy, etc.)[a]	−0.97
25 Ability to work independently[a]	4.09	10 Utilization of clinical technologies (e.g., IV Smart Pumps, medical monitors, etc.)[a]	−0.95
32 Ability to prioritize[a]	4.10	13 Recognition of changes in patient status[a]	−0.91
23 Conflict resolution	4.11	25 Ability to work independently[a]	−0.90
33 Delegation of tasks	4.11	21 Communication with physicians[a]	−0.85
31 Ability to keep track of multiple responsibilities[a]	4.14	20 Communication with interprofessional team[a]	−0.84
9 Performing clinical procedures (e.g., sterile dressing, IV therapy, etc.)[a]	4.17	7 Conducting patient assessments (including history, physical exam, vital signs)	−0.82
10 Utilization of clinical technologies (e.g. IV Smart Pumps, medical monitors, etc.)[a]	4.17	12 Utilization of information technologies (e.g., computers, EMRs, etc.)	−0.81
13 Recognition of changes in patient status[a]	4.17	32 Ability to prioritize[a]	−0.81
34 Completion of individual tasks within expected time frame[a]	4.25	34 Completion of individual tasks within expected time frame[a]	−0.79
15 Interpretation of assessment data (e.g., history, exam, lab testing, etc.)[a]	4.26	14 Ability to anticipate risk[a]	−0.78
35 Ability to take initiative[a]	4.27	19 Rapport with patients and families	−0.77
36 Conducting appropriate follow-up[a]	4.29	15 Interpretation of assessment data (e.g., history, exam, lab testing, etc.)[a]	−0.76
29 Accountability for actions[a]	4.33	31 Ability to keep track of multiple responsibilities[a]	−0.76
16 Decision making based on the nursing process	4.35	22 Patient education[a]	−0.73
27 Ability to accept constructive criticism	4.35	29 Accountability for actions[a]	−0.73
22 Patient education[a]	4.36	8 Documentation of patient assessment data	−0.71
20 Communication with interprofessional team[a]	4.38	26 Ability to work as part of a team	−0.71
11 Administration of medication[a]	4.41	35 Ability to take initiative[a]	−0.71
18 Recognition of unsafe practices by self and others	4.47	36 Conducting appropriate follow-up[a]	−0.71

[a] Items were on both lists: Mean score < 4.50 and Mean difference > 0.70.

of 3.97, indicating communicating with physicians requires particular attention. Next, we identified items that sustained a mean score decrease of greater than 0.70. The three items with the highest decrease in mean score fell under technical skills (medication administration, performing psychomotor skills, and using clinical technology), likely reflecting decreased practice within clinical settings. The items that had both a drop in mean score to less than 4.50 and a mean score decrease greater than 0.70 may also be helpful to augment in TTP programs. In total,

there were 16 items that were included on both lists. These identified items indicate that NGNs may have particular needs for additional learning and practice with interprofessional team communication, using clinical reasoning and judgement, and performance of technical skills; all of which have potential ramifications for patient safety.

Interestingly, the NPRT scores provided by faculty were quite high to begin with. For NGNs pre-pandemic, the mean score for the total NPRT was 5.10 (*Agree*) out of 6.00, with subscale means ranging from 4.93 (management of responsibilities) to 5.27 (technical skills). Yet, prior research has shown that nurses in clinical practice report NGN performance of the competencies on the NPRT much lower. For example, Berkow et al. (2008) found that less than 50% of over 5700 clinical nursing leaders *Agreed* (5.00) or *Strongly agreed* (6.00) with 34 of the 36 items. Further, there were 14 NPRT items in which less than 25% of clinical nursing leaders *Agreed* or *Strongly agreed* that NGNs were performing satisfactorily (Berkow et al., 2008). More recently, Gregg (2020) found mean total NPRT scores of 4.05 reported by nurse managers and 4.07 reported by nurse preceptors working with NGNs, with subscale mean scores ranging from 3.69 (management of responsibilities) to 4.45 (technical skills). These mean scores are lower than ours for both pre-pandemic and during the pandemic graduates, indicating a mismatch between perceptions of nurse faculty and clinical nurses working with NGNs. Such score differences should be taken into consideration by TTP programs when planning to help NGNs transition during the pandemic. Future studies should evaluate NGN and clinical nurse (preceptors, educators, managers) perceptions of practice readiness among those who learned during the pandemic. Additionally, it will be important for clinical nursing leaders who augment their TTP programs for NGNs graduating during the pandemic to evaluate outcomes such as retention rates. Strategies to effectively combat the ongoing and exacerbated nurse shortage are paramount as turnover can cause an overburden of remaining staff (risk for burnout and unsafe care) and high cost for hospitals who hire travel nurses to fill vacated positions (Associated Press, 2020; International Council of Nurses, 2021).

Finally, our findings are also important for nurse faculty. The widespread loss and subsequent reduction in clinical learning should be considered by nurse faculty who are working with continuing nursing students. Students who are continuing their studies as the pandemic continues and/or improves will likely have experienced a loss of hands-on clinical learning in the earlier parts of their education. Further, the trajectory of the pandemic could necessitate continued restrictions to students' education. Our NPRT subscale and item results can be used to help faculty identify particular areas to work on with their continuing students. By addressing the identified areas of opportunity, faculty can help promote successful transition for future NGNs also affected by pandemic-related education changes. Lastly, our results can help nurse faculty and clinical nursing leaders to plan for future pandemics or other situations that could disrupt student learning.

Limitations

The sample size is a limitation of this study. A priori analysis indicated 128 participants were needed to detect statistically significant differences, and we achieved a sample size of $N = 116$. Despite the sample size, we were able to detect statistically significant differences in mean scores for the total scale, all subscales, and all items. Another limitation was drawing the sample of nurse faculty from only the state of North Carolina. The pandemic has been associated with varying severity and dates of patient case surges according to geographical area. Therefore, nurse faculty in other states may have experienced different educational restrictions than our sample. Finally, we retrospectively evaluated faculty perceptions of NGN readiness for practice pre-pandemic, and this is a study limitation.

Conclusion

Promoting a successful transition for students who learned during the pandemic is important to ensure an adequate nursing workforce that is well-prepared to provide care to those in need. Due to the substantial changes the pandemic caused for prelicensure nursing education, including a shift to remote learning and loss of clinical practice experience, we evaluated nurse faculty perceptions of NGN readiness for practice, and compared readiness scores for pre-pandemic graduates to those graduating during the pandemic. Results showed a statistically significant decrease in faculty perceptions of NGN practice readiness overall. To help TTP programs better utilize our results, we identified the subscales and tool items (competencies) that demonstrated the greatest decreases in mean scores. Clinical nursing leaders, educators, and preceptors can utilize our results to augment TTP programs to help facilitate successful transition from student to professional nurse. Likewise, nurse faculty can utilize results to help continuing nursing students who also have been affected by the pandemic to be prepared for professional practice upon graduation.

Declaration of competing interest

None.

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