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Physician and nurse practitioner roles in emergency, trauma, critical, and intensive care

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ABSTRACT

Background: The delivery of emergency, trauma, critical, and intensive care services requires coordination among all members of the care team. Perceived teamwork and role clarity may vary among physicians (MDs) and nurse practitioners (NPs).

Purpose: To examine differences in perceived roles and responsibilities of NPs and MDs practicing in emergency, trauma, critical, and intensive care.

Methods: Secondary Analysis of the *National Survey of Emergency, Intensive, and Critical Care Nurse Practitioners and Physicians*, a cross-sectional national survey of clinicians. Mail survey of randomly selected stratified cross-sectional samples of MDs and NPs drawn from national lists of clinicians in eligible specialties working in emergency, trauma, intensive, and critical care units in the United States. 814 clinicians (351 NPs and 463 MDs) were recruited from national by postal mail survey. Our initial sample included n = 2,063 clinicians, n = 1,031 NPs and n = 1,032 MDs in eligible specialties. Of these, 63.5% of NPs and 70.1% of MDs completed and returned the survey excluding those who were ineligible due to lack of current practice in a relevant specialty.

Findings: NPs in ICU/CCU are more likely to be female and report working fewer hours than do MDs and provide direct care to more patients. 55% of NPs and 82% of MDs agree that their individual role in their unit is clear ($p < .001$); 34% of MDs and 42% of NPs agree that their unit is an example of excellent team work among professionals ($p = 0.021$); 41% of MD and 37% of NP clinicians ($p = 0.061$) agree that their teams are "prepared to provide outstanding care in a crisis or disaster." Perceived role clarity was significantly associated with increased perceptions of excellent teamwork and disaster preparedness.

Discussion: At the time of this survey, and majority of NPs and MDs working in emergency, critical and intensive care did not agree that their teams were prepared for a crisis or disaster. Leaders of health organizations should encourage teamwork and professional role clarity to assist units to perform effectively in emergency and disaster preparedness.

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Introduction

At present, the United States' (US) healthcare system is facing the challenge of a global pandemic which is impacting intensive and critical care capacity around the world and in major municipal areas in the United States. The delivery of emergency, critical and intensive care services requires time-sensitive and life-dependent coordination and teamwork among all members of the care team (Leggat, 2007). Successful teamwork has long been described as a key component of delivering quality health care (Institute of Medicine, 2001), and has been cited as a significant factor in limiting loss of life in the aftermath of mass casualty events and major outbreaks, including the present COVID 19 pandemic, but also the ongoing challenges of the opioid epidemic (Biddinger et al., 2013; Gawande, 2013; Stempniak, 2016). Coordinated critical care in teams, such as the ICU Liberation Project, have significantly reduced mortality and long term cognitive impairment while reducing the costs of care (Ely, 2017).

Teams can be complex in these care settings, and measuring the configuration and work of teams may require a deeper explication of roles and scope of practice to determine efficient and effective staffing and work design (Brennan et al., 2013; Valentine et al., 2014). Coordination may be particularly challenging in hospital settings as professionals and staff have become increasingly specialized and roles have expanded. In theory and practice, teams are not simply groups of people who work together, but who interact to reach a common goal, and have roles or functions to perform. Salas and colleagues, in defining ways of measuring individual versus team performance, point to communication, information exchange, leadership and mission or outcome effectiveness as key measures, along with individual cognition, skills and accuracy (Hughes et al., 2016; Wahr et al., 2013).

In 2015, the National Academy of Medicine (formerly the Institute of Medicine) released an update on that report calling for more interprofessional education and practice, and better data on team composition, roles and outcomes (Assessing Progress on the IOM Report The Future of Nursing : Health and Medicine Division, 2020; The Future of Nursing, 2020). A study our team published in 2013 about the roles of NPs and MDs in primary care practices revealed reported similarities with MDs in tasks performed, but revealed deep attitudinal divisions in perceptions of quality, capability, team leadership and payment for services (Donelan et al.,2013; Buerhaus et al.,2014). If these or different conflicts occur in teams in more critical and rapidly evolving situations, quality certainly might suffer.

In this study, we extend our work on the roles of primary care NPs and MDs into the hospital setting and focus on NPs and MDs in emergency, intensive, and critical care teams. We report on NP and MD perceptions in these care settings on their roles and activities, their perceived individual clinical activities, the perceived effectiveness of their teams and their scope of practice. We ask how perceived role clarity and communication predict both team excellence and preparedness to work effectively in a crisis. We hypothesized that MDs and NPs who perceive their roles to be clear would be more likely to perceive excellence in their teamwork, and to report preparedness to function well in a crisis. These data were collected in a period of time when there were several natural and man-made health crises and emergencies in the United States and may provide an interesting lens on our present challenges in coping with the COVID-19 pandemic .

Methods

We conducted the National Survey of Emergency, Intensive, and Critical Care Nurse Practitioners and Physicians with 814 clinicians in the United States (351 NPs and 463 MDs) by postal mail survey. We defined as eligible for the survey clinicians who were licensed NPs or MDs, trained in relevant specialties, and actively working in emergency, trauma, intensive, or critical care hospital units. The study protocol was reviewed and deemed exempt from review by our Institutional Review Board.

Samples

We randomly selected samples of NPs from the Nurse Practitioner Masterfile (a list of 192,680 state licensed NPs in the United States) and MDs from the AMA Masterfile (a comprehensive listing of all licensed physicians in the United States), both purchased through Medical Marketing Service, Inc. (MMS). We selected direct patient care MDs in eligible specialties (Emergency Medicine, Trauma Surgery or Medicine, Critical Care Anesthesia, Pulmonary Critical Care), stratifying the sample to obtain approximately equal representation of Emergency/Trauma and intensice care unit (ICU)/coronary care unit (CCU) providers. We selected NPs in eligible specialties consistent with physician specialties where possible (Emergency, Critical Care, Acute Care). The NP sample file did not contain a variable indicating whether the NP practiced in direct patient care and also was limited in that practice and professional characteristics such as site of practice, years in practice were not available.

Measures

The survey questionnaire was developed by the research team, beginning with our prior survey developed for assessing roles and scope of practice among MDs and NPs practicing in primary care settings and

retained several core measures. (Donelan et al.,2013). We revised this through key informant interviews with expert NPs and MDs in relevant specialties at 4 hospitals in the United States. New measures of team organization were amended from other sources (Valentine et al., 2014). New items were subject to expert review, cognitive and pretesting to establish internal validity. The full MD and NP questionnaires are shown in the Appendix. Domains included measures of team organization, scope and type of work performed, disaster preparedness, working relationships and other characteristics.

Data Collection

Four waves of mail contact were used. Wave 1 was sent via US priority mail and included: cover letter, questionnaire, $40 incentive check (voided after 2 waves of mailing), and a postage paid return envelope. Waves 2 and 4 were complete packets (absent the incentive) sent by first class mail, and the Wave 3 mailing was also sent priority mail and included a newly issued $60 prepaid incentive check.

Weighting

We used poststratification weights to adjust for nonresponse and stratification. MD respondents were weighted by years in practice, gender and region as there were differences of more than 2% between respondents and nonrespondent MDs; NP respondents by gender and region only as these were the only variables available for target weights.

Analysis: We used the entire sample (n = 814 MDs, NPs) for analyses of all attitudinal measures, personal and practice characteristics, and the subgroups of Emergency/Trauma and ICU/CCU who reported working in eligible units or departments. The sampling error (95% confidence interval) for the entire sample is ± 3.4%, for all NPs (n = 351) is 5.2%, for all MDs (n = 463) is 4.6%. We examine descriptive personal and practice characteristics and multiple attitudinal and experiential outcomes as shown in tables. Question and response wording are shown in the tables, figures, and text.

The primary focus of our analyses was on the comparison of attitudes and experience of MDs and NPs in their respective hospital work settings. We examined the univariate and bivariate relationships, comparing NPs and MDs in the aggregate and by specialty setting (ICU/CCU, emergency/trauma) using two sample t-tests for continuous variables and chi-square tests for categorical variables on measures that were posed to both groups. We also examined differences within each specialty group, and compared groups by age, medicine and nursing teaching hospital, hospital size and state scope of practice. We tested our hypotheses about role clarity in teams and preparedness for crises using logistic regression analyses. Complete multivariate models are found in the Appendix.

Findings

Description of Sample

Our initial sample included n = 2,063 clinicians, n = 1,031 NPs and n = 1,032 MDs in eligible specialties. Of these, 63.5% of NPs and 70.1% of MDs completed and returned the survey. The 814 completed surveys exclude clinicians who were ineligible due to lack of current practice in a relevant specialty, work setting outside of intensive, critical, emergency, and trauma departments. There were no significant differences in response rate by specialty.

Several differences are observed between the NPs and MDs we surveyed, both in the aggregate and within specialty groups (Table 1). NPs are more likely to be female, white, have master's degree preparation, and to earn less than MDs. More than 90% of NPs work in collaborative settings with MDs; only 62% of MDs work with NPs in their units. NPs employed in ICU/CCU settings work fewer hours than MDs on average and see more patients; the same is not true in Emergency/Trauma units.

Team Composition, Leadership, and Roles

Clinician reports of the leadership, composition, roles and relationships within their working teams were measured in a series of items (Table 2). MDs report that MDs are their team leaders in most circumstances; NPs are less likely to indicate that MDs lead their teams. We observed some differences in NP and MD perceptions of teams in responses to items about the perception of team roles and role clarity. Less than half of clinicians agree that they experience "excellent" teamwork in their units and that their teams are "prepared to provide outstanding care in a crisis or disaster". Significantly more MDs than NPs in both unit settings agree that their own personal role in the team is clear, that their colleagues have clear team roles, and that their team displays excellent teamwork. NPs and MDs disagree about the ability of NPs to lead teams and about the quality of the care provided by NPs and MDs when performing similar procedures (4% vs. 62% respectively agree that MDs provide higher quality). 90% of NPs and 55% MDs agree that physicians with whom they work trust NP skills and clinical decisions.

We assessed perceptions of working relationships within teams (all members, NPs and MDs, trainees and attending). While a majority of MDs (77%) and NPs (65%) said all members of their team had excellent or very good working relationships, fewer than half of all

Table 1 – Characteristics of Respondents

		All					ED/Trauma					ICU/CCU				
		MD		NP			MD		NP			MD		NP		
	N =	474		363		*p* value	281		166		*p* value	219		214		*p* value
Respondent characteristics																
Gender	Male	383	81%	74	20%	<.001	222	79%	45	27%	<.001	182	83%	32	15%	<.001
	Female	84	18%	284	78%		55	20%	117	70%		34	16%	180	84%	
White, non-Hispanic	White, non-Hispanic	338	71%	301	83%	<.001	220	78%	139	84%	0.10	138	63%	173	81%	<.001
Other	Other	104	22%	43	12%	0.0001	45	16%	14	8%	0.22	64	29%	32	15%	0.0004
Age	<45	177	37%	146	40%	0.40	90	32%	51	31%	0.77	89	41%	103	48%	0.48
	45+	284	60%	211	58%	0.60	185	66%	110	66%	0.09	114	52%	110	51%	0.89
Education	Masters	3	1%	308	85%	<.001	3	1%	136	82%	<.001	1	0%	185	86%	<.001
	Doctorate	380	80%	9	2%	<.001	219	78%	5	3%	<.001	182	83%	4	2%	<.001
	Masters & Doctorate	75	16%	32	9%	0.003	49	17%	17	10%	0.04	30	14%	19	9%	0.11
Income	$0 - $99,000	3	1%	112	31%	<.001	3	1%	48	29%	<.001	0	0%	70	33%	<.001
	$100,000 - $149,000	12	3%	186	51%		9	3%	74	45%		3	1%	122	57%	
	$150,000 - $200,000 +	428	90%	58	16%		249	89%	70	42%		203	93%	19	9%	
Years in practice (mean)		17.9		11.3		<.001	19.8		13.2		<.001	15.5		9.8		<.001
Practice characteristics																
Unit size	Less than 20	119	25%	103	28%	0.43	64	23%	49	30%	0.176	57	26%	57	27%	0.831
	20–29	125	26%	82	23%		73	26%	26	16%		57	26%	58	27%	
	30 +	214	45%	158	44%		136	48%	84	51%		96	44%	85	40%	
Hospital size	Less than equal to 249	162	34%	91	25%	0.04	112	40%	51	31%	0.36	51	23%	41	19%	0.77
	250–499	176	37%	145	40%		100	36%	68	41%		89	41%	84	39%	
	500 +	102	22%	102	28%		46	16%	32	19%		66	30%	77	36%	
Unit personnel	Nurse Practitioners	292	62%	262	72%	0.001	177	63%	105	63%	0.956	137	63%	171	80%	<.001
	Physicians	377	80%	338	93%	<.001	201	72%	149	90%	<.001	200	91%	204	95%	0.10
	Physician Assistants	286	60%	207	57%	0.334	201	72%	106	64%	0.091	102	47%	108	50%	0.42
Teaching Affiliations	Medical Teaching Hospital	293	62%	235	65%	0.385	165	59%	93	56%	0.577	149	68%	158	74%	0.18
	Nursing Teaching Hospital	335	71%	260	72%	0.764	185	66%	110	66%	0.009	175	80%	164	77%	0.41
Location	Urban	218	46%	214	59%	0.002	116	41%	88	53%	0.012	120	55%	141	66%	0.12
	Suburban	187	39%	101	28%		117	42%	43	26%		75	34%	59	28%	
	Rural	55	12%	34	9%		40	14%	27	16%		18	8%	8	4%	
Collaborative practice (NP/ MD, MD/NP)		292	62%	338	93%	<.001	177	63%	149	90%	<.001	137	63%	204	95%	<.001
Number of actual hours per week (mean)		48.8		42.6		<.001	42.7		40.3		0.327	62.1		44.7		<.001
Number of patients per day (mean)		41.8		52.7		0.302	45.7		54.0		0.559	34.8		49.1		0.316

Table 2 – Perceptions of Team Roles and Relationships

	ALL					Emergency/Trauma					ICU/CCU				
	MD		NP			MD		NP			MD		NP		
N =	474		363		*p* value	281		166		*p* value	219		214		*p* value
Team leader															
Nurse practitioner	0	0%	27	7%	<.001	0	0%	10	6%	<.001	0	0%	18	8%	<.001
Physician	431	91%	222	61%		249	89%	88	53%		208	95%	142	66%	
It depends on the patients' needs and clinical situation	24	5%	65	18%		20	6%	27	9%		4	2%	28	13%	
Other (both, not applicable, not sure)	19	4%	49	14%		13	5%	41	25%		6	3%	26	13%	
Whom do you work with on a daily basis ?															
Registered Nurses	457	96%	349	96%	0.8374	271	96%	158	95%	0.5125	212	97%	206	96%	0.7578
Licensed Practical Nurses	132	28%	46	13%	<.001	83	30%	37	22%	0.095	57	26%	11	5%	<.001
Primary care nurse practitioner	128	27%	90	25%	0.4701	98	35%	60	36%	0.7862	36	16%	34	16%	0.8764
Specialized nurse practitioners	216	46%	225	62%	<.001	111	40%	70	42%	0.5789	124	57%	169	79%	<.001
Physician Assistants	286	60%	207	57%	0.3344	201	72%	106	64%	0.0909	102	47%	108	50%	0.4178
Primary Care physicians	187	39%	146	40%	0.8218	98	35%	71	43%	0.0962	94	43%	80	37%	0.2398
Specialist physicians	370	78%	309	85%	0.0096	195	69%	128	77%	0.0784	199	91%	195	91%	0.9265
Team Assessment (% responding "strongly/ somewhat agree")															
My role is clear to me	388	82%	201	55%	<.001	230	82%	97	58%	<.001	180	82%	115	54%	<.001
My colleagues have clear roles and responsibilities	333	70%	181	50%	<.001	196	70%	82	49%	<.001	156	71%	107	50%	<.001
My unit or department is an example of excellent teamwork between physicians nurses and other health professionals	199	42%	124	34%	0.021	111	40%	50	30%	0.046	105	48%	81	38%	0.034
My colleagues and I are prepared to provide outstanding care in a crisis or disaster	194	41%	136	37%	0.310	116	41%	64	39%	0.570	92	42%	82	38%	0.433
When physicians and nurse practitioners perform the same type of procedure or clinical examination physicians provides higher quality care than nurse practitioners	290	61%	17	5%	<.001	164	58%	8	5%	<.001	139	63%	10	5%	<.001
Physicians with whom I work trust nurse practitioner's skills and clinical decision making	260	55%	326	90%	<.001	148	53%	148	89%	<.001	131	60%	194	91%	<.001
Nurse practitioners are effective leaders of care teams that include physicians nurses and other health professionals	238	50%	350	96%	<.001	145	52%	158	95%	<.001	109	50%	209	98%	<.001
Rating of the quality of working relationships (% responding "excellent/very good", exclude not applicable)															
All members of the clinical team	363	77%	235	65%	0.0080	214	76%	102	61%	0.004	169	77%	145	68%	0.2135
NPs and attending MDs	288	61%	286	79%	<.0001	167	59%	131	79%	<.0001	142	65%	168	79%	<.0001
NPs and trainee MDs	147	31%	166	46%	<.0001	85	30%	76	46%	0.001	76	35%	100	47%	0.000
Attending MDs and nurse trainees	202	43%	115	32%	0.001	110	39%	55	33%	0.142	102	47%	65	30%	0.003

clinicians surveyed reported positive interprofessional working relationships between staff clinicians and trainees. Only 31% of MDs and 46% of NPs said relationships between NPs and MD trainees were "excellent or very good"; by contrast 43% of MDs and 32% of NPs said the same of working relationships between MDs and nurse trainees.

In multivariate regression analysis (detailed findings in Supplement), perceived role clarity was significantly associated with increased perceptions of excellent teamwork and disaster preparedness among all clinicians. Positive working relationships did not predict improvements in perceived teamwork but were significantly associated with more positive ratings of disaster preparedness. Working in a hospital that is a teaching hospital for nurses was also significantly associated with increased perceived excellence in teams. State scope of practice was not significantly associated with any outcome.

Scope of Practice in Clinical Activities

MD and NP reports of clinical activities and procedures that are performed by NPs are shown in Table 3. Only for clinicians who report working in units where both types of professionals are employed. NPs and MDs differ significantly on most items, although the majority in both specialty areas report that NPs provide a wide range of clinical services. ICU/CCU NPs, unlike Emergency/Trauma NPs, commonly participate in code response teams, central line insertion and end-of-life planning. Among MDs and NPs, the least frequent NP activities include leading team rounds, intubation, spinal or joint taps, and carrying an on-call beeper.

Perceptions of Scope of Practice Policy

Table 4 shows NP and MD attitudes about NP scope of practice, including comparable data for some items from our prior study of primary care NPs and MDs. While clinicians find broad agreement with the IOM stated principle that "nurse practitioners should be allowed to work to the full extent of their education and training," significant disagreement exists about expanded scope for NPs with respect to hospital admitting privileges and payment for services. While scope of practice is presently legislated at a state level, 81% of NPs and 55% of MDs agreed scope of practice should be defined by national rather than state policy.

Discussion

These data provide a cross-sectional view of clinical professional teamwork by NPs and MDs in our nation's emergency rooms, intensive, and critical care units. These data have important implications for both clinical practice and state/federal policy.

Implications for Clinical Care and Leadership

In clinical settings, several findings emerge as important for health care leaders to consider. First, considerable variation was reported in how teams in these units are composed, who leads them, and how they do their work. Despite significant differences reported by NPs and MDs in several areas (Table 3), more than two thirds of NPs surveyed were not only performing core clinical evaluation and management activities, but also procedures for wounds and abscesses (66%) and work with patients and families on palliative and end-of life planning (75%). Approximately 25% to 40% worked in procedurally intensive, emergency, and critical/intensive care tasks, including spinal and joint taps (33%), intubation (34%), central line insertions (43%), activities that historically might be observed in the exclusive domain of MD practice.

Second, in clinician responses to a series of team assessment measures (Table 2), we noted several significant differences between NPs and MDs in clarity of roles, excellence of teamwork, perceived quality of care and other issues. Therefore, it was surprising and discouraging that the one point where there were no significant differences was that only 4 in 10 in each professional group reported that their teams were prepared to cope with a disaster or crisis. Importantly, in our multivariate models, self-reported lack of role clarity is one predictor of this perception, as was reported lack of excellent teamwork in these units.

Third, while many studies of care provided by NPs have shown the care they provide to be of similar or better quality in many services (McCleery et al., 2020; Swan et al., 2020), there continues to be a dissonance between the perceptions of MDs and NPs on this point (Poghosyan & Liu, 2016). As in our earlier survey of primary care MDs and primary care NPs, in the present study 62% of MDs and 5% of NPs reported that they believe MDs provide higher quality care than NPs when performing similar clinical services. Recently available data from one of the author's institutions reveals similar outcomes in nurse-led medical intensive care units and resident units (Donelan et al.,2013; Buerhaus et al.,2014). As clinical leaders consider the implementation of evidence-based practices, these perceived differences may impact the response of frontline clinicians to changes in these environments. It may be useful to encourage NPs and MDs to discuss their perceptions of the quality of care provided by each other and determine if such perceptions interfere with effective teamwork or pose barriers to innovation and change in units.

Finally, given the rapid expansion of the NP workforce, and the reported similarity in some clinical activities performed by both NPs and MDs, some level of interprofessional conflict may be inevitable.

Table 3 – Roles of NPs in Units

	ALL					Emergency/Trauma					ICU/CCU				
	MD in collaborative unit		NP			MD		NP			MD		NP		
N =	292		338		*p* value	177		149		*p* value	137		204		*p* value
In my unit, NPs															
Take history and perform physical examinations	249	85%	321	95%	<.0001	157	89%	145	97%	0.003	109	80%	191	94%	<.0001
Formulates and implements treatment plans for management of acute illnesses	225	77%	324	96%	<.0001	143	81%	146	98%	<.0001	99	72%	192	94%	<.0001
Orders and interprets results of laboratory studies	258	88%	335	99%	<.0001	158	89%	149	100%	<.0001	120	88%	201	99%	<.0001
Orders professional consultations	214	73%	314	93%	<.0001	127	72%	138	93%	<.0001	103	75%	190	93%	<.0001
Prescribes appropriate medications	251	86%	335	99%	<.0001	154	87%	149	100%	<.0001	118	86%	201	99%	<.0001
Explains procedures (necessity, preparation, nature, effects) to patients, patient's family	248	85%	327	97%	<.0001	152	86%	148	99%	<.0001	116	85%	194	95%	0.001
Works with patient and family on palliative care and end of life planning	166	57%	255	75%	<.0001	70	40%	85	57%	0.002	113	82%	184	90%	0.037
Performs spinal or joint taps	64	22%	111	33%	0.002	42	24%	66	44%	<.0001	25	18%	52	25%	0.117
Performs basic procedures for wounds and abscesses (sutures, debridement, drain ulcers)	188	64%	223	66%	0.676	148	84%	142	95%	0.001	55	40%	96	47%	0.208
Performs intubation	49	17%	116	34%	<.0001	15	8%	44	30%	<.0001	36	26%	79	39%	0.017
Inserts central lines (subclavian, internal jugular)	73	25%	145	43%	<.0001	21	12%	40	27%	0.0006	62	45%	115	56%	0.044
Leads unit team rounds	18	6%	107	32%	<.0001	3	2%	35	23%	<.0001	17	12%	82	40%	<.0001
Interprets EKGs	113	39%	284	84%	<.0001	52	29%	115	77%	<.0001	74	54%	184	90%	<.0001
Response to emergencies RRT/codes	91	31%	223	66%	<.0001	38	21%	58	39%	0.0006	69	50%	178	87%	<.0001
On call (carries beeper) on nights and weekends	44	15%	114	34%	<.0001	12	7%	31	21%	0.0002	39	28%	93	46%	0.002

Table 4 – Specialist and Primary Care NP and MD Perceptions of NP Policy and Practice

	NP and MD Specialists					NP and MD Primary Care				
	MD		NP			MD		NP		
(% responding "strongly/somewhat agree") N=	474		363		*p* value	505		467		*p* value
Nurse practitioners should practice to the full extent of their education and training	402	85%	352	97%	<.0001	384	76%	448	96%	<.0001
Nurse practitioners should be legally allowed hospital admitting privileges	83	18%	294	81%	<.0001	56	11%	397	85%	<.0001
Physicians and nurse practitioners should be paid the same fees for providing or performing the same services and procedures	39	8%	271	75%	<.0001	20	4%	299	64%	<.0001
The physicians with whom I work support restrictions on nurse practitioners' scope of practice in my state	259	55%	113	31%	<.0001	237	47%	126	27%	<.0001
Full-time nurse practitioners should be required to work the same hours (including shifts and on call coverage) as full-time physicians	156	33%	206	57%	<.0001		NA		NA	
Nurse practitioners' scope of practice should be uniformly defined at a national rather than a state level	241	51%	293	81%	<.0001		NA		NA	
The physicians with whom I work do not understand nurse practitioners education and training	146	31%	138	38%	<.0001		NA		NA	

(Hartog & Benbenishty, 2015; House & Havens, 2017) One of the more sobering findings in our analyses were reported perceptions of difficult working relationships between MDs and nursing trainees, and NPs and medicine trainees. As we educate the next generation of clinicians, we should ask what messages are being conveyed about professionalism and mutual respect in interprofessional context and assure that more junior colleagues are supported as they learn.

Implications for Policy

Two findings from this study of inpatient Emergency, ICU and CCU clinicians may inform ongoing state debates about expanding scope of practice for NPs. 55% of MDs and 31% of NPs agreed that physicians with whom they work support state restrictions on NP scope of practice. While legislative battles about scope of practice continue in many US states, a majority of MDs (51%) and most NPs (81%) support making scope of practice policy at a federal rather than state level. During the current COVID-19 epidemic, the need to move ICU trained professionals across state lines to meet hotspot demands for care, and the considerable expansion of the use of telehealth have highlighted calls for national licensure and credentialing are underscored in HHS Secretary's March 2020 guidance to the states. (National Council of State Boards of Nursing, 2020) Continued discussion of these policies will likely continue when the pandemic crisis abates.

Our research has a few limitations. The sample sources for MD and NP data did not contain sufficient data to target health professionals by specialty and work setting. We used our questionnaire to screen for both to assure that the respondents were eligible to complete the survey. Our sample was too small to control for all clinician characteristics; some regression analyses are limited by this factor. Of note, however, differences between NPs and MDs are highly significant on many outcomes, even with samples of this size. Measuring "team" proved complex as team composition is not always static in hospital units. The word "team" has become widely used in health care—in our changing system with sometimes overlapping and evolving roles and differences in reported role clarity across professions further research is needed to understand optimal team configurations. Despite our extensive efforts to develop and test our questionnaire, all surveys are subject to item and response bias. Finally, these are self-reported data on clinical activities in hospital settings. Due to varying billing and payment practices for hospital care, it is difficult to validate the accuracy of reports on the clinical activities in administrative data for national samples.

The current COVID-19 pandemic will add further pressure and stress on the health care system, the professionals who work in care delivery organizations,

and stress the formation of effective teams and working relationships between NPs and MDs. As professional education changes and affects roles and competencies, role conflicts are inevitable, and lack of role clarity may lead to challenges within teams. The sickest patients in our institutions require increasingly complex and coordinated care. Understanding who can best provide services effectively in different environments will require leaders of health care professions and organizations to engage with one another to further interprofessional education and practice. Further efforts are needed to ensure that professionals have clear roles and responsibilities and that teams are both prepared to provide the highest quality and efficient care for the needs of the population and to respond with coordinated effectiveness in crises.

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Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.outlook.2020.04.010.

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