

# From Medical School to Residency: Transitions During the COVID-19 Pandemic

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## ABSTRACT

**Background** The start of a new academic year in graduate medical education will mark a transition for postgraduate year 1 (PGY-1) residents from medical school into residency. The relocation of individuals has significant implications given the COVID-19 pandemic and variability of the outbreak across the United States, but little is known about the extent of the geographic relocation taking place.

**Objective** We reported historical trends of PGY-1 residents staying in-state and those starting residency from out-of-state to quantify the geographic movement of individuals beginning residency training each year.

**Methods** We analyzed historical data collected by the Accreditation Council for Graduate Medical Education in academic years 2016–2017, 2017–2018, and 2018–2019, comparing the locations of medical school and residency programs for PGY-1 residents to determine the number of matriculants from in-state medical schools and out-of-state medical schools. International medical school graduates (IMGs) were shown separately in the analysis and then combined with out-of-state matriculants. US citizens who trained abroad were counted among IMGs.

**Results** The total number of PGY-1s increased by 10.3% during the 3-year time period, from 29 338 to 32 348. When combined, IMGs and USMGs transitioning from one state or country to another state accounted for approximately 72% of PGY-1s each year. Approximately 63% of USMGs matriculated to a residency program in a new state, and IMGs made up 24.6% to 23.1% of PGY-1s over the 3-year period.

**Conclusions** Each year brings a substantial amount of movement among PGY-1s that highlights the need for policies and procedures specific to the COVID-19 pandemic.

## Introduction

The graduate medical education (GME) system in the United States is large and complex, with residency programs in every state. The Accreditation Council for Graduate Medical Education (ACGME), having almost completed the transition to the Single Accreditation System, accredits the educational programs for all allopathic medical school graduates (MDs) and osteopathic medical school graduates (DOs) in the United States. In the 2018–2019 academic year (AY; July 1, 2018–June 30, 2019), 140 391 residents and fellows were enrolled in residency and fellowship programs, of which 32 348 had entered as postgraduate year 1 (PGY-1) residents following medical school.<sup>1</sup> In 2020, the transition from medical school to residency is occurring in the context of the unprecedented COVID-19 pandemic. There is continued concern

for community spread of the virus with the possibility that medical school graduates may be presymptomatic or asymptomatic carriers, especially moving from regions of the country with high prevalence of COVID-19. There is also concern among GME leaders for residents entering areas under significant pandemic-related stress. Sponsoring Institutions in Stage 3, Pandemic Status, defined by the ACGME as those institutions with COVID-19 patient volumes disruptive to the clinical learning environment,<sup>2</sup> will experience unique challenges with a new cohort of residents entering the environment. Recently, a workgroup from the Coalition for Physician Accountability published a set of recommendations to guide the transition from medical school to residency “in order to protect patients, learners, and the healthcare workforce, and to safeguard the interests of the public.”<sup>3</sup> The purpose of this article is to provide a systems-level view of the likely magnitude of the relocation transitions from medical school to residency in June 2020 and to highlight the need for implementation of policies and oversight of these transitions. Further, this study may serve as a baseline from which to assess the impact of

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TABLE 1

Number and Percentage of Medical School Students Entering PGY-1 Positions by Academic Year

PGY-1 Residents by Medical School Type	AY 2016–2017, n (%)	AY 2017–2018, n (%)	AY 2018–2019, n (%)
Total PGY-1 residents	29 338 (100)	31 033 (100)	32 348 (100)
US medical school graduates (MD & DO)			
Staying in state for residency	8331 (28.4)	8765 (28.2)	9170 (28.3)
Transitioning out of state for residency	13 798 (47.0)	15 022 (48.4)	15 707 (48.6)
International medical school graduates	7209 (24.6)	7246 (23.3)	7471 (23.1)
PGY-1 medical graduates transitioning to new location (out-of-state USMGs + IMGs)	21 007 (71.6)	22 268 (71.8)	23 178 (71.7)

Abbreviations: PGY, postgraduate year; AY, academic year; USMG, United States medical graduate; IMG, international medical graduate.

the COVID-19 pandemic on relocations for subsequent graduating classes.

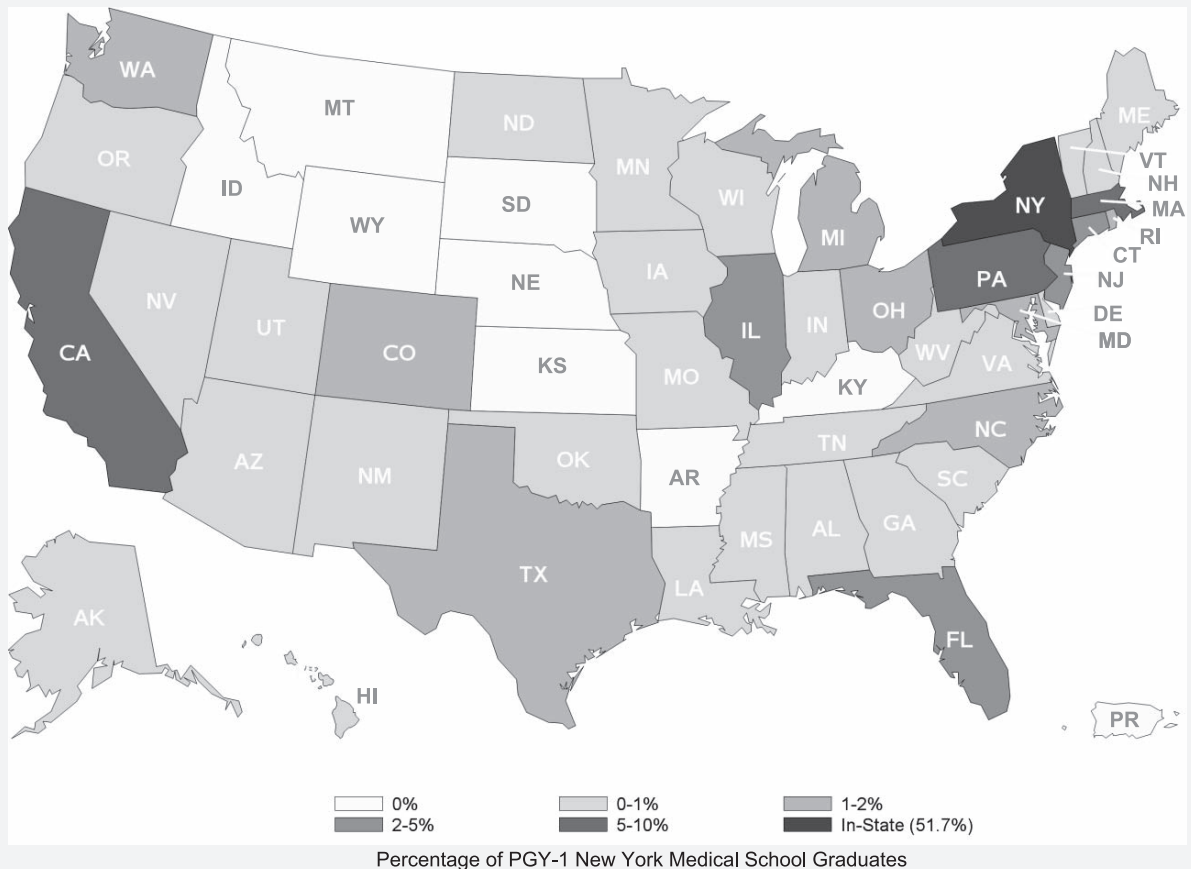
## Methods

We analyzed historical data collected by the ACGME in AY 2016–2017, 2017–2018, and 2018–2019, comparing the locations of medical school and the residency program for PGY-1 residents to determine the numbers of matriculants from in-state medical schools and out-of-state medical schools. International medical school graduates (IMGs) are shown separately in the analysis and then combined with out-of-state matriculants to determine the total number and percentage of residents who did not complete medical school in the same state as their residency program. For the purposes of this analysis, US citizens who trained abroad are counted among IMGs as these students relocate from another country to attend residency. Additionally, US medical school graduates (USMGs) include those graduating from allopathic medical schools and those graduating from osteopathic medical schools. The aggregate number and percentage of PGY-1s in each of the following categories was calculated for each year: IMGs, USMGs transitioning to a new state, USMGs staying in the same state, and the sum of all residents transitioning to a new state (IMGs plus USMGs in a new state). A 3-year average was then calculated (given the consistency of the percentages over time) in order to conduct state-level analyses. Finally, we mapped the residency program location of New York State medical school graduates for the AY 2018–2019 to illustrate the transitions from areas with high prevalence of COVID-19. For additional details on the data collection methodology, the ACGME's Data Resource Book provides an in-depth description of the data collection process that occurs for all programs annually through the Accreditation Data System (ADS).<sup>1</sup> The map of resident transitions from New York medical schools

to residency was generated using SAS Enterprise Guide, Version 7.1 (SAS Institute Inc, Cary, NC).

## Results

The total number of PGY-1s increased by 10.3% during the 3-year time period from 29 338 to 32 348 (TABLE 1). The number and percentage of IMG PGY-1s ranged from 24.6% to 23.1% during this time, with USMGs accounting for the remaining PGY-1 residents (75.4% to 76.9%, respectively). Each year, approximately 5 of 8 USMGs (63%) matriculated to a residency program in a state other than their state of medical school graduation. When combined, IMGs and USMGs transitioning from one state or country to another state account for approximately 72% of PGY-1s each year, 23 178 residents in AY 2018–2019. TABLE 2 shows the 3-year average of the number and percentage of residents entering ACGME-accredited training by residency program state. New York had the highest average number of PGY-1 residents at 4042, of which 1122 (27.8%) were in-state USMGs, 1225 (30.3%) were out-of-state USMGs, and 1695 (41.9%) were IMGs. Out-of-state USMGs and IMGs combined for a total of 2920 (72.2%) of New York residents who completed medical education outside of New York. California, with the second highest number of PGY-1s at 2726, has a high percentage of out-of-state USMGs (57.7%) and a small percentage of IMGs (9.6%) for a combined total of 1835 (67.3%) of PGY-1 residents transitioning from out-of-state. Of the 10 states with the highest number of PGY-1s, New Jersey has the highest percentage of out-of-state residents (83.3%) and Texas has the lowest percentage of out-of-state residents (57.9%). Across all states and US territories, Puerto Rico is the only location where in-state graduates outnumber out-of-state graduates (40.4% out-of-state). Delaware, Idaho, Alaska, Montana, and Wyoming are all states in which 100% of PGY-1s are out-of-state medical school graduates, as they do not have medical schools

**FIGURE**

Distribution of PGY-1 New York State Medical School Graduates (n = 2263) by State of Residency (2018–2019)

Abbreviation: PGY, postgraduate year.

located in those states. The FIGURE shows the distribution by state of residency location for New York medical school graduates as they entered residency in AY 2018–2019. Of 2263 New York medical school graduates beginning residency in AY 2018–2019, 1170 (51.7%) stayed in New York while 1093 (48.3%) began residency in another state. While the state-specific patterns from year-to-year vary, medical school graduates from New York traveled out-of-state to 44, 45, and 42 states in the AY 2016–2017, AY 2017–2018, and AY 2018–2019, respectively.

## Discussion

There has been relatively consistent and substantial movement in geographic location for individuals beginning residency over the past 3 academic years. For every state and territory except Puerto Rico, the majority of new interns will be moving and starting residency from a medical school in another state or country. Given these trends, it is highly likely that this level of movement will occur in June 2020 with the

start of a new academic year. For the Class of 2020, there are significant issues associated with moving during the COVID-19 pandemic, complicated by the ongoing protests of police brutality and racial discrimination following the recent deaths of George Floyd, Breonna Taylor, and Ahmaud Arbery. The importance of these protests and our commitment to address racial bias in our communities has also been highlighted in the disparities in COVID-19 deaths that have been reported in cities across the United States. As such, Sponsoring Institutions may need to provide additional resources for relocation: policies related to quarantine measures on arrival, more in-depth assessment of clinical skills and preparedness for duty in high-risk clinical care settings, and more extensive orientation to personal protective equipment requirements, infection control policies, and factors unique to the context of care in each setting.<sup>2</sup> In addition, Sponsoring Institutions may need to address more specific needs for the relocation of African American physicians, other physicians of color (domestic and IMG), and Asian Americans

TABLE 2

Three-Year Average Number and Percentage of In-State, Out-of-State, and IMG PGY-1 Residents by State of Residency Program

Location of Residency Program	Total PGY-1 Residents	In-State, USMGs (A), n (%)	Out-of-State, USMGs (B), n (%)	IMGs (C), n (%)	PGY-1s Transitioning From Out-of-State Location (B+C), n (%)
Total (all states)	30 906	7309 (23.6)	14 842 (48.0)	8755 (28.3)	22 151 (71.7)
New York	4042	1695 (41.9)	1225 (30.3)	1122 (27.8)	2920 (72.2)
California	2726	263 (9.6)	1572 (57.7)	891 (32.7)	1835 (67.3)
Texas	1934	360 (18.6)	760 (39.3)	814 (42.1)	1120 (57.9)
Pennsylvania	1905	431 (22.6)	845 (44.4)	629 (33.0)	1276 (67.0)
Michigan	1634	465 (28.5)	622 (38.1)	547 (33.5)	1087 (66.5)
Illinois	1548	395 (25.5)	710 (45.9)	443 (28.6)	1105 (71.4)
Ohio	1540	334 (21.7)	757 (49.2)	449 (29.2)	1091 (70.8)
Florida	1487	465 (31.3)	604 (40.6)	418 (28.1)	1069 (71.9)
Massachusetts	1100	208 (18.9)	648 (58.9)	244 (22.2)	856 (77.8)
New Jersey	844	425 (50.4)	278 (32.9)	141 (16.7)	703 (83.3)
North Carolina	782	66 (8.4)	550 (70.3)	166 (21.2)	616 (78.8)
Maryland	675	180 (26.7)	378 (56.0)	117 (17.3)	558 (82.7)
Virginia	658	95 (14.4)	393 (59.7)	170 (25.8)	488 (74.2)
Georgia	633	169 (26.7)	289 (45.7)	175 (27.6)	458 (72.4)
Missouri	613	109 (17.8)	307 (50.1)	197 (32.1)	416 (67.9)
Tennessee	569	92 (16.2)	336 (59.1)	141 (24.8)	428 (75.2)
Connecticut	534	203 (38.0)	277 (51.9)	54 (10.1)	480 (89.9)
Louisiana	495	141 (28.5)	190 (38.4)	164 (33.1)	331 (66.9)
Washington	490	20 (4.1)	382 (78.0)	88 (18.0)	402 (82.0)
Minnesota	463	68 (14.7)	282 (60.9)	113 (24.4)	350 (75.6)
Wisconsin	440	70 (15.9)	258 (58.6)	112 (25.5)	328 (74.5)
Arizona	432	71 (16.4)	243 (56.3)	118 (27.3)	314 (72.7)
South Carolina	376	31 (8.2)	226 (60.1)	119 (31.6)	257 (68.4)
Colorado	355	11 (3.1)	277 (78.0)	67 (18.9)	288 (81.1)
District of Columbia	352	111 (31.5)	175 (49.7)	66 (18.8)	286 (81.3)
Indiana	345	45 (13.0)	174 (50.4)	126 (36.5)	219 (63.5)
Alabama	336	79 (23.5)	173 (51.5)	84 (25.0)	252 (75.0)
Kentucky	313	48 (15.3)	169 (54.0)	96 (30.7)	217 (69.3)
Oklahoma	268	43 (16.0)	122 (45.5)	103 (38.4)	165 (61.6)
Puerto Rico	255	102 (40.0)	1 (0.4)	152 (59.6)	103 (40.4)
West Virginia	234	74 (31.6)	75 (32.1)	85 (36.3)	149 (63.7)
Iowa	224	32 (14.3)	125 (55.8)	67 (29.9)	157 (70.1)
Oregon	224	11 (4.9)	169 (75.4)	44 (19.6)	180 (80.4)
Arkansas	206	59 (28.6)	82 (39.8)	65 (31.6)	141 (68.4)
Nevada	201	51 (25.4)	110 (54.7)	40 (19.9)	161 (80.1)
Nebraska	185	48 (25.9)	79 (42.7)	58 (31.4)	127 (68.6)
Kansas	183	33 (18.0)	93 (50.8)	57 (31.1)	126 (68.9)
Mississippi	178	28 (15.7)	79 (44.4)	71 (39.9)	107 (60.1)
Rhode Island	178	30 (16.9)	135 (75.8)	13 (7.3)	165 (92.7)
Utah	161	6 (3.7)	132 (82.0)	23 (14.3)	138 (85.7)
New Mexico	137	24 (17.5)	86 (62.8)	27 (19.7)	110 (80.3)
Hawaii	132	25 (18.9)	85 (64.4)	22 (16.7)	110 (83.3)

TABLE 2

Three-Year Average Number and Percentage of In-State, Out-of-State, and IMG PGY-1 Residents by State of Residency Program (continued)

Location of Residency Program	Total PGY-1 Residents	In-State, USMGs (A), n (%)	Out-of-State, USMGs (B), n (%)	IMGs (C), n (%)	PGY-1s Transitioning From Out-of-State Location (B+C), n (%)
Maine	87	10 (11.5)	65 (74.7)	12 (13.8)	75 (86.2)
Delaware	86	12 (14.0)	74 (86.0)	0 (0)	86 (100)
New Hampshire	83	12 (14.5)	66 (79.5)	5 (6.0)	78 (94.0)
Vermont	62	4 (6.5)	46 (74.2)	12 (19.4)	50 (80.6)
North Dakota	54	24 (44.4)	14 (25.9)	16 (29.6)	38 (70.4)
South Dakota	47	11 (23.4)	24 (51.1)	12 (25.5)	35 (74.5)
Idaho	47	5 (10.6)	42 (89.4)	0 (0)	47 (100)
Montana	27	7 (25.9)	20 (74.1)	0 (0)	27 (100)
Wyoming	14	5 (35.7)	9 (64.3)	0 (0)	14 (100)
Alaska	13	1 (7.7)	12 (92.3)	0 (0)	13 (100)

Abbreviations: IMG, international medical graduate; PGY, postgraduate year; USMG, United States medical graduate.

(due to prejudice related to the COVID-19 outbreak) during these challenging times.

Our analysis has limitations. Not all residency program matriculants enter training directly out of medical school. The assumption that all IMGs and all PGY-1 residents attending an out-of-state medical school relocate in the months preceding residency may overestimate the extent of the geographic transition. On the other hand, analysis of state-to-state transitions does not capture the extent that medical students move within states. There are potentially a significant number of transitions occurring within states from dense urban areas to less dense urban areas and rural areas (or vice-versa) where the virus prevalence may vary widely. As such, this study is more likely to provide a lower boundary on the amount of movement of physicians in training during these challenging times. Furthermore, this movement is not the only movement of physicians entering training programs in Summer 2020. First-year fellow relocation occurs contemporaneously with PGY-1 residency relocation with first-year fellows accounting for more than 15 000 individuals beginning a new program each year.<sup>1</sup>

## Conclusions

The US undergraduate medical education and GME systems are large, complex, and distributed across a large country that is experiencing varying levels of community COVID-19 infection. Each year brings a substantial amount of movement that highlights the need for policies and procedures specific to the COVID-19 pandemic. Protests occurring throughout the nation raise additional concerns for resident well-

being as individuals move across the country to begin their training.

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