

1 **Title Page**

2 **Title:** Surviving Medical School During a Pandemic: Experiences of New York Medical

3 Students During the Height of SARS-CoV-2

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30 Leanna Knight and all authors commented on previous versions of the manuscript. All authors  
31 read and approved the final manuscript.

## 32 **Abstract**

### 33 **Background**

34 The COVID-19 pandemic dramatically altered the landscape of medical education. While  
35 patients overwhelmed hospital systems, lockdowns and social distancing recommendations took  
36 priority, and medical education was pushed online. Early in 2020, New York State (NYS) was  
37 hit especially hard by COVID-19.

### 38 **Objective**

39 This study sought to understand the effect of the COVID-19 pandemic on medical students well-  
40 being and education.

### 41 **Methods**

42 NYS medical students responded to a six-question survey during April and May 2020. Questions  
43 assessed self-reported changes in stress levels, academic performance, and board preparation  
44 efforts. Open-ended data was analyzed using a modified grounded theory approach.

### 45 **Results**

46 488 responses across 11 medical schools were included (response rate of 5.8%). Major themes  
47 included: standardized test-related stressors (23%), study-related changes (19%), education and  
48 training concerns (17%), financial stressors (12%), and additional family obligations (12%).

49 Second year students reported more stress/anxiety than students in other years (95.9%,  $p$ -value<  
50 0.00001). Reported stress/anxiety, effects on exam preparation, and anticipated academic effect  
51 varied by geographics.

### 52 **Conclusions**

53 While all NYS medical students reported being greatly affected, those closest to the NY City  
54 pandemic epi-center and closest to taking the Step 1 exam were the most distressed. Lack of  
55 flexibility of the medical education system during this public health emergency contributed to  
56 worsened student well-being. It is time to make plans for supporting the long-term mental health  
57 needs of these physicians-in-training and to examine ways the academic medical community can  
58 better adapt to the needs of students affected by a large public health emergency in the future.

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61 **Keywords:** COVID-19, Medical Education, Medical Students, Medical Student Survey, Medical  
62 Schools, Medical Licensing

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77 **Manuscript**

78 **Introduction**

79 Medical students have long been adversely affected by mental health challenges associated with  
80 medical education (1-6). These challenges for medical students were worsened by the COVID-  
81 19 pandemic; various short-term effects have been documented, including poor sleep quality and  
82 a high prevalence of depression, anxiety, and burnout (7). Currently, the long-term effect of the  
83 COVID-19 crisis on medical students, their careers, and their mental health remains unknown.  
84 Early in 2020, New York State (NYS) was hit especially hard by COVID-19 and the effects are  
85 still being felt today (8). Clerkship activities were paused, preclinical classes went online, and  
86 some medical students volunteered in the response effort (9). Early during the first wave of the  
87 COVID-19 pandemic, state medical societies received preliminary communications suggesting  
88 medical students may be experiencing unique stressors. Following up on these communications,  
89 the Medical Society of the State of New York (MSSNY) conducted a multi-institutional survey  
90 using closed and open-ended questions to understand the emotional and educational effect of the  
91 COVID-19 pandemic on NYS medical students.

92  
93 In this study, we aimed to assess the effects of the COVID-19 pandemic on medical students in  
94 NYS, one of the first epicenters of the COVID-19 pandemic in the United States. We took this  
95 opportunity to provide an analysis of medical student education and wellness data from the  
96 MSSNY survey conducted in NYS at the height of the first COVID-19 wave and consider the  
97 information gleaned from this survey to advocate for learner needs. Given our findings, we  
98 suggest that there are additional areas of concern to be addressed (1).

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## 101 Methods

102 The six-question survey was distributed to all 11 active MSSNY medical school chapters  
103 between 04/14/2020-05/02/2020. Medical student respondents of all years attending an  
104 allopathic or osteopathic medical school in NY were included in the study.

105 The survey was composed of closed and open-ended questions including:

- 106 1. During the COVID-19 pandemic are you feeling more stress/anxiety?
- 107 2. Do you feel you will be able to maintain or improve your performance from last  
108 semester?
- 109 3. Do you feel that this pandemic has interfered with your ability to prepare for Step or  
110 Shelf exams?
- 111 4. If you answered the previous questions, please elaborate on how this has impacted you.
- 112 5. If given the time and freedom from your current medical school responsibility, would  
113 you be active in the response efforts to COVID-19?
- 114 6. Would you like to share anything else?

115 Data was accessed by the team in early 2021. Each of the open-ended responses were analyzed  
116 by 2 assigned independent researchers (Knight, Dowling, Gómez-Di Cesare, Henshaw, Seth,  
117 Talukdar, or Rogers) using modified grounded theory with an inductive approach implementing  
118 the techniques described by Strauss and Corbin (10-12). Our analytic process featured six steps:  
119 1. data "fractured" or "broken down into granular codes" during independent review; 2. incident-  
120 to-incident coding; 3. peer debriefing at each step; 4. focused coding of fractured codes into  
121 coherent subsuming categories or "themes" by two independent researchers; 5. axial coding  
122 through identifying relationships between codes and categories; and 6. production of findings  
123 (13). In the final analysis, only themes that were identified by both independent researchers were  
124 included. To minimize bias during the coding process, we blinded the name and location of each  
125 medical school. Researchers used the documented reflective process necessary for a rigorous  
126 application of grounded theory to open-ended responses.

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## 128 Results

129 488 student responses across 11 medical schools were included, with a response rate of 5.8%.  
 130 Table I shows the major themes identified in open-ended responses. These include the effect of  
 131 standardized test-related stressors (23% of respondents, n=113), study-related changes (19%,  
 132 n=93), concerns about the quality of education and training (17% , n=82), financial stressors  
 133 (12%, n=59), and additional family obligations (12%, n=52). Table II summarizes the responses  
 134 to the six survey questions. Results were analyzed by school year with students in all years  
 135 reporting increased levels of stress/anxiety. Second year students (class of 2022) reported near-  
 136 universal increases in stress/anxiety. More second year medical students reported that the  
 137 pandemic had interfered with their ability to prepare for Step or Shelf exams than medical  
 138 students from other years. Geographic differences were seen across responses. Students from  
 139 downstate NY, including NYC and the surrounding area, reported higher rates of stress/anxiety,  
 140 more difficulties in maintaining or improving academic performance, and more difficulties  
 141 preparing for standardized exams.

	Class of 21	Class of 22	Class of 23	Class of 24	P-Value
Difficulties Preparing for Step/Shelf Exams	18.8%	93.3%	70.5%	6.7%	<0.01
Believe I cannot maintain/improve academic performance	42.3%	62.2%	57.7%	43.7%	<0.002
Experiencing stress/anxiety	95.9%	73.8%	82.6%	66.7%	<0.00001
	Downstate (NYC and surrounding areas)	Upstate (the rest of NY State)			P-Value
Difficulties Preparing for Step/Shelf Exams	65.4%	61.4%			0.000269
Believe I cannot maintain/improve academic performance	38.1%	52.6%			0.001258

Experiencing stress/anxiety	88.8%	81.1%			0.016629
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Table II. Medical Students Concerns During the Early Stages of the COVID-19 Pandemic

Theme	Percent Reporting	Example
Step and Shelf	28% (137)	Prometric has canceled my appointment for taking Step so I have no clue when I'll be allowed to take the exam. Because of this, I don't know how to formulate a study plan or if I should even be studying for Step at all. Although I'm still trying to study, my anxiety is making it incredibly difficult to focus on any of the material.
Studying Related Changes	20% (97)	I am home, which is nice for the most part. But my family of 4 lives in a 1 bedroom apartment so finding time to study has been a horrible struggle. I've read articles about how quarantine is exposing students to their inequitable experiences. And that is my life right now. Unlike my friends, I don't have any personal space or any privacy to study effectively. I don't have the gift of silence or a set table and chair to my name to help me focus. I am behind and it is difficult to disclose to anyone, it's embarrassing.
Stress or Anxiety	18% (89)	The uncertainty of everything has created massive anxiety
Quality of Education or Uncertainty about Future Training or School Communication	20% (100)	As a third year medical student, concerns of insufficient training are at the forefront of my concerns. ... As it stands it seems we lost significant core clinical experience in our third year which will hopefully be made up in fourth year, but should the situation escalate again, likely will not be compensated for in our education.
Financial Negative Effect Reported	14% (67)	My parents help pay for my school and apartment. My dad is currently unemployed as a result of the pandemic.
Family Obligations: Other	10% (50)	Multiple sick friends/family that needed assistance, increased at home demands/duties
COVID-19 Fear	8% (37)	I'm worried that I'm a carrier of the virus and will get my parents sick. A lot of people their age die and it makes me anxious.
COVID-19 Illness	4% (12)	I've had multiple deaths in my immediate family from COVID19, financial stress for funerals, and family members sick with Covid19 hoping to recover. I have high anxiety of being infected myself. It's an emotional, mental, and physical strain on me. All I have in my mind is the well-being of my family.
Volunteering Desire Distress	7% (33)	it's a strange kind of uselessness, being a medical student in a pandemic, particularly during the dedicated period of study for Step 1 - I feel that any time not spent studying is wasted but I also really want to volunteer and help more.
Family Obligations to Children	2% (10)	Also had my time taken up by tutoring family members that are no longer in school and doing virtual learning, which has not seemed to be doing much for many NY school attending students.
Isolation or Loneliness	2% (10)	My mental health has been struggling from the self isolation
Positive Academic Experience	2% (10)	The pandemic has paradoxically given me more time to study during this crucial semester before Step 1/Level 1. Without the commute and extra distractions of leaving the apartment, I have had more time to thoroughly review my school course materials as well as board exam-specific tools. With only my spouse and I at home, I did not acquire extra responsibilities.
Acknowledges Privilege	2% (8)	I'm fortunate to have few obligations and that my family is in good health.

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145 Discussion

146 No one in medical education could have predicted at the beginning of the 2019-2020 academic  
147 year that the year would end with a country-wide shut down, over one million deaths, and our  
148 medical institutions being stressed beyond anything ever seen before (14). This data  
149 demonstrates that those who were in medical school during the pandemic faced many acute  
150 stressors within the context of social disruption and isolation. A sizable subset of students faced  
151 additional family obligations, financial pressures, and isolation. The uncertainty and late  
152 cancellations of Step and COMLEX licensing exams were major stressor and led many students  
153 to experience multiple or extended dedicated study periods. Delays inevitably required not only  
154 more time away from their medical education, but exacerbated severe financial stressors and  
155 social isolation. For these reasons among others, it is paramount that we take advantage of  
156 lessons learned.

157 As the pandemic has evolved, medical education has adapted. The once-rigid expectations on  
158 which the foundation of medical education is built have become more flexible and  
159 accommodating. Students can attend online lectures and more easily take sick days. Schools  
160 have become more proactive with COVID-related communications. The NBME and NBOME  
161 eventually developed ways to expand their exam testing capacity by relaxing requirements to  
162 allow medical schools to administer the Step exams.

163 In April of 2022, ACGME, AAMC, AACOM and ECFMG jointly published “Transition in a time  
164 of disruption. Practical Guidance to Support Learners in the Transition to Graduate Medical  
165 Education” as an anticipatory guide for residency programs and students as some of the hardest-  
166 hit students prepared to enter residency in the summer of 2022. The toolkit lays an important  
167 foundation for residents who had their medical education disrupted during medical school by the  
168 pandemic. While competency, training, and assessment tools likely will help to bridge the gap to



169 assist pandemic-affected students to become competent residents, we are concerned about the  
170 long-term consequences of the unique and extraordinary stress medical students in the epicenter  
171 of the pandemic faced as this may contribute to increased vulnerability to the impact of severe  
172 stressors in the future. Going forward, increases in institutional flexibility and education disruption  
173 planning will be needed to protect and assist the next generation of physicians. Since physicians  
174 are needed on the front lines of any public health emergency, contingency planning to address  
175 disruptions in education of affected students is paramount.

176

## 177 Conclusion

178 In this study, we demonstrated that the COVID pandemic was a great social disrupter that  
179 produced noteworthy negative effects on the medical students of NYS during the first wave,  
180 causing psychological distress and creating gaps in education that may leave many of these  
181 students behind their peers as they enter residency. It is imperative that medical educators not  
182 only develop plans to assist those most adversely affected by the pandemic so they can address  
183 potential training gaps to allow for a smoother transition into residency, but also develop disaster  
184 preparedness plans that include strategies to identify, address and mitigate the potential adverse  
185 mental, educational, social and financial ramifications on medical students and training  
186 physicians.

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