Dark Clouds With Silver Linings: Resident Anxieties About COVID-19 Coupled With Program Innovations and Increased Resident Well-Being

Larissa E. Wietlisbach, BSA
David A. Asch, MD, MBA
Whitney Eriksen, PhD, RN
Frances K. Barg, PhD, MEd
Lisa M. Bellini, MD
Sanjay V. Desai, MD
Abdul-Rakeem Yakubu
Judy A. Shea, PhD

ABSTRACT

Background The COVID-19 pandemic forced numerous unprecedented systemic changes within residency programs and hospital systems.

Objective We explored how the COVID-19 pandemic, and associated changes in clinical and educational experiences, were related to internal medicine residents' well-being in the early months of the pandemic.

Methods Across 4 internal medicine residency programs in the Northeast United States that have previously participated in the iCOMPARE study, all 394 residents were invited to participate in a study with open-ended survey prompts about well-being approximately every 2 weeks in academic year 2019–2020. In March and April 2020, survey prompts were refocused to COVID-19. Content analysis revealed themes in residents' open-ended responses to 4 prompts.

Results One hundred and eighty-six residents expressed interest, and 88 were randomly selected (47%). There were 4 main themes: (1) in early days of the pandemic, internal medicine residents reported fear and anxiety about uncertainty and lack of personal protective equipment; (2) residents adapted and soon were able to reflect, rest, and pursue personal wellness; (3) communication from programs and health systems was inconsistent early in the pandemic but improved in clarity and frequency; (4) residents appreciated the changes programs had made, including shorter shifts, removal of pre-rounding, and telemedicine.

Conclusions COVID-19 introduced many challenges to internal medicine residency programs and to resident well-being. Programs made structural changes to clinical schedules, educational/conference options, and communication that boosted resident well-being. Many residents hoped these changes would continue regardless of the pandemic's course.

Introduction

Burnout among health care workers has been associated with health effects including depression, substance abuse, and suicidal thoughts, as well as work effects including medical errors, lower productivity, and greater job turnover.[1] Although an estimated 46% of health care workers experience burnout at any given time, residents display greater proportions of burnout than medical students, fellows (subspecialty trainees), and attendings.[2–4]

The COVID-19 pandemic may have increased the risk of burnout by straining residency training programs and residents. Residents in multiple specialties experienced many of the same COVID-19 stressors as other health care workers, including lack of personal protective equipment, inadequate training to care for COVID-19 patients, and the associated feeling of helplessness, childcare concerns, and the risk of contracting or passing the virus on to family and patients.[5–15] Indeed, these concerns are not unlike those which have been reported for other outbreaks such as SARS and Ebola.[16–18] Residents experienced disruption of their training programs, uncertainty about day-to-day assignments, and concerns about future fellowships or jobs.[9] Residency program directors reconfigured their programs abruptly, some relying on the Extraordinary Circumstances policy of the Accreditation Council for Graduate Medical Education.[18] The sudden suspension of program requirements and the focus on the singular challenge of caring for COVID-19 patients led many programs to innovate quickly and implement new approaches to manage the clinical learning environment and resident well-being.

The iCOMPARE study of resident work hours in internal medicine revealed that a substantial proportion of residents experienced burnout and dissatisfaction.[19] This follow-up study was designed to solicit a prospective evaluation of internal medicine residents through biweekly surveys during the 2019–2020 academic year, during which participating residents

DOI: http://dx.doi.org/10.4300/JGME-D-20-01497.1

would respond to short questions on different aspects of their well-being. When the COVID-19 pandemic spread across the United States, we redirected our prompts to focus on the pandemic's effect on resident well-being. Here, we report on those COVID-19-specific responses, highlighting common themes that drove local innovation in the early days of the pandemic. These findings may inform residency programs more generally.

Objectives
We explored how the COVID-19 pandemic, and associated changes in clinical and educational experiences, were related to internal medicine residents' well-being in the early months of the pandemic.

Findings
Residents showed resilience and engaged in self-care, and after some early miscommunication, programs leaders adapted team and rotation structures, education delivery modes, and clinical care options in ways that supported resident well-being.

Limitations
The research was limited to 4 residency programs and one specialty and was conducted in the early months of the pandemic.

Bottom Line
While the COVID-19 pandemic added stress to the lives of internal medicine residents it revealed program leadership agility and brought opportunity for changes in how education and clinical care are provided.

Methods

All 394 residents in 4 residency programs that participated in the original iCOMPARE trial were invited to participate in a longitudinal study over academic year 2019–2020. The 4 programs comprised 2 large university programs, one small university program, and one small community-based university-affiliated program. The 88 participating residents were asked to respond to an open-ended prompt on 18 occasions roughly 2 weeks apart.

Participants

Of the residents expressing interest in participation, we randomly selected 22 to 24 per program to participate, based on a goal of 15 to 18 residents per site and an expected 20% to 30% dropout rate. Surveys responses were tracked with a blinded study ID. Analytic data sets were anonymized. Participants received a $100 Amazon gift card each time they responded to 3 prompts. The study ran from October 2019 to May 2020. Prompts related to COVID-19 were disseminated to participants in March and April 2020.

Prompts

Prompts were designed by the study team of current and former program directors, health services researchers, and qualitative researchers, many of whom had been studying resident well-being for years. Data were collected and analyzed by a team of research coordinators who were trained in qualitative methods but were not directly involved in graduate medical education. In general, ideas for the prompts were consistent with the biopsychosocial model of health that acknowledges the multiple layers of influence on individual actions and reactions and also with the conceptualization of burnout from Shanafelt and Noseworthy.[20,21] The 4 COVID-19-related prompts are listed in the FIGURE. Prompts and responses were distributed by RedCap email invitations. It is worth noting that in these early weeks of the pandemic there were substantial changes to operations for the residents in all 4 participating programs. Many fewer patients overall were admitted, and fewer caretakers of all types were in the hospital. But patients admitted with COVID-19 were primarily cared for by internal medicine residents and faculty. Specifically, the rapidly increased volumes of patients with COVID-19 with concomitant increases in critical care volumes resulted in redeployment of physicians to COVID-19-specific wards and ICUs.

Analysis

The data were coded by 4 trained coders who met at least biweekly with a subset of the larger team. After all data were collected, the 4 coders met in alternating teams of 2 to initiate a formal content analysis of the responses, utilizing NVivo 12.0 (QSR International). Codes were developed within each prompt and iteratively through weekly meetings, resulting in a master codebook that captured the frequently occurring themes across prompts but also retained those unique to some prompts. Within a prompt, coding proceeded once coders achieved an average reliability rating of 0.80 on a sample of at least 20% of the data within a prompt and interrater agreement was assessed repeatedly.

The study was reviewed and deemed exempt by the University of Pennsylvania Institutional Review Board.

Results

A total of 186 residents expressed interest, and 88 residents were enrolled (47%). Sociodemographic data for the residents are shown in TABLE 1. Of the 88 residents, 59% (n = 52) were female, and 68% (n = 60) identified as White. Site and postgraduate year (PGY) were nearly evenly distributed across participants. The average response rate was 89%. Participants responded to a mean of 16.8 of the 18 prompts

Date	Prompt	Prominent Subthemes
03/12/2020	Due to the spread of the COVID-19 virus, the past few weeks have seen health systems rapidly create, implement, and sometimes refine policies. Naturally, the care and well-being of patients is at the forefront of these conversations, followed closely by the safety of and procedures for patient care teams. What is not so clear is the impact of this spread on the well-being and education of learners within these health care systems. In 200-250 words, please tell us how your well-being has been impacted by all of the conversation and activity around COVID-19. What worries you most about this situation? What's different in your life now than a month ago? How does this impact your education and learning?	• Anxiety and fear • Concern for lack of personal protective equipment (PPE) • Fear of transmission • Frustration with communication • Disappointment and anger over schedule changes • Worry over education and learning • Excitement
03/23/2020	Please tell us in 200-250 words (or more if you want) how you are combatting social isolation. What are a few things you have tried/tricks you have learned that seem to help? What concerns do you have for the coming weeks and what supports do you need to better address the social isolation?	• Appreciation of newfound time for healthy lifestyle changes • Virtual socialization • Read and study
04/10/2020	Many of you have shared personal concerns and experiences regarding your wellness as well as recommendations for your resident training programs. Given the impact of the COVID-19 pandemic on the health care system in our country, it is likely that residency training on the other side of COVID-19 will look much different than before. Please respond to the following prompts in 250-500 words. 1. What parts of residency are now obsolete? What should we be getting rid of in our current resident curriculum and structure? 2. What innovations should we keep once this is over? (ie, education, well-being, clinical service, etc)?	• Removal of pre-rounding • Shorter rotations and shorter shifts • Conferences • Telemedicine • Fewer team members in-person • Enhanced efficiency
04/27/2020	Practicing medicine takes a lot of teamwork, perhaps now more than ever. In 200-250 words, how would you describe your experience with interdisciplinary teamwork over the past year (with attendings and other superiors, nurses, ancillary staff, etc)? How has it changed since COVID-19 came to our health system? What would you like to see changed in the future to improve interdisciplinary teamwork?	• Messaging platforms and improved communication • Focus on wellness • Interprofessional work

FIGURE
Timeline of Prompts Given to Residents and the Main Subthemes Precipitated From Responses

overall, and a mean of 3.6 of the 4 prompts related to the pandemic.

Residents' early responses to the pandemic largely fell into 2 main themes: *emotional impact* and *impact on day-to-day life*. After a few weeks, some routine was established, and observations largely reflected the training program with themes of *communication* and *innovations to program structure*. Each of these themes are described below with exemplary quotations within the text; additional quotations characterizing these themes are included in TABLE 2.

Emotional Impact

Residents offered many reflections that highlighted their *anxiety* and *fear* about the pandemic, the new uncertainties in daily life, and shifting senses of stability. Specific worries were about *lack of personal protective equipment* and contracting the disease—mostly based on a fear of transmission to their family members and patients.

> "As residents I believe that we are anxious of contracting the disease not because we worry about ourselves but because we worry of being contagious and affecting others such as more frail patients. This thought haunts us." –Resident 411, PGY-2, Program 4

Early on, residents in all programs expressed *frustration with communication* from program and hospital leaders. Information was constantly provided, but often with conflicting or uncertain meaning.

> "I am being sent into a situation without a solid plan, without a voice, and without adequate protection, and my hands are tied. No one is telling me what to expect or what the plan is." – Resident 305, PGY-1, Program 3

Residents expressed *disappointment and some anger* with forced schedule changes. Bans on travel, requirements for social distancing, and the canceling of long-awaited vacations or celebrations were a hard adjustment. As the pandemic progressed there was *worry about their education and learning*. The COVID-19 pandemic had dominated residents'

TABLE 1
Sociodemographics of the 88 Resident Participants

Sociodemographics	No. of Residents (%)
Age	
< 30	65 (74)
> 30	23 (26)
Gender	
Male	36 (41)
Female	52 (59)
Postgraduate year	
1	33 (37)
2	27 (31)
3	28 (32)
Site	
1	24 (27)
2	24 (27)
3	20 (23)
4	20 (23)
Race[a]	
White or Caucasian	60 (68)
Asian or Pacific Islander	23 (26)
Black or African American	4 (5)
Hispanic/Latino	5 (6)
Arab	2 (2)
Middle Eastern	2 (2)
Pakistani-American	1 (1)
Prefer not to disclose	1 (1)
Partner	
Yes	63 (72)
No	24 (27)
Prefer not to disclose	1 (1)
Live alone	
Yes	26 (30)
No	62 (70)
Children under 18 in household	
Yes	7 (8)
No	81 (92)

[a] Percentages do not sum to 100 because residents could pick more than 1 response.

clinical experiences, and they worried about holes in their learning of "bread and butter" internal medicine.

> "[COVID-19] impacts my education and learning because I am required to focus heavily on these patients and away from other common presenting issues that could provide me with well-rounded knowledge." –Resident 407, PGY-1, Program 4

Amid all the anxiety and worry, several residents expressed *excitement*. Being a physician on the ground in the wake of a pandemic reinforced primary motivations for entering the field.

> "These times are very hard on everyone, but these are also times that I signed up for when I decided to be a doctor, especially an internal medicine resident. Even though this is a scary time for everyone, I am very motivated to go to work and be there for my patients and answer all their questions regarding the virus. There is something exciting about being on the front-line and helping all the thousands of people in need." –Resident 304, PGY-1, Program 3

Changes to Day-to-Day Life

Thanks to innovative schedule changes described below, residents also expressed *appreciation* for unstructured time in their days. While the pandemic unsettled residents, many embraced the schedule changes and work from home shifts that allowed for healthy lifestyle changes, related to sleep, exercise, meal planning, and reflection.

> "I have been doing more yoga to try to rejuvenate myself; I've been looking up recipes to try to be healthier. I've FaceTimed and video-chatted friends—and for once, I'm not rushing to go somewhere. It's actually been a very nice way for me to do the things I haven't been able to do." –Resident 302, PGY-1, Program 3

Residents missed interacting in-person with their friends and family but were engaged in frequent *virtual socialization*. Many mentioned reaching out to old friends and engaging in virtual dining, movie watching, and game nights.

> "Trying to stay social contacting via web conferences/chat (including virtual happy hour with friends, FaceTime with family, virtual church service, etc). Over the next few weeks, concerned about burnout given completely new schedules and evolving patient loads. Groups/chats allowing us to decompress on a weekly basis would be helpful." –Resident 215, PGY-2, Program 2

Taking advantage of their time at home, some residents aimed to use the time to *read and study*.

> "While stuck at home unable to go anywhere, after I've spent some time decompressing, I try to use the extra time at home to read about the virus, work on scholarly activities, and otherwise find

TABLE 2
Internal Medicine Resident Quotes Describing Themes From COVID-19 Impact on Resident Well-Being

Emotions	Quotes	
Anxiety and fear	"It has been very anxiety provoking with all of the COVID-19 discussions. I am most worried about contracting the virus and spreading it to patients and my family as some people have been asymptomatic. I am also worried about the shortage of supplies." – Resident 117, PGY-3, Program 1	"The overdose of conversation surrounding COVID-19 has allowed medicine, already practically the entirety of my life, to also turn into my personal conversations and a caregiver in many senses for large amounts of anxiety/stress for family/friends/ acquaintances in the limited non-hospital time we are afforded." – Resident 202, PGY-1, Program 2
Lack of personal protective equipment (PPE)	"I am, of course, worried about my own safety, my loved one's safety, and my patient's safety, but it's also hard to have to be on the front lines without much concern for our health and safety (we're expected to show up, with limited PPE availability and treat patients who are not being screened adequately)." – Resident 310, PGY-2, Program 3	"Will we have enough masks/equipment/beds/ vents if there is a huge number of people who come down with the virus at once?" – Resident 417, PGY-3, Program 4
Fear of transmission	"My biggest concern at this time is the potential impact on my family." – Resident 103, PGY-1, Program 1	"It has limited the options that I have in terms of my wellness. I haven't been able to go to yoga classes and I have to cancel my vacation to New Orleans. It has created a lot of mania. We no longer have didactics which was our time of teaching and reprieve. I do worry about our exposure risk and my family." – Resident 112, PGY-2, Program 1
Frustration with communication	"The amount of sheer panic surrounding this is crazy. We have been bombarded with countless emails every single day that offer next to no new information." – Resident 418, PGY-3, Program 4	"Leadership has threatened numerous residents with delayed graduation and suspension of vacation if residents travel even to areas without infection. Leaderships propagates hysteria." – Resident 416, PGY-3, Program 4
Disappointment and anger over schedule changes	"Coronavirus has impacted in 3 ways: (1) I had to cancel my vacation to south Florida due to risks of air travel, which would have been my first family vacation in 10 years; (2) there is a chance I may have to work significantly more instead of taking vacation; and (3) my wife is in a panic, and does not want me leaving the house." – Resident 404, PGY-1, Program 4	"Uncertainty is unsettling. I know some residents are feeling pushed to their limits already as residents and then being asked to give up vacation/research/elective time, although I think most people understand that these are unprecedented times and are more than willing to sacrifice for the care of others." – Resident 212, PGY-2, Program 2
Worry over education and learning	"This negatively impacts our education and learning, because we will less be focused on learning basic principles of medicine, and more focused on taking care of patients with one specific disease, and focusing on not catching and spreading the disease, and being preoccupied with the whole fiasco in general." – Resident 311, PGY-2, Program 3	"Since we mostly only see patients with COVID-19, and we have been losing out on learning about patients with other conditions. I am 3 months away from finishing intern year but I am worried that I won't be as prepared because for the last couple weeks, I've only been taking care of COVID-19 patients." – Resident 205, PGY-1, Program 2

TABLE 2
Internal Medicine Resident Quotes Describing Themes From COVID-19 Impact on Resident Well-Being (continued)

Emotions	Quotes	
Excitement	"I feel close to my peers than I have ever felt despite being physically separated. Recent challenges have fostered innovation and creativity with regards to education and well-being that should be kept well beyond COVID-19. Residents in my program are being given more responsibility and platform to teach and also come up with ways to stay close! It's an exciting time for these reasons." – Resident 206, PGY-1, Program 2	"Going to work every morning and providing direct clinical care to patients who may have a novel pathogen imbues my work with meaning... This is a unique time to be a health care worker and the opportunity to be a part of the response to this on the front line is a privilege that I am deeply grateful for." – Resident 216, PGY-2, Program 2
Changes Day-to-Day	**Quotes**	
Appreciation of newfound time for healthy lifestyle changes	"Facetiming with friends, texting frequently, sitting outside on my deck to get fresh air, doing creative home workouts (walking up and down the stairs, push-ups), cooking more." – Resident 119, PGY-3, Program 1	"I am talking frequently with colleagues on the phone and at work about our experiences and fears. I am trying to keep a schedule of activities for every day and incorporate exercise daily. I am spending time cooking and cleaning and thinking about ways to make home a better space." – Resident 320, PGY-3, Program 3
Virtual socialization	"I've also been scheduling virtual meet ups with groups of friends... [COVID-19] has provided impetus to reconnect with people that I haven't talked with in a while. Everyone is at home when they aren't working, so it's pretty easy to schedule." – Resident 218, PGY-3, Program 2	"I'm using this time to video chat with my friends and family frequently even when I cannot see them in person. This has been a great way to stay as connected as possible during this tough time." – Resident 403, PGY-1, Program 4
Read and study	"I also try to keep moving forward keeping goals in mind like passing the Boards, learning from patients and completing scholarly activities." – Resident 315, PGY-3, Program 3	"I have used the time to delve into a few side projects I had put on the shelf." – Resident 118, PGY-3, Program 1
Communication	**Quotes**	
Messaging platforms and improved communication	"This event has also caused our program to start doing virtual [forums] to keep us posted on changes and allow residents to express their concerns. This transparency is something that needs to be maintained moving forward. More transparency between leadership and the staff is valuable for morale and trust." – Resident 309, PGY-2, Program 3	"I think there have been amazing efforts by residents to come together and organize concerns and things that we want to change about the program which is something that we could take forward after COVID-19 so that we continue to improve our experience." – Resident 114, PGY-2, Program 1
Focus on wellness	"Perhaps to make up for the lack of in-person socialization, there has been an increase in Zoom hangouts and efforts to keep our residency feeling connected. These efforts should not stop once the pandemic is over. ... Well-being initiatives, such as providing more meals to residents or even just snacks should still be the norm after this. The new focus on streamlining medical care to better use residents' time is also beneficial for both clinical service and resident well-being." – Resident 224, PGY-3, Program 2	"I also really appreciated the increased wellness suggestions/wellness website my program created with resources. It's funny how it took a pandemic for my program to make recommendations that are true during any point of high stress (and for many that is all 3 years of residency!)" – Resident 120, PGY-3, Program 1

TABLE 2
Internal Medicine Resident Quotes Describing Themes From COVID-19 Impact on Resident Well-Being (continued)

Interprofessional work	"I have had a great experience throughout the year working with attendings and fellows on the various services that I have rotated through. . . .Since COVID-19 began, all of our physician teams have been restructured to match geographically with nursing units. This also aligns more seamlessly with case management, social work, PT, OT, and SLP coverage, allowing for very effective multidisciplinary rounds and much more streamlined communication. I would like to see this geographic arrangement continued in the future." – Resident 213, PGY-2, Program 2	"This has been an opportunity for more multi-directional leadership with nursing teams doing more education of MD providers, pharmacy, and other team members having a more dynamic space to update teams on new strategies from their perspectives. . . it has helped to momentarily flatten some of the hierarchies inherent to medical practice." – Resident 116, PGY-2, Program 1
Innovations to Program Structure	**Quotes**	
Removal of pre-rounding	"I do think pre-rounding is something that isn't necessary, except for sick patients. It is a waste of time for interns to be seeing PTs in the morning when they will just be evaluated again on attending rounds." – Resident 110, PGY-2, Program 1	"It feels that pre-rounding physically on patients was never an efficient use of time, especially when it requires an intern traipsing all over the hospital, and that we could have done more discovery rounds or card-flipping." – Resident 123, PGY-3, Program 1
Shorter rotations and shorter shifts	"The longer residents are on hard services, the more fatigued and burnt out they are. This should be changed to a maximum of 2-week stretches on service that will give residents a break and help their morale." – Resident 420, PGY-3, Program 4	"For the COVID-19 crisis, our program leadership has changed our floors rotations to 2-week blocks with 6 days with long call every other day and 1 day off per week. There are no golden weekends, no black weekends and most importantly, no 28-hour calls anymore!!! Night float, which used to be 6 12-hour shifts per week for up to 3 weeks in a row is now split into 2 night teams, who either work 4 (Sun–Wed) or 3 (Thu–Sat) 12-hour shifts and have the remainder of nights off..." – Resident 414, PGY-2, Program 4
Conferences	"Daily morning reports and noon conferences are not as frequent and when they do occur you can dial in. I believe this is a huge advantage during this high-volume time and should continue to be an option moving forward. . . It is much easier to care for patients thoroughly with this time now available." – Resident 419, PGY-3, Program 4	"Virtual conference is great as it allows individuals anywhere to take part, whether it's for the whole time or for part of it. Focus on resident well-being is appreciated." – Resident 122, PGY-3, Program 1
Telemedicine	"Likely a common answer here, but while I always thought the telemedicine revolution was coming, it's here now and should stay. It has completely changed both outpatient and inpatient medicine, and I highly doubt shifting back to a purely in-office model will be challenging if not impossible." – Resident 209, PGY-2, Program 2	"While some in-person visits are still critical to incorporate the physical exam, I think many unnecessary in-person visits have been cut down and a lot has been accomplished for patients over tele-video visits. I think it would be great to keep tele-video visits in place in primary care practice and in other subspecialty practices to reduce health care costs, and to reduce travel and time expenditure for patients." – Resident 318, PGY-3, Program 3

TABLE 2
Internal Medicine Resident Quotes Describing Themes From COVID-19 Impact on Resident Well-Being (continued)

Fewer team members in-person	"I additionally [have] noticed how certain staff members can clearly work from home successfully and be crucial part of the team, such as social work, and work from home residents." – Resident 102, PGY-1, Program 1	"Corona virus has dramatically changed the face of education for residency. My program has changed from in person morning report to virtual morning report where people are able to participate from the comfort of their own homes for those are on elective. Even for those that are on service, they can do so, while still being part of the happenings of their team." – Resident 413, PGY-2, Program 4
Enhanced efficiency	"We are rapidly employing telemedicine both in the wards (to minimize interaction with COVID-19 patients) and clinic. It is efficient and improves my well-being (eg, doing clinic from home)." – Resident 306, PGY-1, Program 3	"We should keep the day-float/night-float system. ... I prefer doing flip-card rounds rather than bedside rounds because it makes rounds more efficient and keeps everyone focused on the plans for the day. I also prefer doing split rounds where the attending and resident see one intern's patient while the other intern gets work done and then switches." – Resident 308, PGY-1, Program 3

productive ways to fill the time." – Resident 203, PGY-1, Program 2

Communication

As residents settled into new routines, many complimented their program leadership. They gave numerous examples of *messaging platforms and improved communication* that helped residents feel valued and heard. For example, some of the programs implemented weekly updates and forums.

> "I also like the continued open dialogue between administration/leadership and residents. While we won't need forums to this extent post-COVID, I believe this should set precedent for having a more established back and forth to assess the concerns and needs of residents in real time." –Resident 108, PGY-1, Program 1

The frequent forums and program director availability were widely appreciated. Residents emphasized the *focus on wellness* within their programs. There was a sense that it was genuine (sometimes contrasted to past perceptions of lip service), and there was a shared hope that the messaging and activities could be retained.

> "I think we've started thinking about well-being in a more creative and holistic way. There's a realization that wellness is not just having a half afternoon off. I think some of the innovations surrounding telemedicine should also stay. I have heard from several patients that it is actually easier for them to attend appointments when they do not need to arrange for childcare or transportation for example." –Resident 101, PGY-1, Program 1

When prompted to comment on *interprofessional teamwork*, nearly all responses were positive. Residents wrote of more collaboration and shoulder-to-shoulder work with nurses, fellows, and attendings, sometimes attributing it to the lower census in the hospitals. They also commented that more teaching was occurring and that they were all in this together.

> "Since COVID-19, the adherence to tradition/learning deferred to emphasis on patient/training safety. This climate also eliminated the hierarchy, making this a more a flat organizational structure. The attending, resident, nurse, ancillary staff are all critical to success and we all identify each other as being necessary. Problems are addressed more quickly and everyone is more willing to adapt." – Resident 207, PGY-1, Program 2

Innovations to Program Structure

The COVID-19 pandemic required unprecedented changes to the training environment and schedules. Several residents complimented the agility of their program leadership, contrasting prior notions of stagnant training models. The innovation most often lauded was *the removal of pre-rounding* (daily check-ins with patients that commonly involve a physical

examination, interview, and discussion of the patient's course and diagnostic plan).

> "I think that pre-rounding is obsolete. We have been writing notes in the morning but not examining patients and waiting for the attending to come in to examine the patients together in order to minimize the exposure of going into the rooms. I actually really like this idea." –Resident 104, PGY-1, Program 1

Also appreciated was the general move to *shorter rotations and shorter shifts*. Sometimes this extended to schedule changes that included canceling some previously required rotations and providing more flexibility in selecting learning opportunities. Residents in all programs noted that program directors intentionally followed "hard" rotations with "easier" rotations.

> "My residency program has transitioned all 28-hour call rotations to 13-hour day and night shifts. ... It's shocking that it took a pandemic to illustrate that these long shifts are bad for residents' health and well-being." –Resident 313, PGY-2, Program 3

Residents appreciated the opportunity for more self-directed learning in choice of conferences and some subspecialty rotations.

Responses were varied but generally positive regarding *conference* modality and schedules. Fewer conferences were scheduled and required. The move to virtual conferences was going well, although residents did miss getting together with their peers.

> "More in-person conferences may be transitioned to teleconferences a few times a week. Additionally, we used to have 'chief rounds' in the afternoons in the past that would make it difficult to complete afternoon clinical services and place a lot of pressure on wards teams. I think we can continue to limit these in the future if they do not add to current clinical education." –Resident 317, PGY-3, Program 3

There were some mentions that a virtual format opened the doors for a chance to have more external speakers and perhaps even shared national curricula. In some cases, residents appreciated the opportunity for more teaching and preparation.

The move to *telemedicine* was largely, though not unanimously, well-received. Some residents noted that telemedicine provides more opportunity to get to know their patients.

> "In terms of the outpatient experience, there is a major opportunity to foster better patient continuity, relationships, appointment attendance, and communication with continuation of a telehealth program after the pandemic is over. This is particularly true for patients who have difficulty making it to appointments." –Resident 223, PGY-3, Program 2

Residents hoped that telemedicine would persist beyond the pandemic because of its ease of use for patients and physicians alike, and because it would allow residents to work from home.

Many residents reflected on how the structural changes to training "proved" that *fewer people needed to be in-person*, on a team, and around the bedside. Members of the team at home were still effective and engaged and clearly helped with the workload. Overall, the schedule changes *enhanced efficiency*.

> "Through virtual working it feels like some things are more easily accomplished somehow. It's not like capabilities have changed but perhaps the mindset has. I think having troubleshooting members at home and at more hours can help progress care and disposition. It's easier for ancillary staff to be on call from home than in the hospital." –Resident 221, PGY-3, Program 2

Discussion

This study has 3 main findings. First, the COVID-19 pandemic added stress to residency, but residents' own messages focused on resiliency and adaptation. Early on they expressed a cluster of negative sentiments (eg, anxiety, disappointment, and fear). Sudden and frequent schedule changes and mixed signals from their program leaders unsettled residents. But residents adjusted relatively quickly; as a whole, residents took advantage of more unscheduled time and more time at home for wellness activities, distanced social connections, and reading. Our findings of resilience in internal medicine residents resemble the adaptability reported in other specialties in response to the COVID-19 pandemic[9–14] and other outbreaks such as Ebola and SARS.[16–18]

Second, the historically slow pace of change that characterized graduate medical education pre-COVID-19 was dramatically accelerated as programs quickly developed new solutions to long-standing challenges. Residents were surprised by their programs' agility in creating many structural alterations in schedules, education, and patient interactions. Many of the program changes reported by our participants mirror what was happening in multiple specialties.[6,7,9–14] The majority agreed that many

changes should become permanent; for example, elimination of pre-rounding, shorter blocks and shifts, more attention to the sequence of rotations, virtual rounds, and telemedicine. Equally appreciated were the program directors' attention to well-being and opportunities for more individualized learning. However, positive sentiments were not unanimous. In each program some residents wished for (almost) everything to go back to how it was. Some residents missed past approaches to learning, especially missing "bread and butter" internal medicine in exchange for the COVID-19-focused education.

Third, residents themselves identified tired conventions to abandon forever. Just as the pandemic has led people in other professions to question whether they should return to commuting to an office worksite, business travel, or to formal clothes and uncomfortable shoes,[22] resident participants now question all the conventions of residency that couldn't get a fresh look until now: medical hierarchy, long shifts, and infrequent messaging from administration.

We aimed to engage internal medicine residents for a year, to gain insight into how residency affects their well-being. Unexpectedly, the COVID-19 pandemic became a central part of those experiences[23,24] providing us with a unique resident view we report here. The story's arc takes us from personal and professional concerns through empowerment and purpose toward innovative ways to restructure residency training in the post-pandemic era. We could not have anticipated the pandemic when we designed and launched this study, but it supported our goal to understand how to help residency programs support resident well-being.

This study has limitations. Residents came from programs in the northeastern United States who were volunteers in a study about well-being. They had already received 12 rounds of prompts encouraging them to think about well-being before the pandemic, possibly skewing their responses to highlight well-being. The results we report cannot be disentangled from the prompts we asked. While we did collect data on residents' sociodemographics, we chose not to dive deeply into subanalyses given few observed global differences. As in any study, there is a risk of desirability bias. Finally, we collected these data in the early weeks of COVID-19 in the United States. Residents' perspectives on the impact of the pandemic, and the durability of early program changes, may be different a year later.

Repeating this study in other specialties, as COVID-19 cases continue and programs recalibrate, would help to generalize our findings. More importantly, these data were collected at a unique point in time. Residents' internal responses to external events and the many program adaptations should be reevaluated to learn what was sustained and why. Future efforts should examine the feasibility of maintaining the discussed program changes made in response to the COVID-19 pandemic and their effects on resident job performance, patient outcomes, and program director satisfaction.

Conclusions

The COVID-19 pandemic added stress to the lives of internal medicine residents, but has also revealed human resilience, program agility, and what may be new and enduring approaches to internal medicine residency.

References

1. Dyrbye LN, Shanafelt TD, Sinsky CA, et al. Burnout among health care professionals: a call to explore and address this underrecognized threat to safe, high-quality care. *National Academy of Medicine*. https://nam.edu/burnout-among-health-care-professionals-a-call-to-explore-and-address-this-underrecognized-threat-to-safe-high-quality-care/. Accessed May 10, 2021.
2. Shanafelt TD, Boone S, Tan L, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Arch Intern Med*. 2012;172(18):1377–1385. doi:10.1001/archinternmed.2012.3199
3. Prentice S, Dorstyn D, Benson J, Elliott T. Burnout levels and patterns in postgraduate medical trainees: a systematic review and meta-analysis. *Acad Med*. 2020;95(9):1444–1454. doi: 10.1097/ACM.0000000000003379
4. Edmondson EK, Kumar AA, Smith SM. Creating a culture of wellness in residency. *Acad Med*. 2018;93(7):966–968. doi:10.1097/ACM.0000000000002250
5. Kannampallil TG, Goss CW, Evanoff BA, Strickland JR, McAlister RP, Duncan J. Exposure to COVID-19 patients increases physician trainee stress and burnout. *PLoS One*. 2020;15(8):e0237301. doi:10.1371/journal.pone.0237301
6. He K, Stolarski A, Whang E, Kristo G. Addressing general surgery residents' concerns in the early phase of the COVID-19 pandemic. *J Surg Educ*. 2020;77(4):735–738. doi:10.1016/j.jsurg.2020.04.003
7. Kogan M, Klein SE, Hannon CP, Nolte MT. Orthopaedic education during the COVID-19 pandemic. *J Am Acad Orthop Surg*. 2020;28(11):e456–e464. doi:10.5435/JAAOS-D-20-00292
8. Arowoshola L. Medical education engagement during the COVID-19 era—a student parents perspective. *Med*

Educ Online. 2020;25(1):1788799. doi:10.1080/10872981.2020.1788799
9. Dedeilia A, Sotiropoulos MG, Hanrahan JG, Janga D, Dedeilias P, Sideris M. Medical and surgical education challenges and innovations in the COVID-19 era: a systematic review. *In Vivo*. 2020;34(suppl 3):1603–1611. doi:10.21873/invivo.11950
10. Sanghavi PB, Yeung KA, Sosa CE, Vessenmeyer AF, Limon JA, Vijayan V. Effect of the Coronavirus Disease 2019 (COVID-19) pandemic on pediatric resident well-being. *J Med Educ Curric Dev.*2020;7:2382120520947062. doi:10.1177/2382120520947062
11. Bitonti G, Palumbo AR, Gallo C, et al. Being an obstetrics and gynaecology resident during the COVID-19: impact of the pandemic on the residency training program. *Eur J Obstet Gynecol Reprod Biol*. 2020;253:48–51. doi:10.1016/j.ejogrb.2020.07.057
12. Khusid JA, Weinstein CS, Becerra AZ, et al. Well-being and education of urology residents during the COVID-19 pandemic: results of an American National Survey. *Int J Clin Pract*. 2020;74(9):e13559. doi:10.1111/ijcp.13559
13. Robbins JB, England E, Patel MD, et al. COVID-19 impact on well-being and education in radiology residencies: a survey of the Association of Program Directors in Radiology. *Acad Radiol*. 2020;27(8):1162–1172. doi:10.1016/j.acra.2020.06.002
14. Shreffler J, Petrey J, Huecker M. The impact of COVID-19 on healthcare worker wellness: a scoping review. *West J Emerg Med*. 2020;21(5):1059–1066. doi:10.5811/westjem.2020.7.48684
15. Rambaldini G, Wilson K, Rath D, et al. The impact of severe acute respiratory syndrome on medical house staff: a qualitative study. *J Gen Intern Med*. 2005;20(5):381–385. doi:10.1111/j.1525-1497.2005.0099
16. Maunder R, Hunter J, Vincent L, et al. The immediate psychological and occupational impact of the 2003 SARS outbreak in a teaching hospital. *CMAJ*. 2003;168(10):1245–1251.
17. Li Y, Wang H, Jin XR, et al. Experiences and challenges in the health protection of medical teams in the Chinese Ebola treatment center, Liberia: a qualitative study. *Infect Dis Poverty*. 2018;7(1):92. doi:10.1186/s40249-018-0468-6
18. Accreditation Council for Graduate Medical Education. Stage 3: Pandemic Emergency Status Guidance. https://acgme.org/Stage-3-Pandemic-Emergency-Status-Guidance. Accessed May 10, 2021.
19. Desai SV, Asch DA, Bellini LM, et al. Education outcomes in a duty-hour flexibility trial in internal medicine. *N Engl J Med*. 2018;378(16):1494–1508. doi:10.1056/NEJMoa1800965
20. Engel GL. The need for a new medical model: a challenge for biomedicine. *Science*. 1977;196(4286):129–136. doi:10.1126/science.847460
21. Shanafelt TD, Noseworthy JH. Executive leadership and physician well-being: nine organizational strategies to promote engagement and reduce burnout. *Mayo Clin Proc*. 2017;92(1):129–146. doi:10.1016/j.mayocp.2016.10.004
22. Rosen GH, Murray KS, Greene KL, Pruthi RS, Richstone L, Mirza M. Effect of COVID-19 on urology residency training: a nationwide survey of program directors by the Society of Academic Urologists. *J Urol*. 2020;204(5):1039–1045. doi:10.1097/JU.0000000000001155
23. George B. The Coronavirus pandemic is changing work forever. *Fortune*. https://fortune.com/2020/04/10/coronavirus-pandemic-changing-work/. Accessed May 10, 2021.
24. Adams JG, Walls RM. Supporting the health care workforce during the COVID-19 global epidemic. *JAMA*. 2020;323(15):1439–1440. doi:10.1001/jama.2020.3972

Larissa E. Wietlisbach, BSA, is a Medical Student and Research Assistant, Perelman School of Medicine, University of Pennsylvania; **David A. Asch, MD, MBA,** is Professor, Perelman School of Medicine and The Wharton School, and an Internal Medicine Physician, Department of Medicine, University of Pennsylvania; **Whitney Eriksen, PhD, RN,** is a Senior Researcher, University of Pennsylvania Mixed Methods Research Lab; **Frances K. Barg, PhD, MEd,** is Director, University of Pennsylvania Mixed Methods Research Lab, and Professor, Department of Family Medicine and Community Health, Perelman School of Medicine, University of Pennsylvania; **Lisa M. Bellini, MD,** is Senior Vice Dean for Academic Affairs, Department of Medicine, Perelman School of Medicine, University of Pennsylvania, and University of Pennsylvania; **Sanjay V. Desai, MD,** is Director, Osler Medical Residency, and Vice-Chair for Education, Department of Medicine, Johns Hopkins University; **Abdul-Rakeem Yakubu** is a Research Assistant, University of Pennsylvania Mixed Methods Research Lab; and **Judy A. Shea, PhD,** is Associate Dean of Medical Education Research, Perelman School of Medicine, and Professor, Department of Medicine, University of Pennsylvania.

Funding: This work is supported by a grant (U01HL125388, to Dr. Asch) from the National Heart, Lung, and Blood Institute.

Conflict of interest: The authors declare they have no competing interests.

The authors would like to thank Andrea Bilger from the University of Pennsylvania Mixed Methods Research Lab and Claire Bocage for their assistance.

Corresponding author: Judy A. Shea, PhD, University of Pennsylvania, judy.shea2@pennmedicine.upenn.edu

Received December 11, 2020; revision received March 5, 2021; accepted May 4, 2021.