

# Impact of COVID-19 on Clinical Productivity at the University of Toledo Medical Center Specialty Care Clinics

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## Abstract

The Coronavirus disease 2019 (COVID-19) re-shaped patient care in the United States beginning in March 2020. While fear of contracting the virus was prominent within the general population, hospitals also prioritized surges of COVID-19 patients by cancelling in-person clinic appointments, clinical trials, and elective surgeries. To evaluate the state of clinical practice during the first wave of COVID-19, a regional survey was conducted of clinicians from the University of Toledo Medical Center (UTMC) and ProMedica Toledo hospitals and area clinics from March 9 to July 31, 2020. Qualitative free-form responses from clinicians indicated that both hospital systems observed decreases in patient loads and cancelled clinics. We then evaluated how COVID-19 impacted workload in specialty clinics specifically within UTMC. Clinical productivity changes were quantified by evaluating Work Relative Value Units (wRVUs) for UTMC clinics. wRVUs compared to the same period in 2019 revealed the pandemic's effects of suppressing wRVU in nearly all clinics examined in the initial stages of the first wave. wRVUs recovered to 2019 levels in most specialties and even surpassed 2019 levels by the end of the first wave of the pandemic. The recovery of wRVUs within specialty care during the first wave of the COVID-19 pandemic reveals the adaptability of the UTMC medical system in Northwest Ohio for navigating a rapidly changing infectious disease landscape.

**Keywords:** COVID-19, specialty care, revenue, Ohio, recovery, pandemic, wRVU

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## 1. Introduction

March 2020 was an unprecedented time for the medical field as Coronavirus disease 2019 (COVID-19) re-shaped patient care. In Northwest Ohio, Lucas County (which includes the city of Toledo) reported the first COVID-19 case to the public on March 14 (subsequently revised to an earlier date), and its first death was reported on March 18, 2020. This was also the first COVID-19 death reported in the state of Ohio. In late March 2020, cases rapidly rose in what became the “first wave” of the infection (mid-April peak/receded by early June). Businesses began closing and there was a significant reduction in patient load in the medical field, both regionally and nationally. In-person clinic appointments, clinical trials, and elective surgeries were abruptly cancelled. With mounting apprehension in the public surrounding contracting the disease and a paucity of knowledge regarding COVID-19, patients avoided medical facilities for routine and specialty care (1). Hospitals prioritized and/or were overwhelmed with COVID-19 patients and specialty clinicians were reassigned to COVID units to care for COVID patients. As the severity of the disease became more apparent, personal protective equipment (PPE) became a high priority which caused PPE accessibility to decline. PPE was so scarce that certain states reported bidding against one another to procure ventilators and other equipment for their hospitals (2). Over time, hospital systems adapted to the pandemic landscape to provide continuity of care to patients. Telemedicine, the distribution of health-related services through telecommunication technologies, arose (3). Telemedicine, however, was not a realistic approach for all specialties.

Not all specialties in the medical field were affected the same by COVID-19; some clinics experienced dramatic patient number declines, while others were inundated, and their workloads dramatically increased. Increases or decreases in workload and clinical productivity can be measured by several metrics, such as (unique) patient visits or Work Relative Value Units (wRVUs). wRVUs measure clinical effort or output, and they are based on the relative time, skill, training, and intensity to provide a given service (4). Medicare pays physicians for services based on the submission of the claim using one or more specific Current Procedural Terminology (CPT) codes. Each CPT code has a relative value unit that informs the compensation for a particular service. wRVUs are used to assess productivity and impact revenue in compensation and can correlate with patient numbers. Therefore, wRVUs can be utilized as a sentinel for clinician/clinic performance and can reflect changes induced by an unexpected worldwide pandemic.

To evaluate the state of regional clinical practice during the first wave of COVID-19, we conducted a regional survey of clinicians from both UTMC and ProMedica Toledo

hospitals and area clinics from March 9 to July 31, 2020. As free-form responses received from clinicians indicated changes in patient load and compensation, we evaluated wRVUs from the UTMC health system to objectively assess the health of clinical practices. Clinician responses indicated variability across specialty UTMC clinics, with respect to revenue and patient numbers. Examination of wRVUs across clinical specialties validated clinician perceptions and indicated significant losses in the early pandemic first wave, with few exceptions. However, specialty wRVUs and patient numbers recovered in many specialty clinics after May 2020, as the need for patient care increased towards the end of the first wave of the pandemic (June/July 2020).

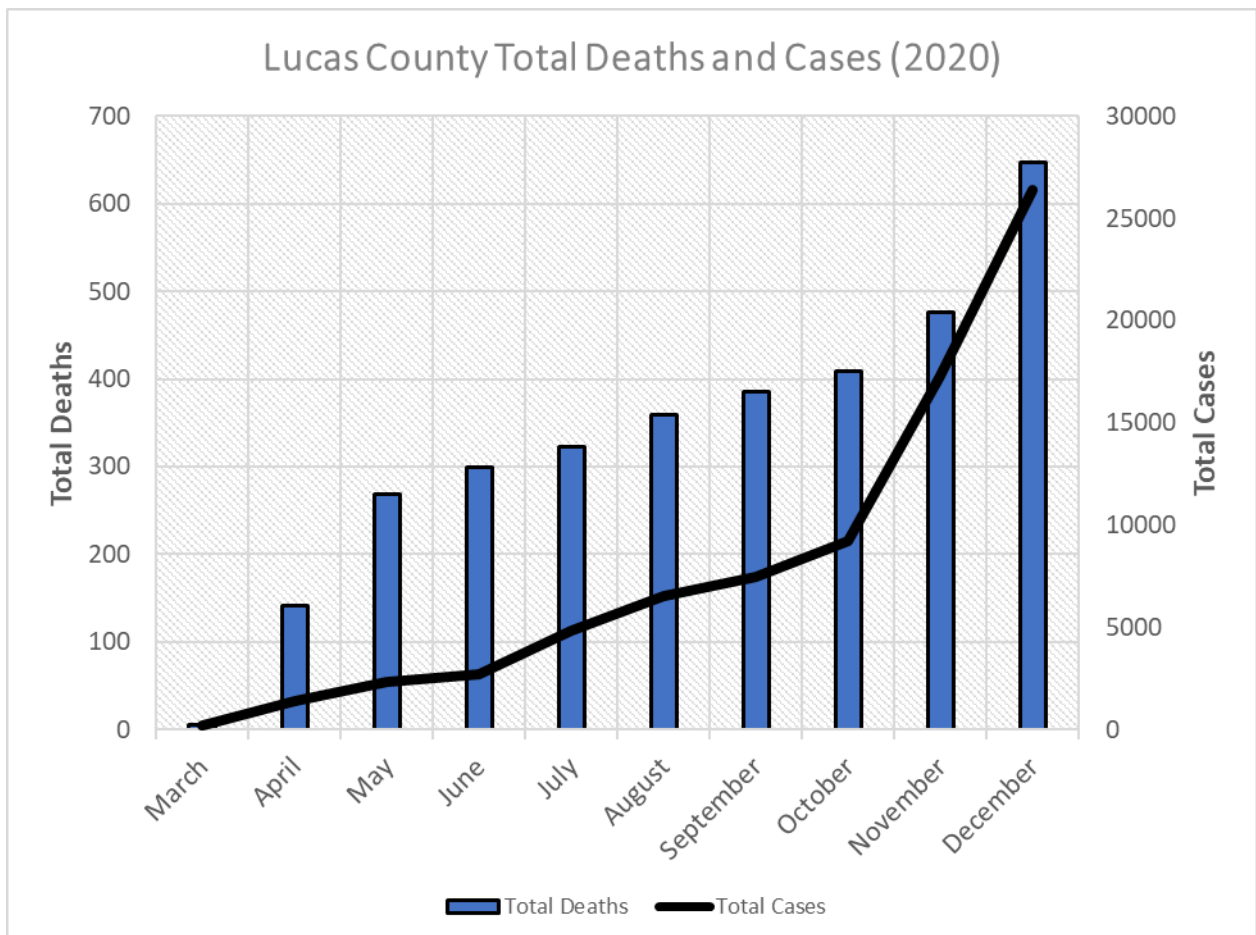
## 2. Methods

Qualitative free-form survey response data were collected with approval from the joint University of Toledo-ProMedica Institutional Review Board (IRB) (protocol 300681-UT, Clinician Interaction with COVID-19 Schroeder, Principal Investigator). This was a cross-sectional survey distributed to all physicians and advanced practice providers catalogued in medical staff services at the UTMC and ProMedica Hospitals. This survey was distributed and hosted online through the Qualtrics™ survey platform licensed to the University of Toledo. Clinicians were asked to anonymously participate through scheduled outreach emails and postings in the University of Toledo College of Medicine and Life Sciences weekly newsletter. The survey was distributed from June 25-July 27, 2020, and the responses (reflective of experiences from March-June 30, 2020) were collected between June 29-August 27, 2020. The survey design consisted of a 5-10-minute questionnaire. The questionnaire was comprised of 13-26 branched questions tailored to the clinician’s experiences.

UTMC wRVUs were provided upon request by the Office of the Dean for March-July 2019 and corresponding 2020 timeframes for all clinical departments.

## 3. Results and Discussion

Through the 5 months encompassing the first wave of the COVID-19 pandemic in the Toledo-Lucas County and surrounding areas (March-July 2020), dramatic changes in workloads were reported relative to the same period in 2019. As a backdrop, in wave one the total death and case count steadily increased throughout March-April and peaked in mid-April before dropping through July and rising once again through Dec 2020 (Figure 1). To overlay clinical perspectives, the epidemiologic features of COVID-19 infection endemic to our region, and clinical productivity within UTMC clinics, we assessed wRVUs from UTMC clinicians (represented by University of Toledo Physicians group, or UTP - the academic practice plan of the University



**Figure 1. Increase in total cases of and deaths from COVID-19 in Toledo-Lucas County from March-December 2020. Total deaths and total cases in Lucas County, OH. Data adapted from the Toledo-Lucas County Health Department [14].**

Month	Change in UTP wRVUs Relative to 2019
March	-19.49%
April	-37.41%
May	-24.39%
June	-2.39%
July	-3.44%

**Table 1 . Total percent change in UTP wRVUs relative to 2019. Percent change in wRVUs in March-July 2020 were assessed relative to the same month in 2019 for all units combined for UTP clinicians.**

of Toledo). When total revenues as expressed by wRVUs were assessed, UTP clinics experienced dramatic changes in wRVUs in 2020 relative to 2019 for the March to July period (Table 1). For instance, in March and April 2020, overall UTP wRVUs decreased by 19 and 37%, respectively, relative to the same period in 2019. However, by July 2020, overall UTP wRVUs had nearly recovered to 2019 levels.

Multiple clinical specialty clinics experienced dramatic wRVU decreases in 2020 relative to the corresponding month in 2019 in March-July (Table 2). Clinics posting the most dramatic losses included Anesthesiology, Pain Management, and Dermatology (each -88% in April 2020, relative to April 2019). Other specialties that saw reductions in 2020 wRVUs relative to the corresponding month in 2019

Specialty	Month	Change in UTP wRVUs Relative to 2019
Anesthesiology Pain Management	April	-88%
Dermatology	April	-88%
Pathology	April	-79%
Orthopedics	April	-78%
Pediatrics	April	-74%
Medicine Community Internal Medicine	April	-74%
Dietary	April	-72%

**Table 2. Significant decreases in 2020 UTP specialty clinic wRVUs relative to 2019. Greatest losses (percent change in wRVUs in March-July 2020 in specialties relative to the same month in 2019 for the indicated units for UTP clinicians**

Specialty	Month	Change in UTP wRVUs Relative to 2019
Medicine Infectious Disease	April	109%
Dietary	July	100%
Medicine Allergy/Immunology	July	68%
Palliative Care	May	52%
Medicine Community Internal Medicine	June	28%
Dermatology	June	28%
Gastroenterology	June	28%

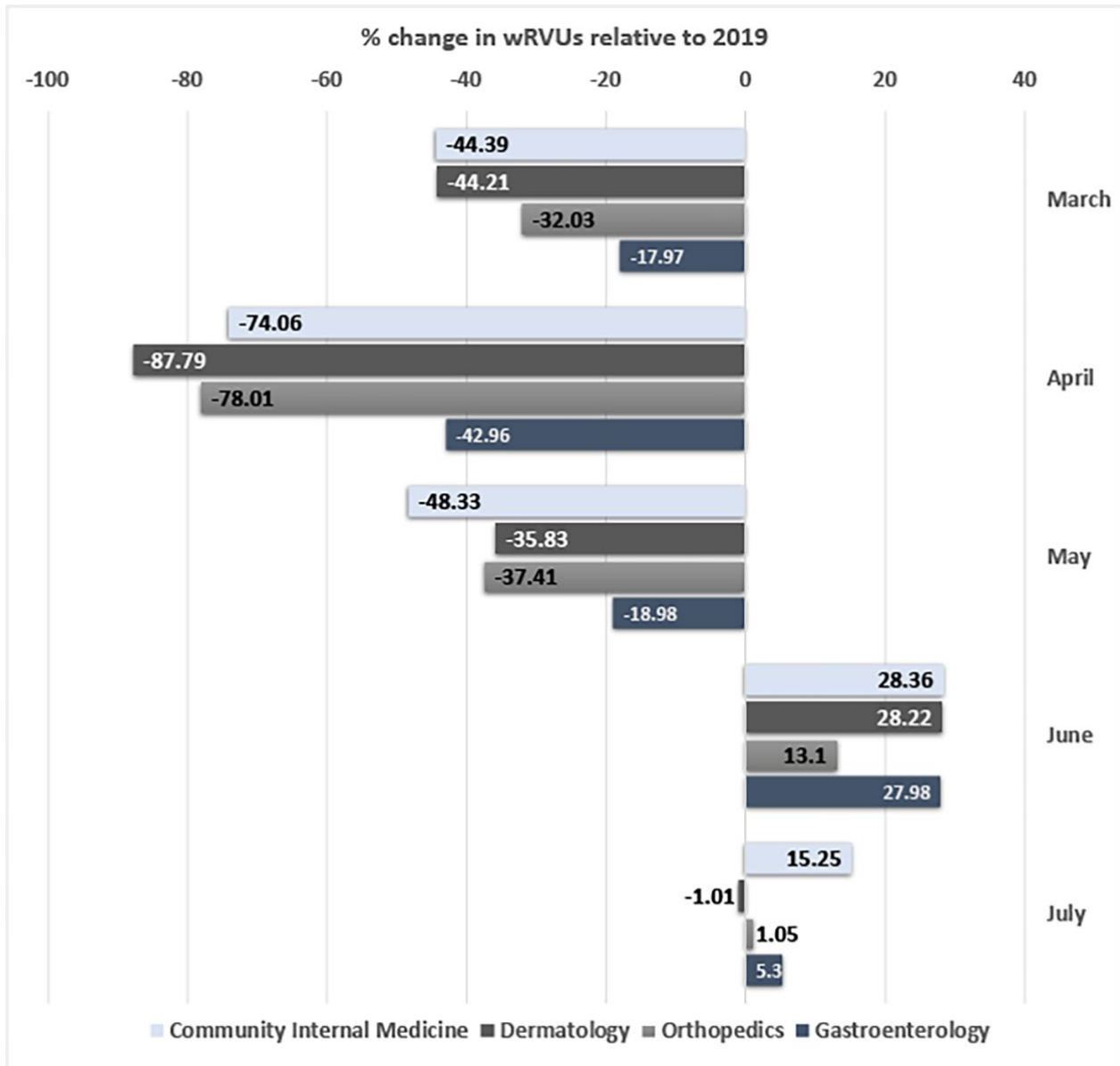
**Table 3. Significant increases in UTP wRVUs relative to 2019. Greatest gains (percent change in wRVUs in March-July 2020 in specialties relative to the same month in 2019 for the indicated units for UTP clinicians.**

included Pathology (-79%; April), Orthopedics (-78%; April), Pediatrics, and Community Internal Medicine (both -74%; April), and Dietary (-72%; April). The remaining 2020 clinic RVUs decreased to a lesser extent relative to 2019 (Table S1).

Psychiatry and Medicine Infectious Disease were two specialties whose wRVUs posted were the least disrupted in the first wave of the pandemic, relative to other UTMC Specialty clinics. Psychiatry was the most invariable specialty relative to 2019, as their 2020 wRVUs stayed relatively consistent compared to respective 2019 values (March to July respectively: +0.63%, -5.39%, -13.09%, +3.44%, -8.93%). The relatively flat loss and/or gains in Psychiatry is likely ascribed, in part, to the rapid adaptability of this UTMC clinic to telemedicine visits, a practice that continues, to a large extent, into the third year of the pandemic. Unsurprisingly, Medicine Infectious Disease was least disrupted as their 2020 wRVUs far exceeded their

2019 values (March to July respectively: +20.83%, +108.86%, +67.37%, +59.07%, +56.07%). This trend is predictable as COVID-19 is a highly transmissible infectious disease requiring the expertise of these specialists to treat the public and protect healthcare workers. However, context is important when considering clinic disruption, *per se*, as workloads increased for these specialists and their support staff in an exponential manner, while staffing remained the same or decreased due to temporary attrition from illness or burnout. These specialists acted as the UTMC control center, assuaging public fears in the media, and driving and guiding an effective pandemic response.

In the months following the onset of the first wave of the pandemic, some clinics saw wRVUs increase relative to the corresponding month in 2019, rebounding from their dramatic losses in April 2020 (above). Of note, relative to wRVUs posted in the corresponding month in 2019,



**Figure 2. Recovery in select UTP wRVUs during the first months of the first wave in 2020. Dramatic wRVU recovery in 4 specialty clinics that experienced dramatic losses in wRVUs relative to the same period in 2019 including A., Community internal medicine; B., D.**

Palliative Care (+52%; May 2020 relative to May 2019), Dietary (+100%; July), Medicine Allergy/Immunology (+68%; July) and Community Internal Medicine, Gastroenterology, and Dermatology (each +28%; June) (Table 3) all rebounded to varying degrees from the prior months’ pandemic losses, and/or relative to the respective 2019 wRVUs.

Many specialties quickly recovered throughout the 5 months assessed. Within UTP/UTMC, wRVUs relative to 2019 for Dermatology, Community Internal Medicine, Gastroenterology, and Orthopedics were the quickest to rebound relative to early wRVU drops in the 5-month period

of the first wave (Figure 2A-D). All 4 specialties experienced their greatest wRVU decreases in April, followed by the largest wRVU increases occurring in June. Primary care physicians (PCPs) saw decreased rates of face-to-face patient interactions at the height of the first wave of the pandemic in March-April 2020. wRVU data suggests that patients turned to the emergency department (ED) for care. Concurrently, PCPs experienced decreases in their RVUs. Our qualitative data from PCPs coincides with the wRVU quantitative data, suggesting that the bulk of revenue lost for the primary care specialties of Pediatrics and Internal Medicine was in April 2020. These specialties modestly recovered after the first

COVID-19 wave; for instance, Internal Medicine significantly increased wRVUs by 28% in June 2020 relative to June 2019.

In the UTMC surgery clinic, wRVUs dropped significantly in the first 2 months of the pandemic but began to recover soon thereafter. In Orthopedic surgery, a 78% decrease was observed in April but rebounded with a 13% increase above wRVUs for June 2019. In free-form survey responses, one surgeon stated that “the initial wave of Covid-19 patients caused changes in [neuro] surgical practice as there were far fewer surgeries due to cancelling elective cases. This caused a temporary decrease in work hours and required a shift to telemedicine and providing most outpatient care.” Another clinician reiterated that “elective surgeries cancelled; emergencies only; my expertise [was] utilized in other ways such as intubating Covid [patients] or starting lines on them.” Outpatient care procedures were directed to be cancelled. Elective surgeries were specifically affected, as PPE and expertise were diverted to other departments. Unless urgent treatment was needed, elective surgeries were not initiated to reduce the risk of contracting an infection and keep the hospitals and procedure rooms open for emergent cases.

Other specialist care saw clinicians reassigned from their practice to inpatient COVID units. EDs tended to experience decreased patient volumes at the beginning of the first wave of the pandemic (5-7). ED visits decreased 42% during the height of the first wave, March 31-April 27, compared to the same period in 2019 (5). It was suggested that many patients with significant complications did not go to the ED, but patients slowly returned after the first 2 months. Patients reported initially avoiding the ED due to fear of contracting the virus (7). Clinicians reiterated that many patients with congestive heart failure or chronic obstructive pulmonary disease did not go to the ED to seek medical attention due to fear of contracting the virus that could cause further complications in their conditions (personal communication, Janice Maxey, palliative care nurse practitioner, Hospice of Northwest Ohio (8)). This led to the tendency to avoid or postpone necessary clinical care. Even young and healthy patients were advised to avoid the ED and contact their primary care physician upon showing COVID-19 symptoms (6).

Other specialties such as Dermatology, Pathology, and Dietary showed some of the most significant decreases and increases in wRVUs relative to the same period in 2019. We infer that Dermatology showed a significant decrease in April 2020 because offices were shut down and appointments were cancelled (9). Dermatology showed a significant increase in June relative to 2019, and the earlier phase of wave one (Figure 2B). This may coincide with offices opening back up, and patients being rescheduled, thus causing an increase in patient load. We hypothesize that Pathology decreased in April 2020 due to a decrease in overall patient care, resulting

in fewer lab tests being ordered, and at that time, COVID-19 tests were scarce and not yet widely available. Another specialty that saw a dramatic wRVU increase was Allergy and Immunology. Compared to the 2019 wRVU data, there was a 68% increase in the same period in 2020. Immunology and Allergy specialists were essential members of teams developing treatments for COVID-19 patients, and their expertise was likely in high demand at this time.

The federal government made resources available to address revenue losses in areas of the medical field. The CARES Act was enacted by the federal government to provide financial aid due to the impact of COVID-19. Much of the aid given to hospitals in the United States was in the Midwest. Although this might have been beneficial to many institutions, the aid given was based on the revenue generated. Thus, much of this fiscal aid was allocated to practices of 50 or more clinicians, therefore, infusions of CARES Act monies were not directly routed to the clinical practices highlighted in this survey (10).

#### 4. Conclusions

COVID-19 significantly reshaped current practices in the medical field. While most medical specialties have since recovered from the dramatic decrease in patient load and wRVUs during the first wave of the pandemic, clinical practices are still affected by ever-changing protocols. Getting back to “life as we know it” in clinical practice has proven a challenge for the medical field and how it implements preventative measures and new normalcy.

The trends we observed during the first 5 months of the pandemic may be attributed to a lack of knowledge about COVID-19, lack of universal guiding protocols surrounding how to manage a pandemic, lack of PPE to control the spread of the disease, and lack of resources to care for severely ill patients. The medical field adapted quickly to mitigate the risk associated with providing patient care amidst a backdrop of a poorly understood and highly contagious virus. One way of controlling the spread of COVID-19 was cancelling all in-person patient visits, leading to the use of telemedicine for certain specialties. Telemedicine is projected to grow 7 times the size it is today by 2025 (3), and thus wRVU calculations for telemedicine may need to be refined to adapt to this changing landscape. Telemedicine was not a solution for all specialties, leading some specialties to a decrease in patient numbers and total wRVUs. The rebound of all specialties late in the first wave, even those who saw the most significant decreases, was remarkable. This shows the ability of the medical system to adapt. Employees, although some were furloughed to reduce staffing temporarily, retained their jobs and returned to full employment. Many medical systems saw the need to increase new staffing hires as well.

A multitude of policy changes were implemented in clinical practices resulting from the UTMC response to the first wave of the pandemic. COVID-19 screening in patients as part of appointment check-ins is now a background function of patient care. Whereas mask requirements were dropped elsewhere on the University campuses, patients and staff must mask in clinical areas, as must anyone passing through a clinical area. Visitation in clinics is limited. Vaccine clinics, once only offered to selected tiers of providers, students and occupations at UTMC, are now routine, if not quiet. PPE stockpiles are robust, waiting for the next variant and/or emergent virus.

Indeed, hindsight is 20/20. In reflecting upon what could have been done better in the first wave of COVID-19 in 2020, or what must be done differently in the wake of a potential emergent pandemic such as H5N1 avian flu [11,12], there are some obvious technology investments that streamline telemedicine to better connect clinicians and patients to protect both health care workers and vulnerable patient populations. Telemedicine is still comprehensive medicine, and steadily increasing email correspondence through virtual portals can be time consuming for providers, beyond time spent in a face to face interaction. Whether UTMC leverages patient-doctor communications within medical portals, as has been implemented in other medical centers to varying degrees of clinician compliance and/or success [13], is up for debate. Beyond technology, and securing supply lines, health care worker mental health investments is key to preparedness for the next crisis and managing the next one. In an ideal world without financial bottom lines, this means less emphasis on wRVUs and more focus on the physical health and mental well-being of care providers.

Finally, it is no mystery that the world has changed significantly since COVID-19 arose in late 2020. COVID-19 will be apparent and existent in our lives, and the aftermath is still present, even as 2023 marches on and vaccines and boosters are widely available to most of the US population. Like a wave, disease and illness flow in and out of our world every year. Although some are worse than others, the ebb and flow that comes with disease is a common historical theme. An important obstacle that hospitals will have to overcome is riding that wave and staying afloat on top of it. As revealed in this study, it is possible to do. We cannot always prevent disease at any given point in time, but we can control the measures we put into place for emergent viruses. With knowledge, research, and learning from our mistakes, we can face emergent viruses with more strength and tenacity than we could before.

## Conflicts of Interest:

Authors declare no conflicts of interest

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Specialty	Month	% change in UTP wRVUs 2020 relative to 2019
Anesthesiology Pain Management	March	-42.79%
	April	-87.53%
	May	-32.94%
	June	12.63%
	July	-17.99%
Dietary	March	-33.33%
	April	-72.09%
	May	-48.00%
	June	-28.57%
	July	100.00%
Emergency Medicine	March	-19.66%
	April	-44.47%
	May	-43.57%
	June	-33.64%
	July	-19.97%
Family Medicine	March	-17.00%
	April	-28.97%
	May	-17.19%
	June	16.08%
	July	9.56%
Medicine Allergy/Immunology	March	-19.56%
	April	-41.54%
	May	-26.37%
	June	-11.29%
	July	68.44%
Medicine Cardiology	March	-36.07%
	April	-61.37%
	May	-51.67%
	June	-22.23%
	July	-23.05%



Medicine Community Internal Medicine	March	-44.39%
	April	-74.06%
	May	-48.33%
	June	28.36%
	July	15.25%
Medicine Dermatology	March	-44.21%
	April	-87.79%
	May	-35.83%
	June	28.33%
	July	-1.01%
Medicine Endocrinology	March	12.82%
	April	-20.80%
	May	-0.76%
	June	-0.27%
	July	-7.95%
Medicine Gastroenterology	March	-17.97%
	April	-42.96%
	May	-18.98%
	June	27.98%
	July	5.30%
Medicine General Internal Medicine	March	-4.94%
	April	-15.94%
	May	-10.51%
	June	4.24%
	July	7.50%
Medicine Hematology Oncology	March	-35.41%
	April	-50.32%
	May	-56.94%
	June	-42.62%
	July	-26.11%
Medicine Hospitalists	March	-14.88%

	April	-21.10%
	May	-18.17%
	June	-15.07%
	July	-20.57%
Medicine Infectious Disease	March	20.83%
	April	108.86%
	May	67.37%
	June	59.07%
	July	56.07%
Medicine Nephrology	March	-18.54%
	April	-23.58%
	May	-11.91%
	June	-6.24%
	July	-9.67%
Medicine Pulmonary Diseases	March	-31.93%
	April	-11.35%
	May	-10.11%
	June	-26.61%
	July	6.69%
Medicine Rheumatology	March	-44.81%
	April	-27.71%
	May	-11.59%
	June	-28.56%
	July	10.77%
Neurology	March	-55.93%
	April	-69.42%
	May	-67.78%
	June	-59.47%
	July	-58.05%
OB/GYN	March	-27.96%
	April	-57.99%

	May	-42.21%
	June	-9.34%
	July	-31.73%
Palliative Care	March	-30.91%
	April	20.12%
	May	51.91%
	June	14.40%
	July	-18.59%
Orthopedics	March	-32.03%
	April	-78.01%
	May	-37.41%
	June	13.09%
	July	1.06%
Pathology	March	-37.66%
	April	-79.15%
	May	-51.70%
	June	12.15%
	July	-12.00%
Pediatrics	March	-42.82%
	April	-73.90%
	May	-58.36%
	June	-25.13%
	July	-7.37%
PM & R	March	-11.75%
	April	-42.90%
	May	-21.52%
	June	23.98%
	July	3.45%
Psychiatry	March	0.63%
	April	-5.39%
	May	-13.09%

	June	3.44%
	July	-8.93%
Radiation Oncology	March	-39.75%
	April	-41.79%
	May	-62.68%
	June	-73.79%
	July	-70.81%
Surgery	March	-24.02%
	April	-68.30%
	May	-33.29%
	June	-17.90%
	July	-9.04%
Urology	March	-3.19%
	April	-50.13%
	May	-16.00%
	June	4.86%
	July	3.31%
Vascular Surgery	March	-6.50%
	April	-36.14%
	May	-31.50%
	June	26.62%
	July	8.08%

**Table S1. Percent change in UTP wRVUs in 2020 relative to 2019 for all specialties.**