


Planning for Post-Pandemic Cancer Care Delivery: Recovery or Opportunity for Redesign?

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Abstract: The delivery of cancer care has never changed as rapidly and dramatically as we have seen with the coronavirus disease 2019 (COVID-19) pandemic. During the early phase of the pandemic, recommendations for the management of oncology patients issued by various professional societies and government agencies did not recognize the significant regional differences in the impact of the pandemic. California initially experienced lower than expected numbers of cases, and the health care system did not experience the same degree of the burden that had been the case in other parts of the country. In light of promising trends in COVID-19 infections and mortality in California, by late April 2020, discussions were initiated for a phased recovery of full-scale cancer services. However, by July 2020, a surge of cases was reported across the nation, including in California. In this review, the authors share the response and recovery planning experience of the University of California (UC) Cancer Consortium in an effort to provide guidance to oncology practices. The UC Cancer Consortium was established in 2017 to bring together 5 UC Comprehensive Cancer Centers: UC Davis Comprehensive Cancer Center, UC Los Angeles Jonsson Comprehensive Cancer Center, UC Irvine Chao Family Comprehensive Cancer Center, UC San Diego Moores Cancer Center, and the UC San Francisco Helen Diller Family Comprehensive Cancer Center. The interventions implemented in each of these cancer centers are highlighted, with a focus on opportunities for a redesign in care delivery models. The authors propose that their experiences gained during this pandemic will enhance pre-pandemic cancer care delivery. *CA Cancer J Clin* 2021;71:34–46. © 2020 American Cancer Society.

Keywords: cancer care delivery, coronavirus disease 2019 (COVID-19), health care delivery, pandemics

Introduction

Cancer care delivery has evolved over decades alongside significant advances in the understanding of the basic biology of cancer, technologic improvements in diagnosis and therapy, and expansion of options in the treatment landscape. Although change is constant, the dramatic and rapid transformation in how we deliver care seen during the coronavirus disease 2019 (COVID-19) pandemic was unprecedented. Within a matter of days, health care systems around the world were faced with developing strategies to immediately mitigate or suppress the effects of the pandemic.¹ Although California hospitals had started internal discussions regarding the potential impact of the virus relatively early, formal surge planning did not begin until February 2020. When the University of California Davis (UC Davis) reported the first reported community transmission of COVID-19 in the United States, it became clear that the magnitude of the pandemic may be greater than previously estimated and that efforts were needed to shift to other methods of infectious control.² In an effort to control the spread of the virus, Governor Gavin Newsom and mayors across California consulted with academic

medical centers and started implementing shelter-in-place mandates with thoughtful foresight. San Francisco was the first city in the state to do so on March 16, whereas a state-wide stay-at-home order went into effect on March 19, 2020.^{3,4} There has been dramatic geographic variation in the incidences of infection and death from COVID-19. Some health care systems were overwhelmed, leading to a shortage of hospital beds, intensive care unit (ICU) beds, and necessary critical care resources. However, the measures taken in California to limit the infection initially led to a lower than expected number of cases.

By May 31, 2020, in total, there were 110,583 confirmed cases with 4213 deaths related to COVID-19 in California⁵ (Fig. 1). This was compared with New York state, in which 370,770 cases were confirmed and 29,784 deaths were reported because of COVID-19.⁶ However, when shelter-in-place restrictions were relaxed in California in late May 2020, the vigilance that was previously in place with the use of masks and social distancing dissipated in some California counties. As a result, a new surge of cases was observed across the state starting in July 2020. By July 24, 2020, the number of COVID-19 cases in California surpassed the number of cases in New York (436,313 vs 410,450 cases, respectively). This observation demonstrated to us that COVID-19 surges are not going to come in waves but instead will be a constant presence in our lives, although with geographic variations even within the state of California. As of July 22, 2020, the highest number of confirmed cases and deaths from COVID-19 in California was in Los Angeles county followed by Orange, Riverside, and San Diego counties (Fig. 1). The resurgence in July 2020 also validated that we cannot seize our response to COVID-19 while we plan a recovery. Instead, our efforts have focused on a continuation of the COVID-19 response while we make an effort to expand services to our patients. The fluctuations in incidence over time and across different counties in California have highlighted the importance of adaptability and flexibility of health policies. Furthermore, the lessons learned during the current COVID-19 pandemic will be informative for the management of future infectious epidemics, whether regionally or internationally.

On April 16, 2020, the White House released guidelines on *Opening up America Again*, in which recovery planning is recommended in a phased approach (phases 1-3). Requirements for initiation of the recovery period include a downward trajectory of suspected or confirmed COVID-19 cases as well as the percentage of positive tests reported within a 14-day period.⁷ Additional state responsibilities noted in the guidelines include adequate personal protective equipment (PPE), screening, testing, and surveillance capacities along with plans for mitigating subsequent outbreaks.

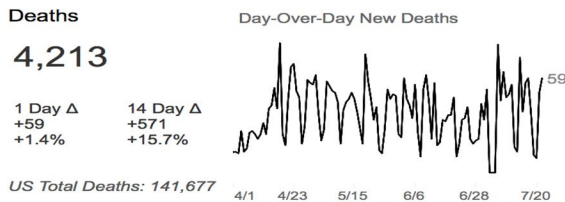
The phased approach recommended in the report includes continued efforts to reduce exposure by safe social distancing, the use of PPE, and continued sheltering in place for vulnerable populations until phase 3. According to this guideline, although nonemergent/nonessential surgeries can be resumed in the first phase, visitors are not advised to visit senior living facilities or hospitals until phase 3 begins. The Centers for Medicare and Medicaid Services (CMS) provided similar guidance in their phase 1 recommendations for nonemergent non-COVID-19 health care.⁸ In its *Physician Practice Guide to Reopening*, the American Medical Association (AMA) provided 4 key elements that must be fulfilled before the relaxation of stay-at-home orders⁹: 1) minimal risk of community transmission based on sustained evidence of a downward trend in new cases and fatalities; 2) a robust, coordinated, and well supplied testing network; 3) a public health system for surveillance and contact tracing; and 4) fully resourced hospitals and health care workforce. Similarly, California's *Roadmap to Modify the State Stay-at-Home Order* listed 6 indicators to start recovery planning¹⁰:

1. The ability to monitor and protect communities through testing, contact tracing, isolating, and supporting those who are positive or exposed;
2. The ability to prevent infection in people who are at risk for more severe COVID-19;
3. The ability of the hospital and health systems to handle surges;
4. The ability to develop therapeutics to meet the demand;
5. The ability for businesses, schools, and childcare facilities to support physical distancing; and
6. The ability to determine when to reinstitute certain measures, such as the stay-at-home orders, if necessary.

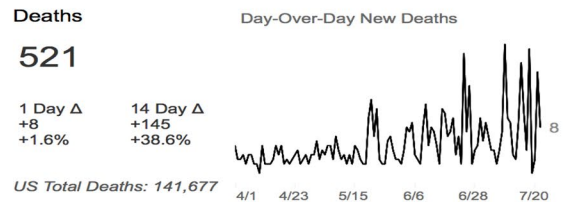
In light of promising trends in COVID-19 incidence and mortality, by late April 2020, recovery planning discussions started within health care systems across the United States with the same urgency as the surge planning. However, it soon became clear that response to COVID-19 should not be abandoned while recovery planning takes place. Instead, the fundamental approach to the pandemic became acceptance of a coexistence with COVID-19 while redesigning our cancer centers.

In an effort to provide guidance to oncology practices as they start preparing for their recovery, here, we share the recovery planning experience of the University of California Cancer Consortium (UCCC) and current recommendations for response and recovery. The UCCC was established in 2017 to bring together the 5 University of California Comprehensive Cancer Centers: UC Davis (UCDH) Comprehensive Cancer Center (Sacramento), UC Los Angeles (UCLA) Jonsson Comprehensive Cancer

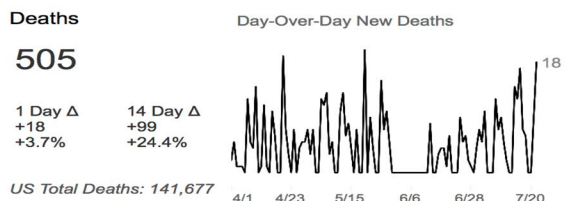
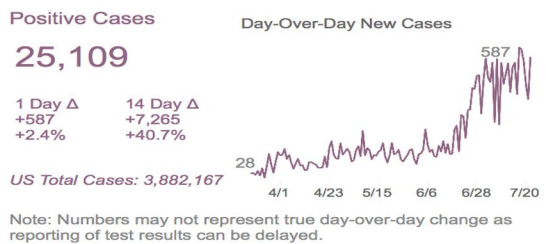
A Los Angeles CASE STATISTICS



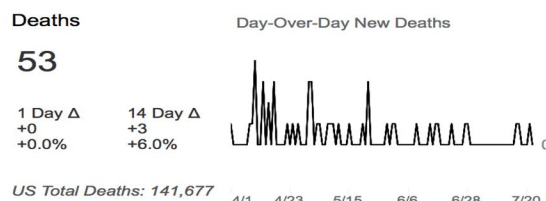
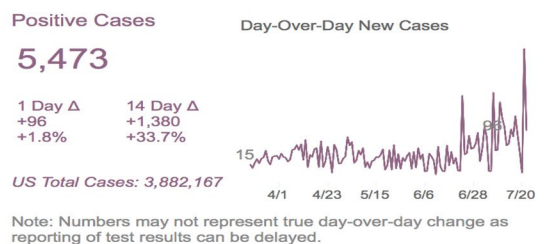
B Orange CASE STATISTICS



C San Diego CASE STATISTICS



D San Francisco CASE STATISTICS



E Sacramento CASE STATISTICS

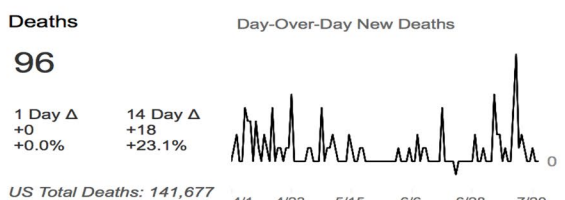
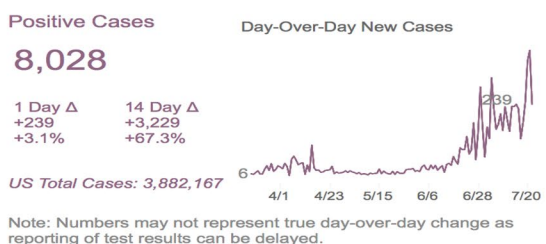


FIGURE 1. Confirmed Cases and Deaths Related to Coronavirus Disease 2019 in California Between March 19 and July 22, 2020.

Center (Los Angeles), UC Irvine (UCI) Chao Family Comprehensive Cancer Center (Orange), UC San Diego (UCSD) Moores Cancer Center (San Diego), and the UC San Francisco (UCSF) Helen Diller Family Comprehensive

Cancer Center (San Francisco). Although all of the centers are under the governance of the Board of Regents of the University of California, they are all structured differently and serve unique patient populations across the state (Fig. 2).

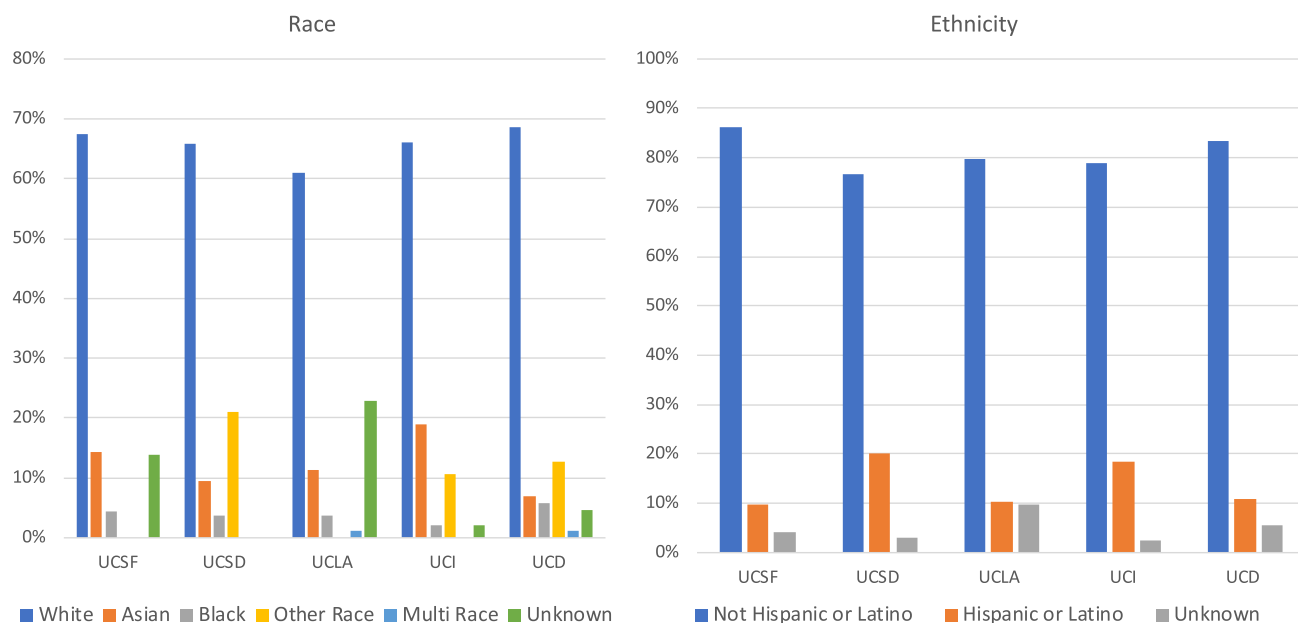


FIGURE 2. Race and Ethnicity Data for the University of California (UC) Cancer Centers between January 2012 and March 2020. UCD indicates UC Davis; UCI, UC Irvine; UCLA, UC Los Angeles; UCSD, UC San Diego; UCSF, UC San Francisco.

The UCCC treats 16% of patients with incident cancer in California, of whom 45% are patients with late-stage cancer.¹¹ The health care inequity in our patient population became pronounced, with a disproportionate percentage of patients from the LatinX community being affected by the pandemic. As of July 24, 2020, 56% of confirmed cases and 45% of deaths because of COVID-19 in California were reported in the LatinX population compared with 18% of cases and 31% of deaths in the White population.⁵

As we share the various interventions across our cancer centers, we would like to call attention to the importance of broadening the definition of recovery to more than just returning to pre-pandemic practice patterns. The pandemic required all health care institutions and providers to develop new ways of delivering care, some of which were innovative and perhaps more efficient, effective, and safer than prior models. We also need to consider and address health care inequities in our patients with cancer as we develop new outreach and care pathways in the UCCC.

Phase 1 Communication

Communication and transparency with both patients and the cancer center community will continue to be important during the recovery and response planning. Many patients may be hesitant to return to the cancer center for evaluation and treatment or for scheduled cancer screening because of fear of exposure to COVID-19. They will require reassurance from the cancer center leadership and their providers to emphasize the safety measures that are in place to protect both patients and staff, including symptom screening,

temperature checks, universal masking, and social distancing in waiting areas. In our institutions, patients received communication outlining these measures through multiple approaches, including letters as well as electronic and automated messages. We also worked closely with the marketing departments to develop educational and promotional materials for broadcasting over many social media channels. The messaging, which focuses on maintaining effective but safe care, understanding risk, and addressing access to clinical trials, continues to be important in our communication to our patients.

Transparency is also important for health care workers to gain an understanding of the plans for recovery in the cancer center and across the health system while coexisting with COVID-19. Each health care worker is interested in knowing how recovery plans will affect their day-to-day work, the care that they provide to their patients, and the rate at which each of the changes will be implemented. During the pandemic, a COVID-19 dashboard was created at each of our sites that showed the number of patients with COVID-19 who were hospitalized as well as the number who required ICU care, the number of days of PPE available, the number of ICU beds and ventilators available, the number of tests that had been done, and the overall positivity rate. During this new phase, the dashboards have now evolved to include recovery metrics showing daily hospital census, daily clinic volume, the percentage of patients using telehealth for outpatient care, and operating room (OR) volume. UCSF also implemented a health equity dashboard that outlines COVID-19 clinical outcomes by race-ethnicity and by language in an effort to bring visibility to this important topic. The availability

of immediate feedback from health care workers will be invaluable to promote a learning health system that promotes continuous improvement. Recurring meetings with disease group leaders, daily huddles with clinic team members, and townhall meetings with cancer center employees should be scheduled for real-time planning during the recovery period.

Testing

During the recovery phase, there should be increased testing in asymptomatic patients, including all patients undergoing surgery, procedures, bone marrow transplantation and other treatments that cause significant immunosuppression; patients admitted to the hospital; and high-risk groups, such as patients who live in congregate living settings. To allow for a wide net of testing for patients who live far from the cancer centers, the UC health systems developed partnerships with community hospitals to allow for testing of patients in their own community. Where possible, UC health systems deployed drive-up testing centers for patients who were having scheduled procedures at a UC facility. Whether all patients with cancer and the cancer center employees should be tested must be weighed against the availability of the testing capacity and the local prevalence of COVID-19 cases. Testing should be prioritized in high-prevalence areas. In low-prevalence areas, testing of asymptomatic health care workers could be considered if there is testing capacity, with greater priority being given to the staff that has suggestive and equivocal COVID-19 symptoms or who are at high risk of exposure to index cases. The differences in testing criteria of asymptomatic patients and employees in each UC cancer center are summarized in Table 1.

There are potential drawbacks of increased COVID-19 testing as well. For patients who do not live near a testing site, have mobility issues, or have transportation difficulties, testing for COVID-19 can become a significant burden, especially if recurrent testing is needed. Nasopharyngeal swabbing is an uncomfortable procedure, and some patients may resist it. Consideration should also be made to account for the potential financial cost of COVID-19 testing to patients and whether repeat testing would be covered by payors if this is implemented in the oncology practices. Finally, widespread testing of asymptomatic patients should be balanced against the availability of resources for the testing methodology such that reagents remain available for essential testing. As serology and rapid antigen testing become available in each UC site, important questions about the role of serologic testing and its use in determining immunity are also being evaluated.

It will be imperative to continue monitoring confirmed COVID-19 cases with detailed contact tracing to avoid large outbreaks and to have containment strategies if an outbreak is detected. To do this effectively, we developed

dashboards to track cases in both inpatient and outpatient settings. These dashboards also include outside COVID-19 testing results when possible. With availability of these easily accessible data, the increased numbers of COVID-19 cases were detected and mitigation plans were made accordingly in both governmental and institutional levels in late June 2020. As an example, UCSF was planning to allow one visitor in the ambulatory cancer center practices starting in July. However, this decision was reversed and a *no visitor* policy was reinstated after the increase in the number of index cases in San Francisco. In addition, Governor Gavin Newsom mandated the closure of indoor activities in nonessential workplaces in 30 California counties on July 13, 2020.¹²

Throughout the pandemic, data related to cases have been shared publicly on social media (ie, Twitter) by faculty at UCSF, UCSD, UCI, and UCDH to provide a factual base for discussions related to COVID-19. University of California Health (UC Health) also started providing daily updates on COVID-19 from their 5 UC medical centers on its Twitter account. In addition, UC Health created a centralized, Health Insurance Portability and Accountability Act of 1996 (HIPAA)-limited data set with clinical information that is accessible to researchers across the entire UC system. The University of California COVID Research Data Set was developed in an effort to allow research collaboration to evaluate real-life data regarding COVID-19 treatment and outcomes.¹³

There has been close collaboration between our large academic institutions and public health efforts in surge planning, recovery planning, and continuous mitigation plans for the pandemic. Experts from the University of California campuses have served as consultants to the government officials in response to COVID-19. The COVID-19 Testing Task Force of the state of California included faculty representation from UCSD and UCDH. UCSF faculty, in collaboration with community organizations, coordinated testing sites in the Mission District, where nearly 3000 residents and workers (of whom 95% were Hispanic or Latinx) were tested for COVID-19 in late April 2020.¹⁴ In addition, as a response to the San Quentin prison's COVID-19 outbreak, Amend at UCSF was integral in providing guidance and developed guidelines for the management of the pandemic in correctional facilities.¹⁵ In early May 2020, UCSF and UCLA also started training volunteers who are deployed for contact tracing across California.¹⁶

Cancer Center Clinics

Prescreening and screening

As the response to COVID-19 continues and the recovery efforts are underway, the primary focus continues to be on patient and health care worker safety. We are continuing

TABLE 1. Characteristics of Selected Interventions Implemented in each University of California (UC) Cancer Center

CANCER CENTER	TESTING OF ASYMPTOMATIC PATIENTS AND EMPLOYEES (WITH PCR)	VISITOR POLICY ^a	TELEHEALTH	WELLNESS
UC Davis	<ul style="list-style-type: none"> All <i>patients</i> admitted for surgery or procedures All <i>patients</i> starting chemotherapy and those who are at risk of developing neutropenia <i>Patients</i> undergoing bone marrow transplantation or chimeric antigen receptor T-cell therapy <i>Patients</i> undergoing radiation therapy for lung cancer and mucosal head/neck cancer and those with thermoplastic immobilization masks or undergoing brachytherapy <i>Staff</i> working in high-risk units 	<ul style="list-style-type: none"> One visitor to accompany <i>patients</i> who are admitted Two visitors for <i>patients</i> in critical condition or children <i>Patients</i> in ambulatory care areas may have one visitor accompany them to appointments 	<ul style="list-style-type: none"> <i>Pre-pandemic</i>: ~1% of encounters <i>April 2020</i>: 53% of encounters <i>June 2020</i>: 26% of encounters Telehealth option expanded for psycho-oncology, supportive care, and genetic counseling appointments <i>Pre-pandemic</i>: <1% of encounters <i>April 2020</i>: 55% of encounters <i>June 2020</i>: 35% video visits and 10% telephone encounters Protocols are being developed to identify which visits are suitable for telehealth vs in-clinic visits Provider templates adjusted to allow for blocks of in-clinic or telehealth encounters <i>Pre-pandemic</i>: <1% of encounters <i>April 2020</i>: >45% of encounters <i>Patients</i> receiving chemotherapy, immunotherapy, or maintenance treatment who have normal laboratory values and no significant treatment toxicity are offered the option of telemedicine or in-clinic visit 	<ul style="list-style-type: none"> Virtual counseling sessions for health care workers Digital wellness newsletter distributed to employees weekly from Chief Wellness Officer Zoom exercise class to help support health/wellness <i>Patients</i>, employees, and caregivers now have access to mental health and well-being classes Cancer support groups, survivorship classes, and chemotherapy classes have moved to virtual format <i>Code Lavender Initiative</i> providing free and confidential counseling services to staff experiencing personal or work-related problems Well-being services are offered free of charge to caregivers and coworkers that include mindfulness and meditation, guided acupuncture, massage, yoga therapy, and stress-management strategies Seminars on compassion fatigue are offered to employees For the patient population, cancer support groups and survivorship classes have moved to virtual format Emotional support request line by text or call for employees Video therapy sessions for employees, including “chat with a chaplain” Active rounding by management with placement of consults as deemed necessary
UC Irvine	<ul style="list-style-type: none"> All <i>patients</i> admitted to the hospital All <i>patients</i> undergoing a procedure or surgery Transplantation <i>patients</i> and <i>donors</i> Strategies around testing of <i>employees</i> are currently in discussion 	<ul style="list-style-type: none"> One visitor per patient 	<ul style="list-style-type: none"> <i>Pre-pandemic</i>: <1% of encounters <i>April 2020</i>: 55% of encounters <i>June 2020</i>: 35% video visits and 10% telephone encounters Protocols are being developed to identify which visits are suitable for telehealth vs in-clinic visits Provider templates adjusted to allow for blocks of in-clinic or telehealth encounters <i>Pre-pandemic</i>: <1% of encounters <i>April 2020</i>: >45% of encounters <i>Patients</i> receiving chemotherapy, immunotherapy, or maintenance treatment who have normal laboratory values and no significant treatment toxicity are offered the option of telemedicine or in-clinic visit 	<ul style="list-style-type: none"> Cancer support groups, survivorship classes, and chemotherapy classes have moved to virtual format <i>Code Lavender Initiative</i> providing free and confidential counseling services to staff experiencing personal or work-related problems Well-being services are offered free of charge to caregivers and coworkers that include mindfulness and meditation, guided acupuncture, massage, yoga therapy, and stress-management strategies Seminars on compassion fatigue are offered to employees For the patient population, cancer support groups and survivorship classes have moved to virtual format Emotional support request line by text or call for employees Video therapy sessions for employees, including “chat with a chaplain” Active rounding by management with placement of consults as deemed necessary
UC Los Angeles	<ul style="list-style-type: none"> All <i>patients</i> admitted to the hospital All <i>patients</i> undergoing surgery and procedures All transplantation <i>patients</i> and <i>donors</i> 	<ul style="list-style-type: none"> No visitors are allowed^a One visitor for ambulatory visits Visitor policy is evolving 	<ul style="list-style-type: none"> <i>Pre-pandemic</i>: <1% of encounters <i>April 2020</i>: >45% of encounters <i>Patients</i> receiving chemotherapy, immunotherapy, or maintenance treatment who have normal laboratory values and no significant treatment toxicity are offered the option of telemedicine or in-clinic visit 	<ul style="list-style-type: none"> Emotional support request line by text or call for employees Video therapy sessions for employees, including “chat with a chaplain” Active rounding by management with placement of consults as deemed necessary

(Continues)

TABLE 1. (Continued)

CANCER CENTER	TESTING OF ASYMPTOMATIC PATIENTS AND EMPLOYEES (WITH PCR)	VISITOR POLICY ^a	TELEHEALTH	WELLNESS
	<ul style="list-style-type: none"> Primary caregivers of patients post-transplantation 		<ul style="list-style-type: none"> Asymptomatic surveillance visits and routine postoperative visits for patients with cancer are offered with telemedicine through the UC Los Angeles patient portal if decided upon by patient and provider Virtual rooming protocol in which medical assistants reach out to patients 15 min before the scheduled visit to ensure telehealth technology is working and the patient is available for the encounter at the assigned time 	<ul style="list-style-type: none"> Zoom sessions conducted for staff and patients Online meditation sessions
UC San Diego	<ul style="list-style-type: none"> All patients admitted to the hospital All patients undergoing surgery and procedures All patients starting systemic and radiation therapy (monthly) Health care workers are encouraged but not required to be tested All patients undergoing surgery and procedures Patients getting admitted to the hospital Patients undergoing bone marrow transplantation and chimeric antigen receptor T-cell therapy; decision has been made to not expand testing to all patients receiving systemic therapy and radiation therapy unless there is an increase in prevalence among asymptomatic patients to > 1% (currently 0.8% in July 2020) Random testing of health care workers at each campus on a monthly basis is starting on July 21, 2020; all new trainees and employees and those who volunteered in New York and Navajo Nation are also being tested 	<ul style="list-style-type: none"> No visitors^a 	<p>A telehealth program was initiated after the pandemic</p> <ul style="list-style-type: none"> Pre-pandemic: <10% of encounters by video and 1% via telephone April 2020: 70% of encounters by video and 6% by telephone June 2020: 51% of encounters by video and 6% by telephone 	<ul style="list-style-type: none"> Community resources for employees and patients listed on the website Partnership with the city for childcare options for essential workers, including some funding Patient-experience program converted the patient calendar of events to a virtual platform with virtual yoga, mindfulness sessions, and other resources for patients
UC San Francisco			<ul style="list-style-type: none"> One visitor per each admitted patient No visitors are allowed in the ambulatory setting^a 	<ul style="list-style-type: none"> Digital tool to assess employee distress with connection to resources Webinars for addressing emotional distress Online resources for counseling, meditation, and well-being
			<ul style="list-style-type: none"> Protocols are developed to identify which visits are suitable for telehealth vs in-clinic visits Optimization of provider templates to allow for scheduled video visits vs in-clinic visits Virtual rooming by medical assistants prior to the scheduled video visits 	<ul style="list-style-type: none"> Childcare resources on campus and in the community Expansion of Caring for Caregiver Program Patients were provided with resources to supportive care and psycho-oncology services Art for Recovery program for patients are offered remotely

Abbreviation: PCR, polymerase chain reaction.

^aAll visitor policies allow for exceptions for patients with disabilities, those with dementia, and for patients at the end of life.

to prescreen and screen for symptoms and exposures that suggest COVID-19 infection in patients, visitors, and employees. Through the use of automated phone messages and digital applications, this can be done efficiently and effectively. Although all of the UCCC sites perform screening for symptoms and exposure, temperature checks are not performed at UCSF. Furthermore, in some of our UC cancer centers, patients are seen in clinics outside of the cancer center and thus may encounter different screening protocols. No matter the screening method, it is essential to standardize workflows and guidelines to allow for consistency across the health care system.

PPE and physical distancing

Adequate and appropriate PPE use is essential as the volume of patients increases in the cancer center. At UCSF, in collaboration with each disease group leader, a framework was developed in which the appropriate PPE is listed for each procedure performed in the cancer center clinics. The guidelines for PPE use in the OR were developed by each UC health system and are followed by the cancer surgeons. In addition, everyone is required to wear surgical masks in clinical areas with at least 6 feet of physical distancing. Beginning in July 2020 at UCDH, the use of face shields is recommended when patients may not be able to consistently wear masks in the examination room or when in close contact with a patient for 15 minutes or longer is expected. Similarly, UCSF and UCSD have made the use of eye protection a requirement in clinical areas after the CDC published recommendations for health care workers in areas with moderate-to-high community transmission to wear eye protection.¹⁷ The waiting rooms are redesigned with signs on the floor and on chairs that mark a distance of 6 feet. In addition, Plexiglass screens were installed between front-desk staff and patients. For floors with smaller waiting rooms, additional waiting areas in nearby conference rooms have been made available. Furthermore, we are implementing alternative models in which patients are instructed to wait in their cars until their provider is available for them. In addition, transactions that previously required in-person contact, such as registration, check-in, and check-out processes, are now being performed virtually as much as possible.

Visitor policy

In the early months of the pandemic, a *no-visitor* policy was put into place at each site according to the local governmental mandates. However, this policy has especially been difficult for our patients who are unable to have their caregiver support nearby as they make treatment decisions, hear difficult news, navigate the health care system, or go through major surgeries. Exceptions have been made for patients with disabilities, dementia, or who are at the end of their lives. In addition, when caregiver education

support is needed and is not possible via video conferencing, visitors are permitted into the clinical areas after they are cleared by screening processes. Although telephone and video capabilities are available at each site to allow for continued participation of patient caregivers, physical presence continues to be an important quality-of-care issue in which patients voice dissatisfaction and anxiety. For this reason, many of our cancer centers are revisiting caregiver policies to determine potential modifications to improve quality of communication without jeopardizing safety and while following the local governmental policies (Table 1).

Telehealth

An opportunity to redesign clinical workflow involves scheduling of clinic and infusion center appointments and finding innovative ways to integrate the role of telehealth visits into clinic templates. Each UC cancer center is planning to continue to use telehealth visits to provide care to patients when appropriate. We expect that the volume of in-clinic visits will increase, especially for encounters that require physical examination. However, we anticipate that the percentage of video visits will likely be higher than the pre-pandemic baseline as long as reimbursement appropriately compensates for services provided. Telehealth provides an opportunity to expand access for patients who live far away and may seek second opinions. Provider schedule templates are being adjusted to offer blocks of in-clinic versus video encounters, extended clinic hours, or stagger start times. This is an attempt to reduce overcrowding in clinics and also to efficiently address support staff presence in clinics. In addition, we are working on developing protocols to identify which of our visits at the cancer center are most suitable for telehealth versus in-clinic visits. Medical assistant workflows have evolved to include remote *rooming* procedures to allow for a smooth intake process and also to troubleshoot any technical difficulties that the patient may be experiencing. During this time period in which recovery and response efforts must be synchronized, thoughtful consideration of reducing exposure risk and managing the surge of cases must be balanced with preserving the financial security of each institution. Some of the cancer centers initiated extended or weekend hours to increase the volume of patients receiving care. The cancer centers with satellite clinics in the community have used the infusion chair capacity in these locations to reduce potential exposure risk and for ease of patients who are hesitant to travel to the main campuses. In addition, this allowed for maintenance of social distancing in the main treatment facilities. Patients are selected based on the proximity of the satellite clinic to their primary residence and are reminded of this option at each visit. Cancer centers in which infusion centers were

not open 7 days a week before the pandemic are now open all week long. At UCI, satellite clinics now have extended hours and infusion center availability is 7 days a week. Overall, the volume of patients at their sites has increased by approximately 15% since March 2020. In addition, these changes have enhanced access to timely scheduling of patient appointments and infusion services. The satellite clinics are also sites of COVID-19 testing for patients treated at UCSD, UCLA, and UCDH where patients get routine testing before their treatment regimens.

At UCSF, as the clinic templates are being modified, the projections of patient and provider volumes on each floor are evaluated using an algorithm that minimizes the risk for overcrowding in waiting rooms, the infusion center, and work rooms. Coordination of care across departments (hematology/oncology and gynecologic oncology, for example) needs to be aligned to maximize access to infusion centers with social distancing measures. Data from infusion center chair availability are also considered in line with provider clinic schedules. Special attention is given to those patients who have multiple appointments within the cancer center that may involve laboratory tests, imaging studies, follow-up visits, and an infusion. The use of a real-time location system at UCSF allows us to track the movement of each patient and provider to assure that we do not experience unforeseen delays or capacity issues.

It is important to note the limitations with telehealth visits, including the challenges for patients who are unable to access telehealth technology, such as marginally housed patients, elderly, or those who have limited English proficiency or a poor internet connection. Therefore, in addition to the encounters that require physical examination, in-clinic visits should be scheduled for the vulnerable population who may not be able to use telemedicine. In an effort to address this, before the video visits, clinic staff reach out to the patients who may require additional assistance in using the telehealth technology.

Treatment modifications

Alternative schedules and methods of systemic therapy have been adopted during the pandemic. These modifications and the move toward potential in-home care will continue to be considered for our patients at the discretion of the treating provider. As an example, immunotherapy regimens (eg, pembrolizumab) that were previously administered every 3 weeks are now administered every 6 weeks with the support of data and regulatory approval. A greater shift to using oral chemotherapy based regimens are also encouraged when possible.

Suspected or confirmed COVID-19 cases

New workflows have been developed for patients who may present to the clinic or to the infusion center with symptoms

concerning for COVID-19 despite clearance by previous screening. These patients are directed to the respiratory screening clinics, which continue to be the designated areas for patients who are suspected of having COVID-19 and who need further evaluation. Patients with confirmed COVID-19 who need to continue their anticancer therapy may also receive their treatments in the respiratory screening clinics or in other designated areas outside of the infusion center.

Health System

As the volume of patients increases in the ambulatory setting, the backlogs of referrals and surgical cases are also analyzed closely. Virtual multidisciplinary tumor board discussions and re-evaluation of the backlog of patients who were unable to be treated because of shelter-in-place ordinances are continued. Dashboards have been developed to monitor volumes of patients in clinics by disease group and department while delineating new patient and follow-up visits. The number of cases scheduled in ORs is also populated on this dashboard. At certain UC campuses, surgeries and procedures are being scheduled while staggering the start of cases in the OR or in the procedural units. At each UC site, a 3-tiered surgical triage has allowed OR cases to ramp up quickly in the recovery phase, with prioritization of patients who have a suspected or confirmed diagnosis of cancer. The interconnected dependence of each department within a health system requires that the increasing demand be synchronically coordinated. As an example, an increase in surgical volume needs to be aligned with an increase in capacity in radiology to accommodate imaging studies or an increase in ICU capacity. The dynamic evaluation and the balance between response and recovery are especially important for procedural and surgical subspecialties.

As with the surge planning, continued collaborations with infection control and infection disease experts are crucial in developing guidelines for staff, providers, and patients and adapting these guidelines to the changing prevalence of COVID-19. Our campuses continue to restrict nonessential traveling and in-person meetings. To be able to meet demands in recovery efforts, staffing with an appropriate ratio of employees is also essential. One strategy is the assignment of staff who work on same shifts in the clinics to minimize potential unprotected exposure to all staff. This will ensure that only a limited number in the workforce may be affected in case of a potential exposure. With the use of eye protection and surgical masks in clinical areas, the probability of a moderate-risk to high-risk exposure is reduced. In cities in which public transportation is used frequently, resources for transportation, such as discounted parking permits and shuttle services, are being provided.

Clinical Trials

As tertiary cancer centers, the research infrastructure and clinical trials are a vital part of our academic mission. In late March 2020, the American Society of Clinical Oncology conducted a survey in which 53% of cancer center research programs reported *tier-based* prioritization of trials based on the severity of disease, patient needs, patient safety, potential patient and cancer center burdens, and the availability and allocation of program resources in the setting of limited resources during the pandemic.¹⁸ UC cancer centers have continued to enroll new patients into some therapeutic clinical trials during the pandemic while increasing remote visits and using electronic signatures. As a result, accrual rates were overall unchanged at UCI and UCSD, whereas they decreased by 30% to 50% at UCDH and UCSF. The decline in accruals was in an effort to address the uncertainty regarding limited resources and because of limited availability of diagnostic tissue biopsies and tissue banking. Patients who were already enrolled in therapeutic trials were treated according to protocol but were managed with modifications, including remote video visits whenever possible to reduce in-clinic visits. Research protocol documentation requirements of adverse events, review of systems, and patient-reported outcomes were completed electronically as were investigator signatures. Remote monitoring using HIPAA-compliant, cloud-based storage as well as electronic consents and source document signatures were implemented rapidly to maintain research compliance. Cooperative groups or the National Cancer Institute's National Clinical Trials Network have allowed for shipping of study medications directly to patients, remote monitoring of sites, and permission for minor deviations in study protocol if the risk/benefit ratio during COVID-19 favors a reduced risk to patients (ie, avoiding an extra visit for research-only blood draw). Many trials also relaxed the requirement for in-person visits and allowed video visits. These changes were found to be so efficient that these interventions will continue going forward. On July 2, the Food and Drug Administration addressed electronic consenting in their updated guidance on *Conduct of Clinical Trials of Medical Products During COVID-19 Public Health Emergency*.¹⁹ We expect that similar recommendations will likely be released in the near future to address additional aspects of clinical trial operations. While our faculty and thought leaders are advocating for continuation of the measures that have resulted in efficiency with clinical research operations, how the cooperative groups' and pharmaceutical industry's response will evolve likely will depend on guidance from regulatory offices, such as the Food and Drug Administration.

In addition, telemedicine may play an important role for patients who live far from the cancer centers and who may

not have been able to participate in clinical trials in the past because of the number of visits required. In providing some visits remotely for patients who live far from the cancer centers, accrual goals may be met more readily than in the past. As the incidence and prevalence of COVID-19 cases across California fluctuate, accrual goals will be adjusted to allow for a gradual increase (eg, 70% of the historical accrual rate) when the demand due to COVID-19 is low. The ease with which patients can obtain laboratory studies within their community or receive their study drugs via mail are other examples of how we will continue to improve our efficiency with clinical trials. These measures have also resulted in improvement in patient experience.

Each disease group is encouraged to prioritize the clinical trials in its pipeline to determine which new studies should open. The trials that provide therapeutic options for patients who otherwise do not have standard-of-care treatment options are prioritized. Increased activity in clinical trials is aligned with recovery planning in the clinical setting as well the administration of research infrastructure. Support staff, such as the clinical research coordinators, are currently conducting most of their roles remotely but are on site when it is appropriate and necessary. Before their return to clinical areas, training on PPE use, safe distancing, and return-to-work guidelines were provided to all research personnel. Because study monitors are considered nonessential, they are not allowed on site but will be granted access to electronic medical records, except in very limited cases. This is currently being piloted at UCSF, UCI, UCSD, and UCLA. In an effort to respond to many unanswered questions regarding the effect COVID-19 has had on our patients with cancer, COVID-19 registries have been developed by the American Society of Clinical Oncology, the American Society of Hematology, the American College of Surgeons, and the COVID-19 and Cancer Consortium. We are also developing a registry for the UCCC that will feed data into these registries.

Wellness

The toll that COVID-19 has had on our emotional and mental health is undeniable. The concern around burnout in oncology that was evident before the pandemic became even more prominent with the continued uncertainties regarding COVID-19. The modifications in our clinical, academic, and personal responsibilities that resulted from the pandemic are ongoing with no end in sight. Resources to support health care workers and their wellness should be readily available and their use should be encouraged by the leadership of the cancer centers. Employees who have children should have accommodations, as schools may continue to be closed for several months. Although initial plans were to open California schools in the fall of

2020, announcements in July indicated that at least two-thirds of all counties will resume classes virtually in the fall.²⁰ This will likely require more health care workers to identify resources for childcare or telecommute if they are unable to find accommodations.

In addition to health care workers, many of our patients experience fear and anxiety regarding their diagnoses, the impact of isolation, lost opportunities, and their concerns regarding COVID-19 exposure. Clear communication required to address these anxieties also is supplemented by support services, such as psycho-oncology, symptom management, and wellness resources at each cancer center. In addition, webinars held by the cancer centers have provided some reassurance to patients while educating them. The different services offered at each of our cancer centers are outlined in Table 1.

Phase 2 and Phase 3

The timing and guidance regarding the second and third phases of recovery will depend on the surge of cases and the local adherence to social distancing and masking guidelines. The initial expectation of cases presenting in waves unfortunately was not the observed pattern. Instead, surges have appeared shortly after governmental restrictions were lifted. Because of the geographical differences in incidence, non-essential travel will not be recommended and will require quarantine practices and extra caution for those who do need to travel. Our vulnerable population of patients with cancer will need to continue with precautions regarding safe distancing and face covering. Further interventions and outreach need to be optimized for patients most affected by COVID-19 in specific patient populations, such as those belonging to underrepresented minority groups. Prescreening and screening methods will still need to continue. We are hopeful that visitor policies will be less strict during the second and third phases to allow for a better experience for our patients while they receive their care in our cancer centers. However, non-essential visitors will not be allowed except for key encounters in which difficult conversations or treatment options may be discussed. The hope and expectation during the later phases of recovery is that the volume of patients who receive treatment via trials or standard of care will increase to pre-pandemic levels. As noted above, the coexistence of recovery and response to COVID-19 will continue for the unforeseen future until a vaccine is available. At UCDH, strategies for how to cope with the pandemic long-term have resulted in development of the *R3 Initiative: Restore, Renew, Reimagine*, which has 5 principles of focus: patient volume recovery, financial counseling, survivorship, transitions of care, expansion of consultation, and clinical research. Although it was not within the scope of this review, we recognize the effect that the pandemic has had on basic science research and on the education of our trainees.

Discussion/Conclusion

Many aspects of cancer care delivery have been uprooted because of the COVID-19 pandemic. Increased demand with limited resources has hindered clinical practice in many institutions to prepare for a surge of COVID-19 cases, which is lasting much longer than anticipated, and has a far greater prevalence than initially suspected in March. In California, although we were initially grateful to not have experienced the high volume of COVID-19 cases that stressed the health systems on the East Coast, the upward trend in incidence observed since June has been concerning. The many uncertainties of how best to manage the COVID-19 pandemic have led to a resurgence of the infection in California with a prolonged presence in the state, which has demanded changes in how we manage navigating care for our patients with cancer through the rest of 2020 and likely much longer. Since March 2020, the financial deficits in smaller or rural hospitals and private practices have been detrimental.²¹ Even our large academic centers have been faced with challenging decisions regarding hiring freezes and pay cuts to secure the future of the institutions. Along with the financial difficulties that the health care system now face, we recognize that many of our patients may have lost their jobs and likely their health care coverage because of the pandemic. The exacerbation in financial toxicity for these patients may be unsurmountable and the already existing gap in health inequities may be wider because of the pandemic's effect.²²⁻²⁵ Therefore, it is of utmost importance that we identify innovative ways to address these challenges by allocating resources for patients who need cancer therapy but may not be able to afford their treatment. In addition to the patients who are already under our care, we also need to remember that cancer screening has been halted across the globe, as seen by the data from the Netherlands, which documented a decrease in cancer diagnoses between late February and April 2020.²⁶ As we start performing more screening tests and procedures, we expect an increase in patients with new diagnoses in our practices. It is possible that patient-directed delays in care may shift diagnoses to higher stages of disease at presentation. Also, there will be a need to identify patients who are *lost to follow-up* during the pandemic and reintegrate them into appropriate clinics. Cancer navigators may present an opportunity to optimize patient care pathways remotely with telehealth, particularly for patients requiring multidisciplinary care.

While we move to a new state of *normalcy* with recovery and response efforts, we have to continue to evaluate the opportunities for care delivery redesign. As the COVID-19 pandemic continues, it is clear that cancer-care guidelines must continue to adapt to the changing landscape of COVID-19 (Fig. 3). Triage and management strategies, including physical distancing, must continue for our patients with cancer to receive the most effective cancer care while

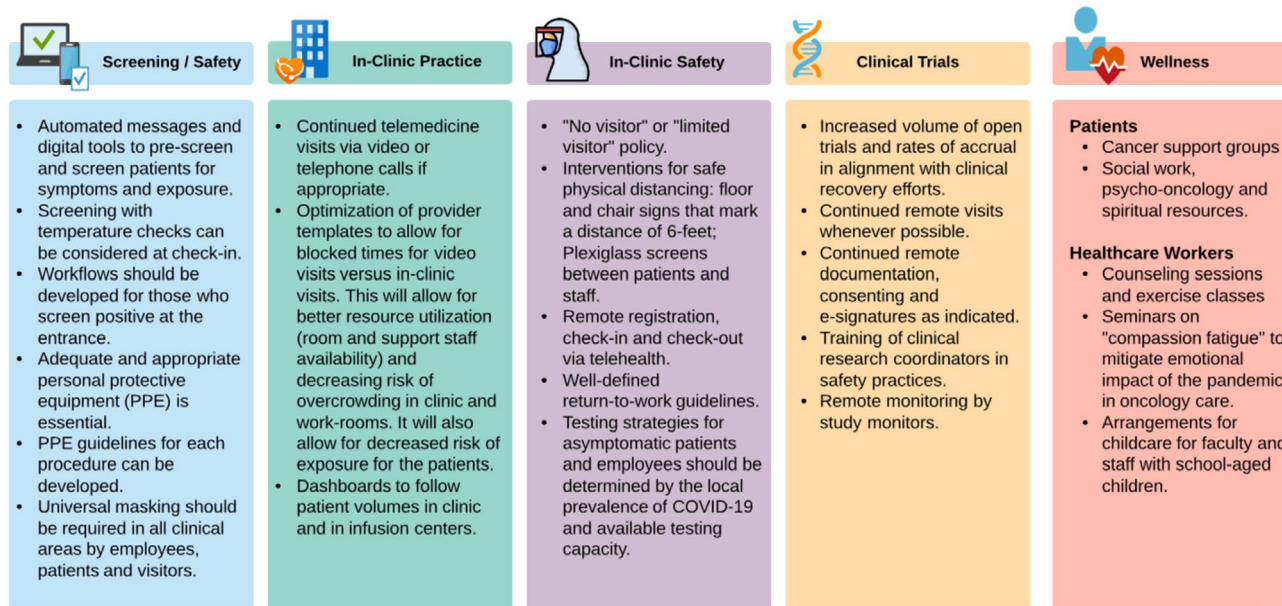


FIGURE 3. Guidance on Interventions That Can Be Implemented at Oncology Practices During the Recovery Phase. COVID-19 indicates coronavirus disease 2019.

minimizing the risk of infection. The use of telehealth will likely improve access to both clinical trials and standard care while improving patient satisfaction. Continued incorporation of telemedicine for postoperative visits and systemic treatment surveillance will minimize patient burden of travel and risk of exposure to infection. The lessons learned with the implementation and use of digital tools for prescreening and screening are already being considered for monitoring symptoms, as with patient-reported outcomes. The activation energy for the implementation of telemedicine has previously been high because of the associated upfront cost and the uncertain reimbursement model associated with them. Prior efforts in moving the digital patient experience forward have also been slow to implement, but the pandemic demonstrated that it could be done efficiently and effectively.

The UCCC represents and treats a large patient population with cancer in the state of California. The inefficient elements of our pre-pandemic care were not ideal for cancer care, and some of the modifications made during the pandemic

may have enhanced the quality of care. With the diverse and unified experience of the UCCC, our recovery plan may provide a framework for re-establishing cancer care delivery in the setting of the COVID-19 pandemic. Therefore, we have presented and discussed the efforts across UCCC to restore health care delivery to pre-COVID-19 capacity and also to reimagine improved cancer care while still responding to the evolving pandemic. For this reason, we encourage oncology practices to identify and take the opportunity to redesign their models of care delivery wherever possible. We embraced any improvement from our pre-pandemic baseline while designing a new normal. The speed at adapting at the time of a pandemic has made us successful in managing the pandemic. Now, it is time for the oncology practices to adapt to redesigning cancer care delivery and share successful modifications across practices and geographic locations. ■

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