In-Person Outreach and Telemedicine in Liver and Intestinal Transplant: A Survey of National Practices, Impact of Coronavirus Disease 2019, and Areas of Opportunity

TO THE EDITOR:

Because of the coronavirus disease 2019 (COVID-19) pandemic, access to care for transplantation has been compromised due to conservation of health care resources and concerns regarding the spread of infection for immunocompromised patients.[1] Telemedicine may improve access and quality of care, but previously, it was underused.[2,3] Herein we report data from a national survey conducted in 2019 to assess the now historical use of in-person outreach clinics and telemedicine in liver and intestinal transplantation. Given the COVID-19 pandemic, we conducted an abbreviated second wave of the survey to investigate differences in telemedicine use in the COVID-19 era.

Abbreviations: COVID-19, coronavirus disease 2019; DSA, donor service area; IQR, interquartile range; LT, liver transplantation; MMaT, median Model for End-Stage Liver Disease at transplant; SCAN-ECHO, Specialty Care Access Network–Extension of Community Healthcare Outcomes; UNOS, United Network for Organ Sharing; VA, Veterans Affairs.

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Patients and Methods

DATA SOURCE

We conducted a national survey of all liver and intestinal adult and pediatric transplant programs active in 2018 in United Network for Organ Sharing (UNOS) to assess practice patterns of in-person outreach clinics and telemedicine from January to March 2019. Surveys were administered using QualtricsXM (Qualtrics, Provo, UT; see Supporting Material). We assessed the use of outreach clinics as well as live video and asynchronous telemedicine (eg, electronic consultation by review of medical records or imaging studies), including the frequency of telemedicine, duration of use, phase of transplant care in which it was used, provision of care across state lines, and reimbursement.

We obtained a single response per center from a transplant provider aware of outreach and telemedicine practices at that center. The study received exempt status from the institutional review board at the University of Pennsylvania. Only centers that responded (n = 73) to the initial survey were invited to complete the COVID-19 follow-up survey. We assessed interval implementation and utilization of telemedicine since March 2020. Given high clinical demands during the COVID-19 pandemic, our follow-up survey asked targeted questions limited to the following:

1. Use of synchronous telemedicine modality (live video, telephone, or both).
2. Type of provider using telemedicine.

3. Phase of transplant care for which telemedicine was used.

STATISTICAL ANALYSIS

Descriptive statistics including proportions as well as mean ± standard deviation and median (interquartile range [IQR]) were calculated for categorical and continuous variables as appropriate. Bivariate comparisons were conducted with Wilcoxon rank sum and Kruskal-Wallis tests for continuous variables as well as chi-square or Fisher's exact tests for categorical variables where appropriate.

Results

TRANSPLANT PROGRAM CHARACTERISTICS

For the initial survey of 143 liver and intestinal transplant centers nationally, transplant center staff were contacted via e-mail (up to 3 attempts per center), and the survey was posted to the UNOS listserv. A total of 73 (51%) responded to the initial survey. Responding programs encompassed all 11 Organ Procurement and Transplantation Network regions, 40 of 58 donor service areas (DSAs), and 29 states. Characteristics of responding transplant programs are summarized in Supporting Table 1 and are compared with all liver/intestinal programs nationally. Of responding programs, 63 (86%) were liver transplantation (LT) and 10 (14%) were combined liver and intestine programs. Among responding programs, the median Model for End-Stage Liver Disease at transplant (MMaT) was 30 (IQR, 28-31) and was similar to all programs nationally (MMaT, 29; IQR, 28-32).

Transplant center characteristics and care delivery practices among the 73 responding centers stratified by outreach modality are shown in Table 1. The geographic distribution of surveyed transplant centers, by UNOS region, that had active in-person outreach and telemedicine services prior to the COVID-19 pandemic are shown in Supporting Fig. 1. A total of 42 (58%) transplant centers had in-person outreach clinics only, whereas 12 (16%) used telemedicine. Using 2018 data, the median number of transplants per center performing outreach was 76.5 (IQR, 40-108) among programs with in-person outreach, 91.5 (IQR, 47-128) among programs with telemedicine, and 83 (IQR, 29-117) among programs with no in-person outreach or telemedicine. The MMaT was 30 (IQR, 28-32 and 29-31 among centers with in-person outreach and telemedicine, respectively); this was higher than the MMaT among centers with no outreach which was 28 (IQR, 27-30; $P = 0.02$). Among the 61 centers that did not have telemedicine, 34 (56%) planned to use telemedicine "in the near future." Among the 19 programs that did not have outreach, 13 (68%) planned to use in-person outreach clinics in the future and 7 (37%) planned for future telemedicine.

Detailed information on telemedicine use characteristics of the 12 centers with telemedicine pre-COVID-19 is presented in Supporting Table 2. Most centers started using telemedicine in the recent past; 9 (75%) in the past 1-3 years and 3 (25%) within 1 year of when the survey was conducted. Telemedicine use was only noted in 6 states and in UNOS regions 2, 4, 5, 7, and 11 with most of these programs (42%) located in region 2 (Supporting Fig. 1). Pre-COVID-19, telemedicine was reported to be reimbursed by payers in 7 (58%) centers and was delivered across state lines by 8 (67%) centers.

UPDATE ON TELEMEDICINE USE IN THE COVID-19 ERA

In the second wave of our survey (conducted the week of April 13, 2020), 55 of the 73 original programs (75%) responded after 3 attempts to reach transplant center staff. These programs represented all UNOS regions and 35 DSAs. Among these, 54 of 55 (98%) now used telemedicine (Table 1; Fig. 1). Transplant center, provider, and care characteristics during the COVID-19 pandemic are shown in Table 1. Characteristics of transplant centers currently using telemedicine were similar to those that reported in-person outreach and/or telemedicine use during the first survey. With nearly universal telemedicine utilization among responding programs, telemedicine was used by 35 (65%) programs to conduct transplant evaluations, 32 (58%) for wait-list management, and 53 (98%) for posttransplant care. Most centers (82%) used a combination of live video and/or telephone (Supporting Table 2).

TABLE 1. Transplant Center Characteristics and Care Delivery Practices Among Responding Programs Stratified by Type of Outreach in 2019 Supplemented by Telemedicine Practices During the COVID-19 Pandemic

	February 2019 Data Pre-COVID-19 Pandemic (n = 73)				April 2020 Data During COVID-19 Pandemic (n = 55)
	In-Person Outreach Only (n = 42; 58%)	Telemedicine (n = 12; 16%)*	No Outreach (n = 19; 26%)	*P* Value	Telemedicine (n = 54; 98%)†
Center characteristics					
Center volume in 2017-2018	77 (40-108)	92 (47-128)	83 (29-117)	0.54	80 (48-11)
MMaT	30 (28-32)	30 (29-31)	28 (27-30)	0.02	30 (28-32)
Transplant centers per DSA	6 (4-10)	4.5 (2-7.5)	4 (3-9)	0.17	6 (4-10)
Population density, people per square mile	182 (110-449)	165 (112-451)	226 (172-468)	0.82	187 (112-454)
Outreach sites	3 (2-6)	5 (4-5)	—	0.23	—
Outreach at least monthly	41 (98)	12 (100)	—	0.42	—
Type of provider			—	0.20	—
Medical transplant physician	42 (100)	11 (92)	—		53 (98)
Surgeon	14 (33)	4 (33)	—		32 (59)
Advanced practice provider	18 (42)	2 (17)	—		35 (65)
Transplant coordinator	13 (31)	4 (33)	—		32 (58)
Other (social worker, nutrition pharmacy, financial coordinator, or others)	6 (14)	3 (25)			43 (80)
Type of care provided					
Transplant evaluations	38 (91)	10 (83)	—	0.02	35 (65)
Care while wait-listed	30 (71)	9 (75)	—	0.06	32 (58)
Posttransplant care	29 (69)	6 (50)	—	0.06	53 (98)
Other (medically complex patients, living donor, patient education)	3 (78)	2 (17)		0.01	3 (5.4)
Future plans					
Plan for future in-person outreach	—	—	13 (68)		
Plan for future telemedicine	27 (64)	—	7 (37)		

NOTE: Data are given as n (%) or median (IQR).
*10 of 12 telemedicine programs also had in-person outreach; 2 telemedicine programs were VA transplant centers with telemedicine only.
†Follow-up survey on telemedicine use conducted among the original 73 programs that responded with a 75% response rate.

Discussion

In a 2019 national survey of liver and intestinal transplant programs, we identified a high uptake of in-person outreach clinics (71% of programs), whereas telemedicine utilization was low at 16%. During this period, we observed that telemedicine and in-person outreach were more often used in programs with higher MMaT scores; however, use was not related to center volume or population density. Patients living in less populated areas would arguably derive the most benefit from telemedicine, but they did have not enough access, highlighting issues of inefficiency and inequity. Importantly, an updated survey conducted in the COVID-19 era showed unprecedented shifts in care delivery with a near-universal uptake of synchronous telemedicine use given the temporary relief in regulatory and reimbursement barriers in this public health emergency.[3] During this second survey wave, our questions were targeted to characterize telemedicine utilization in response to the COVID-19 pandemic; therefore, direct comparisons of pre-COVID-19 and COVID-19 era patterns are not feasible. We did not assess the rationale for in-person outreach and/or telemedicine. Motivations for the use of remote care strategies may include expanding access to transplant care, reducing patient travel and cost, attracting candidates to a transplant center, and providing care via telemedicine when in-person visits are limited due to exposure risks during the COVID-19 pandemic. We did not

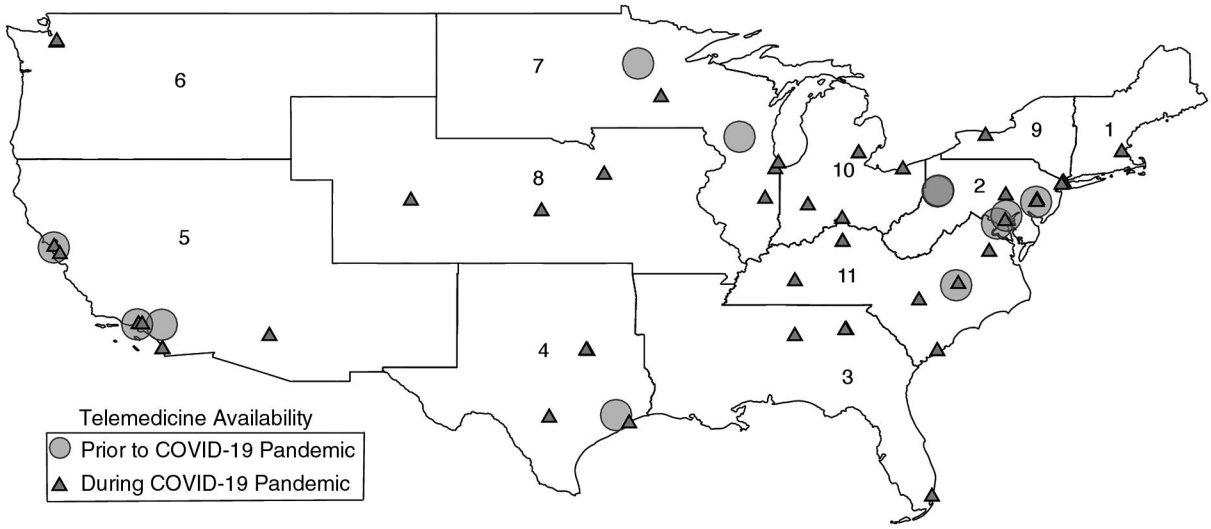

FIG. 1. Geographic distribution of telemedicine use among liver and intestinal transplant centers: before and during the COVID-19 pandemic by UNOS region (n = 55).

evaluate clinical outcomes, financial implications, or patient and provider satisfaction with these care delivery strategies.

Telemedicine has an emerging evidence base in transplantation, but most examples from the literature derive from integrated care systems, such as in the Veterans Affairs (VA) system, due to regulatory and reimbursement barriers. For example, Specialty Care Access Network–Extension for Community Healthcare Outcomes (SCAN-ECHO) has demonstrated increased efficiency and access to specialty hepatology care, improved survival for patients with liver disease, and reduced time from referral to initial LT evaluation by a hepatologist and placement on the waiting list. The main barriers to widespread telemedicine adoption have not been related to technology, which is low-cost and easy to implement, but rather to arcane interstate licensing barriers and highly variable reimbursement.[4] In our initial 2019 survey, only 7 programs using telemedicine (58.3%) were reimbursed, with 2 of these being VA programs.

Since the start of the COVID-19 pandemic, key legislative changes have occurred to make telemedicine a short-term reality. After passage of the Coronavirus Preparedness and Responses Supplemental Appropriations Act in March 2020, the Centers for Medicare and Medicaid Services waived restrictions that previously required patients to be residents of a rural census tract or to only receive telemedicine services in a health care facility. Requirements for interstate licensure have been temporarily waived by most states, and requirements to use Health Insurance Portability and Accountability Act–compliant software have been temporarily relaxed.

Leveraging telemedicine technology serves 2 critically important functions:

1. Allowing for continued patient care remotely during outbreaks while protecting patients, providers, and the community from exposure.
2. Expanding access and efficiency across the continuum of transplant care that can last well beyond the pandemic.

However, barriers to implementation persist, including lack of digital literacy, potential disparities in technology access, and use by patient age, race/ethnicity, and socioeconomic status.[5] Moreover, telemedicine for new patients, symptomatic presentations, and serious illness conversations is not always appropriate. Widespread judicious and optimal use of telemedicine has yet to be established. Nonetheless, the future of telemedicine for transplantation is promising as long as it is viable from a financial and regulatory perspective. We urge transplant centers to advocate for policy changes at the local, state, and

federal levels to allow for continued use of this essential health care delivery modality.

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