

Provider Satisfaction with Infectious Diseases Telemedicine Consults for Hospitalized Patients  
During the COVID-19 Pandemic

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## **Abstract**

During the COVID-19 pandemic, our institution transitioned ID consultations on hospitalized patients to telemedicine. We evaluated satisfaction with telemedicine among referring providers and ID consultants. Respondents were satisfied with telemedicine consults for hospitalized patients, though there were significant differences in perceptions of quality and timeliness between consultants and referring providers.

**Keywords:** Telemedicine, COVID-19, Infectious Diseases Consult, Provider Satisfaction

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## **Background**

In response to the COVID-19 pandemic many healthcare systems adapted their delivery models to minimize hospital staff and patient exposure to SARS-CoV2 and preserve personal protective equipment. One strategy was the implementation of telemedicine. By March 2020, telemedicine use increased by 50% compared to the prior year<sup>1</sup>. The Infectious Diseases Society of America (IDSA) describes telemedicine as “the interaction between a patient and a provider when separated by geographic distance”<sup>2</sup>, including real-time audio-video format (synchronous telemedicine) or review of digital data only (asynchronous telemedicine).<sup>3</sup> Prior work, focused mainly on outpatient primary care, suggests that telemedicine is well-received<sup>4-6</sup>. However, little is known about infectious diseases (ID) consultant or referring provider perceptions of inpatient telemedicine.

In the spring of 2020, our institution transitioned ID consultations on hospitalized patients to telemedicine (having not previously utilized any telemedicine). We studied referring and consulting provider satisfaction with the rapid transition to a telemedicine format. We hypothesized satisfaction with ID telemedicine would be equivalent to traditional face-to-face encounters with respect to quality, timeliness, and communication.

## **Methods**

### **Setting**

Yale-New Haven Hospital is a 1500-bed tertiary care hospital occupying two campuses in New Haven, Connecticut. In March 2020, the Yale ID section transitioned consultations on hospitalized patients to telemedicine format (with rare exception if required). The format (synchronous or asynchronous) was at the discretion of the consultant. The primary difference between synchronous and asynchronous consults was the ability to have a direct conversation

by telephone or video with the patient. Specialized equipment (e.g. digital stethoscopes) was not available.

## **Participants**

Participants included referring providers (attendings, physician assistants [PAs], advanced practice registered nurses [APRNs], and residents) and ID consultants (attendings and fellows) henceforth referred to as “IDCs”. Referring providers were identified by compiling a list of providers who authorized  $\geq 1$  ID consult during the study period with a list of all hospitalist providers at Yale New Haven Hospital (physicians, PAs and APRNs), whether they had placed a consult or not. Potential IDCs were identified via a departmental email list. Survey links were emailed in June and July 2020. Eligible participants (self-identified via completion of the survey) were primary providers for hospitalized patients who requested  $\geq 1$  ID consult or IDCs who performed  $\geq 1$  telemedicine consult during the study period (March 27-May 22, 2020).

## **Survey**

We developed web-based questionnaires for referring providers and IDCs (see supplement). Data about providers (specialty, level of training, years in practice, number of weeks of hospital service during the study period) were collected. Referring providers estimated the number of ID consults they placed during the study period and were asked whether they knew ID consults were being performed electronically.

The term “electronic consult” or “e-consult” was used in the survey to represent any telemedicine consult (synchronous or asynchronous). Satisfaction was assessed via perceptions of quality, timeliness, and amount of verbal communication compared to face-to face consults. Similar to previous studies<sup>7,8</sup>, responses were rated on a Likert scale (range 1 [much worse] to 5 [much better]). Due to sample size, these were later condensed into 3 categories: worse, same, better. Providers rated their level of agreement with the statement “compared to traditional consults, e-consults provided good clinical care” (range 1 [strongly disagree] to 5 [strongly agree]). Due to sample size, these were later condensed into 3 categories: disagree, neutral, and agree. Respondents were asked to specify (in free text) clinical situations where a face-to-

face evaluation was preferable. These were sorted into categories based on the context of the answers. Survey data was captured using *Qualtrics Survey Software* (Qualtrics, Provo, UT).

### **Statistical Methods**

Characteristics were summarized as frequencies (%) and compared between provider type using Chi-square or Fisher Exact test (for expected frequency  $\leq 5$ ). Analyses were conducted using SAS 9.4. (Cary, NC). A p value of  $<0.05$  was used to indicate statistical significance.

### **Results**

Survey emails were sent to 551 referring providers and 55 IDCs. A total of 130 surveys (23.6.%) were completed: 107 by referring providers and 23 by IDCs. Most respondents (73.8%) were attending physicians. Level of training was significantly different between the two groups (70.1% of referring providers were attending physicians vs 91.3% of IDCs;  $p=0.002$ ). APRNs and PAs comprised the remainder of respondents of referring providers (27.1%) whereas fellows accounted for the other IDC respondents. Among referring providers, 79/107 (73.8%) specialized in medicine/medical sub-specialty. Other specialties included Surgery/surgical subspecialty, Obstetrics-Gynecology, Pediatrics, Emergency Medicine, Anesthesiology, and Neurology. No significant difference was found in the distribution of years in practice or weeks on duty in the hospital. (Table 1). The majority of referring providers (54.2%) requested  $\geq 5$  ID consults over the time frame. Only 2 referring providers were unaware that ID consultation was being provided electronically.

When comparing e-consults to traditional consults among all 130 providers, the core domains were rated as 1) quality: the same or better in 66.9% of respondents, 2) timeliness: the same or better in 98.5% of respondents, and 3) communication between teams: the same or better in 80% of respondents. Eighty percent of respondents agreed with the statement that e-consults provided good clinical care.

There were significant differences in satisfaction between referring providers and IDCs. For quality of e-consults, 73.9% of IDCs rated overall quality as worse than traditional consults compared with 24.3% of referring providers ( $p < 0.001$ ). 91.3% of IDCs rated e-consults as timelier, while 44.9% of referring providers felt timeliness was better ( $P < 0.001$ ). There was no significant difference between IDCs or referring providers when rating communication.

A greater percentage of IDCs than referring providers felt there were specific situations where face-to-face consultation was necessary (87% vs 33.6%,  $p < 0.001$ ). Forty-two comments were left regarding the circumstances where face-to-face evaluations were necessary. While the majority were not specific, recurring themes included skin/soft tissue syndromes (11 comments), endovascular infections (5 comments), and unexplained febrile illnesses (6 comments). When compared to providers practicing  $\leq 10$  years, providers practicing  $> 10$  years were significantly more likely to rate quality of consults as worse (25.8% vs 42.9%;  $p = 0.03$ ) and disagree with the statement e-consults provide good clinical care (4.5% vs 19.6%  $p = 0.03$ ).

## **Discussion**

Eighty percent of survey respondents agreed that telemedicine ID consults provided good clinical care and the majority rated them the same or better than traditional consults with respect to quality, timeliness, and communication. This is consistent with current literature where provider satisfaction with outpatient telemedicine ranges from 70-90%<sup>4,7,8</sup>. This study provides unique insight into the perceptions of ID telemedicine for hospitalized patients. We found significant differences between referring and consulting providers in perceptions of quality and timeliness of telemedicine ID consults. Compared to referring providers, IDCs rated overall quality of consultations as worse, despite being more timely than traditional consults. Combining this information with the specific clinical scenarios where providers preferred a traditional consult, we suspect this reflects ID physicians perspectives that certain infectious conditions require a physical exam to monitor therapeutic response or gather clues for an unknown diagnosis. Others have proposed that a better role for telemedicine might be in addressing straight-forward

questions where all the data is available in the chart (e.g. match the appropriate antibiotic to the infecting organism), allowing more time for in-person encounters for complex consults (e.g. fever of unknown origin).<sup>9</sup> Perhaps the discrepancy in perception of timeliness was that IDCs felt that they were completing their telemedicine consult notes faster, but this did not translate into the referring providers seeing these recommendations sooner.

Strengths of our study include the sample size, which is large compared to previous telemedicine surveys, and the presentation of diverse perspectives. However, the response rate was low (21%), possibly because providers were not on service during the period the survey was conducted. In addition, this was a single-center study of mostly attending-level providers specializing predominantly in internal medicine. Being conducted under pandemic-circumstances may also limit the generalizability to non-pandemic times. As with all survey studies, ours has the potential to be biased by recall and by those who are more likely to answer surveys. Finally, we used the term “e-consult” in the survey to represent both synchronous and asynchronous consults, though the respondent’s definition of “e-consults” may have affected how they rated the consults.

In conclusion, respondents were generally satisfied with ID telemedicine consults for hospitalized patients. Significant differences in the perception of quality and timeliness were seen between IDCs and referring providers, and specific situations when traditional consultation was felt to be needed were identified. Telemedicine provides much needed flexibility to the health system, especially during a pandemic when health care workers may be isolated or quarantined.<sup>10</sup> Future qualitative and quantitative research should explore differences in synchronous vs asynchronous telemedicine consults, the effect of the availability of specialized electronic equipment on provider satisfaction, reasons for ID provider dissatisfaction with telemedicine, and the effect of telemedicine on infection outcomes.

## **NOTES**

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### **Conflict of Interest**

All No conflicts of interest.

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**Table 1: Characteristics and Survey Results Among ID Consultants and Referring Providers**

	<i>Provider Type</i>		<i>Total (N = 130)</i>	<i>P Value</i>
	<i>ID Consultants (N = 23)</i>	<i>Referring Providers (N = 107)</i>		
<b>Specialty</b>				
Infectious Diseases	23 (100.0%)	00 (000.0%)	023 (17.7%)	
Medicine	00 (000.0%)	79 (073.8%)	082 (63.1%)	
Other	00 (000.0%)	28 (026.2%)	025 (19.2%)	
<b>Level of Training</b>				
Attending	21 (091.3%)	75 (070.1%)	096 (73.8%)	<b>0.002</b>
Resident/Fellow	02 (008.7%)	03 (002.8%)	005 (03.8%)	
APRN/PA	00 (000.0%)	29 (027.1%)	029 (22.3%)	
<b>Years of Independently Practicing</b>				
≤10	8 (38.1%)	58 (57.4%)	66 (54.1%)	0.11
>10	13 (61.9%)	43 (42.6%)	56 (45.9%)	
Not independently	2 (8.7%)	6 (5.6%)	8 (6.2%)	
<b>Weeks on-duty for In-Patient Care</b>				
≤4 Weeks	15 (065.2%)	48 (044.9%)	063 (48.5%)	0.08
>4 Weeks	08 (034.8%)	59 (055.1%)	067 (51.5%)	
<b>Overall quality of e-consults compared to FTF:</b>				
Worse	17 (073.9%)	26 (024.3%)	043 (33.1%)	<b>&lt;0.001</b>
Same	06 (026.1%)	77 (072.0%)	083 (63.8%)	
Better	00 (000.0%)	04 (003.7%)	004 (03.1%)	
<b>Timeliness of e-consults compared to FTF:</b>				
Worse	01 (004.3%)	01 (000.9%)	002 (01.5%)	<b>&lt;0.001</b>
Same	01 (004.3%)	58 (054.2%)	059 (45.4%)	
Better	21 (091.3%)	48 (044.9%)	069 (53.1%)	

	<i>Provider Type</i>			<i>P Value</i>
	<i>ID Consultants (N = 23)</i>	<i>Referring Providers (N = 107)</i>	<i>Total (N = 130)</i>	
<b>Communication between consultants and the primary teams during e-consults compared to FTF:</b>				
Worse	06 (026.1%)	20 (018.7%)	026 (20.0%)	0.35
Same	08 (034.8%)	55 (051.4%)	063 (48.5%)	
Better	09 (039.1%)	32 (029.9%)	041 (31.5%)	
<b>Infectious Diseases e-consults provided good clinical care:</b>				
Disagree	04 (017.4%)	10 (009.3%)	014 (10.8%)	0.48
Neutral	02 (008.7%)	10 (009.3%)	012 (09.2%)	
Agree	17 (073.9%)	87 (081.3%)	104 (80.0%)	
<b>Were there specific clinical situations where you felt a FTF evaluation was necessary?</b>				
Yes	20 (087.0%)	36 (033.6%)	056 (43.1%)	<b>&lt;0.001</b>
No	03 (013.0%)	71 (066.4%)	074 (56.9%)	

Abbreviations: ID, Infectious Diseases; FTF, Face-to-Face

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