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# Survey of Telemedicine by Pediatric Nephrologists During the COVID-19 Pandemic



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**Introduction:** The slow increase in use of telemedicine began to expand rapidly, along with reimbursement changes, during the coronavirus disease-2019 (COVID-19) pandemic. Standardized protocols for these services are lacking but are needed for effective and equitable health care. In this study, we queried pediatric nephrologists and their patients about their telemedicine experiences during the pandemic.

**Methods:** Surveys that were in compliance with the Health Insurance Portability and Accountability Act were deployed online to patients and physicians.

**Results:** We collected survey responses from 400 patients and 197 pediatric nephrologists. Patients reported positive experiences with telemedicine visits as it was logistically easier than in-person visits. Patients also felt that the quality of their visits were equivalent to what they would receive in person. Physicians used a wide variety of online systems to conduct synchronous telemedicine with Zoom (23%), EPIC (9%), Doxy.me (7%), services not specified (37%), or a mix of local or smaller services (24%). Most physicians' concerns were related to technological issues and the ability to procure physical exams and/or laboratory results.

**Conclusions:** There is a paucity of published trials on telemedicine services in pediatric nephrology. Virtual care was feasible and acceptable for patients, caregivers, and providers during the COVID-19 pandemic.

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KEYWORDS: COVID-19 pandemic; patient experience; patient satisfaction; pediatric nephrology online services; provider experience; telemedicine

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Telemedicine is classified by the World Health Organization as the delivery of health care services by health care professionals via communication

technologies where providers and patients are separated by distance.<sup>1,2</sup> Even before the COVID-19 pandemic, telemedicine in the United States (US) had been slowly on the rise. According to a 2017 survey conducted by the American Telemedicine Association, 88% of health care executives believed they would invest in telehealth in the near future and 98% thought that it offered a competitive advantage.<sup>3</sup> However, the multitude of private insurers in the US can lead to barriers in both coverage and reimbursement for telemedicine services. In the aforementioned survey, 71%

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of respondents believed that lack of coverage and payments were barriers to implementation.<sup>3</sup> In a systematic review, telehealth was found to be comparable to or occasionally even better than the usual in-person care, but there are noted limitations to these conclusions based on the small number of studies with heterogeneous designs and varied findings that served as the basis for the conclusion.<sup>4</sup> The current evidence for telehealth interventions in end-stage kidney disease and chronic kidney disease (CKD) care remains scant and lacks recommendations on how it can be applied optimally.

There are several systems for the provision of telemedicine services. A synchronous method of telemedicine is where the televisit can serve as a digital substitute for the in-person patient–provider interaction. A derivative of this system is tele-supervision, where the provider presents patient information to an attending, with or without the patient's presence.<sup>5</sup> Asynchronous methods of telemedicine include tele-monitoring where the signs and symptoms are sent electronically from the patient to the provider. This method is most beneficial in chronic conditions, providing regular follow up and patient education on their conditions.<sup>5</sup>

More than 50 US health systems, such as Jefferson Health, Mount Sinai, Kaiser Permanente, Cleveland Clinic, and Providence, have implemented telemedicine programs along with individual hospitals. Differences in payment parity (telehealth reimbursement at the same rate as in-person visits) across the states of the US and the lack of guidelines to aid with this expansion led health providers to sporadically use various modalities of telemedicine. In Canada, telemedicine has been used widely and reimbursed since the 1990s.<sup>6</sup>

As the COVID-19 pandemic progressed, more physicians turned to virtual provision of care to contain and prevent the spread of the virus to the community. However, there was no general consensus or standardized training, resulting in different experiences with the use of telemedicine for both the providers and patients.

## METHODS

To create the survey, the authors characterized the telemedicine experiences by patients and providers using a targeted survey. The survey was conceptualized by a team of 6 pediatric nephrologists from the US (from the American Society of Pediatric Nephrology and the Pediatric Continuous Renal Replacement Therapy Registry Group), Asia (from the International Pediatric Nephrology Association and the International Society of Nephrology), Africa (from the International

Pediatric Transplant Association), and Canada (from the Canadian Society of Pediatric Nephrology). The patient and physician questionnaires were constructed to establish face validity and avoid common errors, such as confusing and/or leading questions. Pilot testing was conducted with 10 pediatric subspecialists. The patient responses during the epidemic were taken from institution-based anonymous patient satisfaction questionnaires and individual consent to treat was obtained by the institution. The final web-based questionnaires with informed consent was deployed using the online survey platform Qualtrics.

Pediatric nephrologists were approached electronically using the *pedneph* and the *pcrrt* list servers. The survey was sent to pediatric nephrologists worldwide. However, due to the physicians in various countries already having telemedicine established before the pandemic, secondary to sporadic responses to the questionnaires, only responses from pediatric nephrologists in the US and Canada were used.

The physician questionnaire included 17 questions with both open-ended and closed-ended responses on a Likert scale (totally disagree, disagree, neither agree nor disagree, agree, totally agree), as depicted in [Supplementary Table S1](#). The questionnaire collected information on telemedicine training received, mode of telemedicine delivered, satisfaction with current services, and comments/concerns with current practices between February 28, 2020 and August 30, 2020. Eligibility criteria for the physicians included being a clinical pediatric nephrologist and, for the patients, being a person under the care of a pediatric nephrologist.

In parallel, the patients' responses on telemedicine clinical services were only collected in the US ([Supplementary Table S2](#)). This assessment was sporadic and not center-based, with data available from various surveys that were either hospital- or institution-based, including satisfaction surveys from both Healthgrades and Hospital Consumer Assessment of Healthcare Providers and Systems. The latter surveys were developed by the Centers for Medicare and Medicaid Services and the Agency for Healthcare Research & Quality and were administered to a random sample of patients no later than 42 days after a patient visit/discharge. Questions from the surveys that dealt with similar overarching themes of access, logistics, and satisfaction were analyzed by the authors for comparison. Standardized responses were more difficult to ascertain from international sources and, as such, only the results from the US are presented. The patient questionnaire data were collected from March 30, 2020 to August 30, 2020 from 62 centers across North America. These reports were anonymous and voluntary, and not compensated.

Patients were identified and given the survey by the present authors, along with assistance from providers who were approached to fill out the physician survey. Consent to publish the de-identified findings was obtained with the completion of the survey through an informed statement at the beginning of the survey. To expand knowledge on the patient experience, we used Healthgrades ratings by a summary of the current ratings along with looking at previous trends as analyzed by Gallar *et al.*<sup>7</sup> Exclusion criteria were an inability to read English, having a cognitive impairment, or being unable to sign the consent form.

Principal components analysis was used to compare data points. Factor loading was used to help group questions that were similar in nature and was done when  $\pm 0.60$  or higher. This value was chosen as it determined internal consistency using Cronbach's  $\alpha$  test. The questions used for personal commitment to practice pattern and geographic location had a Cronbach's  $\alpha = 0.91$ , considered significant for internal consistency.

Data were analyzed and gathered among the different partner institutions and all results were assessed anonymously for the purpose of this investigation. Consent was gathered at the point of contact between the provider and patients at 62 partner institutions with the consent of the parent/guardian obtained whenever indicated. Questionnaires were distributed anonymously to patients under nephrology care with the diagnosis unspecified.

## RESULTS

After the results of the surveys were compiled, responses were received from 400 patients from the US. In addition, 197 responses were gathered from pediatric nephrologists in the US and Canada. The pertinent responses from each survey are highlighted in what follows.

*Method of telemedicine delivery (n = 197):* Most physicians (56%) reported using both video chat and telephone calls, followed by video chat only (23%), telephone calls only (12.4%), or text message (8.3%) (Figure 1a).

*Telemedicine training for physicians (n = 197):* The majority of physicians (n = 141, 71%) received training for telemedicine services. Of this subset, training was most often done through video tutorial (n = 59, 42%), followed by PowerPoint presentation (n = 44, 31%), e-mail and written instruction (n = 24, 17%), or one-on-one training (n = 9, 6%).

*Physician satisfaction (n = 197):* The majority of physicians expressed satisfaction with the telemedicine experience. Only 5% (n = 10) of physicians were

disappointed with the clinical aspect of telemedicine, whereas only 4% (n = 8) were disappointed with telemedicine overall (Figure 1b and Supplementary Table S2).

*Perceived benefits by patients and satisfaction (n = 400):* Overall, patients reported telemedicine visits as positive or neutral and with similar levels of satisfaction, compared with in-person visits. Aside from the ability to show physicians a physical problem, all other categories showed a majority of responses with neutral or better-quality results with telemedicine (Figure 2a–c).

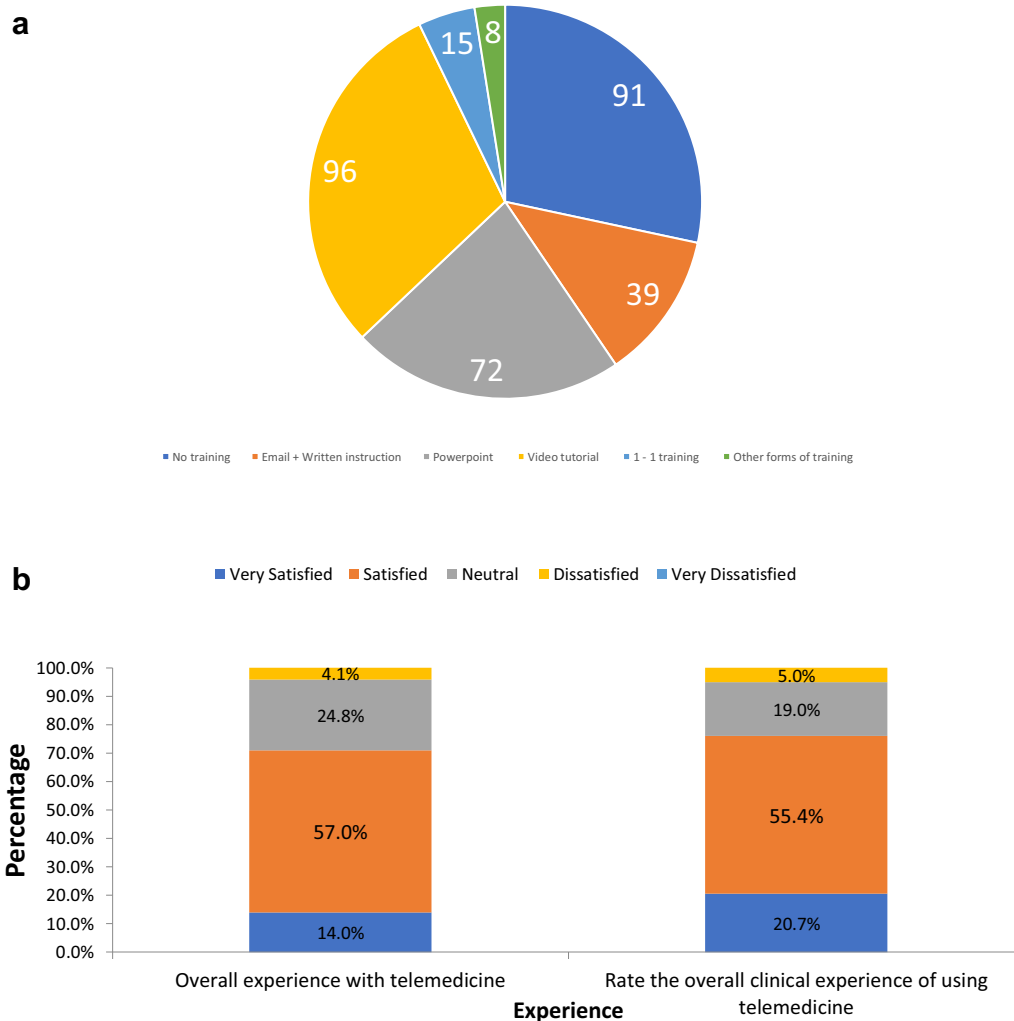
## DISCUSSION

Based on our survey results, telemedicine was readily accessible to both providers and patients. Most of our physician participants (72%) received some form of telemedicine training. Staff training has been shown to be quite important for the success of telemedicine to acclimate stakeholders to the telemedicine system. The most effective methods include recorded videos and live webinars. Video training allows physicians to revisit the training multiple times and have frequently asked questions addressed.<sup>8</sup> The standardization of the limited physical examination conditions, such as edema, general condition, distress, and shortness of breath, can be instructed.

We found that telemedicine was viewed favorably by most users. The results were aided by the fact that pediatric nephrology consultations are largely based on laboratory results, with patient interactions centered around disease education and explanation of treatment choices.<sup>9</sup> Only 5% of physicians were disappointed with the clinical aspect of telemedicine, whereas only 13% of patients were not satisfied.<sup>10</sup> The overwhelmingly positive reviews from both sides bodes well for continued use of telemedicine.<sup>11,12</sup>

Although much can be obtained with home blood pressure monitoring, clinical observation of breathing pattern, and assessment for edema, there is no standardization for the physical examination during virtual care. In our patient survey, 80% of patients felt they could not adequately show their physician a physical problem, whereas 30% of physicians found it was an issue. Although expected, a reliable method of conducting key aspects of a physical exam is needed to keep this as a viable method of care.

Telemedicine visits allow more schedule flexibility. For patients, the ability to attend appointments requires significant time and expense. This can be a barrier for lower income patients especially. One large-scale study showed that telemedicine visits significantly improved patient attendance to appointments. Before implementation of telenephrology service at this



**Figure 1.** Physician telemedicine survey. (a) Telemedicine training method. (b) Overall experience and overall clinical experience with telemedicine.

clinic, 53.1% of scheduled visits were either canceled or were “no-shows.”<sup>13</sup> After instituting telemedicine, the no-show rate was reduced by nearly half (28.5%), with greater adherence to telemedicine appointments (71.9%) compared with in-person visits (61.0%).<sup>13</sup> Technological barriers can be present in lower socio-economic communities because not all patients have sufficient internet or cellular access.

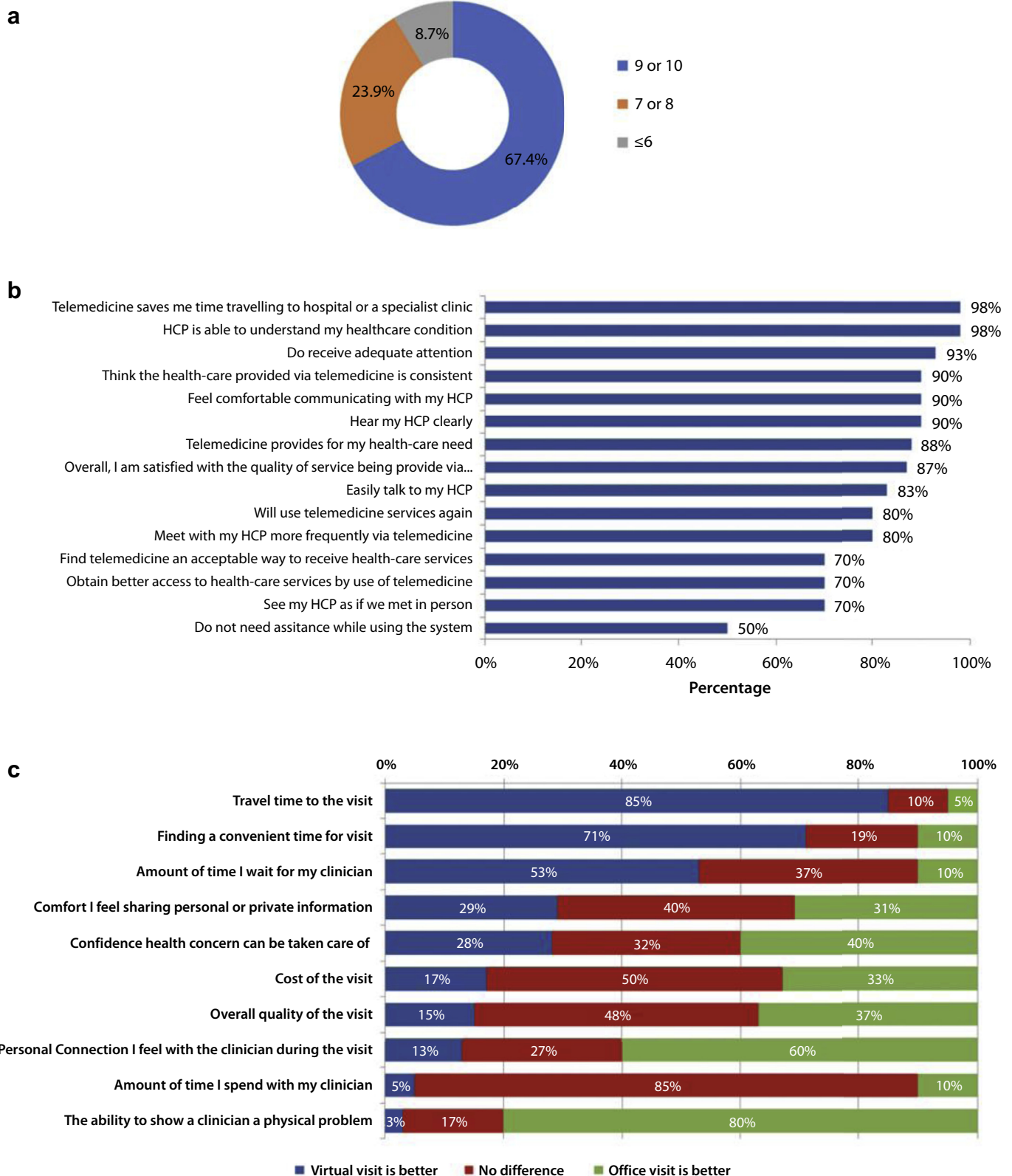
Previous studies have also shown significant benefits associated with telemedicine use. Two trials found that telehealth led to a lower rate of hospitalization (2.2 vs. 5.7 days annually per patient).<sup>7,14</sup> In addition, 3 studies reported a decreased number of hospitalizations for telehealth versus standard care patients (0.0038 vs. 0.0069).<sup>9,12,15</sup>

In terms of patient-reported outcomes, studies have indicated similar or superior treatment with telehealth. Ansary *et al.* and Dey *et al.* found significant improvement in social functioning scores for telehealth patients versus standard care patients.<sup>11,16</sup> Furthermore, Jahromi *et al.* described reduced depression,

anxiety, and stress scores in telehealth patients.<sup>17</sup> This could suggest that patients using telehealth had more stable chronic conditions, resulting in further use of telehealth. Having more stable patients pursue telemedicine services frees up staff and resources for patients with more acute and emergent conditions.

There are key considerations that need to be addressed when conducting telehealth. Providers need to learn to remain “present” during any telehealth visit. In a physical setting, even if the provider looks away from the patient or moves a short distance away, the provider remains “present.”<sup>18</sup> When the clinician is seen on a monitor and he or she looks away, the patient may feel that the provider is no longer “present.” Reviewing a patient’s chart before a visit can help the provider remain more focused on the patient. This was confirmed by the patient survey where 60% of respondents indicated they had a stronger personal connection in person when compared with telemedicine.

Conveying emotional support over a screen is harder to deliver than in person.<sup>19</sup> Pediatric



**Figure 2.** Combined results from the patient satisfaction survey. (a) Patient satisfaction rating of telemedicine. (b) Patient satisfaction with aspects of telemedicine. (c) Patient perception of virtual video visits versus office visits.

nephrology consultation often involves delivering difficult information. Sitting silently for a few moments with a patient can be helpful if the clinician is sitting in the same room. However, silence on

the video monitor may not convey empathy equally.<sup>19</sup>

General concerns revolve mainly around technology (36%) and the inability to perform physical

exams (30%). Technology-related issues could be minimized with the establishment of standardized training and the constant availability of technically trained staff.

Telemedicine is not feasible for acutely ill patients who require immediate attention and is best suited for monitoring chronic conditions or as an initial meeting with a provider. In addition, a telemedicine visit can preclude or limit the relationship between patient and provider with certain nonverbal cues being missed on camera or by the provider. This can cause patients to either take appointments less seriously or be less comfortable in explaining their well-being. The provider needs to pay attention to their body language to ensure they are actively listening to their patient. The physician should be prepared before the telehealth meeting to ensure the best technical quality for interpersonal connections by using a professional background and using ambient noise and lighting to make the patient feel comfortable.<sup>20</sup> Also, the physician should use open-ended questions during the telehealth visit to elicit a list of needs up front, making the visit more efficient. This should be followed by active listening, which would allow for a clearer assessment of the patient's needs and demonstrate respect for the patient, and an empathetic response. Last, information should be shared in a simplistic way while pausing to ask questions to provide comfort and meaning.<sup>20</sup>

An important aspect that was not addressed our survey is patient confidentiality and consent. In Canada, the Ontario Telemedicine Network is encrypted on both ends and provides maximum confidentiality and safety for telemedicine, while also automating consent.<sup>21</sup> It is the opinion of the authors that international standards about confidentiality and consent should be developed to address these concerns.

There are several limitations to our surveys. In the physician survey, there were no questions regarding total number of patients served with the telemedicine platform, or the level of expertise in use of telehealth platforms. In terms of the patient survey, a key point of telemedicine was not assessed: the financial aspect. From a public health standpoint, telemedicine is the preferred form of treatment in the setting of a pandemic, but as a long-term practice the financial cost that is feasible to both patients and providers will need to be determined.

In conclusion, within the COVID-19 pandemic setting, there was widespread acceptance and satisfaction with telemedicine services in the field of pediatric nephrology, both by patients and providers. Although physicians and health care teams have rapidly adapted to the use of telemedicine, there is a need to standardize the provision of virtual care. Standardized workflows for various conditions can potentially allow for more

effective patient care. Even more importantly, these workflows can help ensure optimal patient outcomes with minimal risk of contracting COVID-19 or any potential infectious disease.

## DISCLOSURE

All the authors declare no competing interests.

## SUPPLEMENTARY MATERIAL

Supplementary File (PDF)

**Table S1.** Physician survey questions.

**Table S2.** Patient survey questions

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