Kidney Medicine

Perspective

Telemedicine for Pediatric Nephrology: Perspectives on COVID-19, Future Practices, and Work Flow Changes

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Although the use of telemedicine in rural areas has increased steadily over the years, its use was rapidly implemented during the onset of the coronavirus disease 2019 (COVID-19) crisis. Due to this rapid implementation, there is a lack of standardized work flows to assess and treat for various nephrotic conditions, symptoms, treatment modalities, and transition processes in the pediatric population. To provide a foundation/suggestion for future standardized work flows, the authors of this report have developed standardized work flows using the Delphi method. These work flows were informed based on results from cross-sectional surveys directed to patients and providers. Most patients and providers were satisfied, 87% and 71%, respectively, with their telemedicine visits. Common issues that were raised with the use of telemedicine included difficulty procuring physical laboratory results and a lack of personal warmth during telemedicine visits. The work flows created based on these suggestions will both enhance safety in treating patients and allow for the best possible care.

Complete author and article information provided before references.

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INTRODUCTION

The swift rise of telemedicine in the age of coronavirus disease 2019 (COVID-19) has had large implications for the current and future practice of medicine. Although the growth of telemedicine has been slow during the past few years, the sudden onset of the COVID-19 pandemic has led to the rapid growth of telemedicine. Not only can telemedicine be used as a direct virtual contact between the physician and patient, known as the televisit, but it can also be used to triage patients with midlevel provider virtual visits through the use of "telesupervision."[1] Because much of the care delivered by pediatric nephrology is based on laboratory results, many of the in-person visits can be conducted through telemedicine.

Although the physical examination, an important part of each visit, cannot be done with telemedicine, recent studies have shown that the use of telemedicine is associated with positive outcomes, as outlined in Table 1.[2-8] However, deciding when a patient is an appropriate candidate for a telemedicine visit and how to evaluate and treat through telemedicine have not yet been standardized in pediatric nephrology. Therefore, we discuss the benefits and drawbacks of telemedicine, as well as perspectives on the standardization of work flows for common pediatric nephrology pathologies.

METHODS

The literature search, article review, data extraction, and results were completed by the authors, who submitted their results to the work group for discussion. All individuals were responsible for reviewing and proposing recommendations for the telemedicine work flows. Disagreements between members were resolved by quantifying votes using the RAND Corporation/University of California Los Angeles appropriateness method and subsequently calculating a disagreement index.[9,10]

The modified Delphi method was used to establish the strength of each recommendation. Delphi method panelists were selected based on their skills and previously displayed expertise in different areas of pediatric nephrology. The Delphi method is an iterative method of determining consensus toward clinical problems. An initial list of problems was identified and multiple rounds of voting and discussion took place both over email and through online meetings until agreements were reached. The panel did not grade the evidence but instead used it as part of a suggested guideline because in pediatric literature, there are very limited randomized controlled trials to support the strength of gradation. The PubMed/MEDLINE, EMBASE, and Cochrane databases were searched to identify publications relevant to telemedicine and nephrology in the pediatric population.

For the survey, we characterized telemedicine experiences by patients and providers in a cross-sectional fashion. The physician survey was created by a team of pediatric nephrologists and intensivists from the Delphi panel. The survey was pilot tested with 10 pediatric nephrologists at Akron Children's Hospital. Pediatric nephrologists were approached electronically through the pedneph and the pcrrt list servers. The physician survey had 17 questions with both open-ended and closed-ended responses on a Likert scale. The survey collected information related to the experiences of telemedicine by both patients and providers and was gathered between February 28, 2020, and June 30, 2020.

Patients' responses on telemedicine clinical services were collected in the United States. This assessment was

Table 1. RCTs of Telemedicine Services for Patients With Kidney Failure and Earlier Stages of CKD

Study	Design	Intervention	Provider	Care Supplemented by Telemedicine	Outcomes	Sample Size	Results
Berman et al[3] (2013)	RCT parallel	Remote monitoring + standard HHD care	None	Supporting HHD therapies	Clinical: hospitalization, ED visits, Karnofsky score Patient-reported measures: QoL (SF-36)	43	Significant improvement in hospitalization and ED visits
Chow and Wong[4] (2010)	RCT parallel	Telephone call + standard care	None	Hospital to home transition of care	Patient-reported measures: QoL (KDQOL-SF)	85	Significant improvement in patient satisfaction and social functioning domain
Dey et al[6] (2016)	Cohort (pre/post)	Remote monitoring + standard HHD care	Health care team	Supporting home PD therapy	Patient-reported measures: QoL (KDQOL-36), patient satisfaction w/satisfaction (QUEST)	22	No significant improvement in outcomes
Gallar et al[2] (2007)	RCT parallel	Videoconference	Health care team	Supporting home PD therapy	Clinical: hospitalization	57	Significant improvement in hospitalization rate
Hayashi et al[7] (2017)	RCT parallel	Platform (telemetry) for self-management and remote monitoring	Health care team	Supporting self-management and in between HD care	Patient-reported measures: QoL (KDQOL-SF)	18	Significant improvement in patient-reported QoL factors
Jahromi et al[8] (2016)	RCT parallel	Telephone call + standard care	None	Mental health	Patient-reported measures: DASS	60	Significant improvement in DASS scores
Li et al[5] (2014)	RCT parallel	Telephone call + standard care	None	Hospital to home transition care	Clinical: hospitalization readmission	135	Significant improvement in QoL factors

Abbreviations: CKD, chronic kidney disease; DASS, Depression Anxiety and Stress Scale; ED, emergency department; HD, hemodialysis; HHD, home hemodialysis; KDQOL-SF, Kidney Disease Quality of Life–Short Form, PD, peritoneal dialysis; QoL, quality of life; QUEST, Quebec User Evaluation of Satisfaction With Assistive Technology; RCT, randomized controlled trial; SF-36, 36-Item Short Form Health Survey.

sporadic and not center based, with data available from various surveys that were either hospital or institution based, including satisfaction surveys from Healthgrades and Hospital Consumer Assessment of Healthcare Providers and Systems. The patient questionnaire was collected from March 30, 2020, to June 30, 2020. These reports were anonymous, voluntary, and not compensated. Patients were given the survey by the authors of this article, along with help from providers who were approached to fill out the physician questionnaire. Consent to publish the deidentified findings was obtained with the completion of the survey through an informed statement at the beginning and conclusion of the survey, gathering the consent of the parent/guardian in situations in which it was necessary.

FROM BEDSIDE TO WEBSITE: THE CHANGE IN PARADIGM OF THE PATIENT VISIT

Pediatric nephrology consultations are largely based on laboratory assessment, with patient interaction centered around disease education and explanation of treatment choices. Thus, much of what transpires in an in-person interaction can be translated to a video interaction.[2] Even before the onset of the COVID-19 pandemic, it had been shown that the use of telemedicine is associated with decreased rates of hospital admissions, greater patient follow-up, and increased patient satisfaction when compared with the traditional in-person visit. In a randomized controlled trial, Gallar et al[2] showed a significantly lower rate of hospitalization among patients using telemedicine compared with traditional in-person services.

Furthermore, Reddy and Aronoff[11] reported a 44% reduction in missed appointments when using telemedicine services versus in-person consultations. As such, telemedicine has proved to be a developing alternative to in-person visits. In the field of pediatric nephrology, the traditional in-person visit often includes establishing patient rapport, meeting with families, and discussing laboratory results and prognosis, much of which can be completed through the use of telemedicine, with the exception of the physical examination.

During a telemedicine visit, providers need to learn to remain "present." If the provider and patient are together in a room and the provider happens to look away or move a short distance away, the patient will generally still have a sense that the provider is present.[12] However, when the clinician can only be seen on the monitor and he or she looks away, the patient may feel like the provider is no longer present. To avoid this, it is particularly important to be sure to review the patient's chart before the televisit instead of doing so while on screen. One way to maintain a presence is to have proper eye contact. Providers can practice looking at the camera instead of at the image of the patient on the screen so that the patient feels that the clinician is "looking them in the eyes." Conveying emotional support over a screen is harder to achieve than in person.[13] Simply sitting quietly for a minute or two can be helpful after delivery difficult information.

With technology making great leaps and bounds, accessibility to patients through the virtual world has become a bourgeoning reality. The development of multiple video-capable applications and technologies has made communication better than ever before. In response to the COVID-19 pandemic, nephrologists at Mt. Sinai have used all technologies that allow for video communication, including Facetime, Zoom, and WhatsApp.[14] We recommend the use of these services because they are free to patients and easily accessible to use. In our survey, most providers used Zoom or EPIC to conduct their telemedicine visits.

PERSPECTIVES OF PROVIDERS AND PATIENTS DURING THE COVID-19 PANDEMIC

To examine the experiences with telemedicine of both pediatric nephrologists and patients, we conducted a survey with 197 pediatric nephrologists and 400 pediatric nephrology patients from February 28, 2020, to June 30, 2020. The results showed a positive response among both pediatric nephrologists and patients alike. Most physicians expressed satisfaction with the capabilities of telemedicine visits, with only 10% expressing dissatisfaction with the clinical aspect of telemedicine and 4% expressing disappointment with telemedicine overall. In addition, patients reported their experiences with telemedicine to be as good as if not better than the traditional in-person visit (Table 2[15]).

LACK OF STANDARDIZATION WITH TELEMEDICINE: BILLING AND WORK FLOWS

One of the primary limitations posed by telemedicine is the relative lack of billing coverage from Medicare and private insurance companies throughout the United States. Previously, only 20% of states required payment parity between in-person visits and televisits. However, with the rise of COVID-19, Medicare began providing broader billing coverage, which will extend through the end of the pandemic, allowing for greater use of telemedicine services. Furthermore, with the 1135 waiver, Medicare allows for billing coverage for televisits for patients who have been established with their physician along with new patients.

In addition, the Centers for Medicare & Medicaid Services (CMS) has established codes that should be used for telemedicine visits through electronic charting services, telephone calls, and digital media consulting (Table 3[16]). Although this has greatly broadened the coverage and use of telemedicine, the conclusion of the pandemic may signify a step back with respect to telemedicine if coverage is not continuously present. It is imperative to have standardization of such coverage by Medicare and private insurance companies alike to further evolve the care of pediatric nephrology and other patients alike. The recent Physician Fee Schedule Final Rule from CMS, effective January 1, 2021, finalized the establishment of coding and payment schedules for virtual visits on an interim final basis. This has greatly broadened the coverage of telehealth and creates a strong precedent for private insurance companies to follow. Although payment schedules from CMS do not typically apply to the treatment of pediatric patients, private insurance companies that cover pediatric patients often follow the lead of Medicare. Following the conclusion of the pandemic, it is imperative that payment schedules, under the lead of CMS, adapt with the evolution of medical care to advance the treatment of pediatric nephrology and other patients alike.

SUGGESTED WORK FLOWS FOR TELEMEDICINE USE IN THE FUTURE FOR PEDIATRIC NEPHROLOGY

Although telemedicine has been used for many years, a more widespread adoption of these services has occurred as a result of the COVID-19 pandemic. Given the diverse nature of hospital systems and insurance coverage, finding a standardized method of applying telemedicine will pose a challenge in the near term. As both provider and patient comfort with virtual care increase, delivery will continue to become more refined and established as a routine component of health care practice. Inclusion of metrics around the quality of telemedicine encounters will also be critical. We have developed generalized suggestions and work flows through the Delphi method that can serve as the foundation for standardized telemedicine work flows.

Table 2. Telemedicine Experience as Reported by Patients and Pediatric Nephrologists

Experience	Patients	Pediatric Nephrologists
Perceived benefits: disease specific	90% of patients were comfortable communicating about their health with their provider by telemedicine	
Perceived benefits: contextual specific	>90% of patients were able to save time traveling to the hospital/clinic for appointments (n = 400); most patients reported that virtual visits were better in terms of travel time to clinic (85%), finding convenient time for their visit (71%), and amount of time waiting for the clinician (53%)	Physicians (n = 321) reported 25% better, 42% similar, and 33% worse telemedicine visit attendance compared with in-person visits by patients
Perceived benefits: consultation specific	>90% thought that their provider was able to understand their health condition, received adequate attention, and the care provided via telemedicine was consistent with the in-person visits (n = 400)	
User satisfaction	Patient satisfaction (n = 400) with quality of the telemedicine experience was similarly positive to their in-person visits (87%); a subset of patients (n = 250) provided scores in the Healthgrades system, and their satisfaction level was similar during the COVID-19 pandemic (mean score, 4.2-4.6 of 5) with telemedicine visits in comparison to 2019 ratings (mean, 4.2-4.8 of 5)[15]; in the Healthgrades ratings, patients had overwhelmingly positive reviews of their telemedicine visits: 67% gave score of 9-10 of 10; 24%, 7-8; only 9%, <6	Physicians reported being very satisfied/satisfied (14%/57%) or neutral (25%)
User dissatisfaction	Patients (n = 400) reported that the ability to have a physical examination (80%) and overall quality of visit (60%) was better with office visits	(n = 13) 4% were dissatisfied with telemedicine overall
Challenges	Patients (n = 400) reported that personal connection with clinician was better with in-person setting in 60% of cases; not comfortable sharing confidential information in 30% of cases; patients (n = 400) reported inability to show clinician a physical problem 80% of times; the cost of the visit was better for the in-person clinic visits 33% of time	Physicians (n = 321) reported technology-related challenges (36%) followed by inability to perform physical examinations (30%) or laboratory tests (18%), unfamiliarity with telemedicine (9%), and being uninformed about billing (7%); the 321 responders stated that telemedicine services were not connected to the electronic health record in 60% of cases, had no waiting room feature to queue in patients in 32% of cases, and had restrictions in performing telemedicine services in 24% of cases
Cost	65% of patients were definitely willing to co-pay $10-$25; 28% were definitely willing to pay $26-$50; and 18% were definitely willing to pay full cost of televisit	Inability to use billing codes for telemedicine in 9% of cases
Suggestions for improvement	Changes in cost to patient to make it more affordable?	Physicians (n = 321) suggested that better equipment (39%) followed by pre-check of patients (25%) and increased training (25%) would improve the experience; ~12% did not suggest changes

Abbreviation: COVID-19, coronavirus disease 2019.

We believe that the implementation plans we present can serve as guides to assist with standardization of work flows in the future practice of pediatric nephrology.

COVID-19 and the Dialysis Unit

COVID-19 has significantly changed the dynamics of hospitals around the world. Particularly in settings that require high levels of patient contact, such as in dialysis units, it is of utmost importance to enact preventative measures. Dialysis units can prepare for COVID-19 using the Centers for Disease Control and Prevention's (CDC's) COVID-19 Outpatient Dialysis Facility Preparedness Assessment Tool.[17] The CDC recommends implementing processes to appropriately and routinely screen patients for any symptoms or potential exposures to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

Once screened, facilities should ideally place patients 6 feet apart, with medically stable patients having the option of waiting in their vehicles to prevent further contact. Transportation to and from the isolation rooms must

Table 3. Suggested Billing Codes for Telemedicine Use Based on Advice of American Medical Association

Telehealth Billing/Documentation Requirements Updated 5/4/2020				
Type of Visit/ Treatment	Performed by	SARS-CoV-2–Focused *ICD-10-CM* Codes	*CPT* Codes	Place of Service
In-office E/M visit	Physician/ QHP	Asymptomatic: Z11.59 No exposure to SARS-CoV-2: 03.818 Contact with SARS-CoV-2, suspected exposure: Z20.828	New: 99201-99205 Established: 99212-99215 Consult: 99241-99245	11 physician office; 19 off campus outpatient hospital; 20 urgent care facility; 22 on campus outpatient hospital
Patient swab sample collection	Clinical staff	Asymptomatic: Z11.59; no exposure to SARS-CoV-2: Z03.818; Contact with SARS-CoV-2, suspected exposure: Z20.828	Swab collection included in E/M: 99000	NA
SARS-CoV-2 test performed	Est Mychart Telehealth/ Mychart telehealth	Asymptomatic: Z11.59; no exposure to SARS-CoV-2: Z03.818; contact with SARS-CoV-2, suspected exposure: Z20.828	87635	19 off campus outpatient hospital; 22 on campus outpatient hospital; 81 independent laboratory
Patient evaluated for SARS-CoV-2 testing need by E/ M telehealth	Physician/ QHP	Asymptomatic: Z11.59; no exposure to SARS-CoV-2: Z03.818; contact with SARS-CoV-2, suspected exposure: Z20.828	New patient: 99201 (typical time 10 min). 99202 (typical time 20 min), 99203 (typical time 30 min), 99204 (typical time 45 min), 99205 (typical time 60 min) Current patient: 99212 (typical time 10 min), 99213 (typical time 15 min), 99214 (typical time 25 min), 99215 (typical time 40 min)	11 physician office; 19 off campus outpatient hospital; 20 urgent care facility; 22 on campus outpatient hospital
Patient evaluated for SARS-CoV-2 testing need: online	Physician/ QHP	Asymptomatic: Z11.59; no exposure to SARS-CoV-2: Z03.818; contact with SARS-CoV-2, suspected exposure: Z20.828	New or established patient: 99421 (5-10 min), 99422 (11-20 min), 99423 (≥21 min); payor guidelines may vary; G2010 Remote image: G2012 virtual check-in	11 physician office
Patient setup and education on Telehealth services	Physician/ QHP/ clinical staff	NA	99453: remote monitoring of physiologic parameter(s)	11 physician office
Remote physiologic monitoring treatment (first 20 min)	Physician/ QHP	NA	99457: remote physiologic monitoring treatment management, first 20 min	11 physician office
Remote physiologic monitoring treatment (each additional 20 min)	Physician/ QHP	NA	99458: remote physiologic monitoring treatment management, each additional 20 min	11 physician office
Collection and interpretation of physiologic data digitally stored and/or transmitted by patient	Physician/ QHP	NA	99091: collection and interpretation of physiologic data	11 physician office
Telehealth visit emergency department	Physician/ QHP		99281 (self-limited or minor); 99282 (low to moderate severity); 99283 (moderate severity); 99284 (high severity, no immediate significant threat to life or physiologic function); 99285 (high severity, immediate significant threat to life or physiologic function)	23 physician office

Abbreviations: CPT, Current Procedural Terminology; E/M, evaluation and management; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification; N/A, not available; QHP, qualified health plan; SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.
Information adapted from *Special Coding Advice During COVID-19 Public Health Emergency*. American Medical Association; May 4, 2020.[16]

follow strict procedures. This step will ensure that they can be treated in an effective manner with minimal exposure risk to other patients. Patients who are persons under investigation or have confirmed SARS-CoV-2 infection should ideally be dialyzed in separate closed-off rooms. Ideally, 3 separate rooms for SARS-CoV-2–positive patients, persons under investigation, and patients who show no symptoms but have had contact with persons with confirmed SARS-CoV-2 infection should be created. However, if a separate room is not available, SARS-CoV-2–positive patients and persons under investigation should be treated away from traffic flow, such as at an end-of-row station.[17] Adherence to universal source control measures is crucial to prevent spread among dialysis units and should thus be followed by patients and staff alike. Health care providers on the dialysis shift must not be changed or swapped to prevent cross-contamination. All caregivers should have increased personal protective equipment when treating patients in isolation or defer dialysis and testing to a hospital for testing/treatment (Fig 1).

Acute Nephrotic Syndrome Work Flow

In regard to an emergent in-patient condition such as acute nephrotic syndrome, it is important to establish clear lines of communication between the specialist and the local health care team. Daily video visits should take place that include regular blood pressure charting and observation for fever, rash, joint pain, and heart disease along with absence of serologic evidence of streptococcal infection. If the patient shows improvement, daily video consults can be reduced in frequency and transferred back to the primary pediatrician for follow-up. Advanced practitioners, nephrology nurses, dieticians, nephrology social workers, and providers should communicate with each other on the progress of their patient to ensure that all parties are aware of updates. If the patient shows a rapidly progressing condition, edema, or accelerated hypertension, the patient needs to visit the emergency department and be admitted immediately (Fig 2).

Glomerular Disease Management

There are 4 key components when managing glomerular diseases: immunosuppression, monitoring and diagnosis, supportive care, and in-person visits. Immunosuppression use needs to be carefully managed. In the case of confirmed or suspected infection, it is important to cease all medication to avoid an exacerbation of infection.[18] Even without a suspected infection, it is important to consider switching to short reversible agents. This can allow for easy cessation of medication in case of infection.

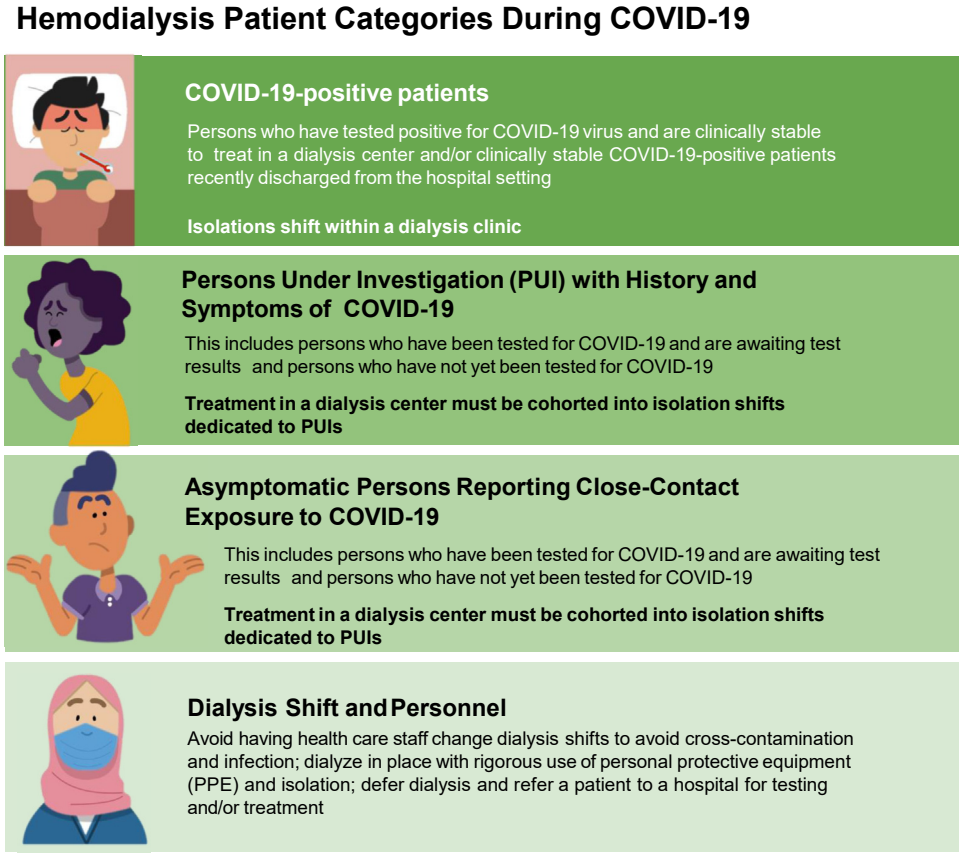


Figure 1. Hemodialysis during coronavirus disease 2019 (COVID-19) work flow.

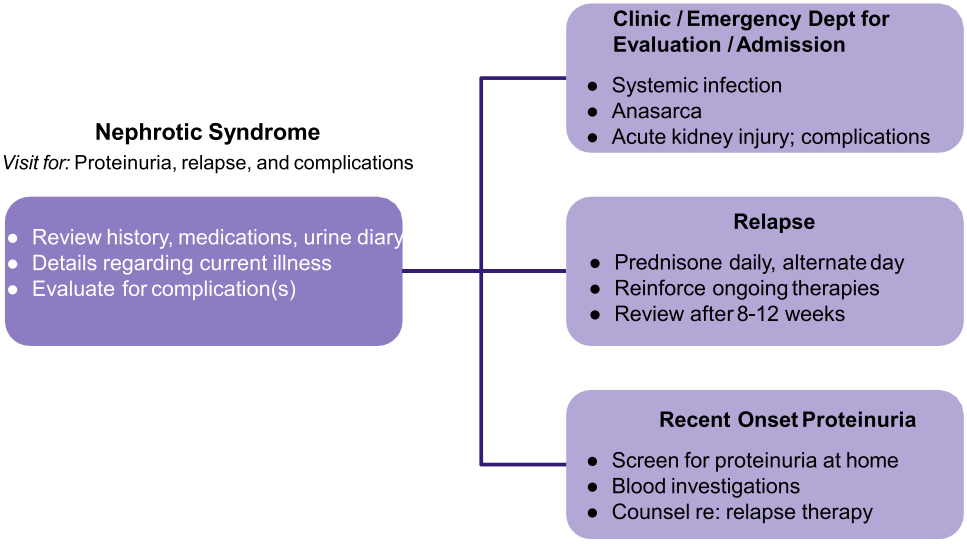


Figure 2. Nephrotic syndrome work flow.

Until the end of the COVID-19 pandemic, providers should avoid immunosuppressive therapy for patients who are otherwise stable to avoid any undue risk. However, in the case of clinical trials, the potential benefits need to be considered, especially regarding promising therapies. Medication should be given as an oral or subcutaneous agent at home or in an isolated section of the treatment center.[18]

For diagnosis and monitoring, laboratory tests should be done outside of a hospital to limit risk if possible. Biopsies should be restricted to cases for which it is absolutely necessary. This limits the time that patients have to spend in hospitals and reduces their risk for infection. Supportive care measures do not need to be altered, with angiotensin-converting enzyme inhibitors and angiotensin II receptor blockers appropriate for use based on current evidence. For stable patients, all visits should be conducted electronically. Patients with suspected infection should conduct an initial telemedicine visit to assess symptoms and triage further treatment[13] (Fig 3).

Chronic Kidney Disease Work Flow

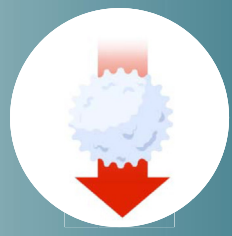
The first step for any patient with chronic kidney disease is to determine their clinical status and the extent to which treatments can be conducted virtually. Virtual visits are more feasible with early-stage chronic kidney disease, whereas in stages 4 or 5, in-person visits may be necessary to submit and conduct laboratory tests. The health care team, composed of provider, advanced practitioners, nurses, dieticians, and/or social workers, should work together to meet with both the parent and patient to establish a regular schedule and train the family on how to use a given telemedicine service. When all parties are comfortable with the telemedicine system, a review of the clinical status and laboratory test results should be presented to the patient and his or her family, with adolescent children given the opportunity to discuss their condition with physicians privately. Before concluding the meeting, the health care team should review recommendations for any lifestyle or medication changes. Patients and their families should also be educated on the importance of home blood pressure monitoring for early detection of clinical status. Future visits should also be determined in accordance with the patient's current conditions and the risk for their condition worsening (Fig 4).

Urinary Tract Infection Algorithm

Physicians should conduct a telemedicine visit with patients for urinary tract infections if they have unexplained fever, vomiting, or dysuria. If the patient is younger than 2 years and has persistent vomiting and a sick appearance after the initial visit, he or she should be referred to the emergency department. Even if none of those emergent symptoms are present, urine cultures should be collected. If vesicoureteral reflux, severe lower tract symptoms, or a high fever with leukocyturia is present, empirical oral antibiotics should be prescribed. If these symptoms are not present, symptomatic treatment should be prescribed. In both instances, a follow-up visit should be scheduled within 2 days with repeat urine cultures taken. If there is no growth in the urine culture, antibiotic treatment may be halted. If significant growths are seen, antibiotic therapy should be continued for another 48 hours. Additionally, the antibiotic treatment should be carried out for 10 to 14 days with a kidney ultrasound during a follow-up visit 2 weeks later if a response is noted. If there is no response, urine cultures should be repeated and antibiotics should be changed (Fig 5).

Immunosuppression

- Discontinue antimetabolites for patients with confirmed or suspected infection, consider discontinuation for patients in sustained remission > 12 months
- Prefer shorter-acting, reversible agents over longer-acting infusions
- Avoid therapy initiation for marginal criteria or nonstandard indications and for minimally symptomatic patients with stable eGFR
- Convert intravenous infusions to oral formulation when possible (eg, cyclophosphamide) and utilize home infusion services rather than hospital- or clinic-based infusion suites
- For patients in clinical trials with potential patient benefit, continue drug study by sending medication to their home if an oral or subcutaneous agent, or dosing in a COVID-19–compliant infusion center if an intravenous agent



Diagnosis and Monitoring

- Reserve biopsies for critical decision-making needs, and postpone protocol biopsies
- Consider empirical treatment, without biopsy, for conditions with high pretest probability diagnoses (e.g., RPGN with positive ANCA serologies)
- Limit blood draws to safety laboratories performed at commercial (i.e., non–hospital-based) laboratories
- Utilize home urine dipsticks for proteinuria monitoring
- Utilize commercially shipped collection kits for 24-h urine collections that can be done at home and shipped back
- Postpone protocol biopsies

Supportive Care

- Continue ACE inhibitors or ARBs in the absence of clear contraindications at this point
- Continue prophylactic antibiotics (e.g., TMP-SMX)
- Encourage social distancing and use of masks outside of the house
- Complete recommended vaccinations for influenza and pneumococcus (PCV13 and PPSV23) to prevent secondary or coinfection

Office Management

- Change all appointments to telemedicine video visits
- Allow office staff to manage phones and patient messages from home
- Develop a standard script of recommendations for patients calling with questions about possible COVID-19 exposure based on CDC guidelines
- Use telemedicine video visits rather than telephone calls for patients concerned about COVID-19 infectious symptoms to best triage respiratory status

Figure 3. Glomerular disease management. Abbreviations: ACE, angiotensin-converting enzyme; ANCA, antineutrophil cytoplasmic antibodies; ARB, angiotensin II receptor blocker; CDC, Centers for Disease Control and Prevention; COVID-19, coronavirus disease 2019; eGFR, estimated glomerular filtration rate; PCV13, pneumococcal conjugate vaccine; PPSV23, pneumococcal polysaccharide vaccine; RPGN, rapidly progressive glomerulonephritis; TMP-SMX, trimethoprim-sulfamethoxazole.

Pediatric Transplant Telemedicine Protocol

Although the risk for acquiring SARS-CoV-2 infection from organ donation is low, all organ donors are required to be screened.[18] However, the capability to conduct screenings varies according to the transplantation center. Any donor or donated organ testing positive for SARS-CoV-2 cannot be used for transplantation (Fig 6). Patients are asked to not travel to high-risk areas for at least 2 weeks before their donations.[18] Contact tracing and a detailed history for donors are imperative, especially if traveled recently. In nonemergent situations, these donors are asked to prolong their donation by 14 to 28 days.[18]

Regardless of where patients are living, those who have undergone transplantation are presumed to be at a higher

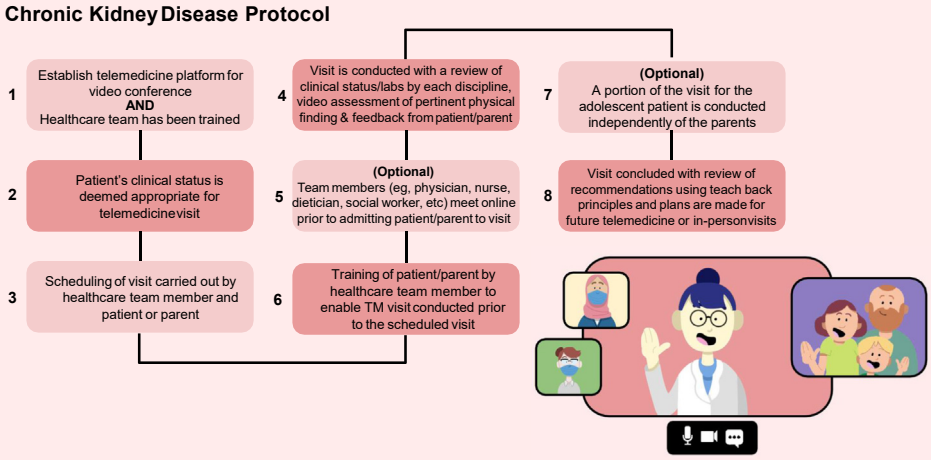


Figure 4. Chronic kidney disease work flow. Abbreviation: TM, telemedicine.

risk for SARS-CoV-2 infection, along with other severe diseases. Risk-benefit analysis should be done to determine whether transplantation can be postponed to a later date.[18] Decisions should be made on a case-by-case basis, and concerns should be shared among the transplant team and patient after carefully assessing the risks and benefits. All members of the transplant team should assess each patient and consider using new pandemic-specific consent forms to communicate the increased risk of the procedure.

Before and after a transplantation procedure, telemedicine should be conducted when clinically possible. Routine laboratory tests should be deferred and if required, strict appointments should be kept to minimize the risk for the patient being exposed to SARS-CoV-2. Any decisions to treat rejection with augmented immunosuppression need to incorporate the risk for SARS-CoV-2 infection and should be tailored to each individual patient.

Care of pediatric transplant recipients with SARS-CoV-2 infection must be individualized, but the use of telemedicine enhances the ability of providers to more frequently monitor patient symptoms and status. For immunosuppressed pediatric transplant recipients who contract SARS-CoV-2 infection, telemedicine may allow those without significant illness to avoid hospitalization. Stable pediatric transplant recipients may benefit from substitution of a telemedicine visit rather than an in-person visit for routine care if both their provider and the parent/patient believes this is reasonable.

Transition From the Pediatric to the Adult World

Given the pandemic, the process of transitioning patients from pediatric to adult care can be disrupted and affect the patient's ability to conduct disease self-management. Our suggested protocol for transition is derived from the RISE (recognition, insight, self-reliance, and establish) protocol from Akron Children's Hospital, which is based on previously stated survey findings and literature review (Fig 7).[19 (p. 51)] This protocol specifies 4 main competency areas for patients to achieve before transition:

1. Recognition of their disease process, reason for transplant, and the healthcare system;
2. Insight into the short- and long-term impact of their disease, therapy, non-adherence, and emotional needs;
3. Self-reliance in scheduling and attending appointments, refilling medications, and identifying urgent/emergent changes to their health on their own;
4. Establish healthy lifestyle choices, life-long adherence to medications and follow-up, psychosocial skills, and educational/vocational goals.[19]

These 4 competency areas are key to an effective transition. Helping patients develop self-reliance and establish healthy choices will improve their autonomy, reduce the emotional burden of their disease and treatment, and minimize disruptions to their daily life. The focus of the recognition and insight goals is to educate the patient about all aspects of their disease. Transition is a process that begins

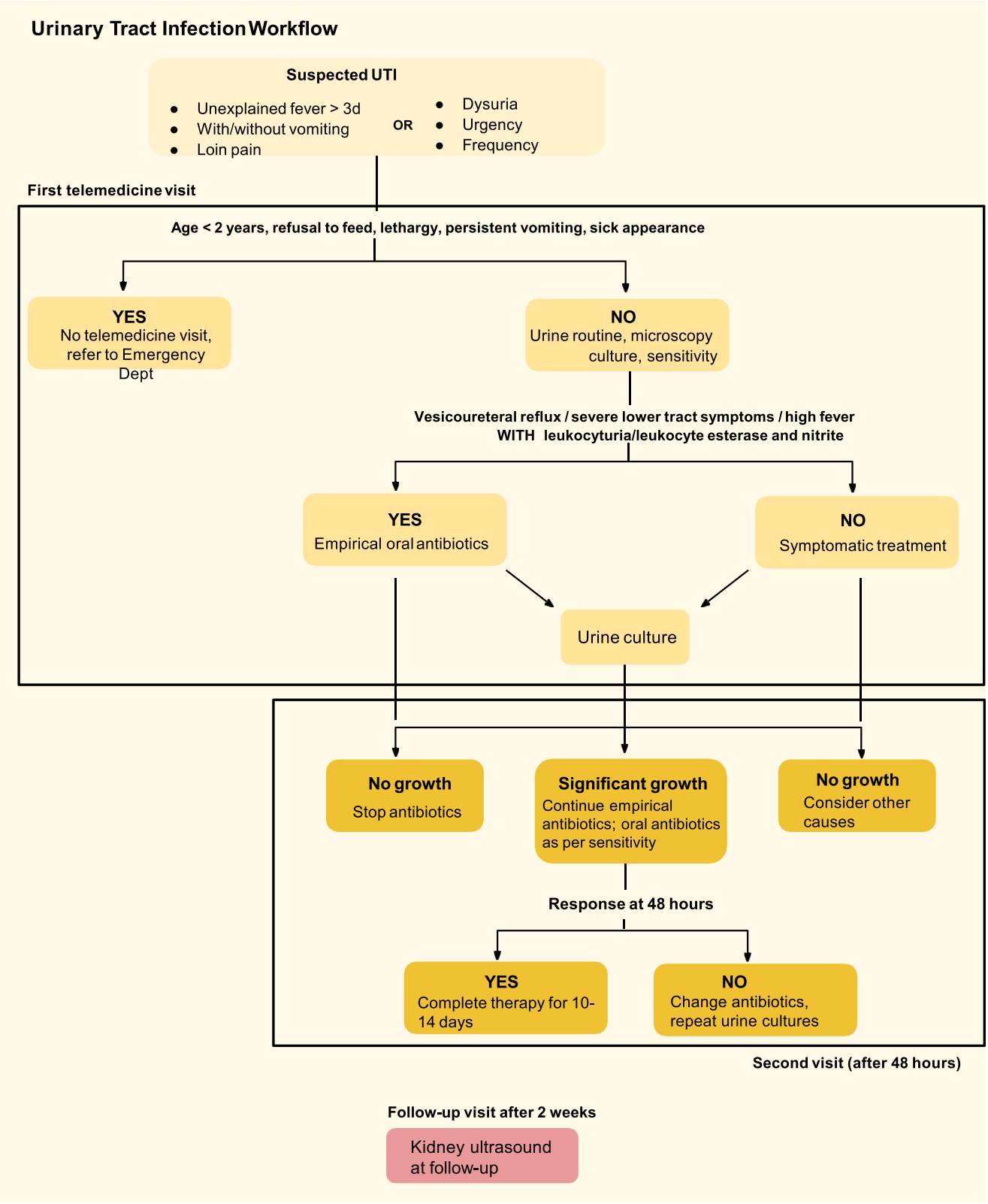


Figure 5. Urinary tract infection (UTI) work flow.

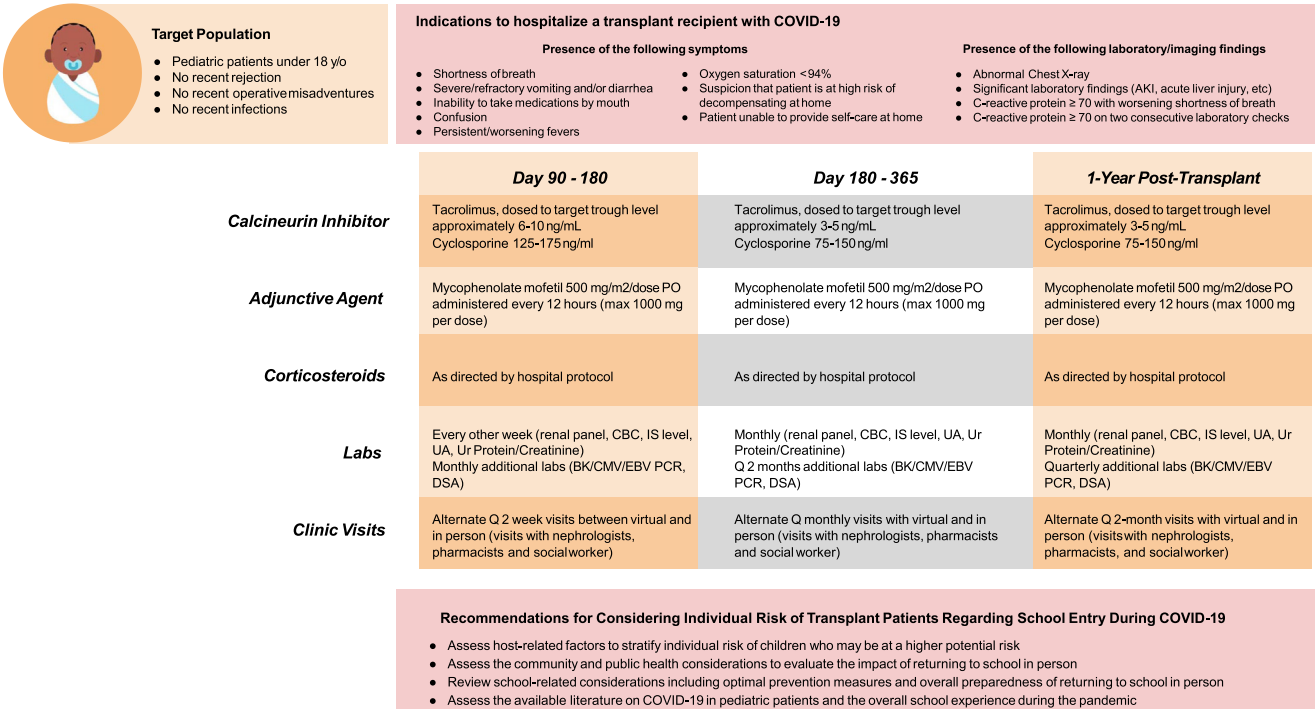


Figure 6. Pediatric transplant telemedicine work flow. Abbreviations: AKI, acute kidney injury; BK/CMV/EBV PCR, polyomavirus BK/cytomegalovirus/Epstein-Barr virus polymerase chain reaction; CBC, complete blood cell count; COVID-19, coronavirus disease 2019; DSA, donor-specific antibodies; IS, immunosuppression; labs, laboratory tests; max, maximum; PO, orally; UA, urine albumin; Ur, urinary.

1 to 2 months before the transfer date to prepare both family and patients for the shift in responsibilities. To provide similar levels of education, regular telemedicine visits are essential to check on the progress of the family and patient. Regularly scheduled visits allow for physicians to check patients' understanding of their kidney's health and the processes required to keep it healthy. Independent questionnaires that assess their understanding of their health care rights, how to make follow-up appointments, and manage comorbid conditions can be delivered online. Similarly, other members of the health care team such as social workers and dieticians can be reached through telemedicine visits to provide information about insurance, support systems, and proper nutrition.

Home Hemodialysis

Home hemodialysis has been shown to have multiple benefits in regard to psychological, clinical, and biochemical parameters (Fig 8). It is imperative to transition patients to home units to limit their exposure to SARS-CoV-2 in the hospital. During the initial chronic kidney disease diagnosis, patients should be educated on the risks of each stage and what to do if the need for dialysis arises. If the patient is at stage 4, they should be educated on the feasibility of home hemodialysis. If the patient can undergo the treatment at home, a home assessment and installation of the proper infrastructure should be done. Patients should be educated and given the means to perform home blood pressure monitoring as well. At the conclusion of infrastructure installation, patients should be monitored remotely for cases of infection, need for transplant/transfer, or death.

Remote Peritoneal Dialysis

For patients who receive peritoneal dialysis, COVID-19 has created a roadblock to routine office visits. Furthermore, nephrologists are unable to see each patient's dialysis cycle information without such visits. A solution to this has been Sharesource, an online platform that allows for medical professionals to remotely monitor each patient's dialysis information.[14] Sharesource has been widely implemented by nephrologists at Mt. Sinai, where 80% of patients are now being monitored remotely with this technology. This can provide nephrologists with access to dialysis information, and with virtual office visits providing an opportunity to meet with patients, the ability for nephrologists to remotely monitor and treat patients receiving peritoneal dialysis has now become a reality.

LIMITATIONS AND FUTURE CONSIDERATIONS

There are a few limitations that can serve as avenues for future research. In the survey released to both patients and providers, data on demographics and relative access to the internet were not gathered. This information could be used

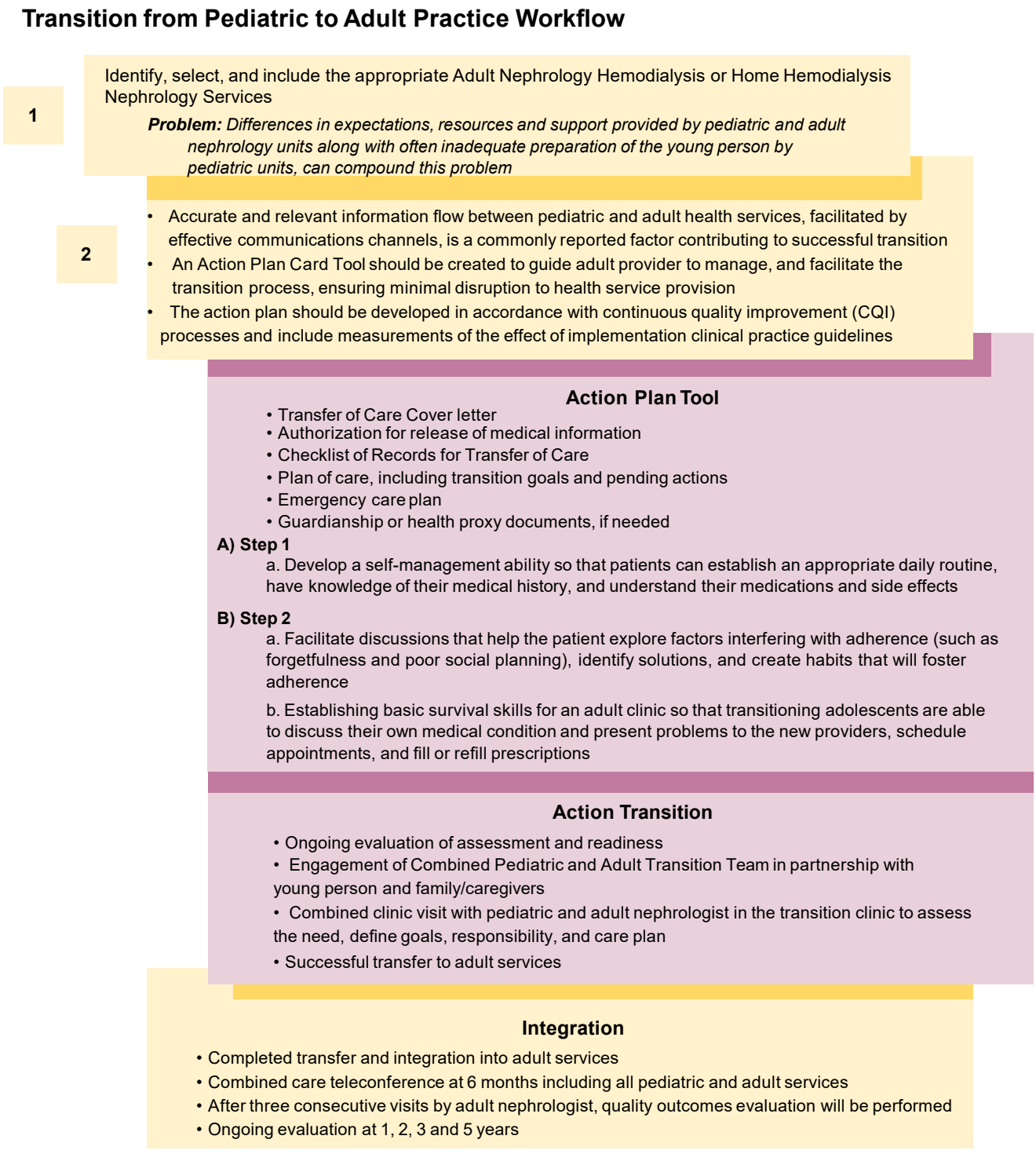


Figure 7. Transition from pediatric to adult care work flow

to better tailor work flows to various communities and minimize health disparities. To date, there are no preliminary data, besides with peritoneal dialysis, on the efficacy of these work flows in practice. Future research and analysis of their implementation will allow for adjustments to be made to improve their quality.

CONCLUSION

To deliver the most effective treatments for patients, standardized telemedicine work flows are imperative. With the COVID-19 pandemic continuing for an indeterminate time, coupled with the impending flu season, there is an ever-increasing need for telemedicine services. We believe

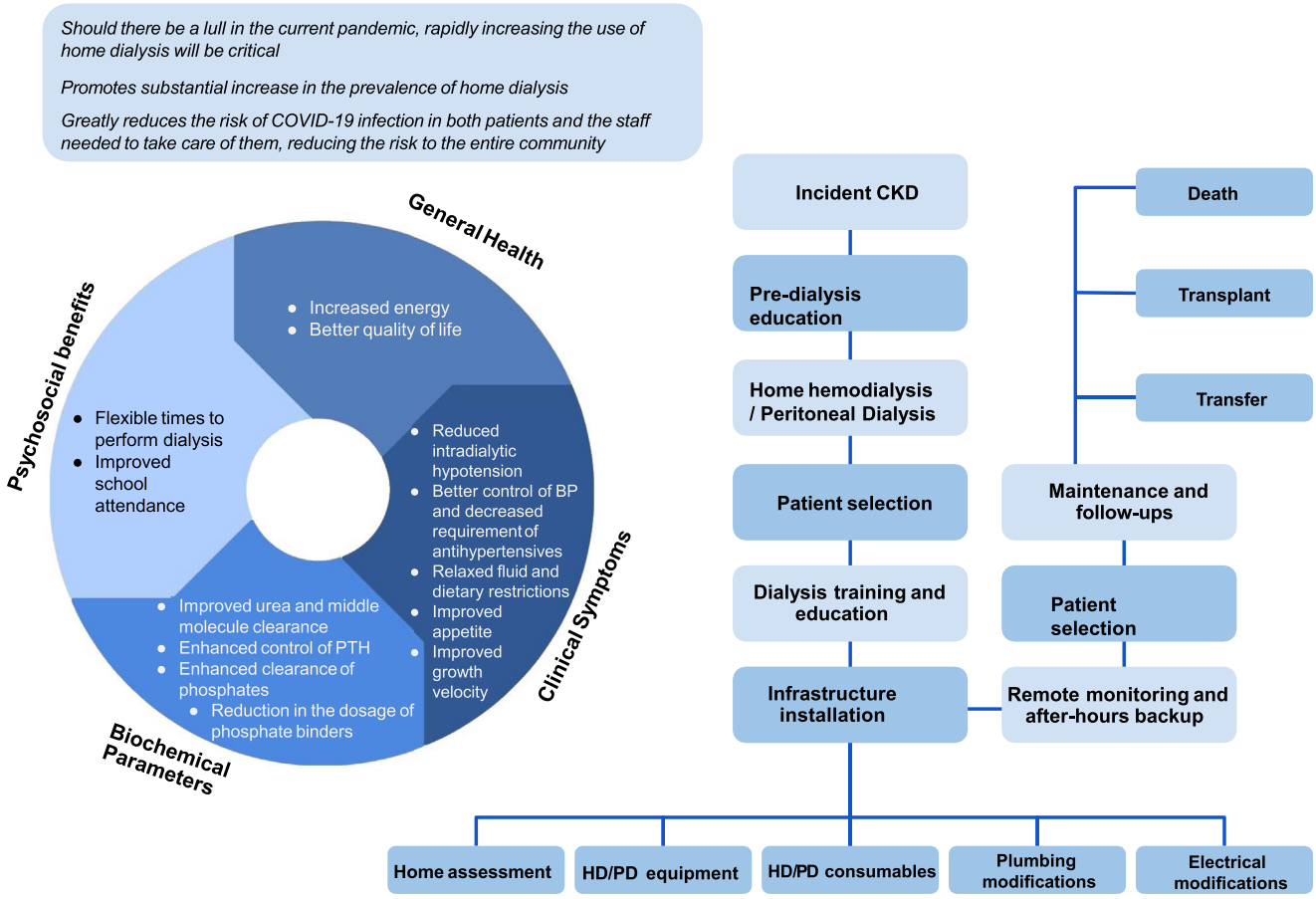


Figure 8. Home hemodialysis (HD) protocol. Abbreviations: BP, blood pressure; CKD, chronic kidney disease; COVID-19, coronavirus disease 2019; PD, peritoneal dialysis; PTH, parathyroid hormone.

that adaptation of these work flows can provide the foundation toward delivering standardized care to patients across the nation.

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