Virtual Solutions for Chronic Kidney Disease Management—Appendices

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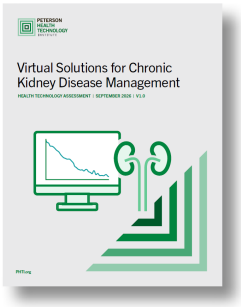
Accessing PHTI's Full Report

You can access the full report here.



Appendix A – Methodology Overview

This evaluation of virtual solutions for chronic kidney disease (CKD) management followed the Peterson Health Technology Institute's (PHTI) published assessment methodology, using the ICER-PHTI Assessment Framework for Digital Health Technologies, and stakeholder engagement process. Additional information about PHTI's process and advisors can be found at phti.org.

Assessment Framework

PHTI partnered with the Institute for Clinical and Economic Review (ICER), a leader in health technology assessment, to develop the ICER-PHTI Assessment Framework for Digital Health Technologies that guides this and all other PHTI evaluations. The assessment framework prioritizes products' clinical benefits and economic impact, while also considering effects on health equity and user experience. The selection process for which technologies are evaluated are based on several factors, including market relevance, disease burden, level of spend and claimed savings, and evidence quality and availability.

PHTI's goal is to provide decision makers with relevant information to inform digital health purchasing and innovation that improves overall health system performance and delivers better health outcomes at lower costs. By helping purchasers identify bright spots in digital health innovation, PHTI aims to raise the bar for technology-driven advances in healthcare delivery, including superior outcomes, convenience, access, and affordability. The assessment framework can also guide technology developers and investors about performance standards and the evidence needed to demonstrate stated clinical and economic benefits.

Clinical Assessment

A systematic literature review (SLR), including online database searches, data screening and extraction, and evidence quality ratings, was conducted by a third-party health technology assessment partner to identify all relevant published literature evaluating clinical impact of virtual solutions for CKD. The SLR was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. This SLR followed the methods and standard set forth in the ICER-PHTI Assessment Framework to provide a rigorous evaluation of digital health technologies. The SLR was registered *a priori* with PROSPERO (CRD420251165564).

Data from two literature databases, MEDLINE and EMBASE, were systematically searched for inclusion into the SLR. Conference proceedings were hand-searched to retrieve relevant publications. Potentially eligible studies were identified via the search strategy outlined in Tables 1 and 2 below. Studies were considered for inclusion in the SLR based on the population, intervention, comparators, outcomes, and setting/study design (PICOS) criteria presented in Table 3 below.

The SLR included a review of the "grey" literature, which captured data from sources not indexed and that are available from scientific conferences, the US Food and Drug Administration (FDA) website and 510k clearances, company websites, information provided by companies under review, and the CMS KCC model outcomes data available as of July 31, 2026.

Table 1. Medline Search Strategy

Search	Terms	Citations
#1	"Renal Insufficiency, Chronic"[Mesh] OR "Chronic Kidney Diseas*"[tiab] OR "Chronic Renal Diseas*"[tiab] OR "Chronic Renal Insufficienc*"[tiab] OR "Chronic Kidney Insufficienc*"[tiab] OR "CKD"[tiab] OR “nephrology”[MesH] OR “nephrology”[tiab]	216,721
#2	"Digital Health"[Mesh] OR "Digital Health"[tiab] OR “digital”[tiab] OR ((“digital”[tiab]) AND (“health"[tiab] OR "health technolog*"[tiab] OR "intervention"[tiab] OR "therapeutic*"[tiab] OR "treatment"[tiab])) OR "Mobile Applications"[Mesh] OR ((“mobile”[tiab]) AND ("health"[tiab] OR "app"[tiab] OR “apps”[tiab] OR “technolog*"[tiab] OR "health program"[tiab])) OR "Portable Electronic App*"[tiab] OR "Smartphone App*"[tiab] OR "mHealth"[tiab] OR "m-Health"[tiab] OR "m health"[tiab] OR "eHealth"[tiab] OR "e-Health"[tiab] OR "e health"[tiab] OR "Wearable Electronic Devices"[Mesh] OR "Wearable Electronic Device*"[tiab] OR "Wearable Device*"[tiab] OR "Wearable Technolog*"[tiab] OR "Electronic Skin*"[tiab] OR "Wearable Computer*"[tiab] OR "Remote Sensing Technology"[Mesh] OR "Remote Sensing Technolog*"[tiab] OR "Remote Monitoring"[tiab:~2] OR (("computer*based"[tiab] OR "web-based"[tiab] OR “web based”[tiab] OR “internet*based”[tiab] OR “online”[tiab]) AND (“treatment*”[tiab] OR “intervention*”[tiab] OR “training*”[tiab])) OR "Texting*"[tiab] OR "Short Message Service"[tiab] OR "Text Messag*"[tiab] OR "Text*based"[tiab] OR "messaging"[tiab] OR “Telemedicine"[Mesh] OR "Virtual Medicine"[tiab] OR "Tele*Referral*"[tiab] OR "Tele*Health"[tiab] OR "Tele*Intensive Care"[tiab] OR "Tele*ICU"[tiab] OR "Tele*Care"[tiab] OR “health education”[tiab] OR “transition* care"[tiab] OR ((“value*based”[tiab]) AND (“kidney care"[tiab]))	569,777
#3	#1 AND #2	2,600
#4	#3 NOT ("Editorial"[pt] OR "Comment"[pt] OR "Clinical Trial Protocol"[pt] OR "Personal Narrative"[pt] OR "Case Reports"[pt] OR "Address"[pt] OR "Lecture"[pt] OR "Letter"[pt] OR "Published Erratum"[pt])	2,389
#5	#4 NOT ("Animals"[MeSH] NOT "Humans"[MeSH])	2,377
#6	#5 AND 2015:3000[dp]	1,823
#7	Filter: English language	1,773

Table 2. Embase Search Strategy

Search	Terms	Citations
#1	'chronic kidney failure'/exp OR 'chronic kidney diseas*':ti,ab OR 'chronic renal diseas*':ti,ab OR 'chronic kidney insufficienc*':ti,ab OR 'chronic renal insufficienc*':ti,ab OR CKD:ti,ab OR 'nephrology'/exp OR nephrology:ti,ab OR 'chronic kidney disorder':ti,ab OR 'chronic nephropathy':ti,ab	339,812
#2	'digital health'/exp OR 'digital health':ti,ab OR digital:ti,ab OR ((digital:ti,ab) AND (health:ti,ab OR 'health technolog*':ti,ab OR intervention:ti,ab OR therapeutic*:ti,ab OR treatment:ti,ab)) OR 'mobile application'/exp OR ((mobile:ti,ab) AND (health:ti,ab OR app:ti,ab OR apps:ti,ab OR technolog*:ti,ab OR phone*:ti,ab OR 'health program':ti,ab)) OR 'portable electronic app*':ti,ab OR 'smartphone app*':ti,ab OR 'tablet application*':ti,ab OR mhealth:ti,ab OR 'm-health':ti,ab OR 'm health':ti,ab OR ehealth:ti,ab OR 'e-health':ti,ab OR 'e health':ti,ab OR 'wearable electronic device'/exp OR 'wearable electronic device*':ti,ab OR 'wearable device*':ti,ab OR 'wearable technolog*':ti,ab OR 'electronic skin*':ti,ab OR 'wearable computer*':ti,ab OR 'remote sensing'/exp OR 'remote sensing technolog*':ti,ab OR 'remote monitoring':ti,ab OR 'remote patient monitoring':ti,ab OR 'telesensing':ti,ab OR ((computer*based:ti,ab OR 'web-based':ti,ab OR 'web based':ti,ab OR 'internet based':ti,ab OR online:ti,ab) AND (treatment*:ti,ab OR intervention*:ti,ab OR training*:ti,ab)) OR texting*:ti,ab OR 'short message service':ti,ab OR 'text messag*':ti,ab OR 'text based':ti,ab OR messaging:ti,ab OR telemedicine/exp OR 'virtual medicine':ti,ab OR 'tele*referral*':ti,ab OR 'tele*health':ti,ab OR 'tele*intensive care':ti,ab OR 'tele*icu':ti,ab OR 'tele*care':ti,ab OR 'health education':ti,ab OR 'transition* care':ti,ab OR (('value*based':ti,ab) AND ('kidney care':ti,ab))	777,295
#3	#1 AND #2	5,284
#4	#3 NOT (editorial:it OR comment:it OR 'clinical trial protocol':it OR 'personal narrative':it OR 'case report':it OR address:it OR lecture:it OR letter:it OR 'published erratum':it)	5,157
#5	#4 NOT (('animal'/exp OR 'nonhuman'/exp OR 'animal experiment'/exp OR 'animal model'/exp OR 'in vitro study'/de) NOT 'human'/exp)	5,116
#6	#5 NOT 'conference abstract'/it	3,430
#7	#6 AND [2015-2025]/py	2,795
#8	Filter: English language	2,716
Conference Abstracts		
#9	#5 AND 'conference abstract'/it	1,686
#10	#9 AND [2023-2025]/py	464
#11	Filter: English language	464
Total		
#12	#8 OR #11	3,180

Table 3. PICOS Inclusion and Exclusion Criteria

Criteria	Inclusion Criteria	Exclusion Criteria
Population	• Adults with chronic kidney disease, stages 3 – 5 (including 3a and 3b) • Dialysis independent	• Patients on dialysis • Patients with CKD stages 1 and 2 • Pediatric population • Patients in hospice or end of life care • Post kidney transplant patients • Mixed patient populations (including stages 1-2 and/or patients on dialysis) without stratified results for dialysis independent patients stages 3-5[c]
Intervention(s)	• Mobile health (mHealth) applications and text messaging programs for education, behavior change, care coordination, and/or disease monitoring • Wearables and connected devices for remote monitoring (e.g., of vital signs, treatment adherence, or physical activity) • Digital platforms with on-demand educational or exercise content for CKD self-management • Provider-facing analytics and care-team tools that help inform an active care plan and direct patient intervention • Telehealth / telemedicine solutions (e.g. virtual visits, remote consultations, synchronous/asynchronous communication)	• Comorbidity-only apps • Direct to consumer, self-pay models • Diagnostic-only • Administrative screening-only • Post-transplant management services
Comparator(s)	• Standard of care • No care	N/A
Outcomes	*CKD specific outcomes* • eGFR • Disease progression • Albumin levels (e.g. ACR) • Serum creatinine levels (change in levels should be understood in context with BMI) • Rates of anemia (incl. fatigue related to anemia) *Relevant clinical outcomes* • Medication adherence • Blood glucose/A1c • Blood pressure • Rate of cardiovascular events (e.g., heart failure, stroke) • Health-related quality of life (e.g., KDQOL-36) • Mortality • Safety (e.g., TRAEs, crisis events) *User experience* • Retention in program/treatment adherence • Patient engagement • Patient activation • Patient satisfaction *HCRU* • IP/ED utilization • Dialysis start rate (planned/unplanned) • Transplant rates ***Health equity***	N/A

	• Access and accessibility • Accessibility • Distribution • Outcomes by subgroups of interest	
Study Design	• Clinical trials (randomized, non-randomized, or single arm) • Observational studies with sample size n≥20 • SLR/MA[a, b]	• Address, case reports / case series, commentaries, editorials, published erratum, lectures, letters, personal narrative, study protocols, non-systematic and narrative reviews
Data Sources	• MEDLINE (via PubMed), EMBASE, ClinicalTrials.gov, FDA 510(k)	N/A
Conferences	• ASN Kidney Week • NKF Spring Clinical Meeting • American Nephrology Nurses Association – National Symposium	N/A
Date of Publication	• Databases: 2015 to 2025 • Conferences: 2022 to 2025	N/A
Language	English	N/A
Geography	• United States (including mixed studies with ex-US patients)	N/A

Notes: N/A = not applicable. SLR = systematic literature review. ACR = Albumin-to-Creatinine ratio. BMI= body mass index. CKD = chronic kidney disease. ED = emergency department. eGFR = estimated glomerular filtration rate. HCRU = health care resource utilization. IP = in-patient. MA = meta-analysis. [a] SLRs are included for manual reference checks only for studies published between 2015 to 2025 and will not be included in the qualitative evidence synthesis. [b] Inclusion of SLRs/MAs is limited to 2020-2025.[c] Mixed populations with less than five percent on dialysis and less than 20% in stages 1-2 were included.

Screening

All publications identified by the systematic literature searches were reviewed against the predefined selection criteria (Table 3). Study selection followed a two-stage screening process based on the review of titles and abstracts (stage I) and full-text articles (stage II). Following completion of title/abstract review, all full texts of publications identified for inclusion during this stage were retrieved for further review. For conference abstracts without available associated posters and for database abstracts without a full text available, the report was screened based on the available information within the abstract. Title/abstract and full-text screening for each report were conducted by two independent investigators with any disagreements resolved by discussion with a third investigator, if needed.

All screening was conducted using Nested Knowledge software, which provides a platform where reports retrieved from the database searches can be organized and screened using customizable entry forms. During both screening stages, abstracts and articles were excluded if they had populations, interventions, outcomes, settings, study designs, or publication types that were out of scope based on the PICOS criteria. Studies published in languages other than English were also excluded.

Data Extraction

Data were extracted by one investigator with quality assurance against the original source publication completed by another independent investigator. Table 4 lists the reported data captured for each included study.

Table 4. Data Collected

Study Information
Publication citation
Study identifier or trial name
Study design
Inclusion and exclusion criteria
Definition of outcomes
Geography
Follow-up duration
Patient Information
Sample size
Age, in years
Sex
Race/Ethnicity
CKD stages
Duration of illness
Duration of treatment
Comorbid conditions
Interventions
Mobile health (mHealth) applications and text messaging programs
Wearables and connected devices for remote monitoring
Digital platforms
Provider-facing analytics and care team tools
Telehealth / telemedicine solutions
Outcomes[a,b]
CKD specific outcomes
eGFR
Serum creatinine levels (change in levels should be understood in context with BMI)
Rates of anemia (incl. fatigue related to anemia)
Albumin levels (e.g. ACR)
Disease progression
Relevant clinical outcomes
Blood glucose/A1c
Blood pressure
Rate of cardiovascular events (e.g., heart failure, stroke)
Health-related quality of life (validated instruments)
Mortality
Safety (e.g., TRAEs, crisis events)
User experience / HCRU outcomes
Retention in program/treatment adherence
Patient engagement
Patient activation
Patient satisfaction
HCRU
• Medication adherence
• IP/ED utilization

- Dialysis start rate (planned/unplanned)
- Transplant rates

Health equity

Access and accessibility
Accessibility
Distribution

Outcomes by subgroups of interest in context of health equity: Race/Ethnicity, gender, age, urban/rural

Notes: [a] If outcomes are reported across multiple timepoints, results will be captured separately. [B] Will include mean, median, and/or effect estimates as reported, and clinically important differences (MCID) achieved.

Evidence Quality Assessment

All included randomized controlled trials (RCTs) were assessed for potential bias using the Cochrane Collaboration Risk of Bias in Randomized Trials Version 2 (RoB2).[1] The RoB2 includes a maximum of 22 questions that considers the following domains: Domain 1: Risk of bias arising from the randomization process, Domain 2: Risk of bias due to deviations from the intended interventions (effect of assignment or adherence to intervention), Domain 3: Missing outcome data, Domain 4: Risk of bias in measurement of the outcome, Domain 5: Risk of bias in selection of the reported result. Possible ROB2 ratings are shown in Table 5.

Table 5. Risk of Bias Categories for RoB2

Rating	Criteria
Low risk of bias	The trial is judged to be at low risk of bias for all domains for this result.
Some concerns	The trial is judged to raise some concerns in at least one domain for this result, but not to be at high risk of bias for any domain.
High risk of bias	The trial is judged to be at high risk of bias in at least one domain for this result. OR The trial is judged to have some concerns for multiple domains in a way that substantially lowers confidence in the result.

Notes. RoB2 = risk of bias in randomized trials version 2.

Non-randomized and observational studies were assessed using the Newcastle-Ottawa Scale (NOS).[2] Studies were evaluated for multiple criteria within 3 categories: selection of groups, comparability of groups, and either exposure or outcome, depending on the type of study. Possible NOS ratings are shown in Table 6.

Table 6. Risk of Bias Rating Using NOS

Rating	Description
++	All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter.
+	Some of the checklist criteria have been fulfilled, where they have not been fulfilled or not adequately described, the conclusions are unlikely to alter.
-	Few or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

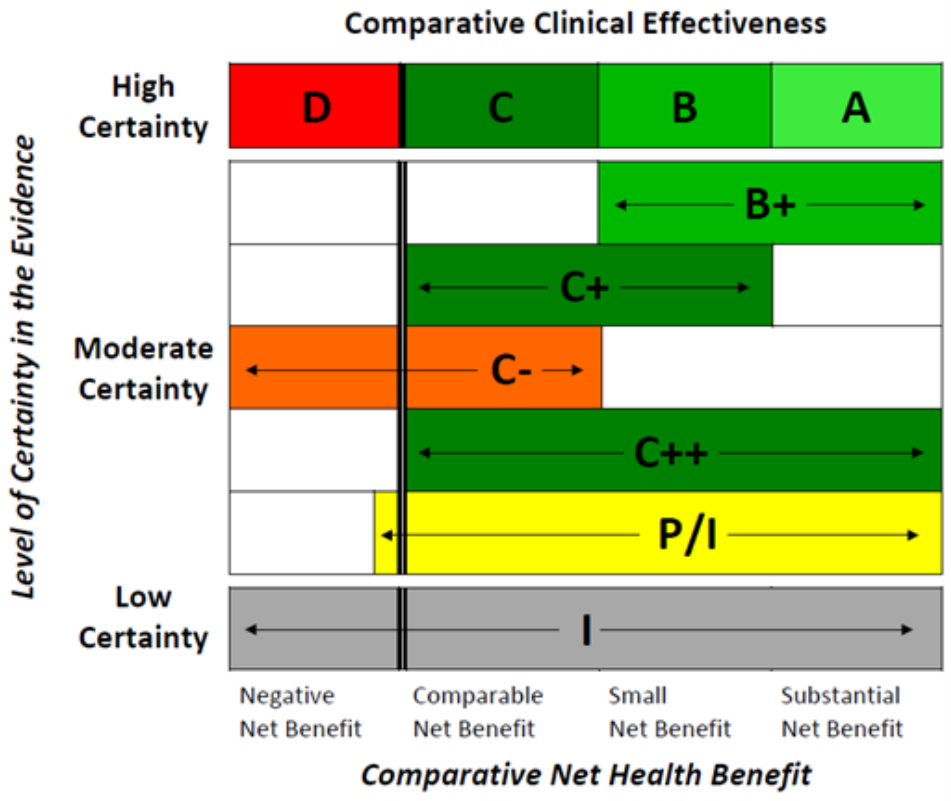
Notes. NOS = Newcastle Ottawa Scale.

For ease of interpretation, scales from the two Risk of Bias tools were converted to a single scale: Low, Moderate, High. "Low" refers to original ratings of "Low Risk of Bias" (ROB2) or "Good Study Quality" (NOS); "Moderate" refers to original ratings of "Some Risk of Bias" (ROB2) or "Fair Study Quality" (NOS); "High" refers to original ratings of "High Risk of Bias" (ROB2) or "Poor Study Quality" (NOS).

ICER-PHTI Assessment Framework Evidence Standards: The body of research that comprised the clinical effectiveness section was assessed against the minimum evidence requirements set forth in the ICER-PHTI framework based on the level of risk that the digital intervention presents to a user. The interventions in this assessment qualify as Tier 3b according to the ICER-PHTI Assessment Framework because they are professionally directed therapeutic services with "moderate to severe risk" to patients if they are not effective. The minimum evidence requirements for Tier 3b are RCTs demonstrating clinical efficacy. Other real-world comparative evidence and single-arm studies may be considered as additional supporting data.

ICER Evidence Rating Matrix: The body of evidence for each digital solution approach was evaluated based on effectiveness and safety that followed the ICER Evidence Rating Matrix™ (see Figure 1).

Figure 1. The ICER Evidence Rating Matrix™



- ***A*** = ***"Superior"*** *– High certainty of a substantial (moderate-large) net health benefit*
- ***B*** = ***"Incremental"*** *– High certainty of a small net health benefit*
  C = ***"Comparable"*** *– High certainty of a comparable net health benefit*
- ***D***= ***"Negative"*** *– High certainty of an inferior net health benefit*
- ***B***+= ***"Incremental or Better"*** *– Moderate certainty of a small or substantial net health benefit, with high certainty of at least a small net health benefit*
- ***C***+ = ***"Comparable or Incremental"*** *– Moderate certainty of a comparable or small net health benefit, with high certainty of at least a comparable net health benefit*
- ***C-*** = ***"Comparable or Inferior"*** *– Moderate certainty that the net health benefit is either comparable or inferior, with high certainty of at best a comparable net health benefit*
- ***C***++ = ***"Comparable or Better"*** *– Moderate certainty of a comparable, small, or substantial net health benefit, with high certainty of at least a comparable net health benefit*
- ***P/I*** = ***"Promising but Inconclusive"*** *– Moderate certainty of a small or substantial net health benefit, small likelihood of a negative net health benefit*
- ***I*** = ***"Insufficient"*** *– Any situation in which the level of certainty n the evidence is low*

Evidence Evaluation Approach

The evaluation approach is informed by expert advisors in the healthcare space, clinical advisors, and patients with a goal of producing meaningful evaluations that inform purchasing decisions.

Virtual Solutions for Chronic Kidney Disease Management: The solutions evaluated aim to support patients with CKD and their providers with disease management over the course of disease. Only three of the eight companies included in this report produced evidence on the clinical or economic effectiveness of their solutions that met inclusion criteria, making up approximately 18% of the literature reviewed. Therefore, most of the evidence for these solutions comes from noncompany evidence. Within the noncompany evidence, most interventions comprise elements of clinical decision support, care team extensions, and virtual education modules that are featured in all of the solutions in this assessment. Although company models vary in structure, most incorporate the same core components studied in the literature.

Comparator Interventions: This assessment prioritizes studies that include comparators over single-arm studies to understand the incremental impact of virtual solutions relative to usual care. Across the comparative studies in this evaluation, "usual care" reflected active clinical management of patients diagnosed with CKD, rather than an untreated control. Patients in control arms typically received routine CKD care within primary care or nephrology settings, which often included medication management and elements of patient education. Many patients and clinicians have access to EHRs and accompanying virtual patient portals in usual care. Comparisons in this report

therefore estimate the incremental effect of virtual CKD management solutions above usual CKD care.

Clinical Outcomes: This evaluation examines evidence about solution impact on two primary outcomes for CKD management: slowing the rate of disease progression and improving dialysis transition. The evidence includes direct clinical outcomes for patients and process measures that enable these clinical benefits. Secondary clinical outcomes described in the evidence include comorbidity management, quality of life, and patient education.

Slowing Disease Progression

This evaluation assesses two measures that support slowed disease progression: guideline-recommended medication utilization and kidney function decline, measured by eGFR, progression to ESKD, and the doubling of serum creatinine. While uACR is an important marker for understanding and managing disease progression, only one study in this review assessed changes in albuminuria.

For medication utilization, most studies measured medication utilization as prescription fill rates or days of supply, and few studies reported baseline rates of utilization. For kidney function decline, studies reported a range of outcomes, including change in eGFR, change in annual eGFR slope, share of patients who reached the next stage of CKD, related surrogate endpoints including progression to ESKD and doubling of serum creatinine, and composite outcomes.

Improving Dialysis Transitions

This evaluation assesses two measures that are indicative of improved dialysis transitions: planned dialysis starts and hospitalizations and emergency department (ED) visits. Planned initiation may contribute to reduced vascular access complications and infections, and more informed modality choice—factors associated with lower hospitalization rates and reduced avoidable acute care.

For planned dialysis starts, outcomes reported include: optimal end stage kidney disease (ESKD) starts (defined as preemptive kidney transplants, home dialysis starts, and in-center hemodialysis starts without a central venous catheter (CVC)), outpatient initiation, home dialysis use, and avoidance of CVCs. For hospitalization and ED visits, outcomes reported include both those linked to planned dialysis starts and those in the general CKD population.

Comparator Studies Data: Among comparator studies that had more than one article, the most complete and relevant data across all study articles was selected for interpretation of the findings. For studies missing between-group differences data points, values were calculated based on data provided in the study articles or, when figures or graphs were provided, digitized data values were obtained. Between-group comparison values were based on differences at follow-up periods when reported or calculation was possible.

Minimally Important Clinical Differences (MCID): There is no consensus in the literature or among clinical experts about what constitutes a minimal clinically important difference (MCID) for the primary outcomes in this evaluation, including medication adherence, eGFR or related surrogate disease progression endpoints, and planned or optimal ESKD starts.

User Experience and Health Equity: To be clinically effective, virtual solutions for chronic kidney diseases management must engage patients and deliver strong user experience. The assessment includes data on patients' user experience, satisfaction, and engagement with the solutions. In addition, patient sociodemographic characteristics were used to better understand how the solutions performed in different patient subgroups.

Centers for Medicare and Medicaid Services (CMS) Kidney Care Choices (KCC) Model Data Sources: Three data sources inform PHTI's assessment of the KCC model's clinical and financial performance. The first is an annual evaluation report, released by CMS and conducted by The Lewin Group. Using a difference-in-differences design, the report compares spending, utilization, and quality outcomes for patients aligned to the model—measured during a premodel period (January 2017–December 2019) and the respective performance year—against a comparison group of patients receiving nephrology care from nonparticipating practices matched on practice and market characteristics. CMS has released evaluation reports for performance years 2022 and 2023.[34] The second source is an annual financial reconciliation file which documents each participating entity's spending relative to its benchmark. CMS has released annual reconciliation files for performance years 2022, 2023, and 2024. [567] The third is the KCC Public Use File (PUF), which is available for performance year 2022 and contains entity-level beneficiary data, participating entity and provider data, and financial and quality measures data.[8] Each data source reflects the most recent data available as of July 31, 2026. For clarity, this report refers to KCEs as "practices" throughout, reflecting the central role that nephrology practices play in each KCE.

Annual Evaluation Report Methodology: Values are reported as published in CMS's KCC Model annual evaluation reports; this evaluation performed no additional calculations. Outcomes for the patients aligned to the Comprehensive Kidney Care Contracting (CKCC) option of the KCC model are prioritized in this evaluation because evaluated companies participate in the option. This assessment uses evaluation report estimates as context alongside the systematic literature review (see Appendix E-1). Key sources of data referenced in the report include: Exhibit B-19 in the 2022 Evaluation Report Appendix and Exhibits E-26 through E-30 in the 2023 Evaluation Report Appendix.

Financial Reconciliation Analysis Methodology: Each CKCC practice's company affiliation was identified by its "Affiliated Dialysis/Care Coordination Organization" column entry in the reconciliation file. This evaluation relabels two organizations for consistency: "US Renal Care" is relabeled as "Kidneylink," the U.S. Renal Care subsidiary that operates as its value-based kidney

care brand, and "Fresenius" is relabeled as "Interwell Health," the value-based care operating group of Fresenius Medical Care.

This analysis calculates and reports gross CKD savings rates for practices, companies, and the CKCC option overall because this assessment's scope is the management of patients with CKD. The reconciliation files report Adjusted CKD Benchmark and Performance Year CKD Expenditure as fields distinct from their ESKD counterparts and the combined (CKD and ESKD) benchmarks and expenditures. Gross CKD Savings Rate is calculated as: (CKD Adjusted Benchmark − CKD Expenditures) ÷ CKD Adjusted Benchmark, applied at the practice, company, and CKCC-option level (See Appendix E-3 and E-4).

Company-level CKD Expenditures and CKD Adjusted Benchmark are calculated by summing the corresponding fields across a company's affiliated practices; Company-level CKD Gross Savings Rate is calculated from these totals using the same formula. CKCC-level annual CKD gross savings per beneficiary is calculated by dividing CKD Expenditures and CKD Adjusted Benchmark separately by CKD Beneficiary Months, then subtracting annualized CKD Expenditures per Beneficiary from annualized CKD Adjusted Benchmark Per Beneficiary (see Appendix E-3).

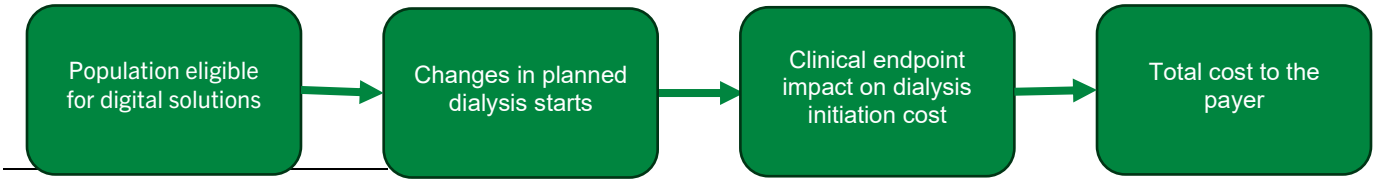
KCC Model Public Use File (PUF) Dataset Methodology**:** The KCC Model Public Use File (PUF) dataset reports each practice's optimal ESKD start rate in the "Quality" tab. This evaluation assesses optimal ESKD start for practices in the CKCC option that were established in the model's first year, representing all participating practices in performance year 2022.[1]

Each entity's optimal start rate was matched to its affiliated company by matching the "Entity Name" column to the "Entity Legal Business Name" column in the in the 2022 reconciliation file, which maps entities to their affiliated company (column name "Affiliated Dialysis/Care Coordination Organization). Each company's optimal start rate is the average of its entities' rates; See Exhibit 16 and Appendix E-2.

Economic Assessment

PHTI developed a de novo budget impact analysis for virtual solutions for adults in the United States (US) with stage 3-5 chronic kidney disease (CKD). The model assumed a hypothetical 1,000,000 member US health plan, where eligible patients with CKD stage 3-5 are attributed to a virtual solution for CKD management compared to usual care and followed over one year. The model estimates the healthcare spending between the two groups.

Figure 2: Budget Impact Model Schematic



1. CMS originally reported 55 participating entities in performance year 2022, but the final performance year roster list, reconciliation data, and public use file contain data for 50 practices.

Table 7: Eligible Population Inputs

Category	Details
Intervention	Virtual CKD management solutions
Comparator	Usual care without virtual solution use
Costs considered	Annual spending of a dialysis initiation per patient for virtual solution and usual care
Results	• Incremental budget impact, total • Incremental budget impact per attributed member in CKD • Incremental budget impact per member per month
Model assumptions and limitations	• The model includes a commercial, Traditional Medicare, and Medicare Advantage perspective. Medicaid is not included in the model since a majority of Medicaid patients with CKD are dual-eligible or transition to Medicare as the primary payer after a three-month waiting period following dialysis initiation • The model does not assume an uptake in the virtual solution or an engagement rate for the virtual solution • The pre-dialysis period is assumed to be 4 months, followed by 8 months of dialysis[9] • Where needed, health plan-specific costs were derived by multiplying costs identified in the literature by published Medicare to Medicaid conversion rates[10] • A dialysis-specific cost conversion was used to estimate Medicare to commercial costs[11]

Notes: CKD = chronic kidney disease.

Analysis Inputs

Patient Population: The eligible patient population for the analysis was US adults with diagnosed CKD stages 3-5 initiating dialysis. The model assumes all eligible patients with diagnosed CKD stages 3-5 are attributed to a virtual solution program. Purchasers typically attribute members to CKD companies on the basis of ICD-10 codes and either nephrology practice relationships or geographic regions. Once attributed, the CKD company is responsible for managing the total cost of care for all attributed patients, regardless of whether individual patients actively engage with the program.

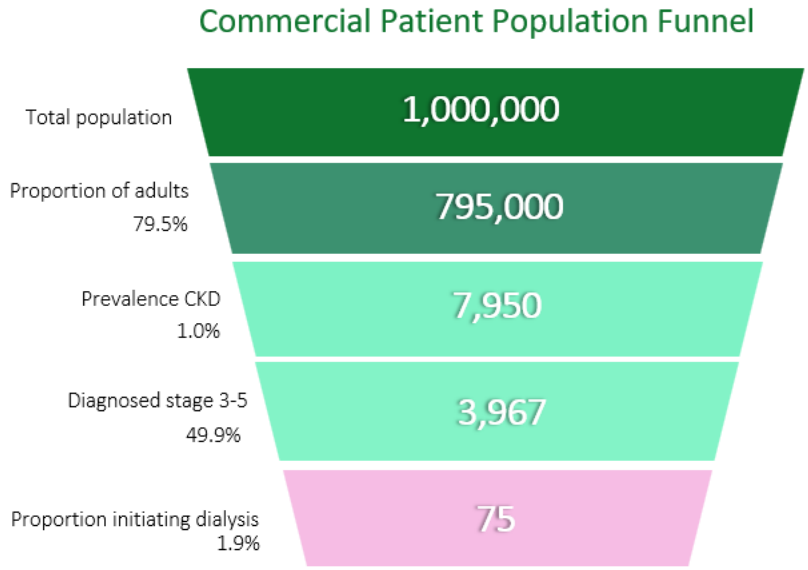
Prevalence of CKD and stage at diagnosis was estimated from published literature.[12] The proportion of patients initiating dialysis was derived using the proportion who are diagnosed at stage 3-5, multiplied by the one-year change in CKD status of patients by stage that are alive and on dialysis, as informed by the United States Renal Data System (USRDS).[13] Commercial enrollees with CKD are assumed to have an age mix similar to Medicaid enrollees; therefore the model assumes the incidence of dialysis initiation among commercial patients with CKD is assumed to match the Medicaid rate informed by the USRDS. Patient population funnel inputs are presented in **Error! Reference source not found.**8. The patient funnel diagrams are presented in **Error! Reference source not found.**.

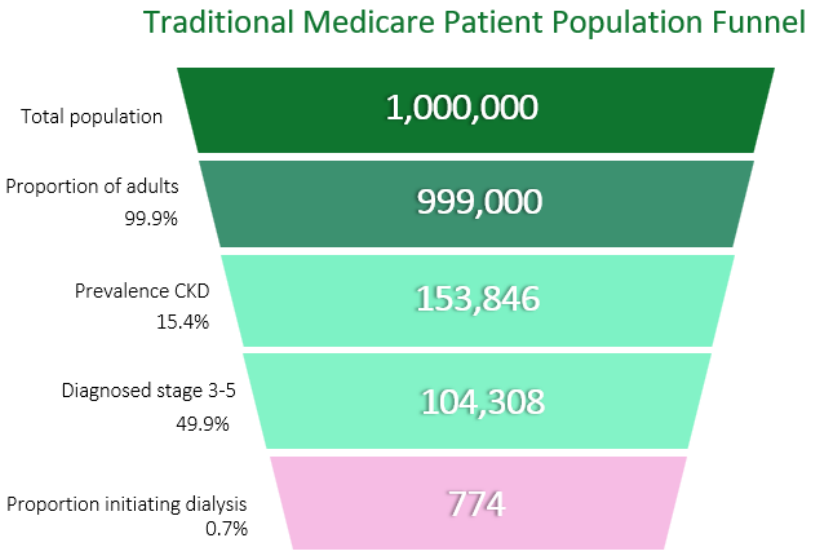
Table 8: Eligible Population Inputs

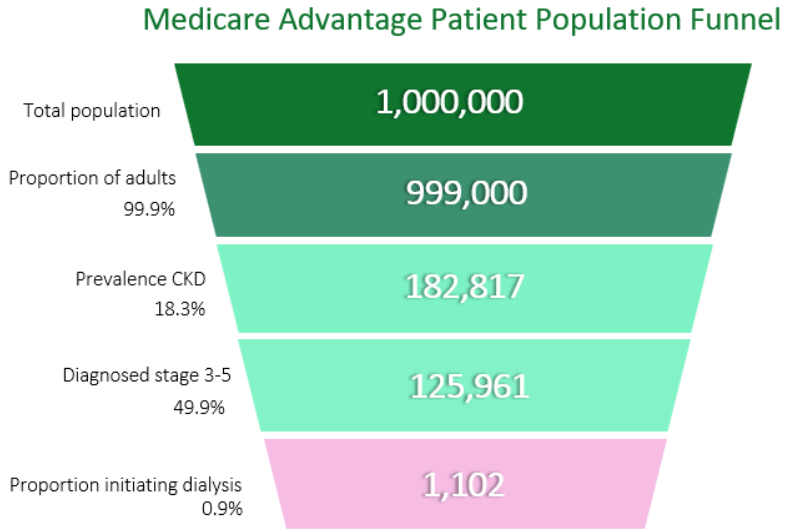
Criteria	Commercial	Traditional Medicare	Medicare Advantage	Source
Plan population	1,000,000	1,000,000	1,000,000	Assumption
Proportion of plan that is adults	79.5%	99.9%	99.9%	ACS[14]
Prevalence of CKD	1.0%	15.4%	18.3%	National Kidney Foundation[15]
Proportion stage 3	43.3%	56.8%	58.4%	
Proportion stage 4	5.6%	10.0%	9.5%	
Proportion stage 5	1.0%	1.0%	1.0%	
Enrollees with diagnosed stage 3-5 CKD attributed to the virtual solution	***0.4%***	***10.4%***	***12.6%***	***Calculation***
Proportion in stage 3, initiating dialysis	1.1%	0.1%	0.2%	USRDS[16]
Proportion in stage 4, initiating dialysis	5.9%	3.2%	3.6%	
Proportion in stage 5, initiating dialysis	14.4%	12.6%	14.4%	
Attributed enrollees initiating dialysis	***1.9%***	***0.7%***	***0.9%***	***Calculation***

Note: ACS = American Community Survey; CKD = chronic kidney disease; USRDS = United States Renal Data System

Figure 3: Population Funnels for a 1 Million-Member Health Plan







Costs: Cost inputs for the budget impact analysis were informed by a review of published literature. Cost inputs were inflated to 2025 US dollars using the annual Consumer Price Index for medical care.[17] For the Medicaid perspective, Medicare to Medicaid payment rate conversions for outpatient and inpatient services were applied to the Medicare cost to derive Medicaid plan-specific costs.[18] Costs were assumed equal for Medicare FFS and Medicare Advantage. Published evidence indicates that privately insured patients incur substantially higher dialysis costs than Medicare beneficiaries, driven by the market power of large dialysis organizations and the limited commercial negotiating leverage. Therefore, the model applied a cost adjustment for commercial spending based on published estimates that commercial dialysis costs are approximately three times as high as Medicare.[19] These ratios are presented in Table 9.

Table 9: Health plan Cost Conversions

Health Plan	Ratio
Medicare to Medicaid	Inpatient: 87% Outpatient: 70%
Medicare to Commercial	Dialysis: 296%

Costs in this analysis include pre- and post-dialysis initiation costs. Pre-dialysis monthly costs were applied to capture the increased resource utilization during the transition to dialysis in the four months immediately preceding initiation. Four months was chosen based on the increasing cost trajectories observed in published literature prior to dialysis initiation.[20] Post-dialysis costs were incurred for eight months to estimate total annual spending for a dialysis initiation. Pre- and post-dialysis costs for crash, optimal, and suboptimal starts were estimated from published literature and assumed as Medicare costs based on the payer demographics of the study population (63% Medicare ACO, 30% Medicare Advantage, and 7% commercial).[21]

The model assumed that costs of unplanned starts would be a weighted average of the suboptimal and crash costs based on the distribution of patients from the study (53% crash, 21% suboptimal, and 26% optimal). Monthly costs for pre- and post-dialysis are presented in Table 10.

Table 10: Dialysis Costs by Start Type (2025 USD)

Dialysis Start and Period Cost	Commercial	Traditional Medicare / Medicare Advantage
Monthly Pre-Planned Start Cost	$6,618	$2,237
Monthly Post-Planned Start Cost	$20,686	$6,994
Annual Planned Start Cost	*$191,956*	*$64,899*
Monthly Pre-Unplanned Start Cost	$19,465	$6,581
Monthly Post-Unplanned Start Cost	$35,454	$11,987
Annual Unplanned Start Cost	*$361,487*	*$122,217*
Difference in Dialysis Start Cost	**$169,531**	**$57,317**

Note: Sums may not add up due to rounding

Clinical Inputs: Monthly pre- and post-dialysis costs were applied as a weighted blend of unplanned and planned start rates based on CMS' KCC Model data on optimal ESKD start rates. In 2023, optimal starts increased from 40% pre-model to 58% post-model among CKCC-aligned patients, compared with an increase from 37% to 43% among matched patients in non-participating practices — a difference-in-difference of 12.4 percentage points.[22] The model assumed the impact on planned start rate was equal across markets, although the effectiveness of virtual solutions is likely to have varying impacts across health plans of different patient populations. This difference in planned start rate was used to derive the average annual spending of dialysis initiation per patient with a virtual solution compared to usual care presented in Table 11.

Table 11: Annual Spending for Dialysis Initiation by Treatment Arm, PPPY (2025 USD)

Treatment Arm	Commercial	Traditional Medicare / Medicare Advantage
Usual Care	$298,082	$100,780
Virtual Solution	$277,061	$93,673
Difference in Annual Spending	**$21,022**	**$7,107**

Note: Sums may not add up due to rounding

Total Cost of Care: To estimate total annual spending for patients with CKD managed by the virtual CKD companies, the model relied on published literature to estimate annual, all-cause, total healthcare spending per patient with CKD by stage. The model drew on a retrospective claims analysis reporting all-cause commercial and Medicare FFS healthcare costs for individuals with CKD, defining costs to include inpatient, ED, outpatient, and pharmacy spending across all care settings.[23] Average health plan-allowed costs per service were applied to each service-event occurring during each CKD stage, with patients assigned to either Medicare (aged ≥65 years) or commercial (aged <65 years) on the basis of pre-index age. Actuarial values were used to uplift cost inputs to represent the total cost of care rather than just health-plan allowed costs.[24,25] Costs per patient by CKD stage are presented in Table 12. Total estimated spending for the attributed CKD population was calculated based on the number of attributed patients per CKD stage from Table 8 and presented in Table 13.

Table 12: Annual Spending Per Patient by CKD Stage

Stage	Commercial	Traditional Medicare / Medicare Advantage
Stage 3a	$39,883	$32,786
Stage 3b	$64,704	$42,901
Stage 4/5	$114,364	$72,137

Table 13: Total Spending by CKD Stage

Stage	Commercial	Traditional Medicare	Medicare Advantage
Stage 3a	$180,012,413	$3,306,942,921	$4,040,374,106
Stage 3b	$50,914,751	$1,109,802,167	$1,252,851,342
Stage 4/5	$9,091,919	$110,980,216	$131,879,088
Total Spending for Attributed Population	**$240,019,085**	**$4,527,725,305**	**$5,425,104,538**

Virtual Solution Program Costs: The model does not assume any cost for the CKD management solution because these solutions contract under shared-savings models.

Engagement/Uptake Rate: The model does not assume a separate uptake or engagement rate for the virtual CKD management solution because all patients diagnosed with stage 3-5 CKD are attributed to the solution.

Appendix B – SLR Studies, Company-Specific Clinical Citations, and HCRU Data

Appendix B-1: 44 Articles Included in the SLR

Study Articles	Article Type	Study Category	Data Source	Full Reference
Healthmap Solutions				
Toth-Manikowski 2024	Abstract/ Poster	O	Online Databases & Conference Proceedings	Stephanie M. Toth-Manikowski, Abigail Forte, Richmond Kwawu, et al., "Transitioning Adults with CKD and Type 2 Diabetes from a Dipeptidyl- Peptidase 4 Inhibitor to a SGLT2 Inhibitor: A Population Health Initiative," Journal of the American Society of Nephrology 35, no. 10 suppl. (2024): FR-PO329. https://doi.org/10.1681/ASN.2024nj8gzvt9
Interwell Health				
Dubin 2019	Full text	I	Online Databases & Conference Proceedings	Ruth Dubin and Anna Rubinsky, "A Digital Modality Decision Program for Patients with Advanced Chronic Kidney Disease," JMIR Formative Research 3, no. 1 (2019): e12528.
Kaiser 2020	Full text	O	Online Databases & Conference Proceedings	Paulina Kaiser, Olivia Pipitone, Anthony Franklin, et al., "A Virtual Multidisciplinary Care Program for Management of Advanced Chronic Kidney Disease: Matched Cohort Study," Journal of Medical Internet Research 22, no. 2 (2020): e17194. https://pubmed.ncbi.nlm.nih.gov/32049061/
Peralta 2020	Full text	I	Online Databases & Conference Proceedings	Carmen A. Peralta, Jennifer Livaudais-Toman, Marilyn Stebbins, et al., "Electronic Decision Support for Management of CKD in Primary Care: A Pragmatic Randomized Trial," American Journal of Kidney Diseases 76, no. 5 (2020): 636–644. https://doi.org/10.1053/j.ajkd.2020.05.013
Strive Health				
Simon 2025	Full text	O	Online Databases & Conference Proceedings	Emily Simon, Melissa Feeney, Joan Mendenhall, et al., "Link from Hospital to Home: Ensuring Quality Transitions for CKD Patients," Journal of Patient Experience 12 (2025): 23743735251367076. https://doi.org/10.1177/23743735251367076
Feeney 2025	Full text	O	Online Databases & Conference Proceedings	Melissa Feeney, Joseph Mehltretter, Tammy Cheung, et al., "Value-Based Care Interventions and Management of CKD Progression," American Journal of Managed Care 31, no. 10 (2025): e302–e307. https://doi.org/10.37765/ajmc.2025.89812
Other				
Anand 2021	Full Text	I	Online Databases & Conference Proceedings	Shuchi Anand, Susan L. Ziolkowski, Ahad Bootwala, et al., "Group-Based Exercise in CKD Stage 3b to 4: A Randomized Clinical Trial," Kidney Medicine 3, no. 6 (2021): 951–961.e1.

Study Articles	Article Type	Study Category	Data Source	Full Reference
Awdishu 2016	Full Text	I	Online Databases & Conference Proceedings	Linda Awdishu, Carrie R. Coates, Adam Lyddane, et al., "The Impact of Real-Time Alerting on Appropriate Prescribing in Kidney Disease: A Cluster Randomized Controlled Trial," Journal of the American Medical Informatics Association 23, no. 3 (2016): 609–616. https://doi.org/10.1093/jamia/ocv159
Boulware 2023	Full Text	I	Online Databases & Conference Proceedings	L. Ebony Boulware, Jamie A Green, Patti L Ephraim, et al., Testing a Program to Help Patients Prepare for Kidney Failure Treatment—The PREPARE NOW Study, Washington, DC: Patient-Centered Outcomes Research Institute, 2023. https://doi.org/10.25302/07.2023.IHS.14092096
Bruinius 2022	Full Text	I	Online Databases & Conference Proceedings	Jacob Bruinius, Mary Hannan, Mustafa Kagalwalla, et al., "Healthy Diet Text Message-Based Intervention in Adults with CKD: A Pilot Study," Journal of Nephrology 35, no. 6 (2022): 1759–1761. https://doi.org/10.1007/s40620-021-01233-5
Carroll 2018	Full Text	I	Online Databases & Conference Proceedings	Jennifer K. Carroll, Gerald Pulver, L. Miriam Dickinson, et al., "Effect of 2 Clinical Decision Support Strategies on Chronic Kidney Disease Outcomes in Primary Care: A Cluster Randomized Trial," JAMA Network Open 1, no. 6 (2018): e183377. https://doi.org/10.1001/jamanetworkopen.2018.3377
Cooney 2015	Full Text	I	Online Databases & Conference Proceedings	Danielle Cooney, Helen Moon, Yang Liu, et al., "A Pharmacist-Based Intervention to Improve the Care of Patients with CKD: A Pragmatic, Randomized, Controlled Trial," BMC Nephrology 16, (2015): 56. https://doi.org/10.1186/s12882-015-0052-2
Dopp 2023	Full Text	O	Online Databases & Conference Proceedings	John M. Dopp, Austin Lange, and Laura Maursetter, "Interdisciplinary Telehealth Team Positively Impacts Difficult-to-Control Hypertension in CKD," Kidney 360 4, no. 6 (2023): e817–e823. https://doi.org/10.34067/kid.0000000000000130
Drake 2023	Full Text	O	Online Databases & Conference Proceedings	Connor Drake, Abigail Rader, Christie Clipper, et al., "Adaptation to Telehealth of Personalized Group Visits for Late-Stage Diabetic Kidney Disease," Kidney 360 4, no. 12 (2023): 1708–1716. https://doi.org/10.34067/kid.0000000000000301
Easom 2020	Full Text	I	Online Databases & Conference Proceedings	Andrea M. Easom, Ashutosh M. Shukla, Dumitru Rotaru, et al., "Home Run-Results of a Chronic Kidney Disease Telemedicine Patient Education Study," Clinical Kidney Journal 13, no. 5 (2020): 867–872. https://doi.org/10.1093/ckj/sfz096
Ennis 2015*	Full Text	O	Online Databases & Conference Proceedings	Jennifer Ennis, Daniel Gillen, Arthur Rubenstein, et al., "Clinical Decision Support Improves Physician Guideline Adherence for Laboratory Monitoring of Chronic Kidney Disease: A Matched Cohort Study," BMC Nephrology 16 (2015): 163. https://doi.org/10.1186/s12882-015-0159-5
Fink 2020	Registered Clinical Trial Data	I	Online Databases & Conference Proceedings	Jeffrey Fink, "Care Coordination/Telehealth to Address Patient Safety and Poor Outcomes in CKD," ClinicalTrials.gov, accessed November 7, 2025. https://clinicaltrials.gov/study/NCT03038126

Study Articles	Article Type	Study Category	Data Source	Full Reference
Fritz 2023	Full Text	O	Online Databases & Conference Proceedings	Benjamin A. Fritz, "Virtual Care in Nephrology: An In-Depth Retrospective Analysis of Outcomes Using the Reset Kidney Health Model," Journal of Clinical Medicine 13, no. 1 (2023): 66. https://doi.org/10.3390/jcm13010066
Green 2021	Full Text	I	Online Databases & Conference Proceedings	Jamie A. Green, Patti L. Ephraim, Felicia Hill-Briggs, et al., "Integrated Digital Health System Tools to Support Decision Making and Treatment Preparation in CKD: The PREPARE NOW Study," Kidney Medicine 3, no. 4 (2021): 565–575.e1. https://doi.org/10.1016/j.xkme.2021.03.009
Ishani 2016	Full Text	I	Online Databases & Conference Proceedings	Areef Ishani, Juleen Christopher, Deirdre Palmer, et al., "Telehealth by an Interprofessional Team in Patients with CKD: A Randomized Controlled Trial," American Journal of Kidney Diseases 68, no. 1 (2016): 41–49. https://doi.org/10.1053/j.ajkd.2016.01.018
Jhamb 2024	Full Text	I	Online Databases & Conference Proceedings	Manisha Jhamb, Melanie R. Weltman, Susan M. Devaraj, et al, "Electronic Health Record Population Health Management for Chronic Kidney Disease Care: A Cluster Randomized Clinical Trial," JAMA Internal Medicine 184, no. 7 (2024): 737–747. https://doi.org/10.1001/jamainternmed.2024.0708
Abdel-Kader 2024	Registered Clinical Trial Data	I	Online Databases & Conference Proceedings	Khaled Abdel-Kader and Manisha Jhamb, "Kidney Coordinated Health Management Partnership (Kidney-CHAMP)," ClinicalTrials.gov, last updated August 22, 2025. https://clinicaltrials.gov/study/NCT03832595
Kwon 2024	Abstract / Poster	O	Online Databases & Conference Proceedings	Katherine Westin Kwon, Roy G. Marcus, Douglas Eckhardt, et al., "Increasing Use of SGLT2 Inhibitors in Patients with CKD and Heart Failure through Physician Education and Outreach Reduces Inpatient Admissions in a Value-Based Care Model," Journal of the American Society of Nephrology 35, no. 10 suppl. (2024): TH-PO1045. https://doi.org/10.1681/ASN.2024yvjyhtw6
Ladin 2023	Full Text	I	Online Databases & Conference Proceedings	Keren Ladin, Hocine Tighiouart, Olivia Bronzi, et al., "Effectiveness of an Intervention to Improve Decision Making for Older Patients with Advanced Chronic Kidney Disease: A Randomized Controlled Trial," Annals of Internal Medicine 176, no. 1 (2023): 29–38. https://doi.org/10.7326/m22-1543
Litvin 2016	Full Text	I	Online Databases & Conference Proceedings	Cara B. Litvin, J. Madison Hyer, and Steven M. Ornstein, "Use of Clinical Decision Support to Improve Primary Care Identification and Management of Chronic Kidney Disease (CKD)," Journal of the American Board of Family Medicine 29, no. 5 (2016): 604–612. https://doi.org/10.3122/jabfm.2016.05.160020
Marcus 2023*	Abstract / Poster	O	Online Databases & Conference Proceedings	Roy G. Marcus, Dave M. Miller, Brian H. Nathanson, et al., "Encouraging a Standardized ESKD Transition Approach in a Comprehensive Kidney Care Contracting (CKCC) Program Is Associated with Increased Optimal Dialysis Starts," Journal of the American Society of Nephrology 34, no. 11 suppl. (2023): 14. https://doi.org/10.1681/asn.20233411s114a

Study Articles	Article Type	Study Category	Data Source	Full Reference
Marcus 2024a	Full Text	O	Online Databases & Conference Proceedings	Roy G. Marcus Katherine Westin Kwon, Rohit Sharma, et al., "Encouraging a Standardized ESKD Transition Pathway in Value-Based Care (VBC) Patients Is Associated with a High Optimal Dialysis Start Rate," Journal of the American Society of Nephrology 35, no. 10 suppl. (2024): SA-PO1132. https://doi.org/10.1681/ASN.2024g01zbhga
Marcus 2024b	Full Text	O	Online Databases & Conference Proceedings	Roy G. Marcus, David M. Miller, Brian H. Nathanson, et al. "A Standardized Care Pathway Increases Optimal Dialysis Starts," American Journal of Managed Care 30, no. 12 (2024): e345–e351. https://doi.org/10.37765/ajmc.2024.89642
Montoya 2024	Full Text	I	Online Databases & Conference Proceedings	Vicki Montoya, Desiree A. Díaz, and Gregory E. Gilbert, "Utilizing Telehealth Education for Persons with Chronic Kidney Disease Stages 4–5: Eliminating Barriers at the Patient and Provider Level," Nephrology Nursing Journal 51, no. 5 (2024): 443–452. https://pubmed.ncbi.nlm.nih.gov/39503452/
Navaneethan 2017	Full Text	I	Online Databases & Conference Proceedings	Sankar D. Navaneethan, Stacey E. Jolly, Jesse D. Schold, et al., "Pragmatic Randomized, Controlled Trial of Patient Navigators and Enhanced Personal Health Records in CKD," Clinical Journal of the American Society of Nephrology 12, no. 9 (2017): 1418–1427. https://doi.org/10.2215/cjn.02100217
Samal 2022	Full Text	I	Online Databases & Conference Proceedings	Lipika Samal, John D. D'Amore, Michael P. Gannon, et al., "Impact of Kidney Failure Risk Prediction Clinical Decision Support on Monitoring and Referral in Primary Care Management of CKD: A Randomized Pragmatic Clinical Trial," Kidney Medicine 4, no. 7 (2022): 100493. https://doi.org/10.1016/j.xkme.2022.100493
Samal 2024a	Full Text	I	Online Databases & Conference Proceedings	Lipika Samal, John L. Kilgallon, Stuart Lipsitz, et al. "Clinical Decision Support for Hypertension Management in Chronic Kidney Disease: A Randomized Clinical Trial," JAMA Internal Medicine 184, no. 5 (2024): 484–492. https://doi.org/10.1001/jamainternmed.2023.8315
Samal 2024b	Registered Clinical Trial Data	I	Online Databases & Conference Proceedings	Lipika Samal, "Electronic Tools to Increase Recognition and Improve Primary Care Management for Hypertension in Chronic Kidney Disease," ClinicalTrials.gov, last updated November 26, 2024. https://clinicaltrials.gov/study/NCT03679247
Samal 2025*	Full Text	I	Online Databases & Conference Proceedings	Lipika Samal, Sarah W. Chen, Stuart Lipsitz, et al., "User Actions Within a Clinical Decision Support Alert for the Management of Hypertension in Chronic Kidney Disease," Applied Clinical Informatics 16, no. 3 (2025): 595–603. https://doi.org/10.1055/a-2554-3969
Schrauben 2023	Abstract / Poster	I	Online Databases & Conference Proceedings	Sarah J. Schrauben, Adriana Purcell, Andrea Bilger, et al., "Supporting Self-Management of Healthy Behaviors (SMART-HABITS) in CKD and Hypertension: A Pilot Trial." Journal of the American Society of Nephrology 34, no. 11 suppl. (2023): 40. https://doi.org/10.1681/ASN.20233411S140a

Study Articles	Article Type	Study Category	Data Source	Full Reference
Schrauben 2024a	Full Text	I	Online Databases & Conference Proceedings	Sarah J. Schrauben, Diane Park, Sandra Amaral, et al., "Supporting Self-Management of Healthy Behaviors in Chronic Kidney Disease and Hypertension: The Supporting Self-Management of Healthy Behaviors Pilot Randomized Trial," Clinical Journal of the American Society of Nephrology 19, no. 9 (2024): 1109–1118. https://doi.org/10.2215/cjn.0000000000000492
Schrauben 2024b	Registered Clinical Trial Data	I	Online Databases & Conference Proceedings	Sarah Schrauben, "A Pilot Trial of the Feasibility of a Patient-Centered Mobile Health Self-Management Support Tool for Healthy Behaviors (SMART-HABITS) in Chronic Kidney Disease," ClinicalTrials.gov, last updated November 17, 2025. https://clinicaltrials.gov/study/NCT04858295
Sequist 2018	Full Text	I	Online Databases & Conference Proceedings	Thomas D. Sequist, Alison M. Holliday, E. John Orav, et al., "Physician and Patient Tools to Improve Chronic Kidney Disease Care," American Journal of Managed Care 24, no. 4 (2018): e107–e114. https://pubmed.ncbi.nlm.nih.gov/29668213/
Sperl-Hillen 2024	Full Text	I	Online Databases & Conference Proceedings	JoAnn Sperl-Hillen, A. Lauren Crain, James B. Wetmore, et al., "A CKD Clinical Decision Support System: A Cluster Randomized Clinical Trial in Primary Care Clinics," Kidney Medicine 6, no. 3 (2023):100777. https://doi.org/10.1016/j.xkme.2023.100777
Tan 2018	Full Text	O	Online Databases & Conference Proceedings	Judy Tan, Anita Mehrotra, Girish N. Nadkarni, et al., "Telenephrology: Providing Healthcare to Remotely Located Patients with Chronic Kidney Disease," American Journal of Nephrology 47, no. 3 (2018): 200–207. https://doi.org/10.1159/000488004
Tome 2021	Full Text	O	Online Databases & Conference Proceedings	June Tome, Shahbaz Ahmed, Angela Fagerlin, et al., "Patient Electronic Health Record Portal Use and Patient-Centered Outcomes in CKD," Kidney Medicine 3, no. 2 (2021): 231–240.e1. https://pmc.ncbi.nlm.nih.gov/articles/PMC8039427/
Tuot 2018	Full Text	I	Online Databases & Conference Proceedings	Delphine S. Tuot, Charles E. McCulloch, Alexandra Velasquez, et al., "Impact of a Primary Care CKD Registry in a U.S. Public Safety-Net Health Care Delivery System: A Pragmatic Randomized Trial," American Journal of Kidney Disease 72, no. 2 (2018): 168–177.
Weltman 2025a	Full Text	I	Online Databases & Conference Proceedings	Melanie R. Weltman, Linda-Marie U. Lavenburg, Zhuoheng Han, et al., "Population Health Management and Guideline-Concordant Care in CKD: A Secondary Analysis of Kidney Coordinated Health Management Partnership," Journal of the American Society of Nephrology 36, no. 5 (2025): 869–881. https://doi.org/10.1681/asn.0000000544
Weltman 2025b*	Full Text	I	Online Databases & Conference Proceedings	Melanie R. Weltman, Zhuoheng Han, Linda-Marie U. Lavenburg, et al., "Effect of a Population Health Management Intervention on Medication Therapy Problems in People with Chronic Kidney Disease: Post Hoc Analysis of the K-CHAMP Cluster-Randomized Trial," Kidney Medicine 7, no. 5 (2025): 100995. https://pubmed.ncbi.nlm.nih.gov/40330910/

Notes: I = interventional. O = observational. Systematic literature reviews and meta-analyses are not included in the table. *Denotes articles with data that could not be extracted.

Appendix B-2: 17 Company-specific Clinical Citations Excluded from SLR

Source	Full Reference	Reason for Exclusion	Details on Reason for Exclusion
Healthmap Solutions			
Company Data Submission	Toth-Manikowski, Stephanie, Howard Shaps, and John Danziger. “Updates to Management of Adults With Chronic Kidney Disease.” American Family Physician 111, no. 3 (2025): 202–204.	Publication type out of scope	Publication is an editorial
Interwell Health			
Company Data Submission	Bergling, Karin, Lin-Chun Wang, Oshini Shivakumar, Andrea Nandorine Ban, Linda W. Moore, Nancy Ginsberg, Jeroen Kooman, Neill Duncan, Peter Kotanko, and Hanjie Zhang. "From bytes to bites: application of large language models to enhance nutritional recommendations." Clinical Kidney Journal 18, no. 4 (2025): sfaf082.	Publication type out of scope	Publication is a review
Company Data Submission	Chaudhuri, Sheetal, Hao Han, Len Usvyat, Yue Jiao, David Sweet, Allison Vinson, Stephanie Johnstone Steinberg et al. "Machine learning directed interventions associate with decreased hospitalization rates in hemodialysis patients." International Journal of Medical Informatics 153 (2021): 104541.	Population out of scope	Population consists of dialysis patients
Company Data Submission	Chaudhuri, Sheetal, Andrew Long, Hanjie Zhang, Caitlin Monaghan, John W. Larkin, Peter Kotanko, Shashi Kalaskar et al. "Artificial intelligence enabled applications in kidney disease." In Seminars in dialysis, vol. 34, no. 1, pp. 5-16. 2021.	Publication type out of scope	Publication is a review
Company Data Submission	Chaudhuri, Sheetal. “Psychosocial Assessments and Hospital Admission Rates in Elevated or High Acuity Hemodialysis Patients.” Oral presentation at the ERA Congress, Milan, Italy, June 15–18, 2023.	Population out of scope	Population consists of dialysis patients
Company Data Submission	Couchoud, Cecile, Brenda Hemmelgarn, Peter Kotanko, Michael J. Germain, Olivier Moranne, and Sara N. Davison. "Supportive care: time to change our prognostic tools and their use in CKD." Clinical journal of the American Society of Nephrology 11, no. 10 (2016): 1892-1901.	Publication type out of scope	Publication is a review
Company Data Submission	Fleischmann, Georg, Gundula Fillafer, Heike Matterer, Falko Skrabal, and Peter Kotanko. "Prevalence of chronic kidney disease in patients with suspected sleep apnoea." Nephrology Dialysis Transplantation 25, no. 1 (2010): 181-186.	Population out of scope	Population consists of patients with sleep apnea
Company Data Submission	Han, Sang-Woong, Anca Tilea, Brenda W. Gillespie, Fredric O. Finkelstein, Margaret A. Kiser, George Eisele, Peter Kotanko, Nathan Levin, and Rajiv Saran. "Serum sodium levels and patient outcomes in an ambulatory clinic-based chronic kidney disease cohort." American journal of nephrology 41, no. 3 (2015): 200-209.	Intervention out of scope	Intervention does not include a digital component
Company Data Submission	Hussein, Usama, Monica Cimini, Garry J. Handelman, Jochen G. Raimann, Li Liu, Samer R. Abbas, Peter Kotanko, Nathan W. Levin, Fredric O. Finkelstein, and Fansan Zhu. "Identification of	Intervention out of scope	Intervention does not include a digital component

Source	Full Reference	Reason for Exclusion	Details on Reason for Exclusion
	fluid overload in elderly patients with chronic kidney disease using bioimpedance techniques." Journal of Applied Physiology 133, no. 1 (2022): 205-213.		
Company Data Submission	Kooman, Jeroen P., Peter Kotanko, Annemie MWJ Schols, Paul G. Shiels, and Peter Stenvinkel. "Chronic kidney disease and premature ageing." Nature Reviews Nephrology 10, no. 12 (2014): 732-742.	Intervention out of scope	Intervention does not include a digital component
Company Data Submission	Kooman, Jeroen P., Marijke J. Dekker, Len A. Usvyat, Peter Kotanko, Frank M. van der Sande, Casper G. Schalkwijk, Paul G. Shiels, and Peter Stenvinkel. "Inflammation and premature aging in advanced chronic kidney disease." American Journal of Physiology-Renal Physiology 313, no. 4 (2017): F938-F950.	Intervention out of scope	Intervention does not include a digital component
Company Data Submission	Korgaonkar, Sonal, Anca Tilea, Brenda W. Gillespie, Margaret Kiser, George Eisele, Fredric Finkelstein, Peter Kotanko, Bertram Pitt, and Rajiv Saran. "Serum potassium and outcomes in CKD: insights from the RRI-CKD cohort study." Clinical journal of the American Society of Nephrology 5, no. 5 (2010): 762-769.	Intervention out of scope	Intervention does not include a digital component
Company Data Submission	Long, Andrew, and Adriana M. Lindsey. “Reducing Hospitalizations with Artificial Intelligence and Clinical Decision Support: Lessons Learned.” Poster presented at the American Society of Nephrology Kidney Week, Washington, DC, November 9, 2019.	Population out of scope	Population consists of dialysis patients
Company Data Submission	Maddux, Dugan W., Len A. Usvyat, Daniel DeFalco, Peter Kotanko, Jeroen P. Kooman, Frank M. van der Sande, and Franklin W. Maddux. "Effects of renal care coordinator case management on outcomes in incident dialysis patients." Clin Nephrol 85, no. 3 (2016): 152-158.	Population out of scope	Population consists of dialysis patients
Company Data Submission	Willetts, Joanna, Hokyung A. Roh, Mary Kay Shepherd, Jamie Bissett, Hao Han, Anna Chew, Michelle Carver, Dinesh K. Chatoth, Len A. Usvyat, and Sheetal Chaudhuri. "Impact of Using a Dietitian Acuity-Based Risk Score for Patients with ESKD: FR-PO1110." Journal of the American Society of Nephrology 36, no. 10S (2025): 10-1681.	Population out of scope	Population consists of dialysis patients
Company Data Submission	Zoccali, Carmine, Patrick B. Mark, Pantelis Sarafidis, Rajiv Agarwal, Marcin Adamczak, Rodrigo Bueno de Oliveira, Ziad A. Massy et al. "Diagnosis of cardiovascular disease in patients with chronic kidney disease." Nature Reviews Nephrology 19, no. 11 (2023): 733-746.	Intervention out of scope	Intervention does not include a digital component
Company Data Submission	Zoccali, Carmine, Francesca Mallamaci, Mehmet Kanbay, Katherine R. Tuttle, Peter Kotanko, Raffaele De Caterina, Guido Grassi, and Giuseppe Mancia. "The autonomic nervous system and inflammation in chronic kidney disease." Nephrology Dialysis Transplantation 40, no. 8 (2025): 1470-1482.	Intervention out of scope	Intervention does not include a digital component

Appendix B-3: 2 Company-specific Economic Citations Included with Healthcare Resource Utilization Claims

Source	Full Reference
Somatus	
Company Website	Validation Institute, "2025–2026 Validation Report: Review for Somatus—Savings," Accessed August 1, 2026. https://validationinstitute.com/mp-files/somatus_savings_2025_final.pdf/
Strive Health	
Company Website	Strive Health, "Case Study: Strive Health Reduces Hospital Admissions and ER Visits for Kidney Patients," Accessed August 1, 2026. https://strivehealth.com/resource-center/southeast-regional-health-plan-partnership/

Appendix C – Risk of Bias Ratings for SLR Studies

Appendix C-1: Risk of Bias Ratings using the Cochrane Collaboration Risk of Bias in Randomized Trials Version 2 (ROB2)

Study Articles	Overall Rating	Random Sequence Generation	Deviation from Intended Intervention Bias	Missing Outcome Data	Outcomes Measurement Bias	Selective Reporting
Interwell Health						
Peralta 2020	Low	Low	Low	Low	Low	Low
Other						
Anand 2021	High	Low	Low	High	Low	Low
Awdishu 2016	Moderate	Some	Low	Low	Low	Some
Bruinius 2022	Moderate	Some	Low	Low	Low	Some
Carroll 2018	Low	Low	Low	Low	Low	Low
Cooney 2015	Moderate	Low	Some	Low	Low	Some
Easom 2020	High	Low	High	Low	Low	Some
Fink 2020*	N/A	N/A	N/A	N/A	N/A	N/A
Green 2021; Boulware 2023	Moderate	Some	Some	Low	Low	Low
Ishani 2016	Low	Low	Low	Low	Low	Low
Jhamb 2024; Weltman 2025a; Weltman 2025b[a]; Abdel-Kader 2024*	Low	Low	Low	Low	Low	Low
Ladin 2023	High	High	Low	Low	Low	Low
Navaneethan 2017	Moderate	Low	Some	Some	Low	Some
Samal 2022	High	Low	High	Low	Low	Low
Samal 2024a; Samal 2024b*; Samal 2025[a]	Low	Low	Low	Low	Low	Low
Schrauben 2024a; Schrauben 2024b*; Schrauben 2023	Low	Low	Low	Low	Low	Low
Sequist 2018	Low	Low	Low	Low	Low	Low
Sperl-Hillen 2024	Low	Low	Low	Low	Low	Low
Tuot 2018	Some	Low	Some	Low	Low	Low

Notes: N/A = not applicable. See Appendix A for detailed rating information. * Indicates clinicaltrials.gov entry. [a] Was not included in data extraction.

Appendix C-2: Risk of Bias Ratings using the Newcastle-Ottawa Scale (NOS)

Study Articles	Overall Rating	Group Selection	Group Comparability	Outcome/Exposure Assessment
Interwell Health				
Dubin 2019	Good	+++		+++
Kaiser 2020	Good	+++	+	+++
Healthmap Solutions				
Toth-Manikowski 2024	N/A	N/A	N/A	N/A
Strive Health				
Feeney 2025	Fair	++		++
Simon 2025	Good	+++	++	+++
Other				
Dopp 2023	Poor	+		++
Drake 2023	Poor	++	N/A	+
Ennis 2015	Poor	++++	++	+
Fritz 2023	Poor	++	N/A	+
Kwon 2024	N/A	N/A	N/A	N/A
Litvin 2016	Good	+++		++
Marcus 2024a; Marcus 2024b; Marcus 2023	Good	+++	++	++
Montoya 2024	Poor	+++	–	+++
Tan 2018	Good	+++	+	+++
Tome 2021	Good	++++	++	++

Notes: N/A = not applicable. More + indicates better evidence quality (lower risk of bias). See Appendix A for detailed rating information. * Indicates conference abstract/poster/clinicaltrials.gov entry. [a]Study article used to assess risk of bias.

Appendix D – Key Comparator Studies with Primary Outcomes

Appendix D-1: Medication Utilization Outcomes

Publication	Company (Solution)	Risk of Bias	Total N, Study	Reported Metric	Treatment Arm	Total N, Arm	Timepoint (Months)	Baseline, Mean	Follow-Up, Mean	Between Group Difference at Follow-Up		Between Group Difference from Baseline	
										Mean	p-value	Mean	p-value
Medication Utilization, ACEi/ARBs													
Cooney 2015	N/A	Moderate	2199	Appropriate use of ACEi/ARBs	DHT	481	12	N/R	64.2%	*2.5*	0.4	N/R	N/R
					Control	483		N/R	61.7%	N/R	N/R	N/R	N/R
Jhamb 2024	N/A	Low	1596	Exposure days per year to ACEi/ARBs[a]	DHT	754	17	N/R	*53.9%*	*9.2*	(1.02, 1.43)[b]	N/R	N/R
					Control	842		N/R	*44.7%*	N/R	N/R	N/R	N/R
Peralta 2020	Interwell Health (Cricket Health)	Low	524	ACEi/ARB use	DHT [eCDSS]	165	12	61.8%	52.0%	*1.0*	0.3	*0.4*	N/R
					DHT [plus]	171		59.7%	44.0%	*-7.0*	0.3	*-5.5*	N/R
					Control	188		61.2%	51.0%	N/R	N/R	N/R	N/R
Sequist 2018	N/A	Low	7691	ACEi/ARB prescription	DHT [low-risk]	1254	12	N/R	64.0%	*-1.0*	0.6	N/R	N/R
					Control [low-risk]	1233		N/R	65.0%	N/R	N/R	N/R	N/R
					DHT [high-risk]	1902		N/R	76.0%	*-3.0*	0.2	N/R	N/R
					Control [high-risk]	1835		N/R	79.0%	N/R	N/R	N/R	N/R
Sperl-Hillen 2024	N/A	Low	6420	New ACEi/ARB orders	DHT	608	18	N/A	15.9%	*-0.2*	0.6	N/R	N/R
					Control	1192		N/A	16.1%	N/R	N/R	N/R	N/R
Medication Utilization, SGLT2 Inhibitors													
Toth-Manikowski 2024	Healthmap Solutions	N/A	364	Started an SGLT2 inhibitor in the follow-up period	DHT	273	3	N/A	4.0%	*3.0*	0.07	N/R	N/R
					Control	91		N/A	1.0%	N/R	N/R	N/R	N/R
Weltman 2025a	N/A	Low	1596	Exposure days per year to SGLT2 inhibitors[a]	DHT	397	17	*4.4%*	*15.3%*	*6.6*	0.02	*6.0*	N/R
					Control	437		*3.8%*	*8.8%*	N/R	N/R	N/R	N/R

Notes: DHT = digital health technology. N/R = not reported. N/A = not applicable. NS = not statistically significant at the 0.05 level, but no p-value reported. All values are rounded to one decimal place; differences may not sum due to rounding. Italic values are calculated values from other data provided in the articles. Where a p-value was not reported, an alternative measure of statistical significance (e.g., 95% confidence interval) is reported instead. Peralta 2020 included two intervention groups: one that received an electronic clinical decision support system (eCDSS) and one that received the eCDSS plus pharmacist support (plus). Sequist 2018 stratified patients into low-risk and high-risk subgroups and compared intervention with control within each subgroup. [a]Jhamb 2024 and Weltman 2025a are articles from the same study and report medication utilization as days per year; converted to share of days per year for comparability. [b]Jhamb 2024 did not report a p-value for the between-group difference and so the 95% confidence interval of the rate ratio is reported instead. Because this interval excludes 1.0, the result is statistically significant.

Appendix D-2: Kidney Function Decline Outcomes

Publication	Company (Solution)	Risk of Bias	Total N, Study	Reported Metric	Treatment Arm	Total N, Arm	Timepoint (Months)	Baseline, Mean	Follow-Up, Mean	Slope	Change from Baseline Between Group Difference at Follow-Up		Between Group Difference in Annualized Slope at Follow-Up	
											Mean	p-value	Mean	p-value
Cooney 2015	N/A	Moderate	2199	Progression to ESKD	DHT	1070	12	N/R	2.4%	N/A	*0.6*	0.28	N/A	N/A
					Control	1129		N/R	1.8%	N/A	N/R	N/R	N/A	N/A
Fink 2020	N/A	N/A	118	eGFR	DHT	61	6	42.5	*42.1*	N/R	*2.8*	N/R	N/R	N/R
					Control	53		42.4	*39.2*	N/R	N/R	N/R	N/R	N/R
Jhamb 2024	N/A	Low	1596	eGFR	DHT	754	17	37.1	*35.7*	-1.1	*0.7*	N/R	*0.1*	NS
					Control	842		36.6	*35.0*	-1.0	N/R	N/R	N/R	N/R
				≥40% reduction in eGFR that was maintained in the next outpatient eGFR measurement	DHT	754		N/R	5.9	N/A	*-0.2*	NS	N/A	N/A
					Control	842		N/R	6.1	N/A	N/R	N/R	N/A	N/A
				uACR[a]	DHT	754		86.0	*108.9*	N/R	-18.2	0.72	N/R	N/R
					Control	842		84.6	*125.8*	N/R	N/R	N/R	N/R	N/R
Navaneethan 2017	N/A	Moderate	209	eGFR	DHT [ePHR]	50	24	34.0	27.6	N/R	*-0.8*	N/R	-0.3	NS
					DHT [ePHR+]	49		35.9	32.0	N/R	*1.7*	N/R	-0.3	NS
					Control	57		35.7	30.1	N/R	N/A	N/R	N/A	N/R
				Reached new CKD stage, started dialysis, or got transplant	DHT [ePHR]	50		N/A	40.0	N/A	0.0	NS	N/A	N/A
					DHT [ePHR+]	49		N/A	41.0	N/A	1.0	NS	N/A	N/A
					Control	57		N/A	40.0	N/A	N/R	N/A	N/A	N/A
Tan 2018	N/A	Low	228	Composite endpoint of death, ESKD, or doubling of serum creatinine	DHT	112	24	N/A	16.1%	N/A	*-0.3*	0.96	N/A	N/A
					Control	116		N/A	16.4%	N/A	N/R	N/R	N/A	N/A

Notes: DHT = digital health technology. eGFR = estimated glomerular filtration rate. N/R = not reported. N/A = not applicable. NS = not statistically significant at the 0.05 level, but no p-value reported. uACR = urine albumin-to-creatinine ratio. All values are rounded to one decimal place; differences may not sum due to rounding. Italic values are calculated values from other data provided in article. Data extracted from a figure is in blue. Navaneethan 2017 included two intervention arms: one that received an enhanced personal health record solution (ePHR) and one that received the ePHR in addition to a patient navigator (ePHR+). [a]Jhamb 2024 reported median, rather than mean, uACR values.

Appendix D-3: Planned Dialysis Start Outcomes

Publication	Company (Solution)	Risk of Bias	Total N, Study	Reported Metric	Treatment Arm	Total N, Arm	Total ESKD starts, N (%)	Timepoint (Months)	Number of Patients with Planned Start (As a share of All ESKD Starts), N (%)	Between Group Difference p-value
Easom 2020	N/A	High	240	Home dialysis initiation (hemodialysis or peritoneal dialysis)	DHT	93	28 (*30.1*)	N/R	*9 (32.1)*	N/R
					Control	89	35 (39.3)		*21 (60.0)*	N/R
Kaiser 2020	Interwell Health (Cricket Health)	Low	98	Started dialysis as a planned outpatient	DHT	37	10 (27.0)	16	8 (80.0)	(1.46, 32.66)[a]
					Control	61	9 (15.0)		2 (22.2)	N/R

Notes: DHT = digital health technology. N/R = not reported. Italic values are calculated values from other data provided in the articles. Where a p-value was not reported, an alternative measure of statistical significance (e.g., 95% confidence interval) is reported instead. [a]Kaiser 2020 did not report a p-value for the between-group difference, so the 95% confidence interval of the hazard ratio is reported instead. Because this interval excludes 1.0, the result is statistically significant.

Appendix D-4: Hospitalization and ED Visit Outcomes

Publication	Company (Solution)	Risk of Bias	Total N, Study	Reported Metric	Treatment Arm	Total N, Arm	Timepoint (Months)	Follow-Up, Mean (%)	Between Group Difference at Follow-Up	
									Mean	p-value
Boulware 2023	N/A	Moderate	2695	Hospitalizations per 100 patients per quarter	DHT	1654	36	9.7	*-0.88*	N/R
					Control	1343		10.6	N/R	N/R
Fink 2020	N/A	N/A	118	Hospitalizations per month	DHT	63	6	0.1	N/R	N/R
					Control	55		0.2	N/R	N/R
Ishani 2016	N/A	Low	601	Hospitalizations	DHT	450	12	29.8	*3.1*	NS
					Control	150		26.7	N/R	N/R
				ED Visits	DHT	450		36.4	*-2.3*	NS
					Control	150		38.7	N/R	N/R
Jhamb 2024	N/A	Low	1596	Hospitalizations or ED Visits	DHT	754	17	54.2	*0.9*	N/R
					Control	842		53.3	N/R	N/R
Navaneethan 2017	N/A	Moderate	209	Hospitalizations and / or ED Visits[a]	DHT [ePHR]	50	24	*2.0*	N/R	NS
					DHT [ePHR+]	43		*2.3*	N/R	NS
					Control	68		*1.5*	N/R	N/R
Simon 2025	Strive Health	Low	4069	Hospital Readmissions	DHT	1041	7 days	3.0	*-2.2*	<0.01
					Control	3028		5.2	N/R	N/R
					DHT	1041	14 days	5.9	*-3.4*	<0.001
					Control	3028		9.3	N/R	N/R
					DHT	1041	30 days	12.1	*-4.0*	<0.01
					Control	3028		16.1	N/R	N/R

Notes: DHT = digital health technology. N/R = not reported. N/A = not applicable. NS = not statistically significant at the 0.05 level, but no p-value reported. ED = emergency department. All values are rounded to one decimal place; differences may not sum due to rounding. Italic values are calculated values from other data provided in the articles. Navaneethan 2017 included two intervention arms: one that received an enhanced personal health record solution (ePHR) and one that received the ePHR in addition to a patient navigator (ePHR+). [a]Navaneethan 2017 reports the number of hospitalizations / ED visits; values have been converted to percentages for comparability.

Appendix E – Key Outcomes from the KCC Model

Appendix E-1: KCC Evaluation Reports Outcomes, 2022 and 2023

Reported Metric	Treatment Arm	Baseline (%)	Follow-Up (%)	Between Group Difference at Follow-Up: Difference in Difference (Percentage Point)	Between Group Difference at Follow-Up: p-value
2022					
Proportion of days covered by an ACEi/ARB	CKCC	30.2	32.0	-0.3	NS
	Control	28.8	30.8	N/R	N/R
Proportion of days covered by an SGLT2 inhibitor	CKCC	0.2	4.7	0.0	NS
	Control	0.0	4.5	N/R	N/R
Optimal ESKD starts	CKCC	43.9	60.2	6.9	<0.05
	Control	38.7	48.1	N/R	N/R
Patients with at Least One Acute Care Hospitalization in a Given Month	CKCC	9.2	8.1	0.1	NS
	Control	9.1	7.8	N/R	N/R
Percentage of Patients with at Least One Hospitalization for Vascular Access Complications in a Given Month	CKCC	0.9	1.0	0.0	NS
	Control	0.8	1.0	N/R	N/R
Patients with at Least One Outpatient ED Visit in a Given Month	CKCC	8.6	7.6	0.1	NS
	Control	9.0	7.8	N/R	N/R
Patients with at Least One Readmission within 30 Days of an Index Hospitalization Stay in a Given Month	CKCC	27.4	26.8	-0.5	NS
	Control	26.7	26.6	N/R	N/R
Quarterly GFR testing	CKCC	85.4	85.1	0.8	NS
	Control	85.5	84.3	N/R	N/R
Patient Activation Measure	CKCC	55.6	63.7	8.1[a]	<0.01
Transplants (per 1,000 patient-months)	CKCC	4.6	5.7	-0.1[b]	NS
	Control	4.6	5.9	N/R	N/R
2023					
Proportion of days covered by an ACEi/ARB	CKCC	30.3	34.0	0.2	NS

	Control	29.7	33.2	N/R	N/R
Proportion of days covered by an SGLT2 inhibitor	CKCC	-0.5	7.4	0.2	NS
	Control	-0.7	7.0	N/R	N/R
Time from onset of CKD stage 4 to dialysis initiation	CKCC	N/R	N/R	N/R	0.92[c]
	Control	N/R	N/R	N/R	N/R
Time from onset of CKD stage 5 to dialysis initiation	CKCC	N/R	N/R	N/R	0.79[c]
	Control	N/R	N/R	N/R	N/R
Time from CKD stage 4 to an event of an event of CKD 5, Preemptive transplant, ESKD or death, whichever comes first	CKCC	N/R	N/R	N/R	0.61[c]
	Control	N/R	N/R	N/R	N/R
Time from CKD stage 5 to ESKD, preemptive transplant, or death	CKCC	N/R	N/R	N/R	0.77[c]
	Control	N/R	N/R	N/R	N/R
Optimal ESKD starts	CKCC	40.4	57.9	12.4	<0.01
	Control	37.4	42.5	N/R	N/R
Patients with at Least One Acute Care Hospitalization in a Given Month	CKCC	9.0	8.2	0.2	NS
	Control	8.9	7.9	N/R	N/R
Percentage of Patients with at Least One Hospitalization for Vascular Access Complications in a Given Month	CKCC	0.85	1.1	0.0	NS
	Control	0.77	1.0	N/R	N/R
Patients with at Least One Outpatient ED Visit in a Given Month	CKCC	8.4	7.5	-0.1	NS
	Control	8.6	7.9	N/R	N/R
Patients with at Least One Readmission within 30 Days of an Index Hospitalization Stay in a Given Month	CKCC	27.4	26.9	0.1	NS
	Control	26.7	26.2	N/R	N/R
Quarterly GFR testing	CKCC	84.5	84.0	1.2	<0.01
	Control	84.5	82.7	N/R	N/R
Patient Activation Measure	CKCC	55.8	63.6	7.8[a]	<0.01
Transplants (per 1,000 patient-months)	CKCC	3.1	4.7	0.0[b]	NS
	Control	3.1	4.7	N/R	N/R

Notes: N/R = not reported. N/A = not applicable. NS = not statistically significant at the 0.05 level, but no p-value reported. Values are reported as published in CMS's KCC Model annual evaluation reports; PHTI performed no additional calculations. All values are rounded to one decimal place; differences may not sum due to rounding. [a]Reflects risk-adjusted within-group mean difference. [b]Reflects difference in differences (DiD) in number of transplants per 1,000 patient-months. [c] Reflects the significance of the Cox model's parameter estimate, rather than a DiD treatment effect.

Sources: Brighita Negrusa, Jennifer Wiens, Darin Ullman, et al., "Kidney Care Choices (KCC) Model First Annual Evaluation Report, Performance Year 2022—Appendices," CMS, August 2024. https://www.cms.gov/kcc-model-eval-ann-rpt-1-app. Brighita Negrusa, Jennifer Wiens, Darin Ullman, et al., "Kidney Care Choices (KCC) Model Second Annual Evaluation Report, Performance Year 2023—Appendices," CMS, February 2026. https://www.cms.gov/priorities/innovation/data-and-reports/2026/kcc-2nd-annual-report-app

Appendix E-2: Optimal ESKD Start Rate by Company and Practice, 2022

Practice	Optimal ESKD Start Rate
CKCC, Overall	49.3%
DaVita IKC	**48.7%**
Integrated Kidney Care of South Texas, LLC	34.7%
Integrated Kidney Care of Texas and Oklahoma, LLC	38.5%
Integrated Kidney Care of Florida, LLC	39.3%
Integrated Kidney Care of Minnesota, LLC	44.0%
Integrated Kidney Care of Southern California, LLC	44.2%
Integrated Kidney Care of New Jersey and Pennsylvania, LLC	44.6%
Integrated Kidney Care Of Virginia, LLC	45.7%
Integrated Kidney Care of Georgia, LLC	51.6%
Integrated Kidney Care of Northern California, LLC	52.1%
Integrated Kidney Care of Pennsylvania and Ohio, LLC	52.4%
Integrated Kidney Care of Nevada, LLC	88.5%
Evergreen Nephrology	**61.8%**
Tennessee Kidney Care Alliance, LLC	48.7%
Camino Renal Care, LLC	75.0%
Interwell Health	**53.3%**
Houston Kidney Care Entity, LLC	22.2%
Heartland Kidney Care Entity, LLC	40.8%
Delmarva Kidney Care Entity, LLC	43.8%
Southern Florida Kidney Care Entity, LLC	45.3%
Northwest Kidney Care Entity, LLC	46.7%
Las Vegas Kidney Care Entity, LLC	49.3%
Michigan Kidney Care Entity, LLC	51.1%
Philadelphia Kidney Care Entity, LLC	51.6%

Practice	Optimal ESKD Start Rate
New Jersey Kidney Care Entity, LLC	51.6%
Red River Kidney Care Entity, LLC	51.6%
Kentuckiana Kidney Care Entity, LLC	53.7%
Dallas Kidney Care Entity, LLC	55.4%
Louisissippi Kidney Care Entity, LLC	56.6%
Grand Canyon Kidney Care Entity, LLC	57.4%
Southeast Kidney Care Entity, LLC	57.6%
Alabama Kidney Care Entity, LLC	58.3%
Central North Carolina Kidney Care Entity, LLC	60.0%
Erie Valley Kidney Care Entity, LLC	60.7%
Charlotte Kidney Care Entity, LLC	72.0%
Eastern North Carolina Kidney Care Entity, LLC	79.6%
Kidneylink	**38.1%**
Integrated Kidney Partners V, LLC	36.7%
Integrated Kidney Partners III, LLC	37.5%
Integrated Kidney Partners II, LLC	40.0%
Strive Health	**36.7%**
Gateway Kidney Care KCE, LLC	30.0%
Detroit Kidney Care KCE, LLC	34.8%
Integrated Patient Solutions IPA, LLC	36.9%
NANI Patient Care Innovations	45.1%
Other participating entities	**47.8%**
Tennessee Valley Kidney Care Alliance, LLC	21.4%
Kidney Care Center Alliance, LLC	34.9%
Total Kidney Health of Northern California, LLC	38.7%
Metropolitan And Capital Region Kidney Care Alliance, LLC	40.7%

Practice	Optimal ESKD Start Rate
CKCC Independence Kidney Care Alliance, LLC	41.7%
Florida FKP KCE, LLC	55.1%
SKI Arizona KCE, LLC	56.6%
Pennsylvania CRAL KCE, LLC	57.1%
Carolina Kidney Partners, LLC	58.6%
West Coast Kidney KCE, LLC	73.2%

Source: CMS, "Kidney Care Choices Model Dataset, 2022," last modified November 7, 2025. https://data.cms.gov/cms-innovation-center-programs/disease-episode-based-payment-models/kidney-care-choices-model.

Appendix E-3: CKD Expenditures, CKD Adjusted Benchmark, and Gross CKD Savings Rate, CKCC Option, 2022 – 2024

Performance Year	CKD Expenditures	CKD Adjusted Benchmark	CKD Beneficiary Months	CKD Beneficiary Months / 12	CKD Expenditures per Beneficiary	CKD Adjusted Benchmark Per Beneficiary	CKD Shared Savings Per Beneficiary	Gross CKD Savings Rate
2022	$1,342,345,494	$1,366,512,131	574,950	47,913	$28,017	$28,521	$504	1.8%
2023	$2,671,888,676	$2,799,296,078	1,090,074	90,840	$29,413	$30,816	$1,403	4.6%
2024	$2,821,184,115	$3,035,296,480	1,094,300	91,192	$30,937	$33,285	$2,348	7.1%

Sources: CMS, "KCC PY 2022 Reconciliation Data Results and Data Dictionary." https://www.cms.gov/priorities/innovation/files/kcc-py1-rcn-es.xlsx. CMS, "KCC PY 2023 Reconciliation Rerun Data Results and Data Dictionary." https://www.cms.gov/priorities/innovation/files/kcc-py2-rcn-es.xlsx. CMS, "KCC PY 2024 Reconciliation Rerun Data Results and Data Dictionary." https://www.cms.gov/priorities/innovation/files/kcc-py3-rcn-es.xlsx.

Appendix E-4: CKD Expenditures, CKD Adjusted Benchmark, and Gross CKD Savings Rate by Company and Practice in the CKCC Option, 2024

Practice	CKD Expenditures	CKD Adjusted Benchmark	Gross CKD Savings Rate
DaVita IKC	**$889,485,568**	**$960,978,114**	**7.4%**
Integrated Kidney Care of The West, LLC	$21,999,716	$21,538,909	-2.1%
Integrated Kidney Care of Florida, LLC	$84,290,992	$83,411,740	-1.1%
Integrated Kidney Care of The Midwest, LLC	$17,502,448	$17,509,408	0.0%
Integrated Kidney Care of South Florida, LLC	$15,473,061	$15,758,876	1.8%
Integrated Kidney Care of The South, LLC	$32,866,111	$33,735,394	2.6%
Integrated Kidney Care of Southern California, LLC	$79,773,828	$82,224,371	3.0%
Integrated Kidney Care of Lake Erie, LLC	$17,551,522	$18,286,398	4.0%
Integrated Kidney Care of Northern California, LLC	$83,534,597	$88,437,852	5.5%
Integrated Kidney Care of Michigan, LLC	$18,263,322	$19,355,029	5.6%
Integrated Kidney Care of Virginia, LLC	$52,136,812	$56,183,914	7.2%
Integrated Kidney Care of Nevada, LLC	$28,952,660	$31,427,936	7.9%
Integrated Kidney Care of Central California, LLC	$41,107,314	$44,793,543	8.2%
Integrated Kidney Care of Ohio, LLC	$22,532,651	$24,609,035	8.4%
Integrated Kidney Care of Mid-Atlantic, LLC	$67,021,161	$74,268,898	9.8%
Integrated Kidney Care of Pennsylvania and Ohio, LLC	$36,236,902	$40,807,790	11.2%
Integrated Kidney Care of New Jersey and Pennsylvania, LLC	$72,790,587	$82,255,251	11.5%
Integrated Kidney Care of the Pacific Northwest, LLC	$34,536,475	$39,084,355	11.6%
Integrated Kidney Care of Minnesota, LLC	$17,685,999	$20,086,841	12.0%
Integrated Kidney Care of South Texas, LLC	$53,578,356	$60,959,491	12.1%
Integrated Kidney Care of Texas and Oklahoma, LLC	$24,134,117	$27,490,148	12.2%
Integrated Kidney Care of Georgia, LLC	$31,702,118	$36,617,747	13.4%
Integrated Kidney Care of Great Plains, LLC	$35,814,816	$42,135,188	15.0%
Evergreen Nephrology	**$312,297,167**	**$332,390,338**	**6.0%**
Colorado Kidney Care Entity, LLC	$23,446,365	$23,029,046	-1.8%
RCA KCE, LLC	$49,193,080	$49,443,949	0.5%

Practice	CKD Expenditures	CKD Adjusted Benchmark	Gross CKD Savings Rate
NANV KCE, LLC	$16,034,415	$16,195,545	1.0%
NAPA KCE, LLC	$30,097,786	$31,052,289	3.1%
KSM KCE, LLC	$13,064,177	$13,552,057	3.6%
Alabama Quality Kidney Care	$16,755,031	$17,717,822	5.4%
Penn Medicine Evergreen Nephrology, LLC	$15,592,123	$16,491,108	5.5%
Mid-Atlantic Integrated Kidney Care, LLC	$56,362,621	$61,967,678	9.0%
Tennessee Kidney Care Alliance, LLC	$41,960,730	$46,977,653	10.7%
Camino Renal Care, LLC	$49,790,840	$55,963,191	11.0%
Interwell Health	**$927,200,751**	**$999,247,845**	**7.2%**
Southeast Kidney Care Entity, LLC	$23,299,386	$22,203,399	-4.9%
Red River Kidney Care Entity, LLC	$35,911,492	$36,134,466	0.6%
NSIPA KCE, LLC	$47,861,151	$48,412,244	1.1%
Kentuckiana Kidney Care Entity, LLC	$47,059,592	$47,684,771	1.3%
Michigan Kidney Care Entity, LLC	$37,078,319	$38,616,921	4.0%
Delmarva Kidney Care Entity, LLC	$71,332,215	$75,091,347	5.0%
Louisissippi Kidney Care Entity, LLC	$51,027,282	$53,828,468	5.2%
Houston Kidney Care Entity, LLC	$12,507,791	$13,199,452	5.2%
Dallas Kidney Care Entity, LLC	$86,441,476	$91,729,296	5.8%
Las Vegas Kidney Care Entity, LLC	$32,576,711	$34,946,530	6.8%
Philadelphia Kidney Care Entity, LLC	$82,030,448	$88,652,577	7.5%
Utah Kidney Care Entity, LLC	$25,110,887	$27,229,440	7.8%
Alabama Kidney Care Entity, LLC	$25,091,730	$27,268,202	8.0%
Southern Florida Kidney Care Entity, LLC	$63,958,677	$69,710,436	8.3%
Eastern North Carolina Kidney Care Entity, LLC	$43,092,686	$47,379,571	9.0%
Central North Carolina Kidney Care Entity, LLC	$30,348,419	$33,527,444	9.5%
Chicago Kidney Care Entity, LLC	$26,233,078	$28,997,282	9.5%
New Jersey Kidney Care Entity, LLC	$60,953,676	$68,184,764	10.6%
Heartland Kidney Care Entity, LLC	$24,675,141	$27,687,837	10.9%

Practice	CKD Expenditures	CKD Adjusted Benchmark	Gross CKD Savings Rate
Charlotte Kidney Care Entity, LLC	$34,866,234	$40,157,563	13.2%
North Florida Kidney Care Entity, LLC	$19,196,746	$22,678,669	15.4%
Erie Valley Kidney Care Entity, LLC	$25,374,777	$30,275,367	16.2%
Northwest Kidney Care Entity, LLC	$21,172,837	$25,651,796	17.5%
Kidneylink	**$221,481,688**	**$244,107,798**	**9.3%**
Integrated Kidney Partners XX, LLC	$11,192,284	$10,422,039	-7.4%
Total Kidney Health Of Northern California, LLC	$23,835,642	$24,946,442	4.5%
Integrated Kidney Partners X, LLC	$12,913,146	$13,686,553	5.7%
Integrated Kidney Partners IX, LLC	$42,378,966	$45,885,163	7.6%
Integrated Kidney Partners II, LLC	$17,351,655	$19,124,424	9.3%
Integrated Kidney Partners XXIII, LLC	$48,672,841	$53,660,054	9.3%
Integrated Kidney Partners VII, LLC	$11,125,432	$12,381,200	10.1%
Integrated Kidney Partners VIII, LLC	$11,175,585	$12,530,820	10.8%
Integrated Kidney Partners III, LLC	$28,212,732	$33,228,459	15.1%
Integrated Kidney Partners V, LLC	$14,623,407	$18,242,645	19.8%
Somatus	**$29,883,424**	**$30,883,146**	**3.2%**
Somatus New Mexico Kidney Care	$8,286,957	$8,347,808	**0.7%**
Kidney Care Center Alliance, LLC	$21,596,467	$22,535,337	4.2%
Strive Health	**$334,046,879**	**$357,463,497**	**6.6%**
Nani Quality Care Innovations, LLC	$44,167,319	$40,906,049	-8.0%
KCE Of Southern California, LLC	$57,515,798	$60,752,176	5.3%
Central KCE, LLC	$19,130,733	$20,501,389	6.7%
KCE Of Ohio, LLC	$34,670,770	$37,310,210	7.1%
Detroit Kidney Care KCE, LLC	$54,631,875	$60,304,861	9.4%
Nani Patient Care Innovations	$74,372,366	$82,196,974	9.5%
Gateway Kidney Care KCE, LLC	$20,522,491	$22,806,104	10.0%
Integrated Patient Solutions IPA, LLC	$29,035,528	$32,685,733	11.2%
Other participating entities	**$106,788,639**	**$110,225,742**	**3.1%**

Practice	CKD Expenditures	CKD Adjusted Benchmark	Gross CKD Savings Rate
CKCC Independence Kidney Care Alliance, LLC	$7,596,911	$6,921,280	-9.8%
Renal Care 360 Connected Care of South Carolina, LLC	$5,967,482	$5,992,058	0.4%
Carolina Kidney Partners, LLC	$69,996,951	$72,096,011	2.9%
Tennessee Valley Kidney Care Alliance, LLC	$8,049,249	$8,659,414	7.0%
Metropolitan And Capital Region Kidney Care Alliance, LLC	$15,178,046	$16,556,979	8.3%

Source: CMS, "KCC PY 2024 Reconciliation Rerun Data Results and Data Dictionary," Accessed August 1, 2026. https://www.cms.gov/priorities/innovation/files/kcc-py3-rcn-es.xlsx
Note: A correction was made to the 2024 reconciliation file to recognize Kidney Care Center Alliance, LLC's affiliation with Somatus.

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