

Local Coverage Determination (LCD): Frequency of Hemodialysis (L37502)

Links in PDF documents are not guaranteed to work. To follow a web link, please use the MCD Website.

Contractor Information

CONTRACTOR NAME	CONTRACT TYPE	CONTRACT NUMBER	JURISDICTION	STATE(S)
Noridian Healthcare Solutions, LLC	A and B MAC	01111 - MAC A	J - E	California - Entire State
Noridian Healthcare Solutions, LLC	A and B MAC	01112 - MAC B	J - E	California - Northern
Noridian Healthcare Solutions, LLC	A and B MAC	01182 - MAC B	J - E	California - Southern
Noridian Healthcare Solutions, LLC	A and B MAC	01211 - MAC A	J - E	American Samoa Guam Hawaii Northern Mariana Islands
Noridian Healthcare Solutions, LLC	A and B MAC	01212 - MAC B	J - E	American Samoa Guam Hawaii Northern Mariana Islands
Noridian Healthcare Solutions, LLC	A and B MAC	01311 - MAC A	J - E	Nevada
Noridian Healthcare Solutions, LLC	A and B MAC	01312 - MAC B	J - E	Nevada
Noridian Healthcare Solutions, LLC	A and B MAC	01911 - MAC A	J - E	American Samoa California - Entire State Guam Hawaii Nevada Northern Mariana Islands

LCD Information

Document Information

LCD ID

Original Effective Date

L37502

For services performed on or after 02/18/2019

LCD Title

Frequency of Hemodialysis

Revision Effective Date

For services performed on or after 03/01/2019

Proposed LCD in Comment Period

N/A

Revision Ending Date

N/A

Source Proposed LCD

DL37502

Retirement Date

N/A

AMA CPT / ADA CDT / AHA NUBC Copyright Statement

CPT codes, descriptions and other data only are copyright 2018 American Medical Association. All Rights Reserved. Applicable FARS/HHSARS apply.

Notice Period Start Date

01/03/2019

Notice Period End Date

02/17/2019

Current Dental Terminology © 2018 American Dental Association. All rights reserved.

Copyright © 2018, the American Hospital Association, Chicago, Illinois. Reproduced with permission. No portion of the AHA copyrighted materials contained within this publication may be copied without the express written consent of the AHA. AHA copyrighted materials including the UB-04 codes and descriptions may not be removed, copied, or utilized within any software, product, service, solution or derivative work without the written consent of the AHA. If an entity wishes to utilize any AHA materials, please contact the AHA at 312-893-6816. Making copies or utilizing the content of the UB-04 Manual, including the codes and/or descriptions, for internal purposes, resale and/or to be used in any product or publication; creating any modified or derivative work of the UB-04 Manual and/or codes and descriptions; and/or making any commercial use of UB-04 Manual or any portion thereof, including the codes and/or descriptions, is only authorized with an express license from the American Hospital Association. To license the electronic data file of UB-04 Data Specifications, contact Tim Carlson at (312) 893-6816 or Laryssa Marshall at (312) 893-6814. You may also contact us at ub04@healthforum.com.

CMS National Coverage Policy

This LCD supplements but does not replace, modify or supersede existing Medicare applicable National Coverage

Determinations (NCDs) or payment policy rules and regulations for additional hemodialysis sessions. Federal statute and subsequent Medicare regulations regarding provision and payment for medical services are lengthy. They are not repeated in this LCD. Neither Medicare payment policy rules nor this LCD replace, modify or supersede applicable state statutes regarding medical practice or other health practice professions acts, definitions and/or scopes of practice. All providers who report services for Medicare payment must fully understand and follow all existing laws, regulations and rules for Medicare payment for additional hemodialysis sessions and must properly submit only valid claims for them. Please review and understand them and apply the medical necessity provisions in the policy within the context of the manual rules. Relevant CMS manual instructions and policies may be found in the following Internet-Only Manuals (IOMs) published on the CMS Web site:

IOM Citations:

- CMS IOM Publication 100-01, *Medicare General Information, Eligibility and Entitlement Manual*
 - Chapter 1, Section 10: General Program Benefits.
 - Chapter 2, Section 10: Hospital Insurance Entitlement.
- CMS IOM Publication 100-02, *Medicare Benefit Policy Manual*, Chapter 11, End Stage Renal Disease (ESRD).
- CMS IOM Publication 100-03, *Medicare National Coverage Determinations (NCD) Manual*, Chapter 1
 - Part 2. Section 110.10: Intravenous Iron Therapy; Section 110.15: Ultrafiltration, Hemoperfusion and Hemofiltration.
 - Part 4, Section 260.6: Dental Examination Prior to Kidney Transplantation.
- CMS IOM Publication 100-04, *Medicare Claims Processing Manual*, Chapter 8: Outpatient ESRD Hospital, Independent Facility, and Physician/Supplier Claims, all sections including Section 140 Monthly Capitation Payment Method for Physicians' Services Furnished to Patients on Maintenance Dialysis.
- CMS IOM Publication 100-05, *Medicare Secondary Payer Manual*, Chapter 2, Section 20: Medicare Secondary Payer Provisions for End Stage Renal Disease (ESRD) Beneficiaries.
- CMS IOM Publication 100-08, *Medicare Program Integrity Manual*, Chapter 13, Section 13.5.1: Reasonable and Necessary Provisions in LCDs.
- CMS IOM Publication 100-09, *Medicare Contractor Beneficiary and Provider Communications Manual*, Chapter 5, Correction Coding Initiative

Change Request References:

- Change Request 5039, Transmittal 1084, October 27, 2006: Line Item Billing Requirement for Type of Bill 72X.
- Change Request 9989, Transmittal 1849, May 12, 2017: Implementation of Modifier CG for Type of Bill 72X.

Social Security Act (Title XVIII) Standard References:

- Title XVIII of the Social Security Act, Section 1862(a)(1)(A) states that no Medicare payment shall be made for items or services which are not reasonable and necessary for the diagnosis or treatment of illness or injury.
- Title XVIII of the Social Security Act, Section 1833(e) states that no payment shall be made to any provider for any claim that lacks the necessary information to process the claim.

Federal Register References:

- 42 CFR, Chapter IV, Subchapter G, Part 494, Subpart C,
 - Section 494.80 Condition: Patient assessment.
 - Section 494.90 Condition: Patient plan of care.

- CMS Final Rule CMS-1651-F published November 4, 2016

Note: *Italicized font* represents CMS manual titles, journal titles and/or CMS national NCD language/wording copied directly from CMS Manuals or CMS Transmittals. Contractors are prohibited from changing national NCD language/wording.

Coverage Guidance

Coverage Indications, Limitations, and/or Medical Necessity

Notice: It is not appropriate to bill Medicare for services that are not covered (as described by this entire LCD) as if they are covered. When billing for non-covered services, use the appropriate modifier.

Compliance with the provisions in this policy may be monitored and addressed through post payment data analysis and subsequent medical review audits.

History/Background and/or General Information

According to the Kidney Disease Outcomes Quality Initiative (KDOQI) Practice Guideline for Hemodialysis Adequacy: 2015 update, over 400,000 patients are currently treated with hemodialysis (HD) in the United States, with Medicare spending approaching \$90,000 per year of care in 2012. They note mortality rates remain higher than age-matched individuals in the general population. They also experience an average of 2 hospitalizations per year.

The KDOQI 2015 Update states the following: Attempts to improve outcomes have included initiating dialysis at higher glomerular filtration rates (GFRs), increasing dialysis frequency and/or duration, using newer membranes, and employing supplemental or alternative hemofiltration. Efforts to increase the dose of dialysis administered 3 times weekly have not improved survival, indicating that something else needs to be addressed.

This guideline was also cited in the most recent CMS Final Rule CMS-1651-F published November 4, 2016.

Covered Indications

1. Metabolic conditions (acidosis, hyperkalemia, hyperphosphatemia)
2. Fluid positive status not controlled with routine dialysis
3. Pregnancy
4. Heart Failure
5. Pericarditis
6. Incomplete dialysis secondary to hypotension or access issues

Limitations

The following are considered not reasonable and necessary and therefore will be denied as not medically justified for payments.

1. Sessions furnished in excess of 3 sessions per week are not considered reasonable and necessary unless fully supported in the medical documentation as detailed in this policy
2. Planned inadequate or short dialysis

3. Sessions performed for convenience of patient or staff

There are documentation requirements in this LCD which if not followed will generate denials. Please refer to the Documentation Requirements section below.

While there are no set frequency limitations for these services, continued use of additional sessions by a given provider or for a given beneficiary or unusual patterns of billing, verification of need for services may generate reviews. Please refer to the Utilization Guidelines section below.

For coding guidelines, please refer to the companion article, A55675-Coding for Hemodialysis Sessions.

Notice: This LCD imposes diagnosis limitations that support diagnosis to procedure code automated denials. However, services performed for any given diagnosis must meet all of the indications and limitations stated in this policy, the general requirements for medical necessity as stated in CMS payment policy manuals, any and all existing CMS national coverage determinations, and all Medicare payment rules.

As published in CMS IOM 100-08, Chapter 13, Section 13.5.1, in order to be covered under Medicare, a service shall be reasonable and necessary. When appropriate, contractors shall describe the circumstances under which the proposed LCD for the service is considered reasonable and necessary under Section 1862 (a)(1)(A). Contractors shall consider a service to be reasonable and necessary if the contractor determines that the service is:

- Safe and effective.
- Not experimental or investigational (exception: routine costs of qualifying clinical trial services with dates of service on or after September 19, 2000, that meet the requirements of the Clinical Trials NCD are considered reasonable and necessary).
- Appropriate, including the duration and frequency that is considered appropriate for the service, in terms of whether it is:
 - Furnished in accordance with accepted standards of medical practice for the diagnosis or treatment of the patient's condition or to improve the function of a malformed body member.
 - Furnished in a setting appropriate to the patient's medical needs and condition.
 - Ordered and furnished by qualified personnel.
 - One that meets, but does not exceed, the patient's medical needs.
 - At least as beneficial as an existing and available medically appropriate alternative.

The redetermination process may be utilized for consideration of services performed outside of the reasonable and necessary requirements in this LCD.

HD at 3 times (3 X) per week is noted to be 'conventional' treatment. Conventional HD remains the most common treatment modality for end stage renal disease (ESRD) worldwide and is usually performed for 3 to 5 hours, 3 days per week. CMS established payment for hemodialysis based on conventional treatment.

Hence, Medicare reimburses HD treatments 3 times per week (13/14 sessions per month depending on length of month). In CMS-1651-F (November 4, 2016), CMS outlines the process for medical justification aspect of the overall requirements of being reasonable and necessary for additional treatment payments. The following statements are made:

Under this policy, the MACs determine whether additional treatments furnished during a month are medically necessary and when the MACs determine that the treatments are medically justified, we pay the full base rate

for the additional treatments. While Medicare does not define specific patient conditions that meet the requirements of medical necessity, the MACs consider appropriate medical conditions that would result in the medical need for additional dialysis treatments (for example, excess fluid). When such patient conditions are indicated on the claim, we instruct MACs to consider medical justification and the appropriateness of payment for the additional sessions.

This LCD sets out medical conditions likely to meet reasonable and necessary requirements for additional payments.

ESRD Facilities establish parameters for treatment of any given patient through a Patient Plan of Care (POC). It is defined in the Conditions of Coverage for ESRD Services 42 CFR 494.90. Among other items, the POC developed by the Interdisciplinary Team must provide the necessary care and services to manage the patient's volume status; and achieve and sustain the prescribed dose of dialysis to meet a hemodialysis Kt/V of at least 1.2 and a peritoneal dialysis weekly Kt/V of at least 1.7 or meet an alternative equivalent professionally-accepted clinical practice standard for adequacy of dialysis.

The prescription for chronic hemodialysis therapies includes the type of dialysis access, the type and amount of anticoagulant to be employed, blood flow rates, dialysate flow rate, ultrafiltration rate, dialysate temperature, type of dialysate (acetate versus bicarbonate) and composition of the electrolytes in the dialysate, size of hemodialyzer (surface area) and composition of the dialyzer membrane (conventional versus high flux), duration and frequency of treatments, the type and frequency of measuring indices of clearance, and intradialytic medications to be administered.

Those treatment sessions furnished to the beneficiary are paid by Medicare as 3 X per week. If more than three sessions per week are furnished, such as 4-6 sessions per week, Medicare will pay the 3 X per week amount unless there is a covered indication, appropriate use of the KX modifier occurs, and it is supported by medical documentation.

However, on occasion, acute, and occasionally chronic, conditions may require additional sessions during the month. These may be considered for additional payment. This LCD provides a list of diagnoses felt to be consistent with such clinical conditions that could establish reasonable and necessary requirements for payment. Use of these diagnoses should be verified in the medical records to support any payment made.

Clinical conditions not seen listed in this policy may still be appropriate to allow payment. However, these claims may require additional review through the appeals process.

Modifier KX will be appended to CPT 90999 to signify an additional session was needed for a particular clinical condition. It will be appended on each line for each additional session within the claim for each month billed. Please refer to the coding companion article A55675 Frequency of Hemodialysis for coding guidelines.

Medicare will monitor the frequency of additional sessions which may trigger Medical Review.

The POC reassessment is noted in 42 CFR 494.80(d) as below:

494.80(d) Standard: Patient reassessment. In accordance with the standards specified in paragraphs (a)(1) through (a) (13) of this section, a comprehensive reassessment of each patient and a revision of the plan of care must be conducted-(1) At least annually for stable patients; and (2) At least monthly for unstable patients

including, but not limited to, patients with the following: (i) Extended or frequent hospitalizations; (ii) Marked deterioration in health status; (iii) Significant change in psychosocial needs; or (iv) Concurrent poor nutritional status, unmanaged anemia, and inadequate dialysis.

Please note the Plan of Care does not establish medical necessity by itself and will need to be supported by other medical documentation as outlined in the documentation requirements below.

Repeated need for additional dialysis sessions as noted by 90999-KX is expected to be addressed in the medical documentation and addressed in the subsequent POC, including attempts to correct any issues, (See medical documentation requirements below).

This LCD establishes documentation requirements as listed in the appropriate section below.

Summary of Evidence

KDOQI Clinical Practice Guideline for Hemodialysis Adequacy: 2015 Update, Guideline 4.1.1 states to "Consider additional hemodialysis sessions or longer hemodialysis treatment times for patients with large weight gains, high ultrafiltration rates, poorly controlled blood pressure, difficulty achieving dry weight, or poor metabolic control (such as hyperphosphatemia, metabolic acidosis, and/or hyperkalemia)." This specific recommendation was 'Not Graded' in the Guidelines but based on expert opinions. However, these guidelines are determined by a panel of experts and are felt to have a STRONG level of evidence to follow.

While uncontrolled hypertension is noted to be an indication for additional dialysis frequency, the included diagnoses are felt to be adequate for the condition in lieu of an available ICD-10 diagnosis.

The Kidney Disease: Improving Global Outcomes (KDIGO) Guidelines for the evaluation and management of chronic kidney disease (CKD) address the many facets of CKD. The guidelines discuss the management variables that may affect CKD. Indications are supportive of guidelines above.

The 2018 Seminars in Dialysis article, "When is more frequent hemodialysis beneficial?", Suri and Klinger discuss the unresolved issue pertaining to frequency of dialysis. They review three randomized trials, 15 comparative cohort studies and some case series for recommendations and adverse events related to increased frequency of dialysis. They note effect on mortality remains controversial with conflicting results. More frequent dialysis is noted as being associated with vascular access site problems. Recommendations for increased frequency of dialysis include pregnant women, patients who are unable to obtain a dry weight on 3X per week regimen and for minimal urine output patients with left ventricular hypertrophy.

National experts were also contacted for input during development of this policy.

Analysis of Evidence (Rationale for Determination)

Based on KDOQI Practice Guidelines as well as KDIGO Guidelines, and the Suri and Klinger article, the listed

conditions in the LCD may meet reasonable and necessary requirements for additional payments.

Based on local collaborative data, Medicare contractors expect the list of diagnoses in this LCD would represent the great majority of claims for which additional payments may occur.

Facilities with sites in multiple states should be able to submit claims in a unified approach.

However, this LCD would not be the appropriate approach to change the payment methodology by CMS and reconsiderations to this LCD to potentially try to change the CMS payment process will be denied as invalid reconsideration to this LCD.

Coding Information

Bill Type Codes:

Contractors may specify Bill Types to help providers identify those Bill Types typically used to report this service. Absence of a Bill Type does not guarantee that the policy does not apply to that Bill Type. Complete absence of all Bill Types indicates that coverage is not influenced by Bill Type and the policy should be assumed to apply equally to all claims.

CODE	DESCRIPTION
072x	Clinic - Hospital Based or Independent Renal Dialysis Center

Revenue Codes:

Contractors may specify Revenue Codes to help providers identify those Revenue Codes typically used to report this service. In most instances Revenue Codes are purely advisory. Unless specified in the policy, services reported under other Revenue Codes are equally subject to this coverage determination. Complete absence of all Revenue Codes indicates that coverage is not influenced by Revenue Code and the policy should be assumed to apply equally to all Revenue Codes.

Note: The contractor has identified the Bill Type and Revenue Codes applicable for use with the CPT/HCPCS codes included in this LCD. Providers are reminded that not all CPT/HCPCS codes listed can be billed with all Bill Type and/or Revenue Codes listed. CPT/HCPCS codes are required to be billed with specific Bill Type and Revenue Codes. Providers are encouraged to refer to the CMS Internet-Only Manual (IOM) Pub. 100-04, *Medicare Claims Processing Manual*, for further guidance.

CODE	DESCRIPTION
0821	Hemodialysis - Outpatient or Home - Hemodialysis Composite or Other Rate
0881	Miscellaneous Dialysis - Ultrafiltration

CPT/HCPCS Codes

Group 1 Paragraph:

Note: Providers are reminded to refer to the long descriptors of the CPT codes in their CPT book.

Group 1 Codes:

CODE	DESCRIPTION
90999	UNLISTED DIALYSIS PROCEDURE, INPATIENT OR OUTPATIENT

ICD-10 Codes that Support Medical Necessity

Group 1 Paragraph:

It is the provider's responsibility to select codes carried out to the highest level of specificity and selected from the ICD-10-CM code book appropriate to the year in which the service is rendered for the claim(s) submitted.

Medicare is establishing the following limited coverage for CPT/HCPCS code: 90999 **(when reported to represent an extra dialysis session):**

Group 1 Codes:

ICD-10 CODE	DESCRIPTION
E83.30	Disorder of phosphorus metabolism, unspecified
E83.39	Other disorders of phosphorus metabolism
E87.2	Acidosis
E87.5	Hyperkalemia
E87.70	Fluid overload, unspecified
E87.71	Transfusion associated circulatory overload
E87.79	Other fluid overload
I30.0	Acute nonspecific idiopathic pericarditis
I30.1	Infective pericarditis
I30.8	Other forms of acute pericarditis
I30.9	Acute pericarditis, unspecified
I32	Pericarditis in diseases classified elsewhere
I50.1	Left ventricular failure, unspecified
I50.20	Unspecified systolic (congestive) heart failure
I50.21	Acute systolic (congestive) heart failure
I50.22	Chronic systolic (congestive) heart failure

ICD-10 CODE	DESCRIPTION
I50.23	Acute on chronic systolic (congestive) heart failure
I50.30	Unspecified diastolic (congestive) heart failure
I50.31	Acute diastolic (congestive) heart failure
I50.32	Chronic diastolic (congestive) heart failure
I50.33	Acute on chronic diastolic (congestive) heart failure
I50.40	Unspecified combined systolic (congestive) and diastolic (congestive) heart failure
I50.41	Acute combined systolic (congestive) and diastolic (congestive) heart failure
I50.42	Chronic combined systolic (congestive) and diastolic (congestive) heart failure
I50.43	Acute on chronic combined systolic (congestive) and diastolic (congestive) heart failure
I50.810	Right heart failure, unspecified
I50.811	Acute right heart failure
I50.812	Chronic right heart failure
I50.813	Acute on chronic right heart failure
I50.814	Right heart failure due to left heart failure
I50.82	Biventricular heart failure
I50.83	High output heart failure
I50.84	End stage heart failure
I50.89	Other heart failure
I50.9	Heart failure, unspecified
I77.0	Arteriovenous fistula, acquired
I95.3	Hypotension of hemodialysis
J81.0	Acute pulmonary edema
M32.12	Pericarditis in systemic lupus erythematosus
N25.81	Secondary hyperparathyroidism of renal origin
O09.211	Supervision of pregnancy with history of pre-term labor, first trimester
O09.212	Supervision of pregnancy with history of pre-term labor, second trimester
O09.213	Supervision of pregnancy with history of pre-term labor, third trimester
O09.219	Supervision of pregnancy with history of pre-term labor, unspecified trimester
O09.891	Supervision of other high risk pregnancies, first trimester
O09.892	Supervision of other high risk pregnancies, second trimester
O09.893	Supervision of other high risk pregnancies, third trimester

ICD-10 CODE	DESCRIPTION
O09.899	Supervision of other high risk pregnancies, unspecified trimester
R60.1	Generalized edema
R63.5	Abnormal weight gain
T82.898A	Other specified complication of vascular prosthetic devices, implants and grafts, initial encounter
T82.898D	Other specified complication of vascular prosthetic devices, implants and grafts, subsequent encounter
T82.898S	Other specified complication of vascular prosthetic devices, implants and grafts, sequela

ICD-10 Codes that DO NOT Support Medical Necessity

Group 1 Paragraph:

All those not listed under the "ICD-10 Codes that Support Medical Necessity" section of this policy.

Group 1 Codes: N/A

Additional ICD-10 Information

N/A

General Information

Associated Information

Documentation Requirements

1. All documentation must be maintained in the patient's medical record and made available to the contractor upon request.
2. Every page of the record must be legible and include appropriate patient identification information (e.g., complete name, dates of service[s]). The documentation must include the legible signature of the physician or non-physician practitioner responsible for and providing the care to the patient.
3. The submitted medical record must support the use of the selected ICD-10-CM code(s). The submitted CPT/HCPCS code must describe the service performed.
4. The medical record documentation must support the medical necessity of the services as directed in this policy.
5. The medical records documentation should include the order from the prescribing physician for the additional sessions. This should be available for each and every additional session outside the usual 13/14 treatments per month with the CG modifier appended as well as those described in this LCD with the KX modifier appended. Should the records not show the order and evaluation leading to additional sessions denials will occur.
6. Documentation should be available on request and may include: the updated Plan of Care, documents from recent hospital care, office visits, dialysis progress notes, or Monthly Capitation Payments (MCP) visits reflecting the clinician's assessment and changes as indicated. Lack of this documentation will lead to denials.

Utilization Guidelines

In accordance with CMS Ruling 95-1 (V), utilization of these services should be consistent with locally acceptable standards of practice.

With continued utilization of additional sessions by a specific provider generally, or for a given beneficiary, providers should expect medical review of medical records by contractors.

Sources of Information

Contractor is not responsible for the continued viability of websites listed.

Novitas Solutions, Inc., L35014 - Frequency of Hemodialysis

Other Contractor's Policies:

First Coast Service Options, L33970 - Frequency of Hemodialysis

Palmetto GBA, L34575 - Frequency of Hemodialysis

Contractor Medical Director ESRD Workgroup

Bibliography

1. American Journal of Kidney Diseases (AJKD), Intensive Hemodialysis: Potential for Improving Outcomes. 2016; 68(5): Suppl 1: S1-S58.
2. Assimon MM, Wenger JB, Wang L, et al. Ultrafiltration rate and mortality in maintenance hemodialysis patients. *Am J Kidney Dis.* 2016; 68(6):911-922.
3. Ayus JC, Achinger SG, Mizani MR, et al. Phosphorus balance and mineral metabolism with 3 h daily hemodialysis. *Kidney Int.* 2007; 71(4):336-342. doi:10.1038/sj.ki.5002044.
4. Ayus JC, Mizani MR, Achinger SG, et al. Effects of short daily versus conventional hemodialysis on left ventricular hypertrophy and inflammatory markers: a prospective, controlled study. *J Am Soc Nephrol.* 2005; 16(9):2778-2788. doi:10.1681/ASN.2005040392.
5. Bansal N, McCulloch CE, Lin F, et al. Blood pressure and risk of cardiovascular events in patients on chronic hemodialysis: The CRIC Study (Chronic Renal Insufficiency Cohort). *Hypertension.* 2017; 70(2):435-443.
6. Banshodani M, Kawanishi H, Fukuma S, et al. The impact of hemodialysis schedules on the day of the week of hospitalization for cardiovascular and infectious diseases, over a period of 20 years. *PLoS One.* 2017; 12(7). DOI: 10.1371/journal.pone.0180577.

7. Buoncristiani U, Fagugli R, Ciao G, et al. Left ventricular hypertrophy in daily dialysis. *Miner Electrolyte Metab.* 1999; 25(1-2):90-94. doi: [10.1159/000057427](https://doi.org/10.1159/000057427).
8. Chan CT, Chertow GM, Daugirdas JT, et al. Effects of daily hemodialysis on heart rate variability: results from the Frequent Hemodialysis Network (FHN) Daily Trial. *Nephrol Dial Transplant.* 2014; 29(1):168-178. doi:10.1093/ndt/gft212.
9. Chan CT, Floras JS, Miller JA, et al. Regression of left ventricular hypertrophy after conversion to nocturnal hemodialysis. *Kidney Int.* 2002; 61(6):2235-2239. doi:10.1046/j.1523-1755.2002.00362.x.
10. Chan CT, Greene T, Chertow GM, et al. Determinants of left ventricular mass in patients on hemodialysis: Frequent Hemodialysis Network (FHN) Trials. *Circ Cardiovasc Imaging.* 2012; 5(2):251-261. doi:10.1161/CIRCIMAGJNG.111.969923.
11. Chazot C, Vo-Van C, Lorriaux C, et al. Even a Moderate fluid removal rate during individualised hemodialysis session times is associated with decreased patient survival. *Blood Purif.* 2017; 44(2):89-97.
12. Chertow GM, Levin NW, Beck GJ, et al. In-center hemodialysis six times per week versus three times per week. *N Engl J Med.* 2010; 363(24):2287-2300.
13. Cullerton BF. Introduction. Canadian Society of Nephrology Clinical Practice Guidelines. *J Am Soc Nephrol.* 2006; 17(3 Suppl 1): S1-S3.
14. Cullerton BF, Walsh M, Klarenbach SW, et al. Effect of frequent nocturnal hemodialysis vs conventional hemodialysis on left ventricular mass and quality of life: a randomized controlled trial. *JAMA.* 2007; 298(11):1291-1299.
15. Daugirdas JT, Chertow GM, Larive B, et al. Effects of frequent hemodialysis on measures of CKD mineral and bone disorder. *J Am Soc Nephrol.* 2012; 23(4):727-738. doi:10.1681/ASN.2011070688.
16. Evangelidis N, Tong A, Manns B, et al. Developing a set of core outcomes for trials in hemodialysis: An International Delphi Survey. *Am J Kidney Dis.* 2017; 70(4):464-475.
17. Finkelstein FO, Schiller B, Daoui R, et al. At-home short daily hemodialysis improves the long-term health-related quality of life. *Kidney Int.* 2012; 82(5):561-569.
18. Flythe JE, Assimon MM, Overman RA. Target weight achievement and ultrafiltration rate thresholds: potential patient implications. *BMC Nephrol.* 2017; 18(1); 1-13.
19. Garg AX, Suri RS, Eggers P, et al. Patients receiving frequent hemodialysis have better health-related quality of life compared to patients receiving conventional hemodialysis. *Kidney Int.* 2017; 91(3):746-754.
20. Hall YN, Larive B, Painter P, et al. Effects of six versus three times per week hemodialysis on physical performance, health, and functioning: Frequent Hemodialysis Network (FHN) randomized trials. *Clin J Am Soc Nephrol.* 2012; 7(5):782-794.

21. Hanly PJ and Pierratos A. Improvement of sleep apnea in patients with chronic renal failure who undergo nocturnal hemodialysis. *N Engl J Med.* 2001; 344(2):102-107.
22. Heidenheim AP, Muirhead N, Moist L, et al. Patient quality of life on quotidian hemodialysis. *Am J Kidney Dis.* 2003; 42(1Suppl):S36-S41.
- 23 Hussein WF, Arramreddy R, Sun SJ, et al. Higher ultrafiltration rate is associated with longer dialysis recovery time in patients undergoing conventional hemodialysis. *Am J Nephrol.* 2017; 46(1):3-10.
24. Jaber BL, Lee Y, Collins AJ, et al. Effect of daily hemodialysis on depressive symptoms and postdialysis recovery time: interim report from the FREEDOM (Following Rehabilitation, Economics and Everyday-Dialysis Outcome Measurements) Study. *Am J Kidney Dis.* 2010; 56(3):531-539.
25. Jaber BL, Schiller B, Burkart JM, et al. Impact of short daily hemodialysis on restless legs symptoms and sleep disturbances. *Clin J Am Soc Nephrol.* 2011; 6(5):1049-1056.
26. Jefferies HJ, Virk B, Schiller B, et al. Frequent hH schedules are associated with reduced levels of dialysis induced cardiac injury (Myocardial Stunning). *Clin J Am Soc Nephrol.* 2011; 6(6):1326-1332. doi:10.2215/CJN.05200610.
27. Jindal K, Chan CT, Deziel C, et al. Canadian Society of Nephrology Clinical Practice Guidelines. *J Am Soc Nephrol.* 2006; 17(3 Suppl 1):S4-S27.
28. Karpetas A, Loutradis C, Bikos A, et al. Blood pressure variability is increasing from the first to the second day of the interdialytic interval in hemodialysis patients. *J Hypertens.* 2017; 35: 000-000. . doi:10.1097/HJH.0000000000001478.
29. KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney Int Suppl.* 2013; 3(1):1-150.
30. Kennedy C, Ryan SA, Kane T, et al. The impact of change of renal replacement therapy modality on sleep quality in patients with end-stage renal disease: a systematic review and meta-analysis. *J Nephrol.* 2017; 31(1): 61-70. doi:10.1007/s40620-017.0409-7.
31. Kotanko P, Garg AX, Depner T, et al. Effects of frequent hemodialysis on blood pressure: Results from the randomized frequent hemodialysis network trials. *Hemodial Int.* 2015; 19(3):386-401.
32. Kraus M, Burkart J, Hegeman R, et al. A comparison of center-based vs. home-based daily hemodialysis for patients with end-stage renal disease. *Hemodial Int.* 2007; 11(4):468-477. doi:10.1111/j.1542-4758.2007.00229.x.
33. Laskin BL, Huang G, King E, et al. Short, frequent, 5-days-per-week, in-center hemodialysis versus 3-days-per week treatment: a randomized crossover pilot trial through the Midwest Pediatric Nephrology Consortium. *Pediatr Nephrol.* 2017; 32(8):1423-1432.
34. Lindsay RM, Heidenheim PA, Nesrallah G, et al. Minutes to recovery after a hemodialysis session: a simple health-related quality of life question that is reliable, valid, and sensitive to change. *Clin J Am Soc Nephrol.* 2006; 1(5):952-959. doi:10.2215/CJN.00040106.

35. Lockridge RS, Spencer M, Craft V, et al. Nightly home hemodialysis: five and one-half years of experience in Lynchburg, Virginia. *Hemodial Int.* 2004; 8(1):61-69. doi:10.1111/j.1492.7535.2004.00076.x.
36. Mactier R, Hoenich N, Breen C. Renal Association Clinical Practice Guideline on haemodialysis. *Nephron Clin Pract.* 2011; 118 Suppl 1:c241-286.
37. Manns BJ, Walsh MW, Culleton BF, et al. Nocturnal hemodialysis does not improve overall measures of quality of life compared to conventional hemodialysis. *Kidney Int.* 2008; 75(5):542-549. doi:10.1038/ki.2008.639.
38. Murashima M, Kumar D, Doyle AM, et al. Comparison of intradialytic blood pressure variability between conventional thrice-weekly hemodialysis and short daily hemodialysis. *Hemodial Int.* 2010; 14(3):270-277. doi:10.1111/J.1542-4758.2010.00438.x.
39. National Kidney Foundation. KDOQI Clinical Practice Guideline for Diabetes and CKD: 2012 update. *Am J Kidney Dis.* 2012; 60(5):850-886.
40. National Kidney Foundation. KDOQI clinical practice guideline for hemodialysis adequacy: 2015 update. *Am J Kidney Dis.* 2015; 66(5):884-930.
41. Painter P, Krasnoff JB, Kuskowski M, et al. Effects of modality change on health-related quality of life. *Hemodial Int.* 2012; 16(3):377-386. doi:10.1111/j.1542-4758.2012.00676.x.
42. Raimann JG, Chan CT, Daugirdas JT, et al. The effect of increased frequency of hemodialysis on volume-related outcomes: a secondary analysis of the Frequent Hemodialysis Network Trials. *Blood Purif.* 2016; 41(4):277-286. doi:10.1159/000441966.
43. Rocco MV, Lockridge RS, Jr., Beck GJ, et al. The effects of frequent nocturnal home hemodialysis: the Frequent Hemodialysis Network Nocturnal Trial. *Kidney Int.* 2011; 80(10): 1-12.
44. Sarafidis PA, Persu A, Agarwal R, et al. Hypertension in dialysis patients: a consensus document by the European Renal and Cardiovascular Medicine (EURECA-m) working group of the European Renal Association - European Dialysis and Transplant Association (ERA-EDTA) and the Hypertension and the Kidney working group of the European Society of Hypertension (ESH). *J Hypertens.* 2017; 35(4):657-676.
45. Silverstein DM. Frequent hemodialysis: history of the modality and assessment of outcomes. *Pediatr Nephrol.* 2017; 32(8):1293-1300.
46. Sirich TL, Fong K, Larive B, et al. Limited reduction in uremic solute concentrations with increased dialysis frequency and time in the Frequent Hemodialysis Network Daily Trial. *Kidney Int.* 2017; 91(5):1186-1192.
47. Suri RS and Kliger AS. When is more frequent hemodialysis beneficial? *Semin Dial.* 2018; 00:1-11.
48. Suri RS, Li L, Nesrallah GE. The risk of hospitalization and modality failure with home dialysis. *Kidney Int.* 2015; 88(2):360-368. doi:10.1038/ki.2015.68.
49. Tattersall J, Martin-Malo A, Pedrini L, et al. EBPG guideline on dialysis strategies. *Nephrol Dial Transplant.* 2007; 22 Suppl 2:ii5-21.

50. Thomson BKA, Huang S-HS, Chan C, et al. Nocturnal home hemodialysis associates with improvement of electrocardiographic features linked to sudden cardiac death. *ASAIO J.* 2014; 60(1):99-105. doi:10.1097/MAT.0000000000000023.
51. Ting GO, Kjellstrand C, Freitas T, et al. Long-term study of high-comorbidity ESRD patients converted from conventional to short daily hemodialysis. *Am J Kidney Dis.* 2003; 42(5):1020-1035.
52. Unruh ML, Larive B, Chertow GM, et al. Effects of 6-times-weekly versus 3-times-weekly hemodialysis on depressive symptoms and self-reported mental health: Frequent Hemodialysis Network (FHN) Trials. *Am J Kidney Dis.* 2013; 61(5):748-758. doi:10.1053/j.ajkd.2012.11.047.
53. Watanabe Y, Kawanishi H, Suzuki K, et al. Japanese society for dialysis therapy clinical guideline for "Maintenance hemodialysis: hemodialysis prescriptions". *Ther Apher Dial.* 2015; 19 Suppl 1:67-92.
54. Weinhandl ED, Gilbertson OT, Collins AJ. Mortality, hospitalization, and technique failure in daily home hemodialysis and matched peritoneal dialysis patients: a matched cohort study. *Am J Kidney Dis.* 2016; 67(1):98-110. doi:10.1053/j.ajkd.2015.07.014.
55. Weinhandl ED, Liu J, Gilbertson DT, et al. Survival in daily home hemodialysis and matched thrice-weekly in-center hemodialysis patients. *J Am Soc Nephrol.* 2012; 23(5):895-904.
56. Weinhandl ED, Nieman KM, Gilbertson DT, et al. Hospitalization in daily home hemodialysis and matched thrice-weekly in-center hemodialysis patients. *Am J Kidney Dis.* 2015; 65(1):98-108. doi:10.1053/j.ajkd.2014.06.015
57. Zoccali C, Moissl U, Chazot C, et al. Chronic fluid overload and mortality in ESRD. *J Am Soc Nephrol.* 2017; 28(8):2491-2497.

Revision History Information

REVISION HISTORY DATE	REVISION HISTORY NUMBER	REVISION HISTORY EXPLANATION	REASON(S) FOR CHANGE
03/01/2019	R1	This LCD is revised to change the effective date of the LCD from 2/18/19 to 3/1/2019. The effective date applies to dates of service, not to claim submission dates.	<ul style="list-style-type: none"> Other (The LCD effective date of 2/18/19 is changed to 3/1/2019.)

Associated Documents

Attachments

N/A

Related Local Coverage Documents

Article(s)

A55675 - Coding for Hemodialysis Sessions

A56240 - Response to Comments: Frequency of Hemodialysis

LCD(s)

DL37502 - Frequency of Hemodialysis

Related National Coverage Documents

NCD(s)

260.6 - Dental Examination Prior to Kidney Transplantation

110.10 - Intravenous Iron Therapy

110.15 - Ultrafiltration, Hemoperfusion and Hemofiltration

Public Version(s)

Updated on 02/01/2019 with effective dates 03/01/2019 - N/A

Updated on 12/29/2018 with effective dates 02/18/2019 - N/A

Keywords

- dialysis
- kidney disease
- end stage renal disease
- Frequency of Hemodialysis
- KDOQI
- ESRD
- 90999