

Adult Home Hemodialysis

Standing Orders

1. Target Weight

All new patients will have an initial assessment.

2. Access:

a. Cannulation of AV Fistulas

In order to initiate cannulation of a new AV Fistula, the access must meet the following criteria as assessed by a Registered Nurse, either Care Manager or their designee:

- At least six weeks from date of creation
- Greater than 1" total palpable length
- 6mm or greater diameter
- 6mm or less depth

b. Cannulation of AV Grafts

In order to initiate cannulation of new AV Grafts, the access must meet the following criteria as assessed by a Registered Nurse, either Care Manager or their designee:

- At least two weeks from date of installation
- 6mm or less depth

c. If cannulation criteria not met contact surgeon and nephrologist to discuss access plan.

d. Guidelines for Cannulation as follows:

- Aim for experienced staff to cannulate new accesses for the first six runs. If no experienced staff is available, fistula cannulation will be deferred.
- Refer to Vascular Surgeon and nephrologist for CVC removal after three consecutive treatments with x2 needles
- Adjust blood flow rates to needle gauge per table or per MD order.

Blood Flow rates to Needle Gauge	
200-250ml/min	17 gauge
>250-350ml/min	16 gauge
>350-450ml/min	15 gauge

- AV Fistula week one – use 17g needle for arterial, CVC for venous return OR 17g needles for both A&V if approved by Registered Nurse, either Care Manager or their designee
- AV Fistula weeks two and three – 16g needles for both A&V if approved by Registered Nurse
- AV Fistula weeks four and ongoing – advance to 15g needles if approved by RN or their designee.

- vii. AV Fistula weeks four and ongoing – advance to 15g needles if approved by RN or their designee.
- viii. AV Graft week one – 16g needles for both A&V
- ix. AV Graft weeks two and ongoing – 15g needles

e. Access Infiltration

- i. Apply cold pack per policy for infiltrations related to access punctures.
- ii. Refer to access dysfunction algorithm.
- iii. Notify nephrologist if infiltration occurs that prevents dialysis provision that day or if infiltration occurs in new AVF (first 2 weeks of cannulation).

3. Guidelines for K+ <4.0:

- a.** A dietary consult will automatically be made for patients whose serum potassium is less than 4.0.
 - i. evaluate for K+ supplements, if on a supplement, verify usage. If not, contact primary MD for Rx consideration.
- b.** The serum potassium will be checked every week while the patient has a K+ of <4.0 (ICD10 = E87.6)
- c.** When the serum potassium level falls below 4.0 for two consecutive blood draws, the dialysate will be evaluated for a change to 2K+ 45 lactate if currently on a 1K bath.
- d.** HCO3 level will be checked prior to changing any dialysate.
- e.** For patients with a history of GI fluid losses, acute decrease in oral intake, or is post hospitalization:
 - i. Draw an NKC Profile (ICD10 = N18.6)
 - ii. Notify the physician

4. Daily Routine Diet/Fluid Guidelines

- a.** 1500-2000 mg sodium
- b.** 2-3 gram potassium
- c.** 0.8-1.2 gram phosphorus
- d.** 1.0-1.5 gram/kg protein
- e.** 750cc fluid plus the amount equal to the urine output

5. Dialyzers

- Cartridges with dialyzer for the NxStage machine will be provided by NxStage.

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6. Laboratory Tests – Routine Draws

Test	ICD10	Frequency
NKC chemistry panel **	N18.6	<ul style="list-style-type: none"> ° Monthly ° Repeat Ca PRN if result ≥ 10.2
Post-dialysis BUN **	N18.6	<ul style="list-style-type: none"> ° Monthly
Hemoglobin (Hgb)	N18.6	<ul style="list-style-type: none"> ° Monthly – 3rd week of month as needed ° (Also see Home Dialysis Programs Standing Orders for ESA)
Ferritin, TSAT, Fe, TIBC	E83.10	<ul style="list-style-type: none"> ° Quarterly (Jan-Apr-Jul-Oct) ° (Also see Home Dialysis Programs Standing Orders for Iron)
Hgb A1C	E11.9	<ul style="list-style-type: none"> ° Quarterly (Jan-Apr-July-Oct) on patients who have a diagnosis of diabetes mellitus ° (ICD10 = Refer to Patients Problem List)
HBs Ag	N18.6	<ul style="list-style-type: none"> ° Monthly if patient is HBsAg negative and Anti-HBs negative (or anti-HBs is <10 mIU/mL) unless patient is receiving the Hepatitis vaccination series. ° If receiving the vaccination series draw HBsAg one month after series complete. ° Annually (Jan) on all patients
HBs Ab (Anti-HBs)	N18.6	<ul style="list-style-type: none"> ° Annually (Jan) on all patients ° Per vaccination policy.
Hepatitis C Antibody	N18.6	<ul style="list-style-type: none"> ° On admission to home hemodialysis (if not previously obtained) and every 6 months, in January and July. ° For those new patients with a positive HCV Ab redraw HCV Ab and Hepatitis C RNA by PCR. (Refer to HCV surveillance policy.)
Anti-HBc (core antibody)	N18.6	<ul style="list-style-type: none"> ° On admission if not previously obtained
PTH Intact	N25.81 E20.8	<ul style="list-style-type: none"> ° Quarterly (Jan-Apr-July-Oct) when patient schedules with clinic visit ° Hyperparathyroidism ° Hypoparathyroidism
CBC with Platelets	N18.6	<ul style="list-style-type: none"> ° Monthly

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Aluminum	N18.6	<ul style="list-style-type: none"> ° On admission and annually ° Quarterly (Jan–Apr–July–Oct) for patients with aluminums >30 ° Quarterly (Jan–Apr–July–Oct) for patients on aluminum binders
URR / Kt/V **	N18.6	° Calculated monthly, repeat PRN if standard Kt/V <2.2 for patients dialyzing >3x/week, or spKt/V < 1.4 for 3x/week dialysis.
HCO ₃	N18.6	<ul style="list-style-type: none"> ° If HCO₃ >27 or <20 repeat in monthly clinic ° If result >27 or <20 x3, review HCO₃ with MD.
Magnesium	N18.6	° Quarterly

** Draw on midweek run for conventional therapy and on third run of week for daily therapy.

7. Water Testing Routine Labs

		Testing Schedule			
Initial Home Survey (Testing Done by Technical Services)	Initial Home Treatment (Sampling Done by RN)	Quarterly Testing (Sampling Done by Patient)	Annual Testing (Sampling Done by staff)	New or change in H ₂ O source BET(LAL)/CC sampling by Patient AAMI sampling by staff	Patients on well water Quarterly testing BET(LAL)/CC sampling by patient AAMI sampling by staff
AAMI (Raw Water)	AAMI (Product Water)	BET (LAL)/CC (Dialysate)	AAMI (Raw Water)	AAMI (raw & product water) BET (LAL)/CC (dialysate)	Quarterly BET LAL/CC AAMI (product & raw)
	BET (LAL)/CC (Dialysate)		AAMI (Product Water)		
			BET (LAL)/CC (Dialysate)		

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- a. In the event of water main break or flushing, patient will run on bags until approval received from water purveyor and negative LAL/CC/AAMI obtained.**

8. Laboratory Tests – PRN Draw

- a. Blood cultures: (ICD10 = R50.9)**
- For patient **with** a central line and with fever >100° F (37.8°C) or rigors draw 2 sets of blood cultures from the access/bloodlines at least 5 minutes apart. Notify MD by phone
 - For patient **without** central line but with fever >100°F (37.8° C), call MD for orders.
 - Blood Cultures must be drawn in center.
 - Notify MD.
- b. Water and dialysate cultures, BET (LAL), and colony counts:** from the machine and treatment station used should be obtained when clinical suspicion warrants. (This is in addition to the routine scheduled cultures).
- c. Access site cultures: (ICD10 = T82.7XXA for the initial culture; T82.7XXD for subsequent culture for same infection).** Obtain if clinical signs of infection.
- Must be done in center.
 - Notify MD.
- d. Potassium: (Hyperkalemia:ICD10-E87.5 or Hypokalemia:ICD10-E87.6)**
- e. New patient training labs:**
- End of week #1 & 3 & PRN:
- K+
 - CO2
 - Pre & post BUN
 - Hgb
 - NKC Profile
 - CBC/Platelets
 - LFT
- f. Redraw critical labs PRN**
- g. Covid-19 PCR testing: Obtain for patients with signs and/or symptoms consistent with COVID-19, when appropriate. Notify MD by fax or phone.**

9. Back Up in-center orders to be updated annually.

10. Laboratory Tests requests for patients who travel

- a. Patients who wish to travel to other facilities while on vacation may have their labs drawn prior to travel, at the discretion and request of the unit to be visited, as long as correct ICD10 codes are provided. (Hepatitis labs ICD10-N18.6). The patient signature must be obtained on the ABN section of the lab form prior to the lab draw.**

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11. Medications

a. Heparin – Anticoagulant

- i. Use Pork Heparin 1:1000 u/ml.
- ii. Prime and/or hourly Heparin doses per nephrologist order.
- iii. If helper/patient reports clotted or streaked dialyzer, Short Daily, increase prime by 500u. If this occurs a second time, schedule patient for a back-up treatment in the Home Training Unit for heparin dose adjustment.
 1. Contact MD for change in heparin dose.

If helper and/or patient notify the Home Training Unit that the patient has had a fall, or is scheduled for same day surgery, dental appointment, or that epistaxis or other active bleeding is present, or if patient is diagnosed with suspected pericarditis reduce the total heparin dose (prime and/or hourly) by ½ or per MD order for that day's treatment.

- iv. Heparin NxStage Short Daily Dialysis
 1. If patient is transferring from in-center, bolus dose = initial prime + 50% of the total hourly dose.
 2. If dose exceeds 3000u bolus, HH Medical Director to review.
 3. Short daily has no hourly heparin.
- v. Heparin Extended Dialysis
 1. Start with prime of 1000u and 500u/hr.
 2. Adjust per clearance of dialyzer and lines, & bleeding time post dialysis.
 3. Adjust prime first, then hourly.
 4. Notify MD of changes.
 5. When heparin pump is being used to adjust heparin off time based upon duration of bleeding after the removal of needles post dialysis from exit sites, bleeding should stop within 10 minutes after fistula needle is removed . If it is longer heparin dose may need adjustment.
 6. With excessive bleeding despite Heparin decrease, evaluate access for stenosis prior to further dose adjustment.
- vi. MD to be notified for platelet drop greater than 50% from previous value and/or absolute platelet count less than 50.

b. Heparin – Central Line Catheter Anticoagulant (ICD10 D68.9)

- i. Post Dialysis Lumen Instillation
- ii. Fill each lumen with heparin 1:1000 u/ml post dialysis.
- iii. Draw up 0.2 ml more than catheter fill volume and instill using positive pressure technique.
- iv. If no catheter fill volume is specified, use 1.5 ml/lumen.
- v. Use of 1:5,000u/ml Heparin requires special orders.

c. ESA – administer per ESA Standing Orders

d. Iron – administer per Iron Standing Orders

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e. Normal Saline – Muscle Cramps or Hypotension

- i. Nurse may advise helper to give an additional 500 ml of normal saline in increments of 100 to 200 ml for a total of 1000 ml.
- ii. Call MD if patient is requiring >1000 mls.

f. ODPS- Dialysis protein Supplements per dialysis unit policy

12. PRN Medications For Back-Up or Training Runs In-Center

a. Adverse Reactions

NOTIFY:

- o MD by phone of any dialyzer, drug or transfusion reaction
- o Pharmacy of any drug reactions
- o Blood Center of any blood transfusion reactions

TREATMENT:

Benadryl; Epinephrine; Solumedrol related to Transfusion Reaction (ICD10 - T80.89XA), Dialyzer Reaction (ICD10 T78.40XA) or Drug Reaction (ICD10 - T50.995A)

- **Diphenhydramine (Benadryl)** 25 mg may be given IV and repeated x 1 if necessary (if patient is not hypotensive) for chills, fever, rash, itching and backache as relates to transfusion, dialyzer, or drug reaction.
- **Epinephrine** 0.3 mg **IM**
- **Solumedrol** 125 mg IV push over 5-10 minutes

b. Lidocaine (Xylocaine) – Anesthesia for access

- i. May use any of approved topical anesthetics for access cannulation.

c. Tylenol – Pain (ICD10 - R52) & Fever (ICD10 - R50.9) Acetaminophen (Tylenol) 325 mg., 1 to 2 tablets every 4 hours PRN during dialysis (after checking patient's temperature) for mild pain or headache, joint and muscle ache, discomfort related to access, and for fever >100.0° F.

d. Nitroglycerin – Anginal Chest Pain (ICD10 - I20.9)

- i. Nitroglycerin 0.4 mg (gr 1/150) SL. May repeat every 5 minutes x 2.
- ii. Notify MD by phone
- iii. Do not give if systolic BP is <100 mmHg.

e. Oxygen – Dyspnea, Chest Pain, Hypotension, Arrhythmia (ICD10 - R09.02 Hypoxemia) Before administering oxygen, check O2 sat. If patient has symptoms such as: dyspnea, chest pain, hypotension, arrhythmia or O2 < 90%, administer at 2 L/min per nasal cannula or 5 L/min per mask. For patients with COPD use no more than 2 L/min and only by nasal cannula.

f. Glucose Paste – Insulin Reactions (ICD10 - E16.2)

- i. Obtain glucose meter reading.
- ii. For symptomatic hypoglycemia (glucose meter reading below 80), administer approximately ½ to 1 tube (12-24 gm) glucose

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paste PO.

g. Dextrose 50% - Insulin Reactions (ICD10 - E16.2)

- i. For severe symptoms of hypoglycemia or glucose meter reading <50, administer Dextrose 50%, 50 ml (25 gm), IV x 1 dose.
- ii. Notify MD.

h. Normal Saline – Muscle Cramps or Hypotension

- i. Normal Saline (0.9%) IV may be given in 100 – 200 cc boluses up to 1000 cc's.

i. Antihypertensives – Hypertension

- i. Notify MD if systolic BP greater than 200, or if diastolic BP greater than 120.
- ii. Do not initiate dialysis.

j. Seizures

Initiate Seizure Management Protocol and call MD.

k. TPA

May only be administered in-center following NKC protocol.

l. Naloxone:

Please follow assessment for Naloxone use and administration. If the assessment is to administer naloxone, it can be administered as follows (per NKC procedure): Naloxone 0.4mg IV/IM once, followed by contacting emergency response team, if not already done so. May repeat once after 3 minutes, if appropriate.

13. Miscellaneous Medications

a. Influenza Vaccine (ICD10 - Z23)

Influenza vaccine should be administered to all patients annually (when vaccine is available) except those with egg allergy, those for whom the patient's physician has stated it is contraindicated, and those who refuse.

b. Pneumococcal Vaccine (ICD10 - Z23) Per protocol

c. Hepatitis B Vaccine (ICD10 - Z23) Per protocol

d. Covid Vaccine (ICD10 - Z23): Per Protocol

14. Miscellaneous

a. PureFlow: Change to PureFlow PRN

b. Transition to nocturnal dialysis as indicated.

c. During NxStage training patient will dialyze 5x/wk.

d. OK for patient to miss one run for 1st home supply delivery.

e. Any other missed training day will be notified to MD.

f. Unstable Medical Conditions: If nursing assessment deems the patient unsafe for dialysis, the hemodialysis treatment may be postponed or terminated at the discretion of the RN (With documentation in the EMR) and the MD notified by phone.

g. Initiate On-Dialysis Protein Supplement (ODPS) Program.

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- h.** Initiate Bowel Protocol, as needed.
- i.** Initiate TB Screening per TB Testing Surveillance for Patients policy.

15. Miscellaneous- For Back-Up or Training Runs In-Center

a. Unstable Medical Conditions

- i. If nursing assessment deems patient unsafe for dialysis, hemodialysis may be postponed or terminated at the discretion of the RN.
- ii. Notify the nephrologist.
- iii. Document in medical record.

b. Emergency Dialysis Orders

- i. In the event the patient is unable to dialyze at home due to earthquake, fire, flood, power-outage, pandemic etc. provision of dialysis services depends on the degree of social isolation of both patients and staff, availability of patient transportation for access to care, and the reserve of caregivers to provide care.
- ii. During emergencies (earthquake, fire, flood, power-outage, pandemic, etc.), the following procedure will be implemented:
 - 1. In a declared emergency in which the NKC Emergency Operations Center (EOC) is convened, standing orders specific to the emergency at hand will be communicated to facilities, staff and medical staff.
 - a. They are subject to change depending on changes in conditions.
 - b. They may vary from facility to facility.
 - c. Nursing services may exercise discretion and clinical judgment in their application.
 - 2. Baseline provision of care should include:
 - a. Dialyzer: any standard single use dialyzer available in that facility.
 - b. Dialysate: [Ca⁺⁺] and [K⁺] per patient in-center prescription: if emergency obligates decreased frequency or shortened time, [K⁺] = 1 K⁺; if patient on Digoxin, 2K.
 - c. Heparinization 1.0 cc (1000 units) prime
 - d. Time: provision of maximum dialysis time feasible given the nature of the emergency, in conjunction with instructions from the EOC.
 - e. Kayexalate (ICD10 - E87.5): provide patient with Kayexalate as needed from disaster supplies (30 gm).

c. Direct Start NxStage Orders:

Week 1:

- i. 17 Gauge needles
- ii. QB 200 ml/min, advance as tolerated to 250 ml/min
- iii. 30L three days per week, 100% FF

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Week 2:

- i. 16 Gauge needles
- ii. QB 250ml/min, advance as tolerated to 350 ml/min
- ii. 40L three days per week, 100% FF

Week 3:

- i. 16 Gauge needles
- ii. Start standard home Rx, ie 50L 5 days per week, 75% FF

Week 4:

- i. Advance to 15G as tolerated

Medications:

- i. Heparin 1000 unit bolus, IV at start of treatment.

Matthew Rivara, MD

Physician Name (Please Print)

Physician signature

(see Initial Orders)

Date

Patient Name _____

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