

## **UCLA Guidelines for Use of Peripheral Ultrafiltration (UF) in Patients with Acute Decompensated Heart Failure**

Patients hospitalized with acute decompensated heart failure with evidence of systemic congestion and adequate systemic perfusion that fail to respond to initial treatment with intravenous loop diuretics and other standard of care therapies for heart failure, may be considered for treatment with peripheral ultrafiltration.

Ultrafiltration removes water and nonprotein-bound small- and medium-molecular-weight solutes through a semipermeable membrane when hydrostatic pressure, generated by blood pressure or an external blood pump, exceeds oncotic pressure. Ultrafiltration results in a decrease in the ventricular filling pressures without significant changes in renal function. Furthermore ultrafiltration does not seem to activate neurohumoral systems as can occur with high doses of loop diuretics. Ultrafiltration does not result in significant changes in creatinine or urea concentration, so it should not be confused with hemodialysis. Ultrafiltration is not a substitute for hemodialysis in patients with acute or chronic renal failure.

### **Patient Selection**

To be considered for peripheral ultrafiltration patients must meet certain criteria. The patient should be hospitalized with acute decompensated heart failure resulting from left ventricular systolic and/or diastolic dysfunction. There must be signs and/or symptoms of systemic congestion and volume overload. The patient must be hemodynamically stable without evidence of systemic hypoperfusion (shock, symptomatic hypotension, altered mental status). The patient must not be in acute or chronic renal failure (creatinine > 3.0 mg/dL). There must be adequate venous access. Furthermore there should be no evidence of active systemic infection.

Prior to considering peripheral ultrafiltration an adequate trial of standard of care therapies for acute decompensated heart failure including intravenous loop diuretics should have been tried and there should be objective evidence that the patient has not responded adequately. Patients who have failed a prior course of standard of care therapy for acute decompensated heart failure with readmission within 7 days may be considered for peripheral ultrafiltration early in the course of their re-hospitalization.

As part of the internal UCLA approval process for this therapy, use is restricted to acute decompensated heart failure patients being monitored on the COU or CCU and being cared for by the CCU service. Patients with volume overload due to non-cardiac conditions are not candidates for this therapy. In addition, patients with isolated right heart failure, primary pulmonary hypertension, and secondary pulmonary hypertension without left heart failure are not candidates for peripheral ultrafiltration at the UCLA Medical Center.

### **Aquadex UF System**

The Aquadex UF system is a small, portable device requiring only a peripherally inserted 16G 35-cm withdrawal catheter and a regular 16G or 18G 3.5-cm infusion catheter in a major vein system, usually the brachial-cephalic system. The Aquadex UF system allows for the removal of water and nonprotein-bound small- and medium-molecular-weight solutes through a semipermeable membrane. The ultrafiltrate is 200-250% more concentrated in sodium compared

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to urine derived by loop diuretics and therefore enables removal of sodium more efficiently than diuretics. The fluid removal rate is set by the treating physician and can range between 100 and 500 ml/hour.

The device does not require an ICU setting or specialized nursing or technical oversight. Ultrafiltration does not seem to change the creatinine or urea concentration. Initial pilot studies suggest that the device is safe and a recent randomized trial has been completed – results will be reported at the ACC late breaking clinical trials session. The device is now FDA approved.

### **Patient Selection Criteria**

Patients that meet the following inclusion criteria can be considered for peripheral UF:

- Admitted with Acute Decompensated Heart Failure (ADHF)
- Refractory or inadequate response to intravenous diuretic therapy and other standard of care heart failure therapies for at least 12 hours or failed discharge for ADHF (Readmitted within 7 days)
- Managed by the CCU Service.
- Patient location is the 4W COU or 4W CCU only, NO other ICU patients.
- SBP  $\geq$  90 mm Hg.
- Serum Creatinine  $\leq$  3.0 mg/dL.
- Afebrile and no evidence of systemic infection.
- Adequate IV access.

### Use UCLA Ultrafiltration for Heart Failure Order Set

Discontinue all intravenous or oral diuretic treatment except aldosterone antagonists (spironolactone or eplerenone) during ultrafiltration. Other heart failure oral or intravenous medications should be continued. Diuretics should be restarted as appropriate after ultrafiltration is completed.

Most patients can be adequately treated with a single filter over 24 hours allowing for as much as 12 liters of fluid removal. Filters must be replaced at 24 hour intervals. Select patients may require a longer treatment course and use of a second filter. Prior-authorization from one of the Ahmanson-UCLA Cardiomyopathy Center attending is required if requesting a third (or more) filter/patient. It is recommended that nephrology consultation be considered in patients undergoing peripheral ultrafiltration.