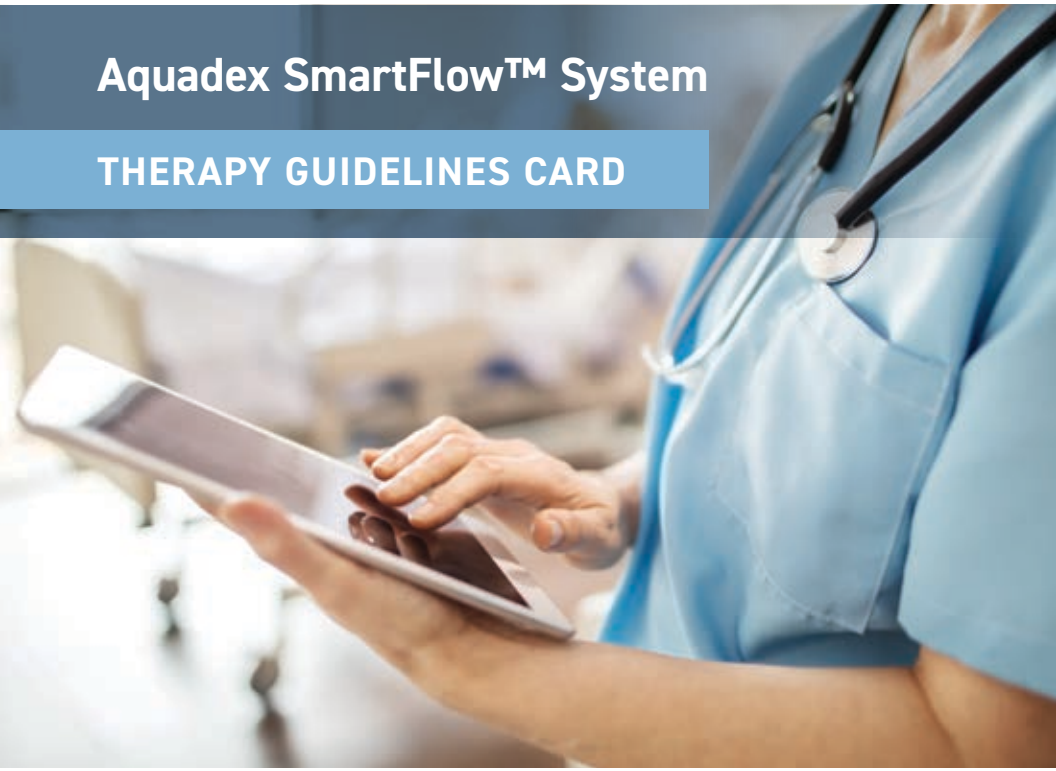
aquadex SmartFlow™

Aquadex SmartFlow™ System

THERAPY GUIDELINES CARD



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PATIENT SELECTION CONSIDERATIONS

- Fluid overloaded and with low diuresis/natriuresis[1,2]
  - Low urine volume (i.e., <100cc/hr)[1]
  - Elevated serum creatinine or increasing serum creatinine on standard therapy[1]
  - Frequent hospitalizations for fluid overload[2]
- Hemodynamic evidence of poor tolerance of fluid removal by persistent hemodynamic changes -AND- net negative <1 1/24 hours[3]
- Poor diuretic natriuretic response (≤50 mmol sodium output in the 6 hours after the diuretic)[4,5]
- Unresponsiveness to diuretic therapy leading to persistent signs and symptoms of congestion[6]

ANTICOAGULATION CONSIDERATIONS

- Anticoagulation is recommended to prolong the life of the filter[7,8]
- Heparin is most commonly used (other anticoagulation agents may be used if contraindicated e.g., Argatroban)[7,8]
- Anticoagulation is often administered at least 30 minutes prior to beginning therapy[7,9]
- Example therapeutic ranges:
  pTT = 80-100 ACT = 180-220 Anti-Factor Xa = 0.4-0.7[10]

VENOUS ACCESS CONSIDERATIONS

Peripheral Venous Access:

- Dual Lumen Extended Length Catheter (dELC) from CHF Solutions
- Placement of the dELC above the antecubital fossa is recommended

Central Venous Access:

- Central Venous Access Catheter (CVC) with lumendiameters ≤16 gauge. Illustratively:
  - Dual lumen CVC with two 14 gauge lumens
  - Dual lumen CVC with two 16 gauge lumens
  - Quad lumen CVC with at least one 14 gauge and one 16 gauge lumen

Not Recommended for Venous Access

- Catheters with >16 gauge lumen, PICC lines, peripheral IVs

Note: refer to Aquadex FlexFlow DFU Appendix E Catheter Compatibility Guide for catheter flow rates.

HEMATOCRIT CONSIDERATIONS

- Determine desired % blood volume reduction (default 5%)
- Increase in Hct indicates hemoconcentration; when user-defined limit is exceeded, UF pump pauses to allow plasma refill
- If limit exceeded and therapy goal has not been reached, consider increasing Hct limit by increasing % blood volume reduction, and/or reducing the UF rate
- For Hct monitoring without pump stoppage, set Hct Limit alarms to "Off" under Settings

SVO2 CONSIDERATIONS

- SvO2 displayed when Hct feature is enabled and baseline complete
- Vascular access sampling source (Peripheral Venous Catheter-SpvO2 vs Central Venous Catheter- ScvO2) will affect the displayed value; SpvO2/ScvO2 trend with SvO2[11,12]
- Changes in SvO2 during therapy may indicate the need for changes in UF rate or intervention by Prescriber or Provider

FLUID REMOVAL CONSIDERATIONS[3]

Therapy Initiation Considerations

- Recommended blood flow rate: 20-40ml/min
- UF Rate range: 0-500 ml/hr
- UF Rate should not exceed PRR

Set Initial UF Rate

Systolic Blood Pressure	Suggested Initial UF Rate
<100 mmHg	150 cc/hour
100-120 mmHg	200 cc/hour
>120 mmHg	250 cc/hour

Decrease initial UF rate by 50 cc/hr if ANY of the following are present:

- RV>LV dysfunction
- SCr increase 0.3 mg/dl above recent baseline
- Baseline SCr > 2.0 mg/dl
- History of instability with diuresis or UF

FLUID REMOVAL CONSIDERATIONS[3] *cont.*

UF Rate Titration Considerations
Every 6 hours, evaluate blood pressure (BP), heart rate (HR), urine output (UO), net intake/output, SCr:

Consider *Decreasing* UF Rate by 50 cc/hr and checking SCr STAT if any of the following are observed:	
SCr rise >15% or 0.2 mg/dl compared to prior measurement	UO drops >50% compared to prior 6 hours but remains >125 cc/6 hours
Resting SBP decreases >10 mm Hg compared to prior 6 hours but remains >80 mm Hg	Resting HR increases >20 bpm compared to prior 6 hours but remains <120 bpm

Consider *Holding* UF Rate and Checking SCr STAT if any of the following are observed:	
SCr rise >30% or 0.4 mg/dl compared to prior measurement	UO <125 cc/6 hours
Resting SBP decreases >20 mm Hg compared to prior 6 hours or > 80 mm Hg	Resting HR increase >20 bpm compared to prior 6 hours or >120 bpm

- If UF held, re-evaluate after laboratory values are available:
  - If hemodynamics are stable and SCr has plateaued, then consider re-starting UF at rate 50-100 cc/hr less than previous rate

- If persistent, volume overload present, then consider:
  - IV inotropes in patients with LVEF <40% or RV systolic dysfunction
  - Weaning vasodilators (especially in patients with HFPEF)
  - RHC

THERAPY DISCONTINUATION CONSIDERATIONS[3]

1. Best achievable "Dry Weight"

- Evidence of poor tolerance of fluid removal

  -AND-

- UF rate <100 cc/hr or net negative <1 liter per 24 hours

2. Resolution of congestion (all of the following)

- JVP <8 cm H2O
- No orthopnea
- Trace or no peripheral edema

3. Persistent elevation in SCr >1.0 mg/dl above baseline at start of IV diuretic treatment

4. Persistent hemodynamic instability

AFTER COMPLETION OF UF THERAPY[3]

If satisfactory "dry weight" has been reached AND SCr is stable:	
Initiate oral loop diuretic therapy with goal to keep net even	GDMT (Guideline Directed Medical Therapy)

If SCr, hemodynamics or UO are NOT stable:	
Hold diuretics until SCr is stable for a minimum of 12 hours and then: - If "dry weight"/ adequate decongestion has been reached then initiate oral diuretics with goal to keep net even - If "dry weight"/ adequate decongestion has NOT been reached then initiate IV diuretics	If elevated SCr or hemodynamic instability present, then consider a bolus of IV fluid

START THERAPY

F — Frequent admits for volume overload/HF[2]

L — Labs - increasing Cr[1]

U — Unresponsive to diuretics[1,2,3,4,5]

I — Inadequate urine output (< 2 L/24 hrs)[3-5]

D — 10 pounds > Dry weight[2]

STOP THERAPY

S — Serum Creatinine continuing to rise despite reducing UF rate[3]

T —Therapy goal achieved[3]

O — Oliguria despite reducing UF rate[3]

P — Pressure (patient not tolerating therapy-hypotension)[3]

[1] Peterangelo M. Prog Cardiovasc Nurs. 2008;23:168-172. [2] Pellocori P, et al. Cardiac Failure Review. 2015;1(2):90-95. [3] Costanzo MR, et al. J Am Coll Cardiol 2017;69:2428-2445. [4] Testani JM, et al. Circ Heart Fail. 2016;9(1). [5] Singh D, et al. J Card Fail. 2014 Jun;20(6):392-399. [6] ter Maaten JM, et al. Nat. Rev. Cardiol. 2015;12(3):184-192. [7] Sniecinski R, et al. Best Practice & Research Clinical Anesthesiology. 2015;29:189-202. [8] Oudemans-van Straaten H, et al. Critical Care. 2011;15:202. [9] Hirsh J, et al. Circulation. 2001;103:2994-3018. [10] Byun J, et al. Blood Research. 2016;51(3)171. [11] Nebout S, Pirracchio R. Cardiol Res Pract. 2012;2012:370697. [12] Chemtob RA, Moller-Sorensen H. Scand J Trauma Resusc Emerg Med. 2018 Sep;26(1):75.

RX ONLY

INDICATION: The Aquadex SmartFlow System is indicated for: Continuous ultrafiltration therapy for temporary (up to 8 hours) or extended (longer than 8 hours in patients who require hospitalization) use in adult and pediatric patients weighing 20 kilograms or more whose fluid overload is unresponsive to medical management, including diuretics. All treatments must be administered by a healthcare provider, within an outpatient or inpatient clinical setting, under physician prescription, both of whom having received training in extracorporeal therapies.

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