Clinical Considerations for Acute HF Management in Nursing Homes

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### Defining the population of patients

#### Risk for development of LV dysfunction
- **A**: PCMD

#### Asymptomatic LV dysfunction
- **B**: PCMD

#### Symptomatic LV dysfunction
- **C**: HFC and PCMD

#### Drug refractory LV dysfunction
- **D**: HFC and PCMD

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**TIMELINE**

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Once the patient has diagnosis of heart failure, he or she will always have this diagnosis. This replaces the concept of “in heart failure, out of heart failure” dependent on volume status.
Left ventricular systolic dysfunction

• Severe left ventricular dilation
• Severely reduced left ventricular systolic function with EF 30%

• OUT OF WHAT VOLUME?
  – LVEDv 250ml; LVESv 175 ml; Stroke volume 75ml

• WHERE IS THE BLOOD GOING?
  – Severe mitral regurgitation: 50% of stroke volume is ejected back to left atrium
  – Forward stroke volume is 38ml
Systolic and diastolic heart failure

- Less Blood pumped out of ventricles
- Less blood fills the ventricles
- Weakened heart muscle can’t squeeze as well
- Stiff heart muscle can’t relax normally
Left ventricular performance

Normal LVED volume 150ml
Normal LVES volume 75ml
Normal stroke volume 75 ml
EF ~ 50%

Severe left ventricular dilation LVED 250ml
LVES volume 175 ml
Stroke volume 75ml
Severely reduced LVSF with EF 30%
NYHA Class:
Mild, moderate and advanced HF

• **Class I**  No limitation of physical activity.

• **Class II**  Ordinary physical activity does not cause undue fatigue, palpitation, or dyspnea.

• **Class III**  Marked limitation of physical activity. Comfortable at rest, but ordinary physical activity results in fatigue, palpitations, or dyspnea.

• **Class IV**  Symptoms of cardiac insufficiency present at rest. If any physical activity is undertaken, discomfort is increased
Patient are difficult to evaluate at rest

- They look good at rest
- They may or may not look short of breath when talking with you
- They will not tell you that he/she has been sleeping in a chair last 7 nights
- They will not tell you that they are having trouble putting their socks on and that is why they are wearing flip flops in winter
Expect most of your patient to:

- Look good while sitting in your exam room
- Look comfortable when talking with you
- Tell you that they are tired
- Tell you that they are on low sodium diet
Patient evaluation

In approaching any patient with congestive heart failure, consider the two parameters of:

- **PERFUSION**: Is the patient warm or cold?
- **CONGESTION**: Is the patient dry or wet?
Hemodynamic profile defines treatment

Yes

R. Bourge, UAB Cardiology (adapted from L. Stevenson)

Stevenson LW. Eur J Heart Failure 1999;1:251-257

Warm and Dry
PCW normal
CI normal

Cold and Dry
PCW low/normal
CI decreased

Vasodilators
Diuretics

Inotropic Drugs
Dobutamine
Milrinone

Inotropic Drugs
Dobutamine
Milrinone

Warm and Wet
PCW elevated
CI normal

Cold and Wet
PCW elevated
CI decreased

Normal SVR
High SVR

Poor Perfusion

No

Yes
<table>
<thead>
<tr>
<th>Symptoms or Signs</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>Predictive Accuracy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exertional dyspnea</td>
<td>66</td>
<td>52</td>
<td>23</td>
</tr>
<tr>
<td>Orthopnea</td>
<td>21</td>
<td>81</td>
<td>2</td>
</tr>
<tr>
<td>Paroxysmal history of edema</td>
<td>33</td>
<td>76</td>
<td>26</td>
</tr>
<tr>
<td>History of edema</td>
<td>23</td>
<td>80</td>
<td>22</td>
</tr>
<tr>
<td>Resting heart rate</td>
<td>7</td>
<td>99</td>
<td>6</td>
</tr>
<tr>
<td>Rales</td>
<td>13</td>
<td>91</td>
<td>21</td>
</tr>
<tr>
<td>Third heart sound</td>
<td>31</td>
<td>95</td>
<td>61</td>
</tr>
<tr>
<td>Jugular</td>
<td>10</td>
<td>97</td>
<td>2</td>
</tr>
<tr>
<td>Edema (on examination)</td>
<td>10</td>
<td>93</td>
<td>3</td>
</tr>
</tbody>
</table>

PCWP Predicts Subsequent Mortality

Hemodynamic measurement in 456 heart failure patients after tailored vasodilator therapy.

Effect of preload and afterload on cardiac output in normal heart and heart with reduced LVEF
The Donkey Analogy

Ventricular dysfunction limits a patient's ability to perform the routine activities of daily living...
Diuretics, ACE Inhibitors

Reduce the number of sacks on the wagon
Guidelines

- All patients with reduced LVEF should receive ACE inhibitor whether or not they are symptomatic, unless they have a contraindication.
- ARB should be used in patients intolerant to ACE I.
- ARB and ACEI should not be used together.
- HYD/ISO should be considered in patients with increased K and renal insufficiency (C).
# Effects of β-Blockade on Mortality

<table>
<thead>
<tr>
<th>Study</th>
<th>All-cause Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US Carvedilol Program</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td>↓ 48% disease progression* ((P&lt;.001))</td>
</tr>
<tr>
<td>366 patients (mild–moderate)</td>
<td></td>
</tr>
<tr>
<td><strong>CIBIS II</strong>&lt;sup&gt;2&lt;/sup&gt;</td>
<td>↓ 34% ((P&lt;.0001))</td>
</tr>
<tr>
<td>2647 patients (moderate–severe)</td>
<td></td>
</tr>
<tr>
<td><strong>MERIT-HF</strong>&lt;sup&gt;3&lt;/sup&gt;</td>
<td>↓ 34% ((P=.0062))</td>
</tr>
<tr>
<td>3991 patients (mild–moderate)</td>
<td></td>
</tr>
<tr>
<td><strong>COPERNICUS</strong>&lt;sup&gt;4&lt;/sup&gt;</td>
<td>↓ 35% ((P=.0014))</td>
</tr>
<tr>
<td>2289 patients (severe)</td>
<td></td>
</tr>
</tbody>
</table>

*Defined as the triple end point of heart failure, death, or hospitalization or the need for sustained increase in medications for heart failure.

Data shown from individual trials—not direct comparison data.

Beta blockers and HF exacerbation

• It is recommended that beta blocker therapy be continued in most patients experiencing a symptomatic exacerbation of HF, unless they develop cardiogenic shock, refractory volume overload, or symptomatic bradycardia (C)

• Abrupt discontinuation in patients with symptomatic exacerbation should be avoided, unless the situation is life-threatening. (C)
CHF mortality data depend on the level of neurohormonal blockade

Placebo arm of Val-HeFT trial

- Patients on BB plus ACE I – mortality in 23 months 11.9% = ~ 6%/year (79% SCD)
- Patient not on BB or ACE I - mortality in 23 months 31.6% = ~ 15-16% year (48% SCD)
  - 29% reduction by ACE I alone
  - 39% reduction by BB alone
  - 62% reduction by both BB and ACE I

Diuretics

- Loop diuretics are recommended to restore normal volume status
- IV diuretics may be needed in volume overloaded patients
- Metolazone or Chlorothiazide may need to be used
- Electrolytes should be monitored carefully
- Low sodium diet is important
Open-label randomized trial of torsemide compared with furosemide therapy for patients with heart failure.
One Medium Potato
1 Hot Dog, 1 Tb. Catsup, 13 Chips,
1 tsp. Mustard, 1/2 C. Baked Beans
Digoxin

- Digoxin should be considered for patients who have symptoms of HF caused by reduced LVEF while receiving standard therapy.
- The dosage of digoxin should be .125 mg to .25 mg daily
- Serum digoxin level should be <1.0ng/ml, generally 0.7-0.9ng/ml
Aldosterone Antagonists

- Aldosterone antagonist should be considered for patients receiving standard therapy who have Class II/IV HF from reduced LVEF (A).

- Patients should have a normal serum potassium level (less than 5.0 mmol/L) and adequate renal function (creatinine less than 2.5 mg/dL).
Aldosterone Antagonists

- Serum potassium concentration should be monitored
- Consideration should be given to lowering or eliminating supplemental potassium
All individual components of the primary composite endpoint were significantly improved with ISDN-hydralazine therapy, namely death, first hospitalization for heart failure, and change in the quality-of-life score (a larger negative score indicates a better quality of life).
Clinical signs of low cardiac output (being “cold”)

- Cool extremities
- Mental status depression
- Hypotension or hypotensive response to ACE-inhibition
- Hyponatremia
- Renal failure
Clinical signs of low cardiac output (being “cold”)

- Pulse pressure
  - Systolic BP - diastolic BP / Systolic BP x 100
  - It should be > 25%;
  - PP <25% correlates with CI <2.0l/min/m2

- Pulsus alternans is pathognomonic of low cardiac output
Who is cold?

Patient A: BP 100/80

Patient B: BP 85/55
Stage D goals and medication management

- Survival with usual disease progression is 6 months or less
- Main goal is making patient comfortable and not harm them with medication
- May need to decrease the doses or eliminate beta blockers and/or ACE I/ARB
- Be very careful with spironolactone
- Consider turning ICD off
The effect of correction of mild anemia in severe, resistant CHF using EPO and IV iron.

- 32 patients with NYHA III and IV HF despite maximally tolerated doses of medications
- LVEF < 40%
- HGB between 10.0 and 11.5
- Randomized into treatment (epo and iv iron) and control group
- Follow up 8.2 months

Silverberg et al J Am Coll Cardiol 2001;37:1775-80
Other effect of correction of mild anemia in severe, resistant CHF using EPO and IV iron.

- NYHA class changed from 3.8 to 2.2 in treatment group (3.5 to 3.9 in control group)
- No death in treatment group and 4 deaths in control group
- Stable renal function in treatment group, worsening creatinine in control group (1.4 to 1.8)

Silverberg et al J Am Coll Cardiol 2001;37:1775-80
The effect of correction of mild anemia in severe, resistant CHF using EPO and IV iron.

Silverberg et al J Am Coll Cardiol 2001;37:1775-80
Hemoglobin and Mortality in Heart Failure Patients

Survival (%)

Time (months)

Hb > 14.8 g/dL
Hb 13.7–14.8 g/dL
Hb 12.3–13.6 g/dL
Hb < 12.3 g/dL

P = 0.00001

N = 1,061

## Mortality in Anemic Heart Failure Patients

<table>
<thead>
<tr>
<th>Study</th>
<th>Total N</th>
<th>Time Frame</th>
<th>Anemic Hb/Hct</th>
<th>Anemic Mortality</th>
<th>Nonanemic Hb/Hct</th>
<th>Nonanemic Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRAISE</td>
<td>1,130</td>
<td>24 months</td>
<td>&lt; 37.6%</td>
<td>56%</td>
<td>≥ 37.6%</td>
<td>~ 40%</td>
</tr>
<tr>
<td>Kosiborod</td>
<td>2,281</td>
<td>12 months</td>
<td>&gt; 32%–37%</td>
<td>38%</td>
<td>&gt; 37%</td>
<td>29%</td>
</tr>
<tr>
<td>Hurwich</td>
<td>1,061</td>
<td>12 months</td>
<td>&lt; 12.3 g/dL</td>
<td>44%</td>
<td>≥ 13.7 g/dL</td>
<td>26%–29%</td>
</tr>
<tr>
<td>ELITE II</td>
<td>3,044</td>
<td>24 months</td>
<td>&lt; 12.5 g/dL</td>
<td>25%</td>
<td>14–15 g/dL</td>
<td>17%</td>
</tr>
<tr>
<td>COPERNICUS</td>
<td>2,286</td>
<td>12 months</td>
<td>11.0 to &lt; 12.5 g/dL</td>
<td>17%</td>
<td>13.5 to &lt; 15 g/dL</td>
<td>16%</td>
</tr>
<tr>
<td>Ezekowitz</td>
<td>12,065</td>
<td>12 months</td>
<td>ICD-9</td>
<td>38%</td>
<td>ICD-9</td>
<td>27%</td>
</tr>
<tr>
<td>RENAISSANCE</td>
<td>912</td>
<td>20 months</td>
<td>≤ 12.0 g/dL</td>
<td>28%</td>
<td>&gt; 12.0 g/dL</td>
<td>16%</td>
</tr>
<tr>
<td>OPTIME-CHF</td>
<td>906</td>
<td>60 days</td>
<td>≤ 11.3 g/dL</td>
<td>14%</td>
<td>≥ 11.4 g/dL</td>
<td>8%</td>
</tr>
<tr>
<td>McClellan</td>
<td>633</td>
<td>12 months</td>
<td>&lt; 30%</td>
<td>50%</td>
<td>30%–35% Hct 36%–39% Hct</td>
<td>37% 34% 31%</td>
</tr>
</tbody>
</table>
Inotropic support

If hypotension prevents the adequate addition of afterload reducing therapy or diuretics, the following agents can be considered:

- **Dobutamine** - high inotropic activity; mild to moderate vasodilatory effects. Associated with tachyarrhythmias;

- **Milrinone** - moderate inotropic activity; moderate to significant vasodilatory effects. Should not be used when patients are hypotensive given its vasodilatory effects.
Introduction of palliative care

• Stage C and D patients with HF and their families should be educated that patients with HF are at high risk of death, even while aggressive efforts are made to prolong life.

• Discussions regarding end-of-life care should be initiated while the patient is still capable of participating in decision-making.