Evaluation of Intravenous Loop Diuretic Use in Acute Decompensated Heart Failure in a Community Hospital

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OBJECTIVE

• To characterize the use of intravenous loop diuretics in patients hospitalized with fluid overload secondary to acute decompensated heart failure (ADHF) within a community hospital.

BACKGROUND

• Loop diuretics cause water excretion renally by inhibiting the sodium-potassium-chloride cotransporter in the ascending loop of Henle to reduce sodium and chloride reabsorption.

• The loop diuretic drug class includes furosemide, bumetanide, torsemide and ethacrynic acid. Furosemide is the most utilized loop diuretic in heart failure.

• Furosemide, bumetanide, and torsemide are on formulary for this facility.

• Prompt treatment with loop diuretics is recommended for fluid overload in ADHF by the 2022 AHA/ACC/HFSA Heart Failure Management Guidelines.

• High doses of loop diuretics have been associated with adverse effects such as acute kidney injury (AKI) and hypokalemia.

• There is lack of data on the optimal regimen for empiric diuresis in ADHF.

• Furosemide, bumetanide, and torsemide are on formulary for this facility.

METHODS

• This is an Institutional Review Board (IRB) approved retrospective study from September 1, 2020 to December 31, 2021.

• ≥ 18 years old
• ADHF diagnosis
• Continuous infusion or more than 1 bolus dose of loop diuretic

Primary Endpoints: Secondary Endpoints:
• Frequency of the initial loop diuretic
• Chronic kidney disease (CKD) stage 5 receiving dialysis
• Description of subsequent regimen adjustments
• Cirrhosis
• Thoracentesis during admission
• Thioridazone during admission

RESULTS

Table 1: Patient Demographics

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<thead>
<tr>
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<th>Total patient, n</th>
<th>599</th>
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<tbody>
<tr>
<td>Average age, years ± SD</td>
<td>71.5 ± 13.4</td>
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<tr>
<td>Female sex, n (%)</td>
<td>223 (37)</td>
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<td>Ejection fraction, mean ± SD</td>
<td>40.1 ± 16.2</td>
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<td>Home loop diuretic prior to admission, n (%)</td>
<td>322 (54)</td>
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<td>CrCl at admission, mean ± SD</td>
<td>58.7 ± 35.2</td>
<td></td>
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<tr>
<td>Past medical history CKD Stage 1-4, n (%)</td>
<td>371 (62)</td>
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Table 2: Therapy Characteristics

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<thead>
<tr>
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<th>IV loop diuretic duration (days), mean ± SD</th>
<th>3.62 ± 2.72</th>
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<tbody>
<tr>
<td>Total loop diuretic duration (days), mean ± SD</td>
<td>4.98 ± 3.75</td>
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<tr>
<td>Frequency of transition to PO loop diuretic, n (%)</td>
<td>422 (72)</td>
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<tr>
<td>Additional IV non-loop diuretic administered, n (%)</td>
<td>18 (3)</td>
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Table 3: Incidence of Side Effects

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<th>Acute kidney injury, n (%)</th>
<th>86 (14)</th>
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<td>Hypokalemia, n (%)</td>
<td>223 (40)</td>
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DISCUSSION & CONCLUSIONS

• There were 36 initial regimens, underscoring the need for standardization. Top 10 most utilized regimens account for 87% of total encounters.

• Majority of regimens following once-doses were intravenous and included furosemide, following trends in practice and guideline recommendations.

• Highest average urine output was associated with bumetanide IV 9mg; however, it wasn’t highly utilized. 24 hours of furosemide 80mg, 120mg, and 160mg account for ~50% of regimens with similar urine outputs. Initial regimens could be streamlined to equal those 24 hour furosemide doses.

• Minimal usage of additional non-loop IV diuretics implies the loop diuretic regimens utilized provided adequate congestion management.

• Incidence of hypokalemia warrants further investigation of potassium supplementation for specific loop diuretic regimens.

• Higher incidence of AKI in CKD indicates additional monitoring and conservative loop diuretic dosing may be appropriate.

• This study was limited by inconsistent urine output documentation and patient-specific nature of loop diuretic dosing in ADHF.

• To conclude the best loop diuretic regimen(s), further evaluation of in-patient dosing compared to home diuretic dosing and additional diuretics efficacy endpoints such as clinical signs of congestion and/or weight changes is needed.

REFERENCES


