Purpose:

• Hidden fluids, defined as discrete fluids administered as part of routine care

• One focus of fluid stewardship is the prevention of fluid overload, which is associated with organ dysfunction and death in critically ill patients\(^1\)^\(^\,\)\(^\,\)\(^2\)

• It has been suggested that fluid stewardship be guided by the 4 patient rights of medication safety: Right Patient, Right Drug, Right Dose, Right Route\(^2\)

• One focus of fluid stewardship is the prevention of fluid overload, which is associated with organ dysfunction and death in critically ill patients\(^1\)^\(^\,\)\(^\,\)\(^2\)

• Hidden fluids, defined as discrete fluids administered as part of routine care that might be unaccounted for but contribute to overall fluid balance, account for 40-60% of total volume administered in the ICU\(^3\)

• Aims of fluid stewardship include: 1) reduce unnecessary fluid administration, 2) reduce fluid overload, 3) reduce device-related infections, 4) improve organ function

• Fluid stewardship focuses on managing fluids based on patient specific needs in an effort to optimize volume status and improve outcomes\(^1\)

• It has been suggested that fluid stewardship be guided by the 4 patient rights of medication safety: Right Patient, Right Drug, Right Dose, Right Route\(^2\)

• Recommendation Assessment:

  - Each recommendation was assessed for relevance to fluid stewardship

  - Fluid stewardship recommendations were then stratified based on the four patient rights of fluid stewardship. Each recommendation was assessed for relevance to hidden fluids

  - All categorization was based on definitions agreed upon by the investigators a priori

  - Documentation was reviewed for all pharmacy recommendations made on each patient day

  - Assessment of pharmacist

STUDY DESIGN

• IRB approved, single center, retrospective review

• Patients who were admitted to the medical ICU (MICU) between June 2016 and June 2019 and had pharmacy documentation in TheraDoc\(^6\) were included

• Patients were excluded if they were less than 18 years of age or were not followed by the academic rounding team

• Documentation was reviewed for all pharmacy recommendations made on each patient day

• Recommendation Assessment:

  - Each recommendation was assessed for relevance to fluid stewardship

  - Fluid stewardship recommendations were then stratified based on the four patient rights of fluid stewardship. Each recommendation was assessed for relevance to hidden fluids

  - All categorization was based on definitions agreed upon by the investigators a priori

ENDPOINTS

Primary

• Percentage of fluid stewardship recommendations related to hidden fluids

Secondary

• Percentage of all recommendations that were related to fluid stewardship

• Average number of fluid stewardship recommendations per patient

• Average number of fluid stewardship recommendations per patient day

• Average number of hidden fluid recommendations per patient

• Characterization of hidden fluid recommendations according to the four patient rights

RESULTS

Table 1. Hidden Fluid Recommendation Examples

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right Route</td>
<td>[PERCENTAGE]</td>
<td>Conversion from IV to PO</td>
</tr>
<tr>
<td>Right Patient</td>
<td>[PERCENTAGE]</td>
<td>Parenteral nutrition discontinuation</td>
</tr>
<tr>
<td></td>
<td>[PERCENTAGE]</td>
<td>Enteral water discontinuation</td>
</tr>
<tr>
<td>Right Dose</td>
<td>[PERCENTAGE]</td>
<td>Concentration of antibiotics, vasopressors or sodium bicarbonate</td>
</tr>
<tr>
<td></td>
<td>[PERCENTAGE]</td>
<td>Parenteral nutrition volume adjustment</td>
</tr>
<tr>
<td></td>
<td>[PERCENTAGE]</td>
<td>Enteral water volume adjustment</td>
</tr>
</tbody>
</table>

Figure 1. Screening and Description of Recommendations

122 Patients

307 Patient Days

939 Pharmacist Recommendations

189 Fluid Stewardship Recommendations

Figure 2. Secondary Endpoints

1.55 fluid stewardship recommendations were made per patient

0.62 fluid stewardship recommendations were made per patient day

0.45 hidden fluid recommendations were made per patient

Figure 3. Characterization of Hidden Fluid Recommendations

Table 2. Characterization of Hidden Fluid Recommendations

Table 3. Percentage of Fluid and Hidden Fluid Recommendations

3 (VALUE)

6 (VALUE)

1.55 fluid stewardship recommendations were made per patient

0.62 fluid stewardship recommendations were made per patient day

0.45 hidden fluid recommendations were made per patient

CONCLUSIONS

• 1 in 5 recommendations made by a critical care pharmacist is related to fluid stewardship

• Almost 30% of those recommendations are related to hidden fluids

• Most hidden fluid recommendations are categorized as pertaining to the right route

• Limitations:

  • Small sample size

  • Single center

  • Retrospective design

  • Future research should explore the clinical impact of these pharmacist-driven recommendations on patient outcomes

REFERENCES


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