Improving BP and Volume Assessment in Children Admitted to the Nephrology Service.

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Background

Hypertension is frequently misdiagnosed in pediatrics, increasing the risk of long-term cardiovascular and renal complications. Misdiagnosis is often caused by inaccurate blood pressure readings and errors can be decreased by proper documentation of cuff size, BP site and patient status at time of BP check and avoiding taking measurements in the lower extremities. Trends in daily weight are sensitive indicators for volume overload in children receiving intravenous fluids. Volume overload is associated with hypertension and cardiorespiratory complications.

Objective

Our study aim was to develop a QI project to improve BP and volume assessment documentation in pediatric patients admitted to the nephrology service at Norton Children’s Hospital.

Methods

The variables studied for our initial PDSA cycle were a) Daily weight recordings b) Site of BP measurement c) Documentation of patient status and d) size of cuff used when BP was elevated. Binary data were obtained over 3 months (Sep to Dec 2017) on children admitted to Nephrology service (n=22). Following initial assessment, key drivers and aims were established. The key aim was to achieve 100% compliance in monitoring daily weights and prevent persistent (≥2) BP checks on lower extremities. An in-service training about updated (2017) BP measurement guidelines was given to the medical house-staff and nurses on Nephrology floor with pre- and post-testing. Following PDSA cycle, the same variables were collected over 3 months (Jan-Mar 2018) on children admitted to nephrology service (n=21). N1-Chi square was used to study differences in desired outcomes between the two samples, and t-test was used to compare means between the two samples.

The mean age and length of stay in pre- and post-intervention samples were not statistically significant (p>0.05). The proportion of checking daily weights increased significantly [X²(1, N = 41) = 5.3, p = 0.015], the frequency of persistent (≥2) BP check in legs decreased significantly [X²(1, N = 43) = 5.26, p = 0.021], and the proportion of documentation of patient status or intervention when hypertension increased significantly [X²(1, N = 42) = 6.3, p = 0.01] as seen in Figure 1. Documentation of cuff size was not done for any patient pre- or post-intervention.

<table>
<thead>
<tr>
<th></th>
<th>Pre-Intervention Group</th>
<th>Post-Intervention Group</th>
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<tbody>
<tr>
<td>Mean Age (years)</td>
<td>11.7</td>
<td>11.1</td>
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<tr>
<td>Length of stay (days)</td>
<td>7.4</td>
<td>4.6</td>
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Table 1. Population characteristics

Figure 1. Percentage of patients pre- and post-intervention

Limitations

The number of patients available to analyze (N=41) was small, decreasing the power of our study. There was selection bias with patients only selected from nephrology service. Not all BP documentation variables were present in vitals flowsheet which made the work of nursing more challenging and we thank them for their excellent cooperation during the study.

Conclusions

1. Pediatric residents and nursing house-staff should be updated on new 2017 AAP pediatric hypertension guidelines on techniques to improve BP measurement in children.
2. In-service education regarding these guidelines with pre- and post-test questionnaire improved BP documentation on patients admitted to the nephrology service.
3. Daily weights are critical for volume assessment and should be ordered by residents in pediatric patients admitted to the hospital and should be obtained when possible.
4. Blood pressures tables changed in recent guidelines with lower BP norms for corresponding age, sex and gender compared to previous standards.
5. We recommend creating ‘EHR elevated BP flags’ based on new BP table recommendations.
6. Modification of EMR BP flow sheet to include cuff size and patient state when BP is elevated may also improve BP measurement.

References