Small Bowel Obstruction: Facilitating Diagnosis and Optimizing Resuscitation and Management

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Introduction

As a common surgical emergency that presents in our Emergency Department, Small Bowel Obstruction (SBO) is a disease process where appropriate treatment relies on early detection, fluid resuscitation, and gastric decompression. Despite SBO representing a common emergency, many patients experience inadequate or delayed management as compared to established guidelines, potentially leading to suboptimal treatment and resolution of SBO. As order sets and alerts within Epic are in place for other disease processes whose management relies on timely diagnosis and fluid resuscitation (e.g. sepsis), objectives for our quality improvement plan involve incorporating elements of alerts and order sets within our EMR to optimize detection, management and resuscitation of patients with small bowel obstruction presenting to the Emergency Department.

Methods

Using a sample of patients diagnosed with SBO in our emergency department, we performed a data review to evaluate overall management of SBO. We identified three potential areas of improvement for management, specifically assessment of serum lactate, performance and documentation of nasogastric decompression, and use of various diagnostic imaging modalities in evaluation for SBO.

We intend to use the data from our findings to promote improvement of SBO management as is described in “Conclusion: Upcoming Steps for Improvement”.

Discussion

After review of data regarding lactate orders, a large portion of patients ultimately diagnosed with SBO are never having lactates ordered at any point in their workup. When used as a surrogate for tissue perfusion, one could infer that without a serum lactate a given patient may be under resuscitated and indeed, there is a discrepancy of nearly 1 L NS of fluid resuscitation between patients who had lactate assessed and those who did not. Additionally, for patients who did have lactates assessed, both the median and mean time of blood draw took place after the respective median and mean time for CT abdomen pelvis order. In an effort to improve rates of adequate resuscitation, one possible area for improvement could include an alert when ordering CT abdomen pelvis which could encourage providers to consider assessing serum lactate if diagnoses such as SBO or other ischemic intraabdominal pathologies are on their differential.

When considering nasogastric decompression, NG tube placement for SBOs is a poorly documented procedure with documentation present in only 61% of patients with NG placement. This is problematic for several reasons. First, procedures should always be documented in the event complications related to procedure arise, subsequent providers have questions regarding the procedure or need to know when it was completed. Also, NG tube placement is a billable procedure. Payment for this procedure requires it to be documented in the patient’s chart. Improvement in documentation can lead to better patient care in addition to increase payment to the hospital.

Prior research has been equivocal on the utility and efficacy of obstruction series radiography in diagnosing SBO. In our review, 30% of patients diagnosed with SBO via CT had Obstruction Series Radiography ordered, with 60% of those studies read as negative for obstruction. Although evaluation with radiography was considerably faster than with CT, that benefit is limited by the poor sensitivity of radiography compared to CT. Additionally, when evaluating rate and modality of contrast administration, the majority of CT scans were performed without oral contrast. Administration of oral contrast added an average of 46 minutes of wait time for CT performance. Additionally, when evaluating for SBO, bowel gas has been noted to provide ideal contrast with bowel wall to highlight pathognomonic findings of bowel obstructions that may be obscured by oral contrast. Oral contrast in the setting of small bowel obstruction has also been associated with increased risk of aspiration. With regard to radiation exposure, average radiation exposure in an abdominal x-ray is 1.0 milliSieverts (mSv) which is equivalent to 50 chest radiographs. This non-insignificant amount of radiation exposure, combined with the poor efficacy that has been demonstrated with Obstruction Series radiography, the tendency for a follow up CT to be ordered regardless of the XR result, as well as the risk, delay of diagnosis, and potential decreased sensitivity of CT when PO contrast is administered; all support performing CT with IV contrast only as the sole imaging test for the evaluation of small bowel obstructions.

Results

Rate of Serum Lactate Assessment: On review of our data, 41% of our patients did not have lactate levels ordered during their workup. 80% of those patients were ultimately diagnosed with SBO with 31% requiring surgical intervention. The average amount of fluid administration for all patients included in our review was 1,746 mL, however the average amount of fluids given for patients with lactate ordered was 2,011 mL as compared to 1,040 mL of fluids given for patients who did not have lactates ordered. For patients who did have lactates ordered, the average time to lactate order was 155 minutes after arrival (median 129). For patients who had CT abdomen/pelvis ordered, the average time to CT order was 153 minutes after arrival (median 114).

Rate of Nasogastric Tube Placement and Documentation: Based on the data we analyzed of patients diagnosed with SBO, 51% of patients had NG tubes placed. Of those patients who had an NG tubes placed, only 61% had any documentation of NG tube placement.

Use of Obstruction Series Radiography and CT abdomen Pelvis: Preliminary data from our patient population at TJUH shows that Obstruction Series Radiography was performed on nearly 30% of patients later found to have SBO. All patients who received an obstruction series also underwent a CT Abdomen Pelvis during the same visit. Of the patients receiving an obstruction series 36.7% of them were read as negative. Of those with an initial negative obstruction series 60% went on to have a small bowel obstruction discovered on CT scan in the ED. In regards to time required to obtain CT abdomen pelvis, data has been consistent with CT wait times in the ED with the average wait time from CT order to exam completion being 198.31 minutes (~3.3 hours). The average time to perform an obstruction series from order (38.4 minutes) and time to obtain a result from order (60.5 minutes) was significantly less than the times to perform and receive a result for a CT. When evaluating use of contrast with CT abdomen pelvis, 59% of CTs ordered were performed with IV contrast and without oral contrast. When evaluating wait times for CT scans ordered with PO contrast compared to scans without PO contrast, studies including oral contrast had an average wait time of 225 minutes compared to an average wait of 179 minutes for studies ordered without PO contrast.

Conclusion: Upcoming Steps for Improvement

After obtaining preliminary data related to ED management of SBO and identifying potential areas of improvement upon management of SBO, our goal is to develop elements within our EMR to promote improvement on SBO management. Potential areas of further research include evaluating site specific ordering tendencies, along with sensitivities and specificities of all obstruction series ordered for significant abdominal pathology. A suggested intervention involves building an alert into the electronic medical record describing the efficacy of an obstruction series XR based on our data, used as a means to decrease ordering of obstruction series. Along similar lines, we hope to develop similar alerts to provide reminders on assessment of serum lactate as well as documentation of nasogastric decompression. We plan to collaborate with administration within TJUH informatics to achieve this goal with respect to our EMR. Furthermore, education to all levels of providers in the form of a didactic session or brief overview via email on the utility, cost and radiation associated with an obstruction series is another method at curbing the use of the test. We plan to collaborate with stakeholders such as Acute Care Surgery and Internal Medicine to determine if any elements that could be incorporated to ED management may impact outcomes after patients are admitted to their respective services.