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Utilization of Thoracic irrigation reduces the incidence of Secondary Surgical Intervention in Traumatic Hemothorax Patients at a Level 1 Trauma Center

What is the problem or challenge you identified?

Hemothorax is one of the most common pathologies following a trauma to the thorax. While often successfully treated by inserting chest tubes, there remains a risk of developing a retained hemothorax that may require secondary intervention, such as Video-Assisted Thoracoscopic Surgery (VATS), which increases hospital stay length and the risk of secondary complications. As a result, it remains desirable to find targeted and cost-effective treatment strategies that may prevent or reduce the incidence of retained hemothorax and secondary surgical interventions, thereby reducing the financial burden of treatment.

Describe the intervention you developed or change you implemented to address the problem.

Thoracic irrigation for the management of hemothorax has been associated with reduced rates of retained hemothorax requiring secondary intervention, shorter hospital stays, lower hospital costs, and is guideline-supported.^{1,2,3} As a result, the use of thoracic irrigation was selected as an appropriate intervention in an attempt to treat hemothorax in a cost-effective manner by reducing the need for secondary interventions.

How did you measure the effects of the change?

A retrospective analysis was conducted at a Level 1 trauma center from January 2022 to February 2024. Inclusion criteria were adult patients presenting with an acute hemothorax or hemopneumothorax and placement of tube thoracostomy. Exclusion criteria were tube thoracostomy or thoracic irrigation >24 hours after trauma. A total of 214 patients were identified: 20 belonging to the Thoracic Irrigation Cohort and 194 belonging to the Non-Thoracic Irrigation Cohort. Baseline demographic data collected included age, BMI, and medical comorbidities. Injury data collected included Injury severity score, mechanism of injury, and initial hemothorax volume. The initial hemothorax volume was calculated using Mergo's formula. The primary outcome measured was the incidence of VATS. Complications measured were empyema, pneumonia, and bleeding complications. Univariate analyses were performed with a $p < 0.05$ considered to be significant.

Both groups were well-matched in terms of baseline demographics and injury severity score. The Thoracic Irrigation Cohort had a significantly larger hemothorax volume than the Non-Thoracic Irrigation Cohort (755.9 ml vs. 344.5 ml $p = 0.002$). The incidence of VATS was found to be decreased in the thoracic irrigation cohort (0% vs. 17% $p = 0.049$).

1. Kugler NW, Carver TW, Milia D, Paul JS. Thoracic irrigation prevents retained hemothorax: A prospective propensity scored analysis. *J Trauma Acute Care Surg.* 2017;83(6):1136-1141. doi:10.1097/TA.0000000000001700
2. Crankshaw L, McNickle AG, Batra K, Kuhls DA, Chestovich PJ, Fraser DR. The Volume of Thoracic Irrigation Is Associated With Length of Stay in Patients With Traumatic Hemothorax. *J Surg Res.* 2022;279:62-71. doi:10.1016/j.jss.2022.05.031
3. Western Trauma Association. Management of traumatic hemothorax. Western Trauma Association Algorithms. Available at: <https://www.westerntrauma.org/western-trauma-association-algorithms/>. Accessed June 27, 2024