

Utilization of Thoracic Irrigation Reduces the Incidence of Secondary Surgical Intervention in Traumatic Hemothorax Patients at a Level 1 Trauma Center

Kenneth Avanzino; Katelyn Gill; Katherine Foley; Monique St. Roman; Alan Marr; John P. Hunt; Patrick Greiffenstein; Juan Duchesne; Lance Stuke; Alison Smith

Affiliations: Louisiana State University Health Science Center New Orleans; University Medical Center New Orleans



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.

Demographics and injury data

Demographics	Thoracic Irrigation n=20	Non-Thoracic Irrigation n=194	P=value
Age, mean yrs. (SD)	38.0 (14.4)	42.2 (17.9)	.31
BMI, mean (SD)	26.6 (8.2)	26.8 (5.4)	.89
Medical Comorbidities n (%)	5 (25)	78 (40.2)	.23
Injury Data			
ISS, mean (SD)	20.0 (16.9)	21.0 (11.5)	.72
MVA, n (%)	1 (5)	59 (30.4)	.02
Assault, n (%)	2 (10)	2 (1.0)	.04
Fall, n (%)	0 (0)	21 (10.8)	.23
Penetrating, n (%)	17 (85)	104 (55.6)	.008
Other, n (%)	0 (0)	9 (4.6)	1
Initial Hemothorax Volume, mean ml (SD)	755.9 (867.9)	334.5 (544.9)	.002

Table 1: containing baseline demographics and injury data collected via retrospective chart review. Univariate analysis was performed using Fischer's Exact test and Student's T-test with $p < 0.05$ considered statistically significant.

Primary outcomes and complications

Primary Outcome			
Incidence of VATS, n (%)	0 (0)	33 (17.0)	.049
Complications			
Empyema, n (%)	0 (0)	8 (4.1)	1
Pneumonia, n (%)	0 (0)	2 (1.0)	1
Bleeding Complications, n (%)	0 (0)	2 (1.0)	1

Table 2: Primary outcome and complication rate collected via retrospective chart review. Univariate analysis was performed using Fischer's Exact test and Student's T-test with $p < 0.05$ considered statistically significant.

How did you measure the effect 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. The initial hemothorax volume was calculated using Mergo's formula.

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% $p = 0.049$).

How did you sustain change?

With this evidence-based approach, the utilization of thoracic irrigation was supported as an effective tool to reduce the incidence of VATS and, subsequently, the financial burden in traumatic hemothorax patients. As a result, increased use was encouraged to maintain increased high-value care.