A Faster Recovery is at Your Fingertips

PLEURAFLOW
ACTIVE CLEARANCE TECHNOLOGY

NEXT-GEN PLEURAFLOW

THE PROVEN LINE OF DEFENSE AGAINST RETAINED BLOOD.

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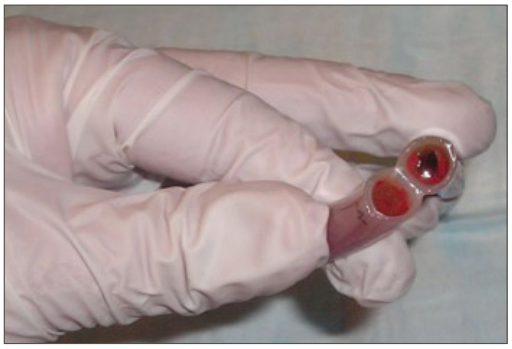
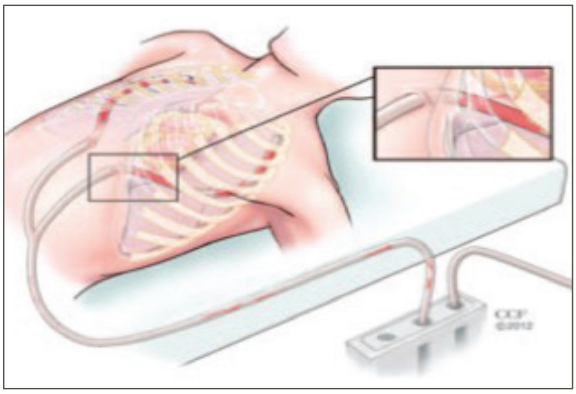
Chest Tube Occlusions Often Go Unnoticed in the ICU

36% of patients have clogged chest tubes after cardiac surgery.[1]





86% of chest tubes that occluded were inside the patient where the clotting couldn't be seen by the nursing staff.[1]

> *"The patency of chest tubes is, of course, fundamental to their utility for preventing complications associated with retained blood; however, clogging is common."*
>
> *–Lobdell et al., Innovations (Phila) 2023*[2]

Occluded Chest Tubes - Root Cause of Retained Blood

The crucial hours post-surgery make every bit of difference to the recovery of your patient. So why rely on a common chest tube to evacuate blood and fluids from the surgical site? The reality is, more than one in three cardiac surgery patients experience an occluded chest tube that can lead to Retained Blood.

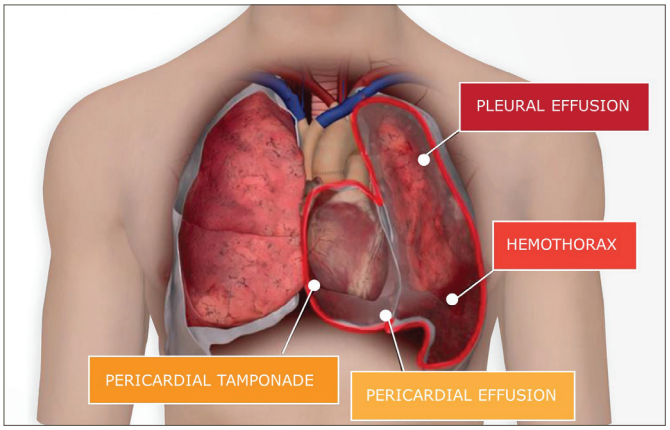
Retained Blood Syndrome (RBS) is a well-documented clinical composite of drainage-related post-cardiothoracic surgery complications requiring intervention which includes **hemothorax, tamponade, pleural and pericardial effusions, and re-explorations for bleeding**.[3,4]

> *"The goal of my chest tube is to work from the time it's placed until the time it's removed."*
>
> *Arab Health Conference Webinar, Jan 2022*
>
> *–A. Marc Gillinov, MD, Professor and Chair, Department of Thoracic and Cardiovascular Surgery, Cleveland Clinic*

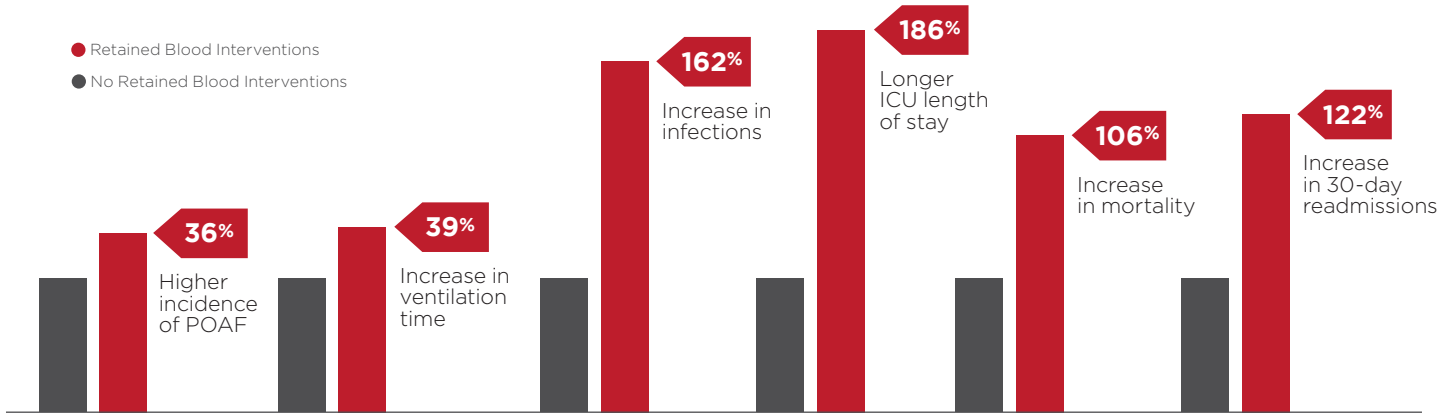
Chest Tube Occlusions Lead to Retained Blood

20% of cardiac surgery patients require re-interventions due to **Retained Blood** complications such as:[3,4]

- Pleural effusion
- Pericardial effusion
- Hemothorax
- Pericardial tamponade

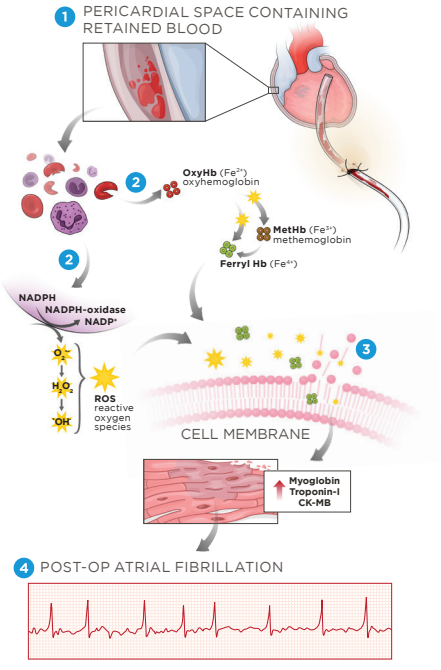


Complications from Retained Blood after Cardiothoracic Surgery[5]



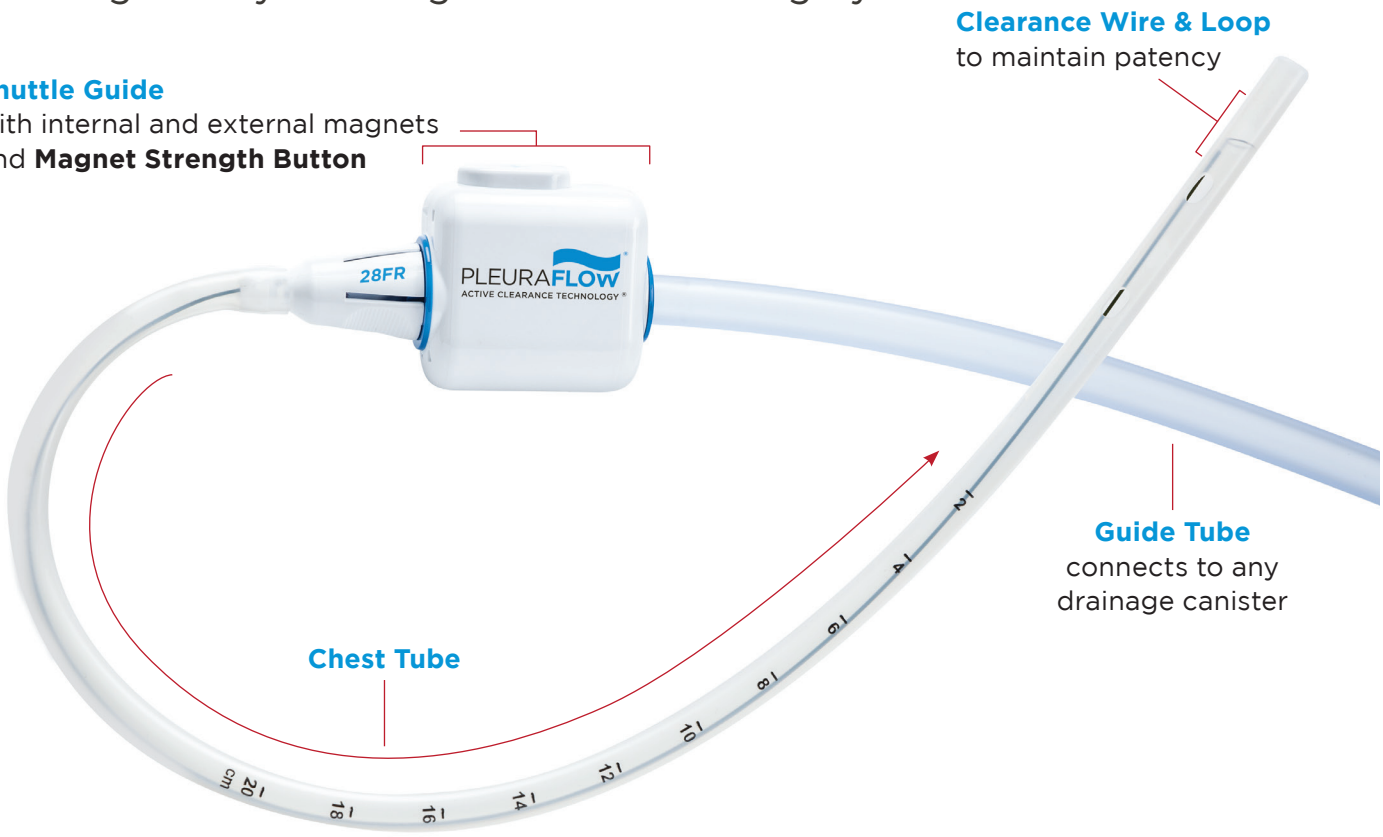
Retained Blood and PostOperative Atrial Fibrillation (POAF)

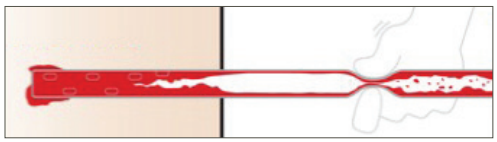
Evidence suggests that shed mediastinal blood through breakdown products, activation of coagulation cascade, and oxidative burst contributes to a highly pro-oxidant and pro-inflammatory milieu found within the pericardial space that can trigger POAF in susceptible persons.[6]



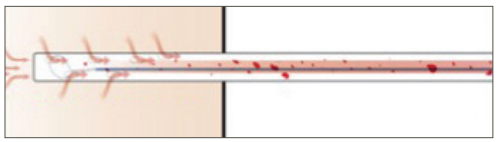
PleuraFlow® Active Clearance Technology®

PleuraFlow Active Clearance Technology (ACT®) is a unique, FDA-cleared system that proactively removes clots formed inside the chest tube to help maintain chest tube patency and prevent or minimize occlusion, all while preserving sterility following cardiothoracic surgery.

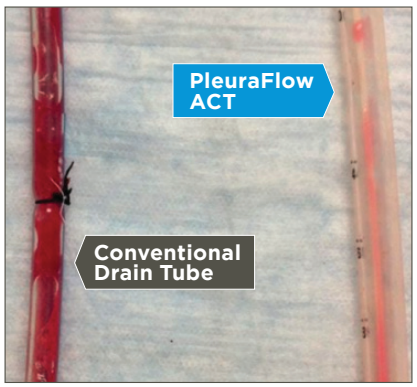


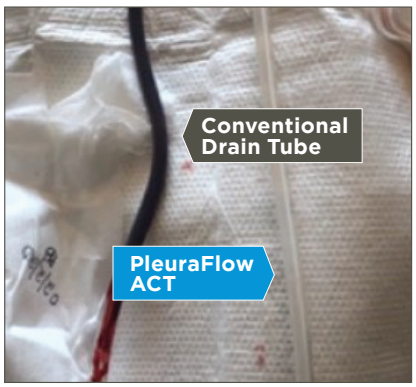


Conventional chest tube stripping only clears to the skin surface



Active Clearance helps maintain patency throughout the entire chest tube





Examples of conventional drainage tubes and PleuraFlow ACT pulled from the same patient 24 to 48 hours post surgery

> *"Actuating the chest tube helps prevent clots from forming inside the tube and keeps the tube patent."*
>
> *Active Clearance of Chest Tubes Reduces Complications and Costs of Heart Surgery Webinar, Oct 2023*
>
> *–Alyson Mehringer, RN, MSN, CCRN, Unit Clinical Expert, Surgical Intensive Care Unit and Surgical Progressive Care Unit, Franciscan Health*

Validated Clinical & Economic Outcomes*

Reduction in Re-Exploration for Bleeding

↓ 59–72%

	Reduction	p-value
Grieshaber, et al.[7]	59%	p=0.015
Maltais, et al.[8]	65%	p<0.001
St. Onge, et al.[9]	72%	p=0.01

Reduction in Postoperative Atrial Fibrillation**

↓ 17–33%

	Reduction	p-value
Gerdisch, et al.[10]	17%	p=0.049
Baribeau, et al.[11]	32%	p=0.011
Sirch, et al.[12]	33%	p=0.013

Reduction in Retained Blood Syndrome

↓ 39–58%

	Reduction	p-value
Maltais, et al.[8]	39%	p=0.0044
Gerdisch, et al.[10]	41%	p=0.014
Sirch, et al.[12]	43%	p=0.0087
Baribeau, et al.[11]	58%	p<0.001

Total Post-Op Length of Stay (LOS)

6 Days
Conventional Chest Tube

1 Day Reduction

5 Days
PleuraFlow ACT

	p-value
Gerdisch, et al.[10]	p<0.001
Baribeau, et al.[11]	p<0.001
Churyla, et al.[13]	p=0.025

A 1-day LOS reduction equates to **~$3,132** in savings per patient[14]. Across a 500 patient cohort, this represents over **$1.5 million** in total hospital cost reduction.

> *"The savings and reduced utilization of health care resources justify the cost to use Active Tube Clearance for every patient."*
>
> *–Marc Gerdisch, MD, Chief of Cardiothoracic Surgery, Franciscan St. Francis Medical Center, discussing findings from Gerdisch et al., Innovations (Phila) 2025*[10]

Real-World Outcomes: Franciscan Health

Active Chest Tube Clearance Added to an Enhanced Recovery After Surgery (ERAS) Program Improves Outcomes and Reduces Resource Utilization.[10]

STUDY POPULATION

1,334 cardiac ERAS patients

Group 1: 650 control patients from Jan 2020 to Oct 2020 and Jan 2021 to Oct 2021

Group 2: 684 ATC (Active Tube Clearance) intervention from Jan 2022 to Aug 2023

Preoperative characteristics and operative procedures similar

INTERVENTION

Chest tubes placed in OR just before closing the chest

ATC Actuation Schedule per protocol:

q15min x 2h, then q30min x 2h, then q60min x 1-2h in ICU, and q4h if the ATC unit is present upon transfer to the step-down unit

OUTCOME

Group 2

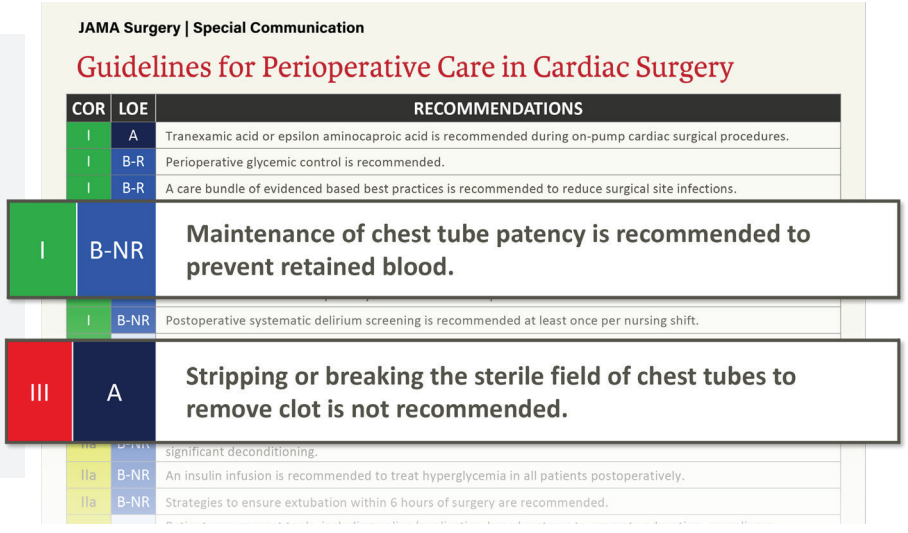
- ↓ **41%** reduction in **RBS composite** (8.2% to 4.8%, p=0.014)
- ↓ **17%** reduction in **POAF** (33.8% to 28.1%, p=0.049)
- ↓ **30%** reduction in **ICU time** (median 51.6h vs. 36.3h, p<0.001)
- ↓ **64%** reduction in **ICU readmissions** (3.2% to 1.17%, p=0.013)

CONCLUSIONS

ATC added significantly to the already positive impact of our cardiac ERAS program, achieving better outcomes for our patients and reduced resource utilization for our institution, generating a positive return on investment.

Enhanced Recovery After Surgery (ERAS) is an evidence-based, multimodal, transdisciplinary care improvement initiative to promote recovery of patients undergoing surgery throughout their entire perioperative journey. These programs aim to reduce complications and promote an earlier return to normal activities.

ERAS-Cardiac Surgery recommends maintaining chest tube patency without breaking the sterile field to prevent retained blood complications as a Class I, Level B-NR classification.[15]


JAMA Surgery | Special Communication

Guidelines for Perioperative Care in Cardiac Surgery

COR	LOE	RECOMMENDATIONS
I	A	Tranexamic acid or epsilon aminocaproic acid is recommended during on-pump cardiac surgical procedures.
I	B-R	Perioperative glycemic control is recommended.
I	B-R	A care bundle of evidenced based best practices is recommended to reduce surgical site infections.
I	B-NR	**Maintenance of chest tube patency is recommended to prevent retained blood.**
I	B-NR	Postoperative systematic delirium screening is recommended at least once per nursing shift.
III	A	**Stripping or breaking the sterile field of chest tubes to remove clot is not recommended.**
		significant deconditioning.
IIa	B-NR	An insulin infusion is recommended to treat hyperglycemia in all patients postoperatively.
IIa	B-NR	Strategies to ensure extubation within 6 hours of surgery are recommended.

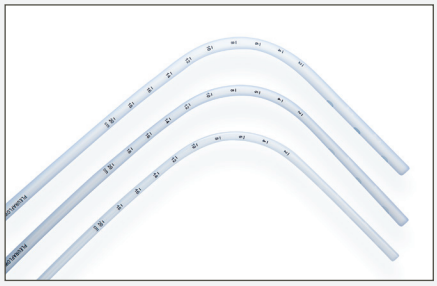
ACT NOW

Improve Outcomes. Lower Costs.

PLEURAFLOW
ACTIVE CLEARANCE TECHNOLOGY

Ordering Information

Available in a range of sizes and configurations

TYPE		CODE	SIZE	# OF EYELETS	EFFECTIVE DRAINAGE LENGTH (EDL)
STRAIGHT		PFFG3-20	20FR	6	4″ (10.2 cm)
		PFFG3-24	24FR	6	4″ (10.2 cm)
		PFFG3-28	28FR	6	4″ (10.2 cm)
		PFFG3-32	32FR	6	4″ (10.2 cm)
RIGHT ANGLE (RA)†		PFFG3-24RA	24FR	6	4″ (10.2 cm)
		PFFG3-28RA	28FR	6	4″ (10.2 cm)
		PFFG3-32RA	32FR	6	4″ (10.2 cm)
LONG (XDL)†		PFFG3-20XDL	20FR	15	10″ (25.4 cm)
		PFFG3-24XDL	24FR	15	10” (25.4 cm)

Discover how PleuraFlow can help enhance recovery in your cardiac surgery program:

CUSTOMER SERVICE: 1-714-916-5010 **FAX:** 1-714-916-5019
TOLL FREE: 1-844-257-3569 (1-844-CLR-FLOW) **E-Mail**: customerservice@clearflow.com
GPO PARTICIPATION: Premier | Ascension (The Resource Group) | Vizient

CLEARFLOW
CLEARING THE PATH TO RECOVERY

Clinical References

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*Studies include both retrospective observational assessments and prospective trials, supported by ClearFlow. Results could be impacted by variations in study methodologies, institutional protocols used in treating patients, and other factors. ClearFlow products are not therapeutic devices. Please see full publications at www.clearflow.com for additional information.

**Retained blood has been shown to contribute to the occurrence of postoperative atrial fibrillation (POAF). These studies showed a reduction in POAF which correlated with a reduction in retained blood in patients. These findings suggest that use of PleuraFlow can reduce retained blood, which may contribute to reduced risk of POAF in some patients.

†Identified device configurations are not available for marketing in the EU or Switzerland. Market availability varies by region, check with your local ClearFlow representative for current device status.

℞ ONLY Caution: Federal law restricts this device to sale by or on the order of a physician.

Patent Information: https://www.clearflow.com/virtual-patent-marking/

CLEARFLOW

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