

# Perioperative and Volume-based Outcomes for Hepatic Arterial Infusion (HAI) Pump Chemotherapy: A Multicenter Analysis from the International HAI Consortium Research Network (HCRN)

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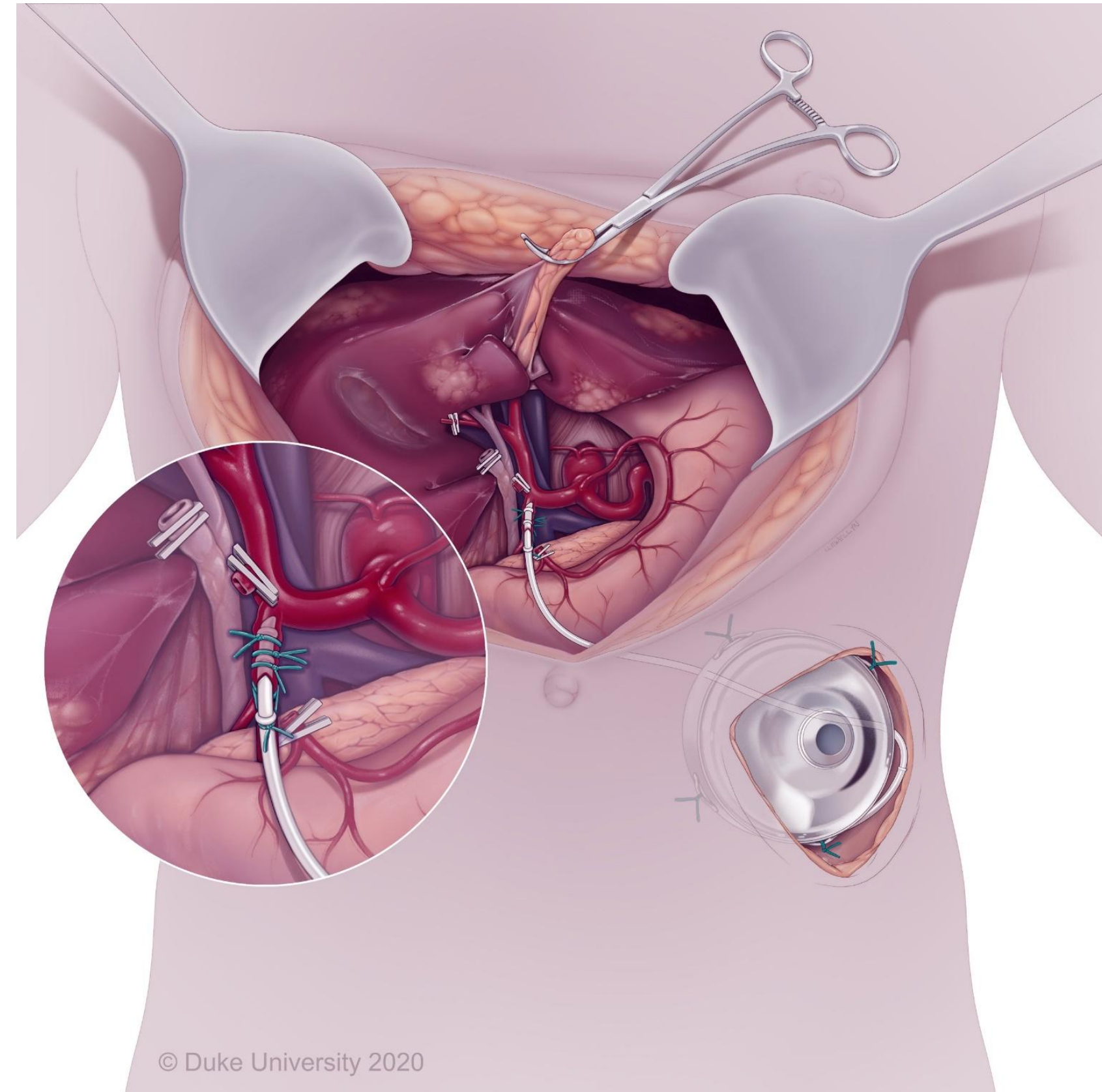
On behalf of the HAI Consortium Research Network

# Disclosures

- None

# Hepatic Artery Infusion (HAI)

- Physiologic and pharmacologic isolation of the liver
  - Liver tumors perfused by the hepatic artery
  - Normal parenchyma perfused by both portal vein and hepatic artery
- Floxuridine (FUDR): short half-life and 99% hepatic clearance
  - 100-400x hepatic exposure



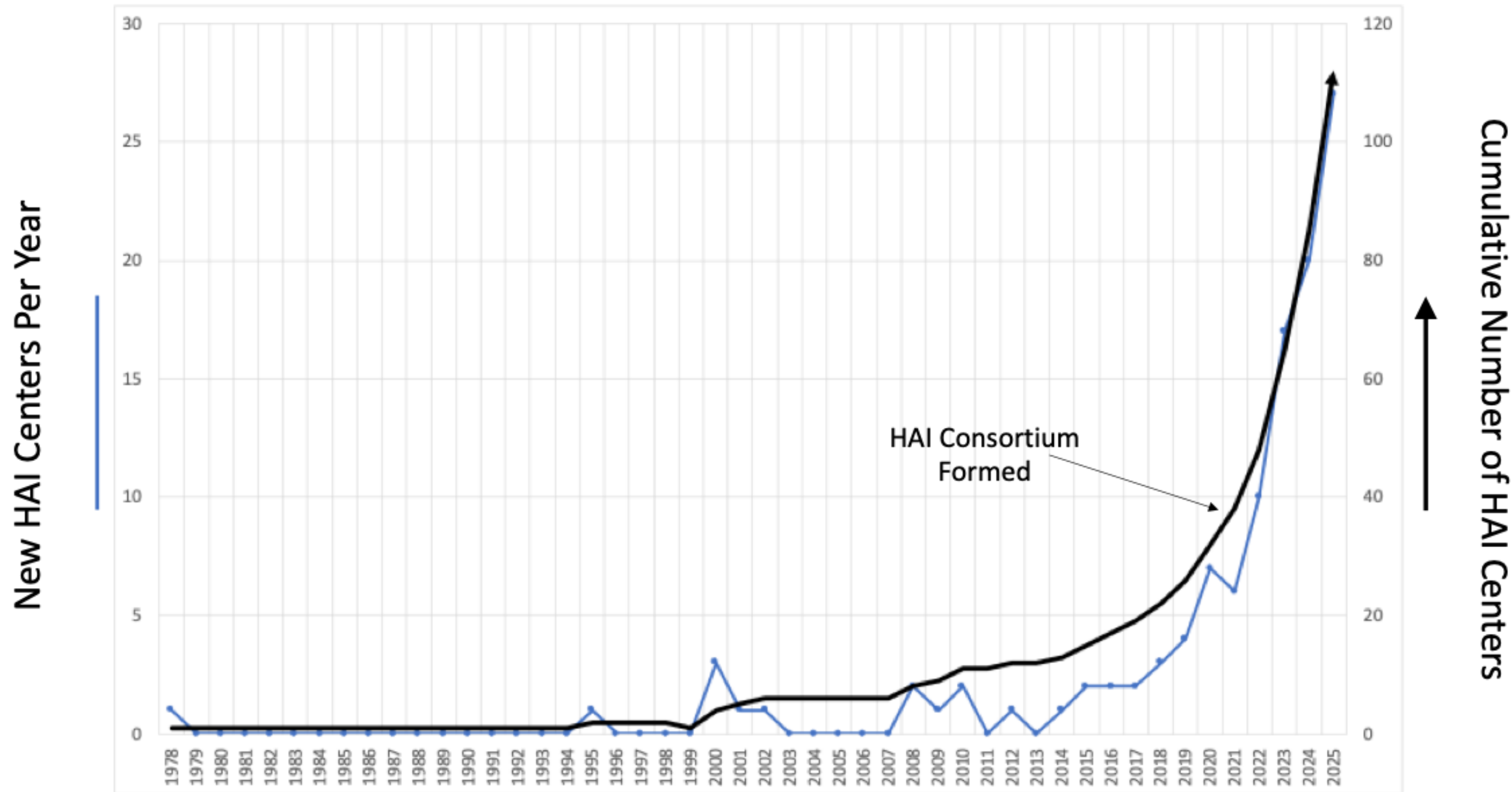
# HAI-Related Complications

Complication	Memorial Sloan Kettering n(%)
Arterial thrombosis	6.1%
Extrahepatic perfusion	2.9%
Pocket related complications	3.5%
Biliary sclerosis	4.6%
Any HAI-related complication	22%

# HAI-Related Complications

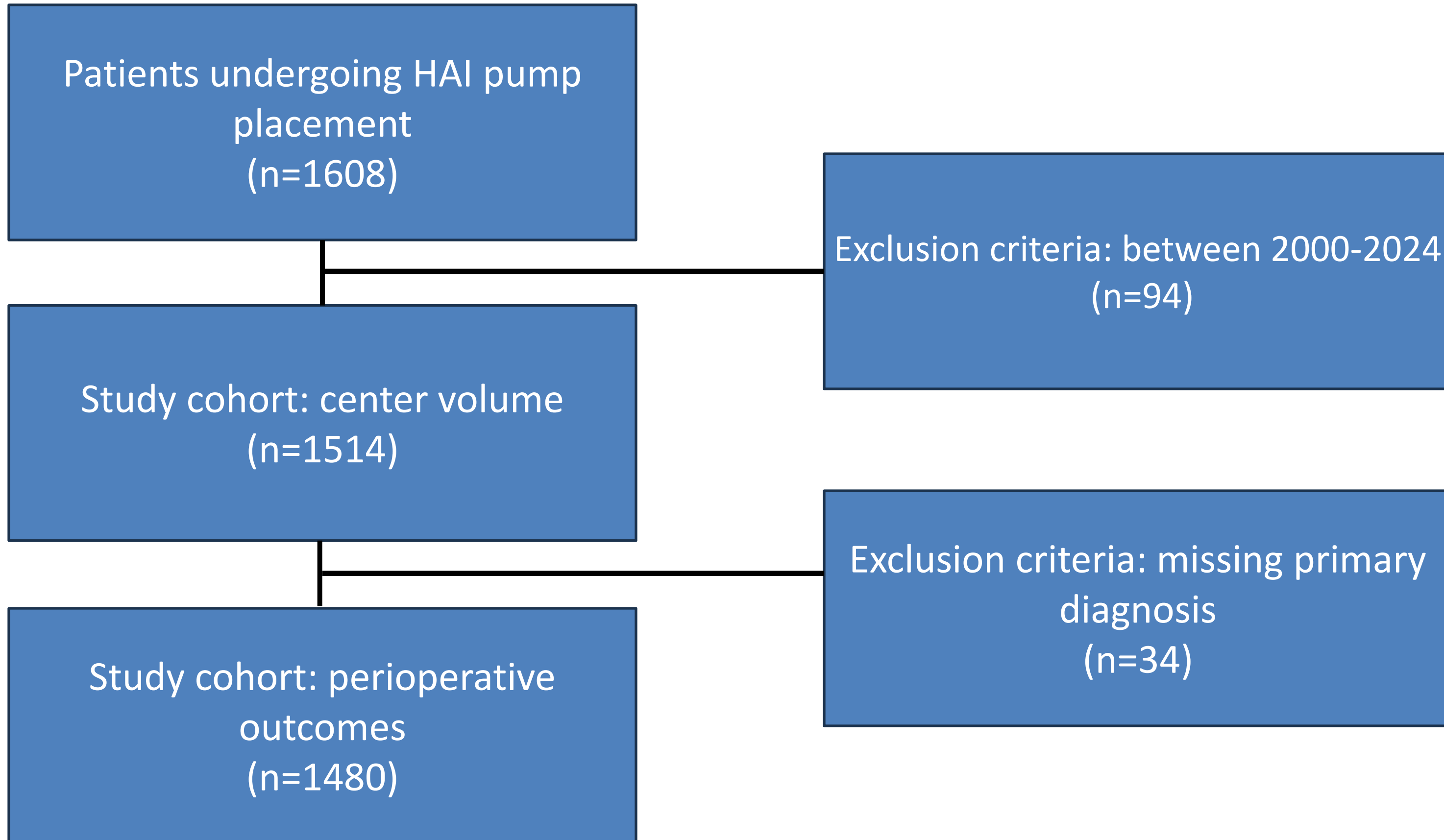
Complication	Memorial Sloan Kettering n(%)	Duke n(%)
Arterial thrombosis	6.1%	2%
Extrahepatic perfusion	2.9%	2%
Pocket related complications	3.5%	11%
Biliary sclerosis	4.6%	5%
Any HAI-related complication	22%	23%

# HAI Consortium Research Network

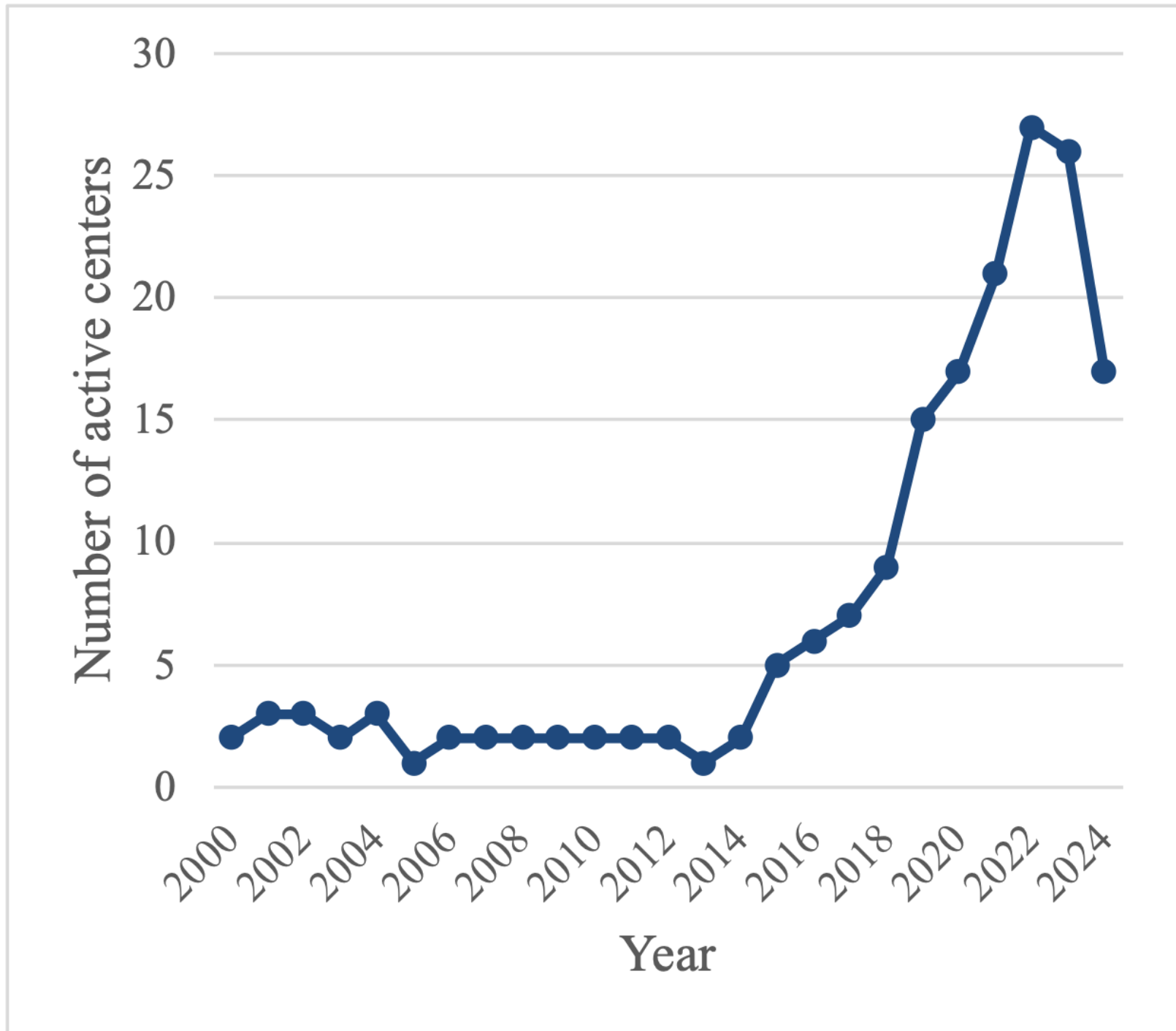


- 33 centers
- > 400 data entry fields
- Developed in 2020
- \*Data from MSK omitted

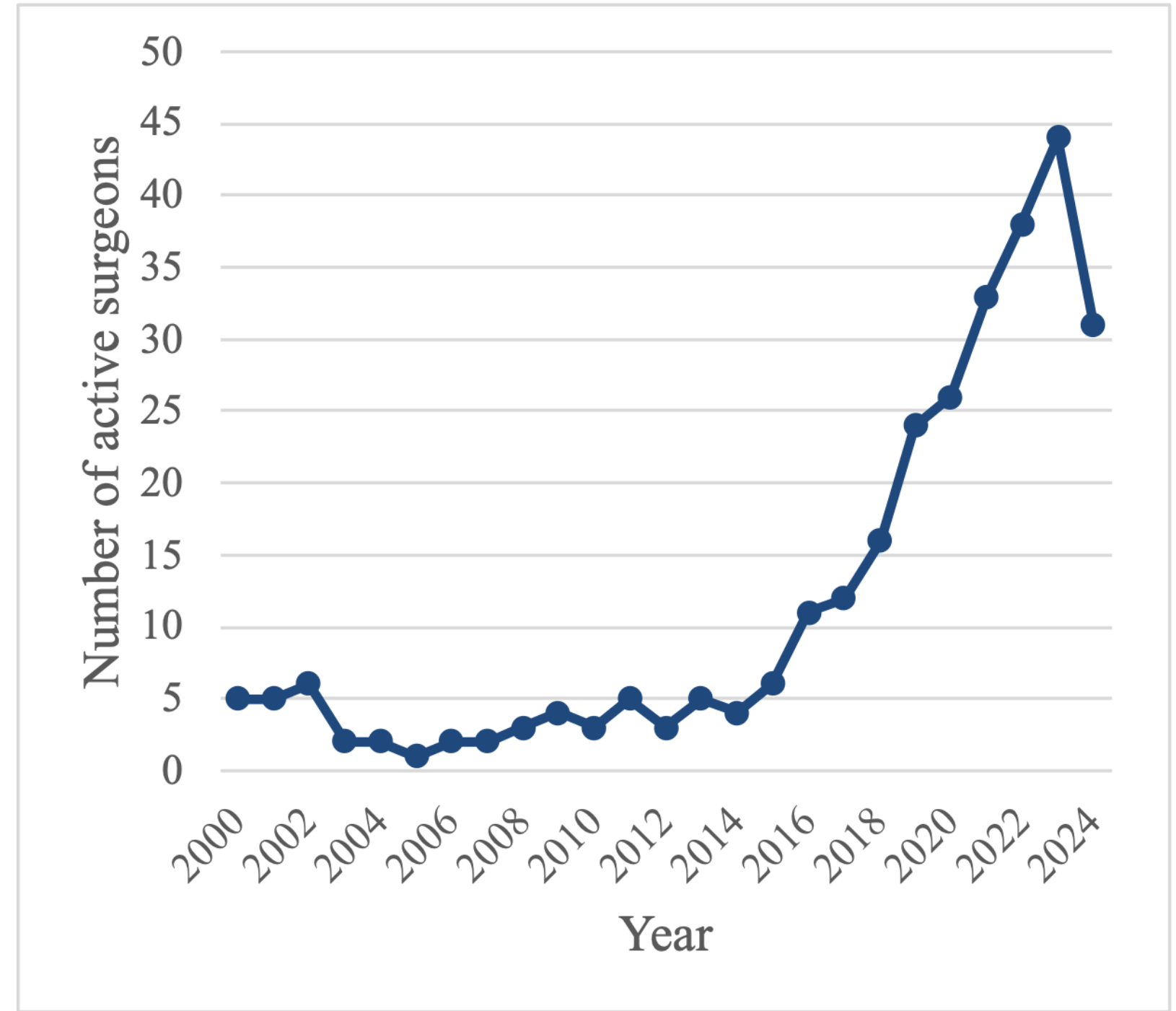
# Methods: Cohort Selection



# Center and Surgeon Volume

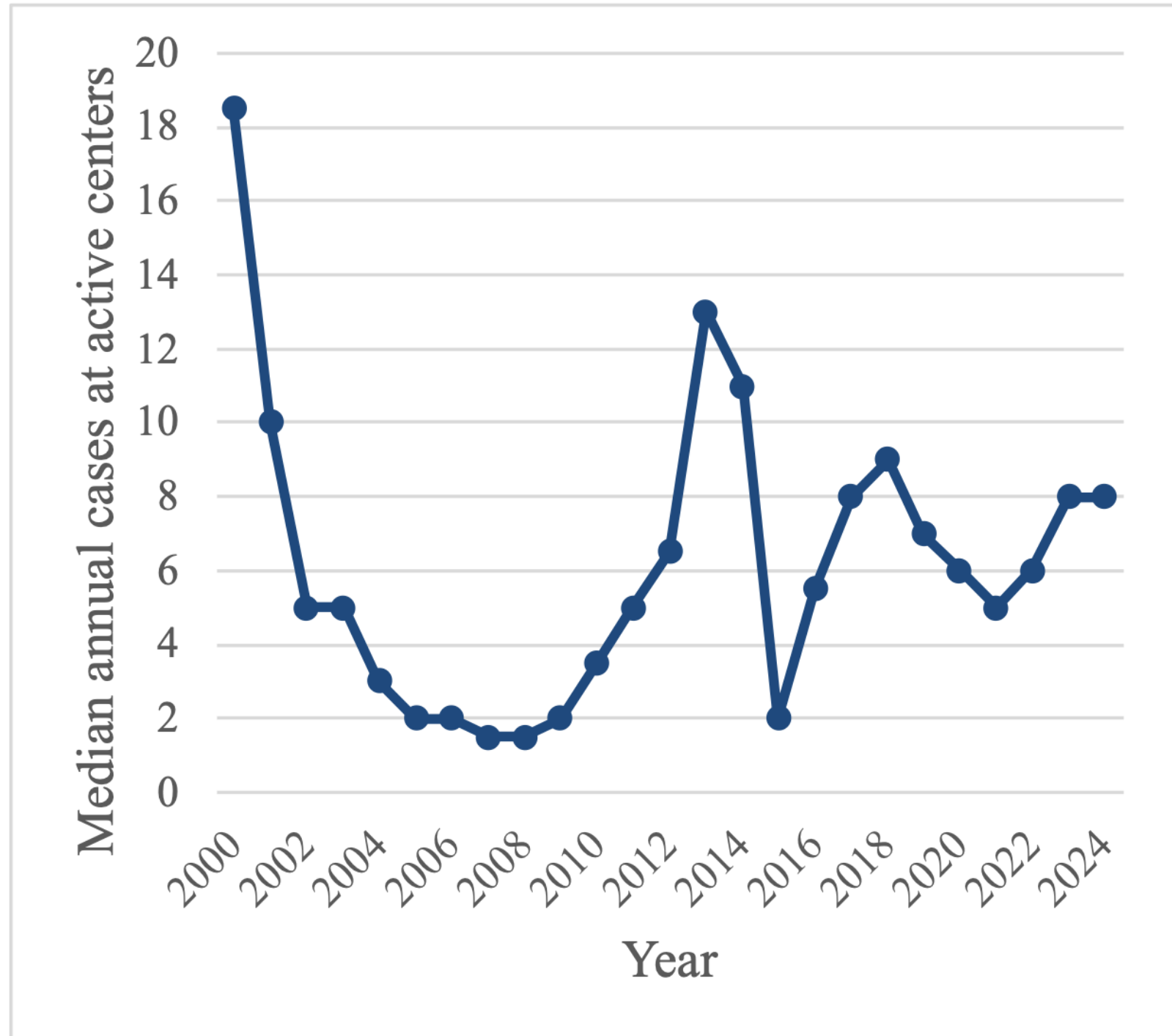


Number of active centers per year

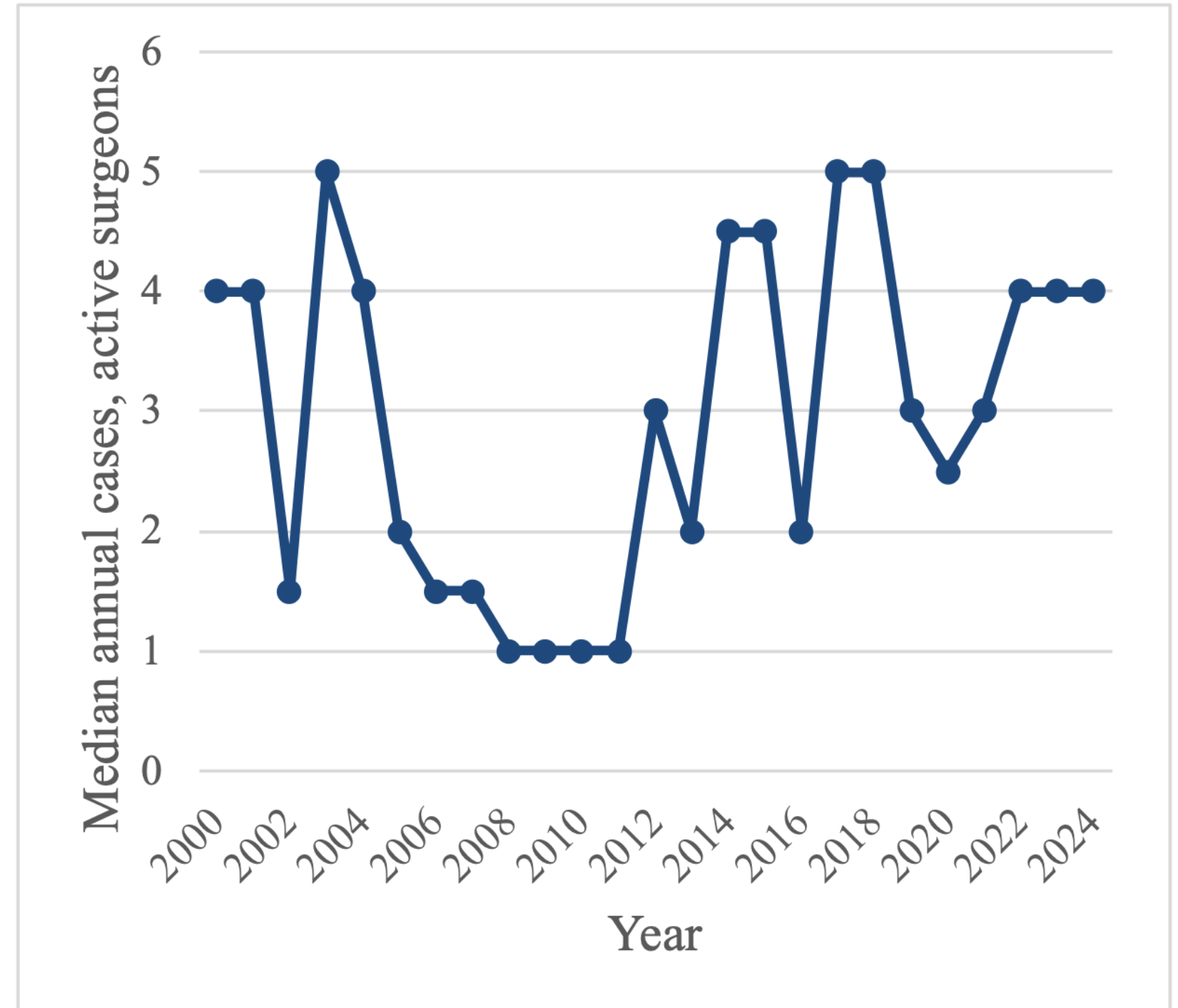


Number of active surgeons per year

# Center and Surgeon Volume



Median annual cases at active centers per year



Median annual surgeons at active centers per year

Range: 1-43 cases per year

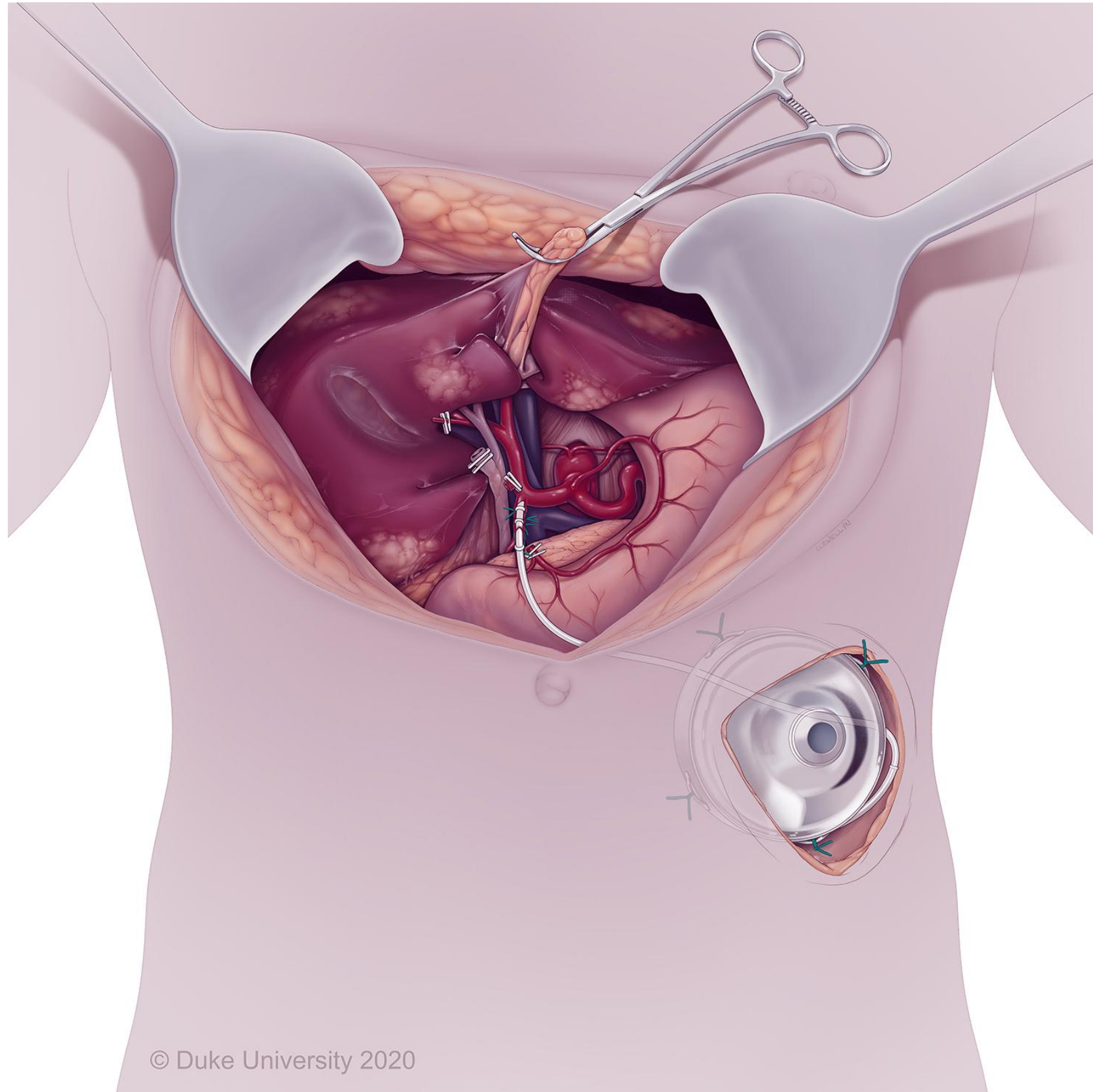
# Patient and Disease Characteristics

Variable	n (%) / median (range)
	Total patients: 1480
Age (years)	54 (22-87)
Male	854 (58%)
BMI	26.9 (15.8 – 50.8)
→ Cholangiocarcinoma	105 (7%)
Colorectal cancer	1375 (93%)
→     Unresectable	957 (70%)
Adjuvant	418 (30%)
→ Extrahepatic disease	414 (28%)
Number of preoperative liver metastasis	
1-4	483 (37%)
5-10	267 (21%)
11 +	536 (42%)
Prior chemotherapy	1288 (94%)
Months between diagnosis and pump insertion	9 (5.8 -17)

# Perioperative Details

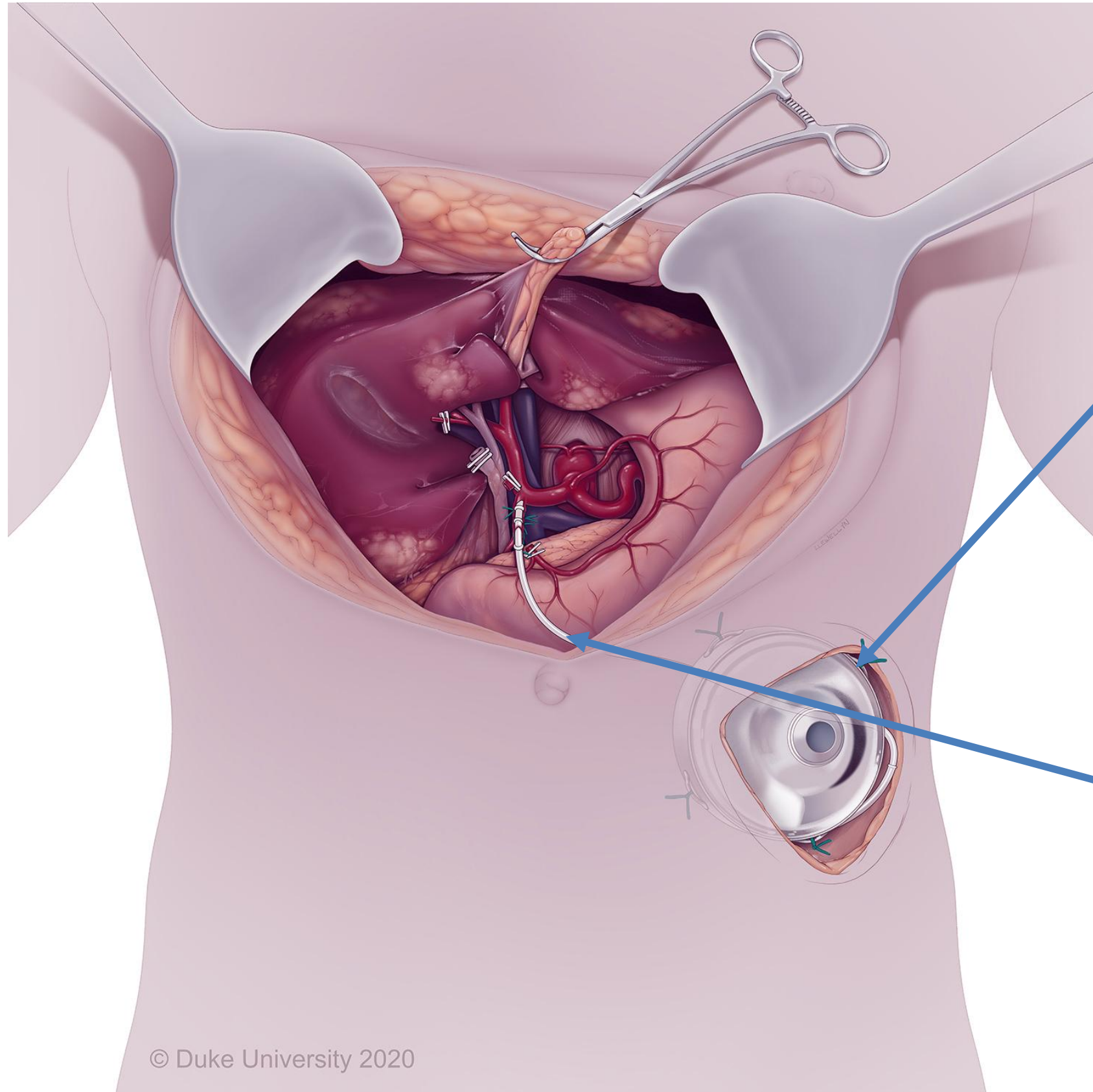
	Variable	n(%) /median (range)
→	Surgical approach – open	1107 (81%)
	Pump placement aborted	11 (1%)
→	Variant arterial anatomy ligated	382 (28%)
	Gastroduodenal artery canulated	1354 (99%)
	Concomitant cholecystectomy	1090 (83%)
	Concomitant colectomy	417 (29%)
	Concomitant proctectomy	106 (7%)
	Concomitant minor hepatectomy (<3 segments)	498 (34%)
	Concomitant major hepatectomy	171 (12%)
	Estimated blood loss, ml	150 (50-300)
	Operative time, min	302 (228 -402)
→	Length of stay, days	5 (4-7)

# HAI-Specific Complication Rates



Outcomes	%
Any HAI-specific complication	35%
90-day mortality	2%
Need for additional procedure within 90 days	10%

# HAI-Specific Complication Rates



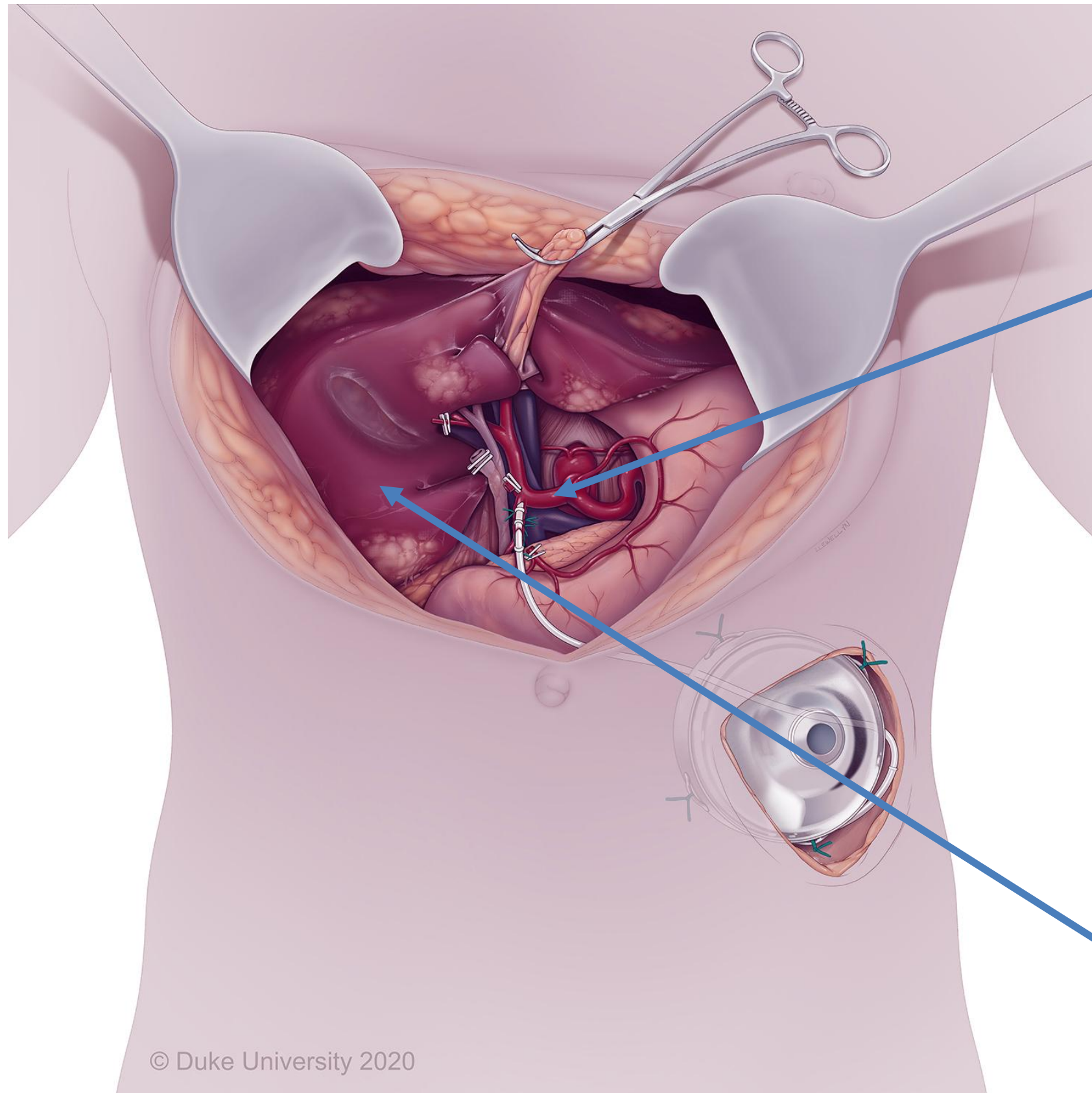
## Pocket-related complications

Outcomes	%
Total pocket related complications	17%
Malfunction	3%
Migration	3%
Seroma	5%
Hematoma	2%
Infection	5%

## Catheter-related complications

Outcomes	%
Total catheter related complications	6%
Thrombosis	2%
Dislodgement	2%
Separation (spliced catheter)	<1%
Erosion	1%

# HAI-Specific Complication Rates



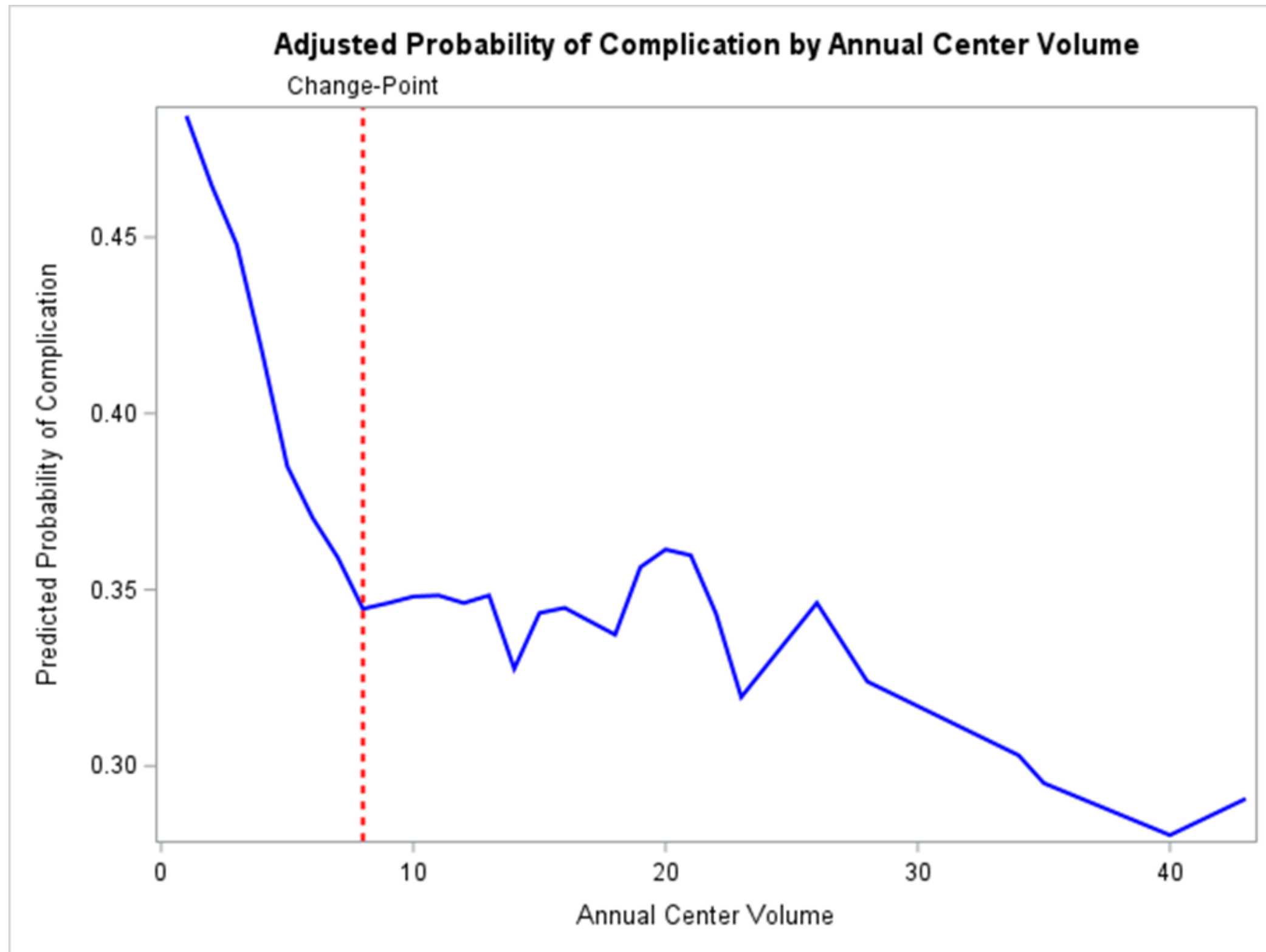
## Arterial complications

Outcomes	%
Total arterial complications	3%
Hemorrhage	1%
Pseudoaneurysm	1%
Dissection	1%
Thrombosis	1%

## Perfusion/hepatobiliary related complications

Outcomes	%
Total perfusion complications	7%
Extrahepatic perfusion	2%
Incomplete perfusion	2%
Preferential perfusion	1%
Biliary sclerosis	8%

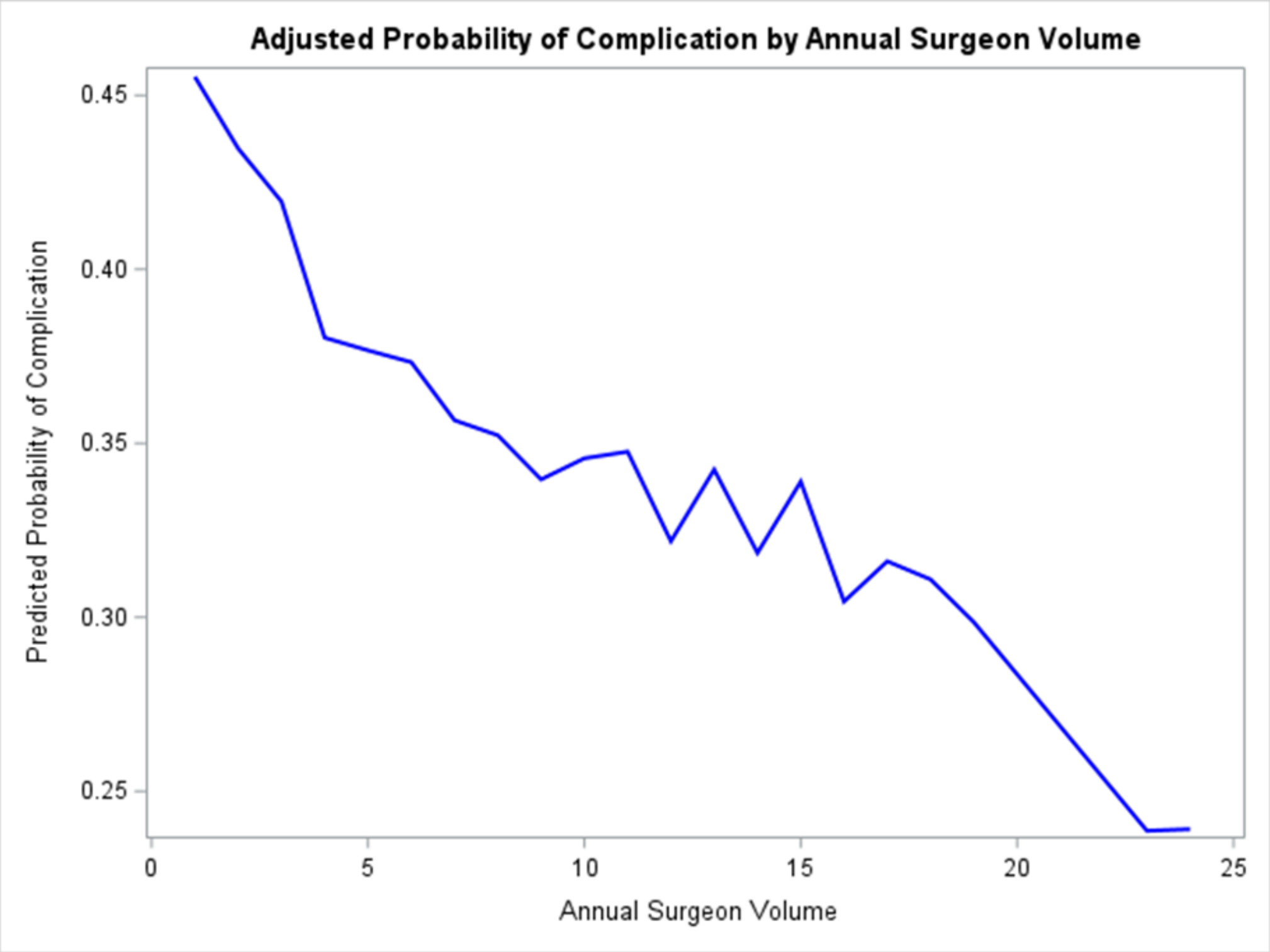
# HAI-related complication rates per annual center volume



- Complication risk declined with increased volume
- 8 cases/yr marked the threshold of low volume versus high volume

\*Change-point analysis using polynomial regression

# HAI-related complication rates per annual surgeon volume



- Complication risk declined with increased volume
- No clear threshold

# HAI-Specific Complications Stratified by Center Volume

Outcome	High vs Low Volume Center Odds Ratio (95% CI)	p-value
Any HAI complication	0.61 (0.40 - 0.93)	0.02
Pocket-related complication	0.37 (0.21 - 0.62)	<0.001
Arterial complication	0.33 (0.09 - 1.31)	0.12
Perfusion-related complication	2.25 (0.92 - 5.47)	0.07
→ Biliary sclerosis	1.27 (0.60 - 2.69)	0.54
Any 90-day postoperative complication	0.50 (0.23 - 1.09)	0.08

# Conclusion

- Largest, multicenter series of HAI patients, representing a real-world snapshot of HAI
- Most HAI pumps were placed via laparotomy for unresectable colorectal liver metastasis
- Overall morbidity of 36% - driven by pocket related events
- The risk of complications decreased when centers performed  $\geq 8$  cases annually





THANK  
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