Trends and Outcome in the Utilization of Vena Cava Filters: A contemporary study

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Background

Although pharmacologic anticoagulation is the standard care of therapy for patients at high risk for venous thromboembolism (VTE), it may be contraindicated in the presence of significant traumatic injuries. Inferior vena cava (IVC) filters are mechanical devices that have been selectively used instead of anticoagulants to reduce the risk of serious VTE. The present population-based study examined the temporal trends and outcome in the utilization of IVC filters in blunt trauma patients with a focus on their prophylactic and therapeutic use.
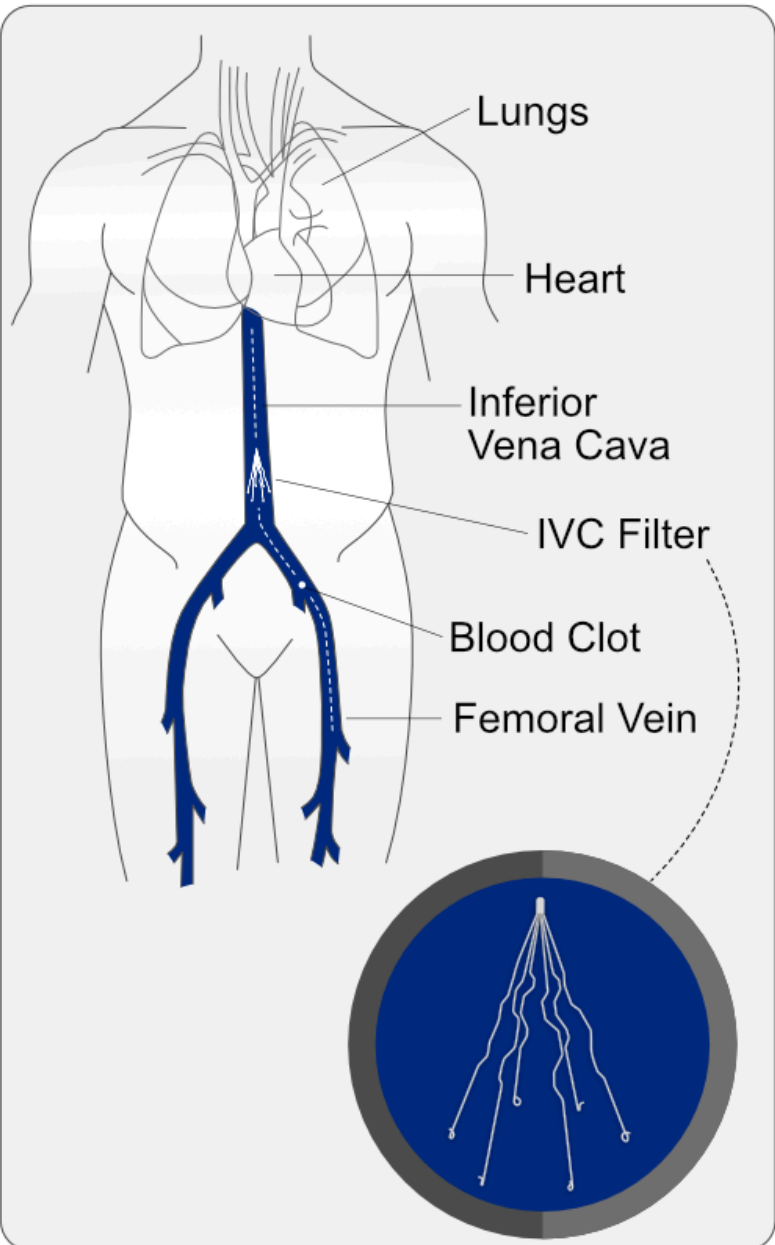

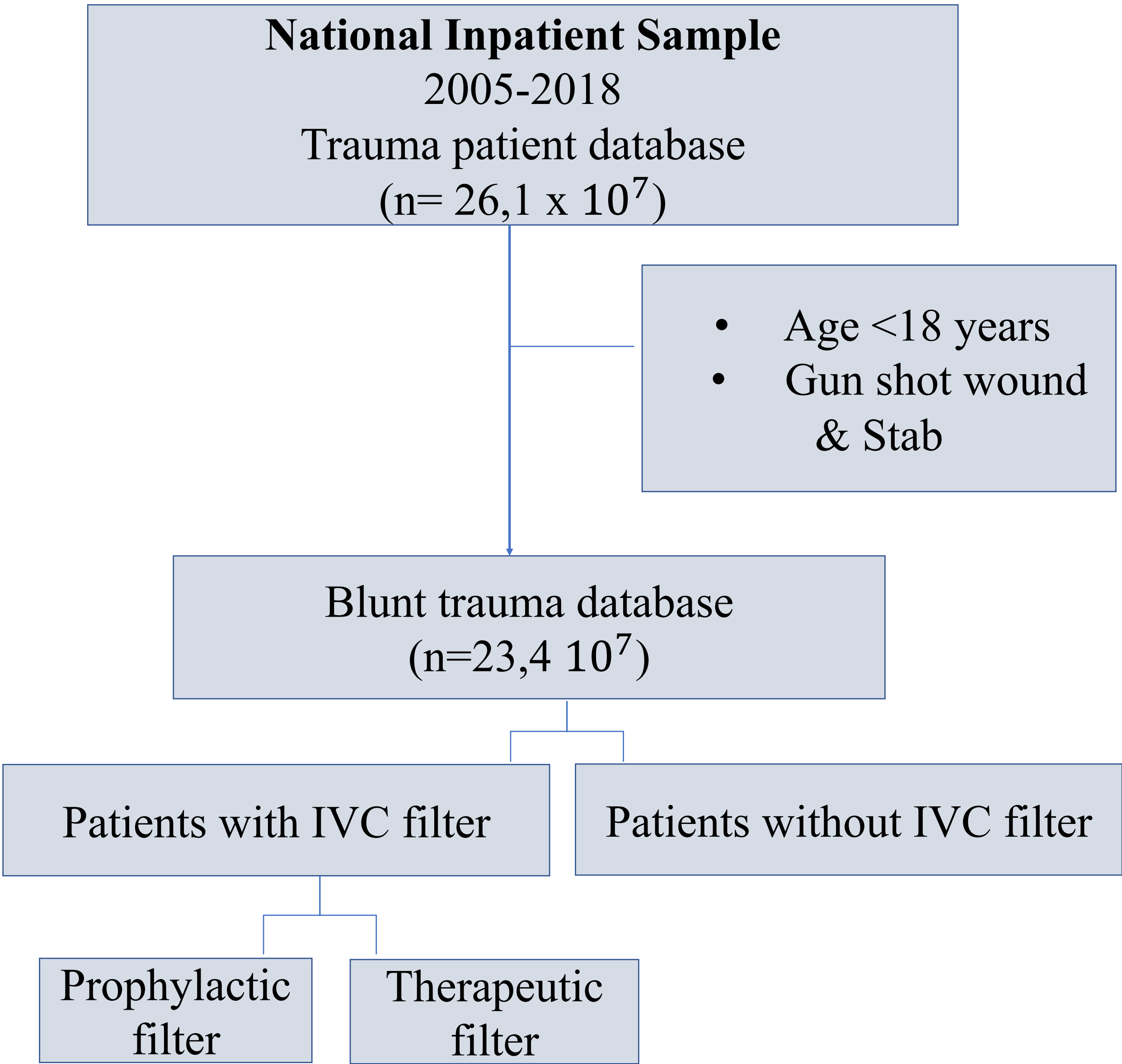Figure 1. IVC filter insertion

Methods

National Inpatient Sample
2005-2018
Trauma patient database
$(n= 26,1 \times 10^7)$

- Age <18 years
- Gun shot wound & Stab

Blunt trauma database
$(n=23,4 \; 10^7)$

Patients with IVC filter | Patients without IVC filter

Prophylactic filter | Therapeutic filter

Figure 2. Patient selection flowchart

Results
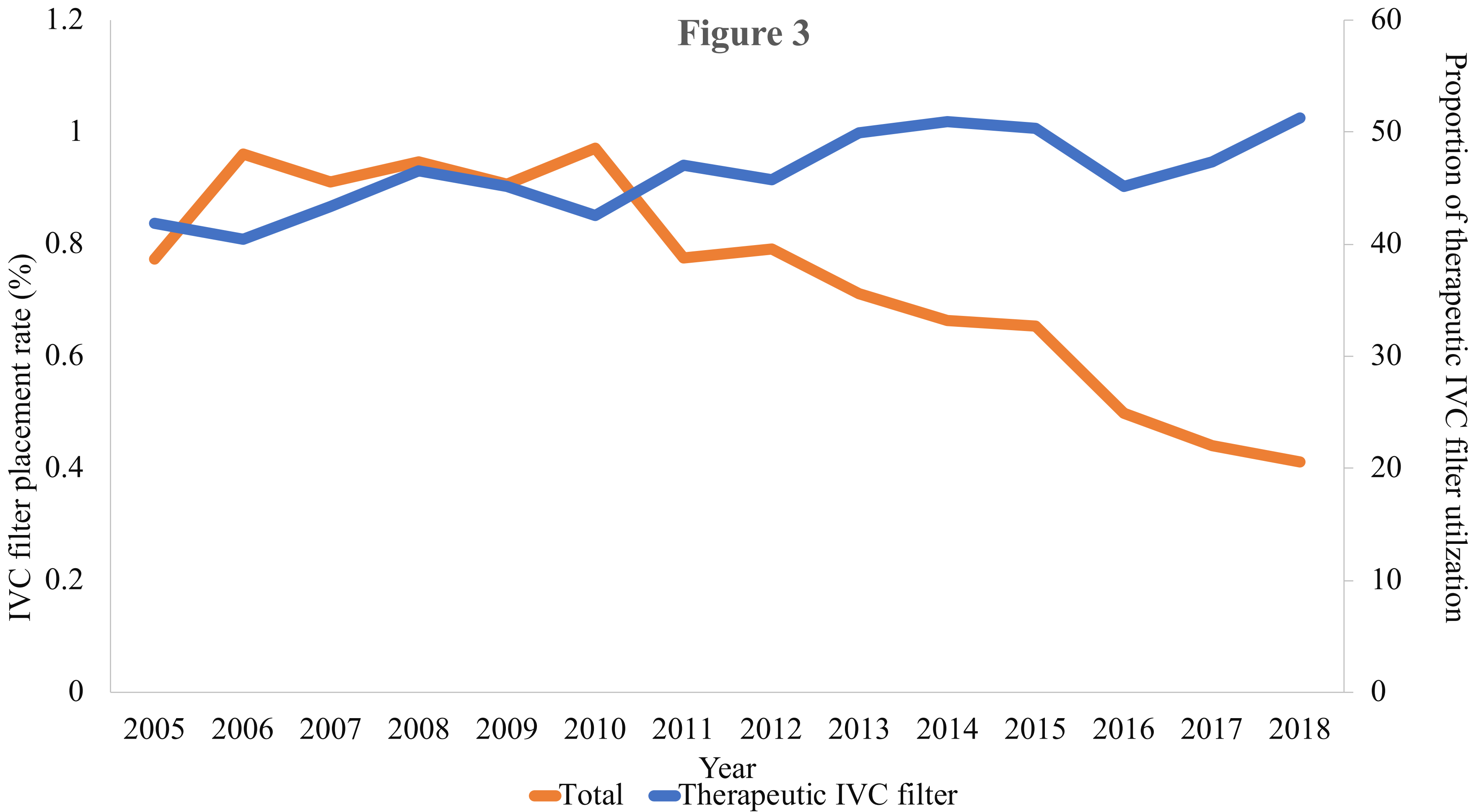
Figure 3. Unadjusted rates of IVC placement

Variables	IVC (n=172,286)	no IVC (n=2363,130)	P-value
Age, years	61.0	67.1	< 0.001
Age @snh, years	53.4	---	< 0.001
Male %	66.4	54.7	< 0.001
Race %			
White	73	77	< 0.001
Black	12	9	< 0.001
Hispanic	10	9	< 0.001
Other	6	5	< 0.001
Medical Insurance %			
Private insurance	32.4	22.8	< 0.001
Medicare	43.4	55.4	< 0.001
Medicaid	12.1	10.2	< 0.001
Other payer	12.0	11.6	< 0.001
Income %			
76th-100	24.4	22.4	< 0.001
51st - 75th	24.7	24.6	< 0.001
26th – 50th	25.0	26.1	< 0.001
< 25th	24.7	24.6	< 0.001
Tmpm	0.047 ± 0.0012	0.046 ± 0.0015	N.S
Outcomes			
Cost $	68,150	15,000	< 0.001
Length of stay	18.5	5.4	< 0.001
In-hospital Mortality %	6.2	2.6	< 0.001

Table 1. Baseline characteristics and Outcomes

Variables	IVC filter (n=172,286)	Therapeutic IVC filter (n=79,137)
Male sex	AOR: 1.27, 95% CI: 1.23-1.30	AOR: 1.06, 95% CI: 1.00-1.12
Race		
Black	AOR: 1.11, 95% CI: 1.06-1.16	AOR: 1.24, 95% CI: 1.12-1.34
Hispanic	AOR: 1.12, 95% CI:1.07-1.18	AOR: 1.04, 95%, CI: 0.94-1.13
Paralysis	AOR: 1.77, 95% CI: 1.67-1.87	AOR: 0.99, 95% CI: 0.89-1.11
Spinal injuries	AOR: 4.82, 95% CI:4.56-5.09	AOR: 0.41, 95% CI: 0.37-0.45
Frailty	AOR: 1.19, 95% CI: 1.16-1.23	AOR: 1.18, 95% CI: 1.16-1.20
Cancer	AOR: 1.82, 95% CI: 1.72-1.92	AOR: 1.71, 95%CI: 1.54-1.91
Fall	AOR: 0.64, 95% CI: 0.62 -0.66	----
Teaching status		
Urban teaching	AOR: 1.14, 95% CI: 1.12-1.15	----
Urban non-teaching	----	AOR: 1.14, 95% CI: 1.12-1.15
Outcomes		
Cost	β: +29,600, 95% CI: 29,400 to 29,900	----
Length of stay	β: +6.94, 95% CI: 6.85-7.03	

Table 3. Multivariable logistic and linear regression models

Variables	Prophylactic (n=93,149)	Therapeutic (n=79,137)	P-value
Proportion (%)	54.1	45.9	< 0.001
Age, years	55.3	67.7	< 0.001
Male %	61.4	53.0	< 0.001
Race %			
White	79.9	58.6	< 0.001
Black	8.5	19.0	< 0.001
Hispanic	6.8	15.0	< 0.001
Other	4.8	7.4	< 0.001
Medical Insurance %			
Private insurance.	39.1	24.8	< 0.001
Medicare	33.9	59.4	< 0.001
Medicaid	13.3	7.6	< 0.001
Other Payer	13.8	8.3	< 0.001
Income %			
76th-100	22.5	26.6	< 0.001
51st - 75th	24.5	24.9	< 0.001
26th – 50th	25.9	24.0	< 0.001
< 25th	27.1	24.5	< 0.001
Tmpm	0.049 ± 0.0023	0.045 ± 0.0014	N.S
Outcomes			
Length of stay (LOS)	20.3	16.5	< 0.001
In-Hospital Mortality %	6.7	5.6	< 0.001

Table 2. Baseline characteristics and Outcomes

Conclusion

Utilization of IVC filters in hospitalizations for blunt trauma has decreased significantly over the past decade. While there was a sharp decline in the overall use of IVC filters, the rate of placement of IVC filters for therapeutic indications increased over time. Association of patient and hospital factors with the use of this modality warrants further investigations.