

Supplementary Materials

Figure S1. Impact of CFSCs on fluoroscopy and procedure time with respect to major confounders.

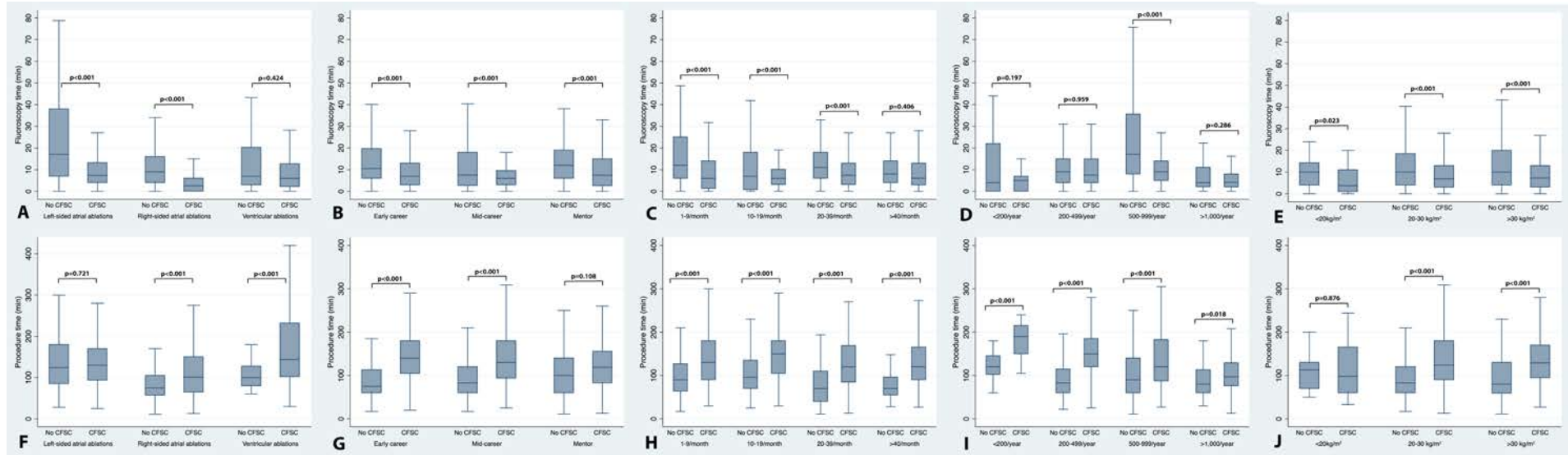


Figure S1. Box and whiskers plots depicting the impact of contact force sensing catheters (CFSCs) on fluoroscopy time (upper panels A-E) and procedure time (lower panels F-J) according to type of EP procedure (panels A+F), level of operator experience (panels B+G), operator volume (procedures per month, panels C+H), center volume (ablations per year, panels D+I) as well as the patients' body mass index (BMI, panels E+J). Boxes represent 25th and 75th percentiles with the median as a solid center line. Whiskers indicate the most extreme values within 1.5 times the interquartile range above the 75th percentile and below the 25th percentile, respectively. Outside values were not plotted.

Table S1. Details of contributing countries and centers.

Country	Number of centers	University hospitals	Tertiary care centers	Public hospitals	Overall number of operators	Overall number of procedures	Number of procedures included in this analysis
Austria	2	1	0	1	10	187	153
Belgium	1	0	1	0	2	40	39
Croatia	2	2	0	0	5	87	64
France	3	2	0	1	11	221	150
Germany	3	3	0	0	10	200	176
Hungary	1	1	0	0	5	100	91
Italy	3	2	0	1	12	218	181
Poland	3	3	0	0	13	232	138
Portugal	1	0	0	1	1	20	20
Romania	1	1	0	0	3	60	56
Slovenia	1	1	0	0	4	80	65
Spain	2	1	0	1	12	145	115
Ukraine	1	1	0	0	5	100	92
United Kingdom	1	0	1	0	5	98	85
Overall	25	18	2	5	98	1,788	1,425

Table S2A. Overview of the number of different EP procedures per group as well as use of a 3D mapping system and/or contact force sensing catheters.

Procedure type	Overall number of procedures*	3D vs. no 3D*	CFSC vs. no CFSC*	3D + CFSC*	3D + no CFSC*	No 3D + CFSC*	No 3D + no CFSC*
Group 1	646	237/409	120/526	104	133	16	393
AVNRT	267	70/197	27/240	19	51	8	189
Atrial flutter	301	121/180	63/238	56	65	7	173
RA AT	38	27/11	20/18	20	7	0	11
RA AP	40	19/21	10/30	9	10	1	20
Group 2	622	576/46	480/142	477	99	3	43
PVI (RF) w/o additional lines	393	393/0	352/41	352	41	0	0
PVI (RF) with additional lines	122	122/0	95/27	95	27	0	0
All PVIs (RF)	515	515/0	447/68	447	68	0	0
LA AT	42	35/7	23/19	22	13	1	6
LA AP	65	26/39	10/55	8	18	2	37
Group 3	157	148/9	125/32	125	23	0	9
PVC	91	82/9	69/22	69	13	0	9
VT	66	66/0	56/10	56	10	0	0

Group 1: right-sided atrial EP procedures, group 2: left-sided atrial EP procedures, group 3: ventricular EP procedures. 3D = three-dimensional, CFSC = contact force sensing catheter, PVI = pulmonary vein isolation, RF = radiofrequency energy source, LA = left atrial, AT = atrial tachycardia, AP = accessory pathway, AVNRT = AV nodal reentrant tachycardia, RA = right atrial, PVC = premature ventricular contraction, VT = ventricular tachycardia. *Absolute numbers.

Table S2B. Fluoroscopy times with and without the use of contact force sensing ablation catheters for different EP procedures and according to the use of a 3D mapping system.

		Entire cohort			Procedures using 3D mapping systems only			Procedures w/o the use of 3D mapping systems only		
Procedure type	Fluoro time [†]	Fluoro time with CFSC [†]	Fluoro time w/o CFSC [†]	p-value [‡]	Fluoro time with CFSC [†]	Fluoro time w/o CFSC [†]	p-value [‡]	Fluoro time with CFSC [†]	Fluoro time w/o CFSC [†]	p-value [‡]
Group 1	7.2 (2.6-15.0)	2.6 (0.0-6.0)	9.0 (4.0-16.0)	<0.001	2.0 (0.0-5.7)	2.0 (0.0-7.0)	0.473	5.8 (3.3-9.2)	11.0 (6.0-18.0)	<0.001
AVNRT	8.0 (3.0-13.3)	2.6 (0.0-5.6)	8.8 (4.0-14.7)	<0.001	1.1 (0.0-3.7)	2.0 (0.0-7.0)	0.044	6.9 (4.5-10.3)	10.0 (6.0-16.0)	0.012
Atrial flutter	6.0 (2.0-15.0)	2.0 (0.0-6.0)	9.0 (3.2-16.0)	<0.001	2.0 (0.0-5.3)	2.0 (0.0-4.0)	0.624	4.6 (3.2-6.3)	11.0 (6.0-20.0)	0.064
RA AT	7.1 (4.0-20.0)	5.2 (1.0-16.0)	13.3 (6.0-22.0)	0.082	5.2 (1.0-16.0)	6.0 (0.6-8.0)	0.160	n/a*	22.0 (14.0-37.9)	n/a*
RA AP	8.5 (2.5-19.6)	1.0 (0.0-7.0)	10.5 (4.0-22.0)	<0.001	0.0 (0.0-3.0)	4.5 (0.0-8.0)	0.171	9.45**	17.6 (9.0-32.4)	n/a*
Group 2	8.6 (4.6-16.8)	7.4 (4.0-13.2)	17.0 (7.0-38.0)	<0.001	7.4 (4.0-13.6)	16.4 (8.0-41.0)	<0.001	11.1 (5.0-12.0)	19.1 (6.2-25.7)	0.009
PVI (RF) w/o additional lines	8.0 (4.2-14.0)	7.2 (4.0-13.0)	19.0 (11.0-33.7)	<0.001	7.2 (4.0-13.0)	19.0 (11.0-33.7)	<0.001	n/a*	n/a*	n/a*
PVI (RF) with additional lines	10.0 (5.0-20.0)	7.3 (5.0-14.0)	45.3 (34.9-61.8)	<0.001	7.3 (5.0-14.0)	45.3 (34.9-61.8)	<0.001	n/a*	n/a*	n/a*
All PVIs (RF)	8.4 (4.5-15.5)	7.2 (4.0-13.0)	27.4 (13.5-46.8)	<0.001	7.2 (4.0-13.0)	27.4 (13.5-46.8)	<0.001	n/a*	n/a*	n/a*
LA AT	9.0 (6.0-20.4)	8.5 (6.0-22.6)	10.0 (6.0-20.4)	0.293	8.3 (6.0-22.6)	7.0 (6.0-16.4)	0.586	12.0**	21.9 (11.2-27.7)	n/a*
LA AP	8.5 (4.0-21.0)	6.0 (4.0-11.1)	10.2 (4.0-21.7)	0.055	5.5 (2.2-12.5)	5.4 (0.5-8.0)	0.519	8.1 (5.0-11.1)	18.5 (6.2-24.8)	0.063
Group 3	6.2 (2.5-14.0)	6.0 (2.2-12.7)	7.0 (3.0-20.3)	0.424	6.0 (2.2-12.7)	4.0 (2.5-20.0)	0.632	n/a*	10.0 (7.5-20.6)	n/a*
PVC	5.0 (2.0-8.0)	4.0 (1.0-7.0)	7.8 (3.0-20.0)	0.016	4.0 (1.0-7.0)	5.2 (2.5-19.0)	0.193	n/a*	10.0 (7.5-20.6)	n/a*
VT	9.9 (4.0-23.0)	10.0 (5.0-23.0)	4.0 (3.0-35.6)	0.886	10.0 (5.0-23.0)	4.0 (3.0-35.6)	0.886	n/a*	n/a*	n/a*

Group 1: right-sided atrial EP procedures, group 2: left-sided atrial EP procedures, group 3: ventricular EP procedures. 3D = three-dimensional, CFSC = contact force sensing catheter, PVI = pulmonary vein isolation, RF = radiofrequency energy source, LA = left atrial, AT = atrial tachycardia, AP = accessory pathway, AVNRT = AV nodal reentrant tachycardia, RA = right atrial, PVC = premature ventricular contraction, VT = ventricular tachycardia. †Data are presented as medians with interquartile ranges. ‡Student's t-test with Welch modification. w/o = without, CFSC = contact force sensing catheter. *A group size of 0 observations (or only 1** observation) precludes calculation of a p-value.

Table S2C. Procedure times with and without the use of contact force sensing ablation catheters for different EP procedures and according to the use of a 3D mapping system.

		Entire cohort			Procedures using 3D mapping systems only			Procedures w/o the use of 3D mapping systems only		
Procedure type	Proced. time [†]	Proced. time with CFSC [†]	Proced. time w/o CFSC [†]	p-value [‡]	Proced. time with CFSC [†]	Proced. time w/o CFSC [†]	p-value [‡]	Proced. time with CFSC [†]	Proced. time w/o CFSC [†]	p-value [‡]
Group 1	78.5 (59.0-115.5)	101.0 (65.0-150.0)	75.0 (57.0-105.0)	<0.001	111.0 (70.0-155.0)	90.0 (60.0-118.0)	0.002	68.0 (57.0-81.0)	72.0 (56.0-96.0)	0.172
AVNRT	78.0 (60.0-110.0)	80.0 (66.0-123.0)	76.0 (60.0-110.0)	0.253	106.0 (70.0-150.0)	95.0 (70.0-123.0)	0.936	72.5 (64.5-99.0)	74.5 (56.5-100.0)	0.697
Atrial flutter	70.0 (55.0-103.0)	98.0 (60.0-150.0)	70.0 (52.0-95.0)	<0.001	118.0 (65.0-160.0)	70.0 (45.0-103.0)	<0.001	59.0 (39.0-82.0)	70.0 (55.0-91.5)	0.139
RA AT	120.0 (90.0-140.0)	110.0 (71.0-138.0)	120.0 (93.0-170.0)	0.402	110.0 (71.0-138.0)	120.0 (100.0-160.0)	0.476	n/a*	120.0 (93.0-180.0)	n/a*
RA AP	90.0 (60.0-155.0)	162.5 (80.0-190.0)	86.5 (40.0-120.0)	0.025	165.0 (150.0-190.0)	105.0 (70.0-130.0)	0.154	80.0**	81.5 (38.5-120.0)	n/a*
Group 2	128.0 (92.0-177.0)	130.0 (93.5-170.0)	124.0 (85.0-180.0)	0.721	130.0 (94.0-170.0)	135.0 (90.0-200.0)	0.377	120.0 (25.0-123.0)	110.0 (70.0-130.0)	0.528
PVI (RF) w/o additional lines	124.0 (92.0-167.0)	123.0 (90.0-162.5)	135.0 (100.0-180.0)	0.122	123.0 (90.0-162.5)	135.0 (100.0-180.0)	0.122	n/a*	n/a*	n/a*
PVI (RF) with additional lines	169.5 (130.0-210.0)	153.0 (127.0-200.0)	210.0 (180.0-240.0)	0.001	153.0 (127.0-200.0)	210.0 (180.0-240.0)	0.001	n/a*	n/a*	n/a*
All PVIs (RF)	135.0 (97.0-180.0)	130.0 (95.0-172.0)	180.0 (115.0-210.0)	<0.001	130.0 (95.0-172.0)	180.0 (115.0-210.0)	<0.001	n/a*	n/a*	n/a*
LA AT	114.5 (60.0-180.0)	117.0 (70.0-215.0)	110.0 (36.0-177.0)	0.306	117.5 (75.0-215.0)	40.0 (36.0-177.0)	0.243	25.0**	125.0 (70.0-150.0)	n/a*
LA AP	94.5 (65.0-121.5)	107.5 (70.0-123.0)	92.0 (65.0-120.0)	0.978	102.5 (63.0-130.0)	70.0 (60.0-90.0)	0.418	121.5 (120.0-123.0)	108.5 (75.0-127.5)	0.227
Group 3	130.0 (92.0-261.5)	144.0 (102.5-232.0)	100.0 (80.0-127.5)	<0.001	144.0 (102.5-232.0)	115.0 (80.0-140.0)	0.012	n/a*	100.0 (80.0-110.0)	n/a*
PVC	110.5 (80.0-159.0)	120.0 (83.5-180.0)	90.0 (75.0-115.0)	<0.001	120.0 (83.5-180.0)	90.0 (75.0-115.0)	0.001	n/a*	100.0 (80.0-110.0)	n/a*
VT	180.0 (123.0-260.0)	182.5 (130.0-271.5)	135.0 (120.0-225.0)	0.199	182.5 (130.0-271.5)	135.0 (120.0-225.0)	0.199	n/a*	n/a*	n/a*

Group 1: right-sided atrial EP procedures, group 2: left-sided atrial EP procedures, group 3: ventricular EP procedures. Proced. = procedure, 3D = three-dimensional, CFSC = contact force sensing catheter, PVI = pulmonary vein isolation, RF = radiofrequency energy source, LA = left atrial, AT = atrial tachycardia, AP = accessory pathway, AVNRT = AV nodal reentrant tachycardia, RA = right

atrial, PVC = premature ventricular contraction, VT = ventricular tachycardia. †Data are presented as medians with interquartile ranges. *Student's t-test with Welch modification. w/o = without, CFSC = contact force sensing catheter. *A group size of 0 observations (or only 1** observation) precludes calculation of a p-value.