## **Supplementary Online Content**

Freund Y, Goulet H, Leblanc J, et al. Effect of systematic physician cross-checking on reducing adverse events in the emergency department: the CHARMED cluster randomized trial. *JAMA Intern Med.* Published online April 23, 2018. doi:10.1001/jamainternmed.2018.0607

- **eFigure 1.** Adverse events form
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This supplementary material has been provided by the authors to give readers additional information about their work.

Supplementary	Appendix				
Center :	□PSL	□SAT		□AVC	□GRN
		Patient	number:		
Severe outcome	e within 7 da	ays			
Death or cardiac	arrest				Yes ⊡No
ICU admission					Yes ⊡No
Return visit to the	e ED or re ho	ospitalisation			Yes ⊡No
Adverse drug ev	ent				Yes ⊡No
Thrombo-emboli	c event				Yes ⊡No
Severe hemorraç	ge				Yes ⊡No
Severe sepsis or	septic shoc	k			Yes ⊡No
Acute coronary s	syndrome				Yes ⊡No
One episode of h	nypotension	(SBP<90 mm	ıHg)		Yes ⊡No
Antidote regimen	n started (Flu	mazenil, Prot	thrombin com	plex)	Yes ⊡No
Other undesirable	le outcome				Yes ⊡No
Deteil					

Known at risk situation	
Major procedure (Sedation, intubation, ponction)	□Yes □No
Catecholamine or vasopressor introduction	□Yes □No
Mechanical ventilation or NIV	□Yes □No
Total length of stay in the ED > 4 hours	□Yes □No
Electrolyte disturbances (Dysnatraemia, Dyskalaemia,)	□Yes □No
At least one aspect of the ED care is subopting	nal
□Yes □No	
Suspicion of :	
Guideline violation (local or national)	□Yes □No
Medication error	□Yes □No
Delay for recommended treatment	□Yes □No
Insufficient monitoring	□Yes □No
Error in ordering test	□Yes □No
Delay in ordering test	□Yes □No
Lack of prevention (eg no LMWH)	□Yes □No
Supplemental figure 1: adverse events form.	

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Center	annual ED census	Number of ED beds	Number of hospital beds	Trauma center	Setting	Trainees (N)	Senior emergency physicians (N)	Mean years in practice of senior emergency physicians
1	40 000	11	500	No	Urban	6	13	5
2	55 000	24	2142	No	Semi rural	15	25	10
3	70 000	37	700	Yes	Urban	12	25	7
4	66 000	22	1800	Yes	Urban	10	25	6
5	60 000	36	620	No	Urban	9	25	6
6	44 000	14	600	No	Urban	7	13	5

## **Supplemental Table 1: Characteristics of participating emergency departments.** All centers were academic emergency departments, adult only, saw both medical and surgical patients and have 24/7 coverage by a senior emergency physician. Trainees are post-graduate young doctors in their 3 to 6 years internship. Senior emergency

physicians are board certified physicians who completed their training.

	Annual	Age .	Age - years mean (SD)	Median waiting ti (IQR), minutes	Median waiting time (IQR), minutes	Median length of ED stay (IQR), hours	h of ED stay nours	No comorbidity N (%)	orbidity %)	Cross-checked patient	ecked nt	Medical error N (%)	l error %)
Doring		ر	, <del>1</del>	ر ر	7	ر ر	S <sub>to</sub>			(%) Z	(e)	ر	747
N per center		3	3	3	3		3	140	140	140		140	140
Center No.													
1	40 000		57 (21) 58 (24)	01:01 [00:40;01:49		01:00 06:33 06:22 [00:34;01:25] [04:18;11:56] [04:33;10:43]	06:22 [04:33;10:43]	40 (27)	52 (37)	40 (27) 52 (37) 62 (44) 0 (0) 10 (7) 23 (16)	0) 0	10 (7)	23 (16)
2	55 000	67 (20)	67 (20) 69 (21)	01:03 [00:32;01:50]	00:46 [00:31;01:08]	01:03 00:46 12:03 10:02 [00:32;01:50] [00:31;01:08] [08:25;18:29] [07:29;15:33]	10:02 [07:29;15:33]	30 (21)	17 (12)	30 (21) 17 (12) 140 (100) 0 (0) 9 (6) 14 (10)	0) 0	(9) 6	14 (10)
т	70 000	52 (20)	52 (20) 52 (20)	01:08 [00:31;01:52]	01:00 [00:33;02:00]	01:08 01:00 05:34 05:48 [00:31;01:52] [00:33;02:00] [03:12;08:28] [04:01;08:24]	05:48 [04:01;08:24]	46 (33)	45 (32)	46 (33) 45 (32) 80 (57) 0 (0) 12 (9) 20 (14)	0) 0	12 (9)	20 (14)
4	000 99	53 (21)	53 (21) 56 (21)	00:46 [00:28;01:09]	01:00 [00:33;01:32]	00:46 01:00 06:20 07:39 [00:28 ; 01:09] [00:33 ; 01:32] [03:35 ; 24:02] [04:30 ; 24:24]	07:39 [04:30 ; 24:24]	61 (56)	45 (32)	61 (56) 45 (32) 95 (68) 0 (0)	0) 0	7 (5)	8 (6)
Z	000 09	57 (23)	57 (23) 57 (22)	00:44 [00:24;01:25]	00:44 [00:24;01:39]	00:44 06:05 06:13 [00:24;01:39] [04:18;08:16] [04:14;09:23]	06:13 [04:14;09:23]	44 (31)	32 (23)	44 (31) 32 (23) 123 (88) 0 (0) 4 (3)	0) 0	4 (3)	8 (6)
9	44 000	58 (21)	58 (21) 55 (20)	01:04 [00:40 ; 02:07]	01:03 [00:33;01:33]	01:04 01:03 04:41 06:03 [00:40;02:07] [00:33;01:33] [02:59;06:39] [04:23;10:08]	06:03 [04:23;10:08]	23 (14)	30 (21)	23 (14) 30 (21) 73 (52) 0 (0) 12 (9) 17 (12)	(0) 0	12 (9)	17 (12)

**Supplementary table 2:** main characteristics in the six centers. CC: cross checking period. Std: Standard period. IQR: interquartile range

Variable	Cross-check	Standard	р
	(N=573)	(N=1107)	•
Age	59.9 ± 21.1	56.2 ± 21.9	0.001
Median waiting time, min (IQR)	54 (28 ; 91)	57 (33 ; 97]	0.03
Median length of ED stay, hr	7 [ /[ 1 . 12 [)	6 2 /4 1 . 10 2\	<0.001
(IQR)	7.5 (5.1 ; 12.5)	6.3 (4.1 ; 10.2)	<0.001
Chief complaint, N (%)			< 0.001
Cardiovascular	41 (7)	39 (4)	
Respiratory	60 (11)	87 (8)	
Trauma	100 (17)	210 (19)	
Neurological	63 (11)	87 (8)	
Abdominal	49 (9)	86 (8)	
Infection / fever	29 (5)	49 (4)	
Intoxication	4 (1)	18 (2)	
Fatigue, difficulty to cope	41 (7)	87 (8)	
Pain	97 (17)	251 (23)	
Other	89 (16)	193 (17)	
Severity triage level, N (%)			< 0.001
1 (most severe)	4 (1)	12 (1)	
2	169 (30)	252 (23)	
3	313 (55)	551 (50)	
4	87 (15)	292 (26)	
Comorbidities			
None	138 (24)	327 (29)	0.02
Cardiovascular	253 (44)	409 (37)	0.004
Respiratory	79 (13)	162 (14)	0.62
Neuromuscular	59 (10)	102 (9)	0.49
Cognitive	39 (6)	64 (5)	0.41
Cancer	69 (12)	113 (10)	0.26
Psychiatric	58 (10)	96 (8)	0.34
Renal	38 (6)	88 (8)	0.33
Liver and guts	59 (10)	105 (9)	0.61
Other	218 (38)	447 (40)	0.33

**Supplementary table 3:** Per-protocol population. Comparison of cross-checked patients and non cross-checked patients. IQR: interquartile range

Variable	Cross check	Standard
	n=54	n=90
Sequence order		
Standard – Cross check	34 (36)	60 (64)
Cross-check - Standard	20 (40)	30 (60)

**Supplementary table 4:** number (%) of adverse events. p=0.49 for period effect and p=0.18 for sequence order.