

Supplementary Material

Figure S1. Numbers of patients enrolled per month in the intervention and control groups, IMPROVED trial.

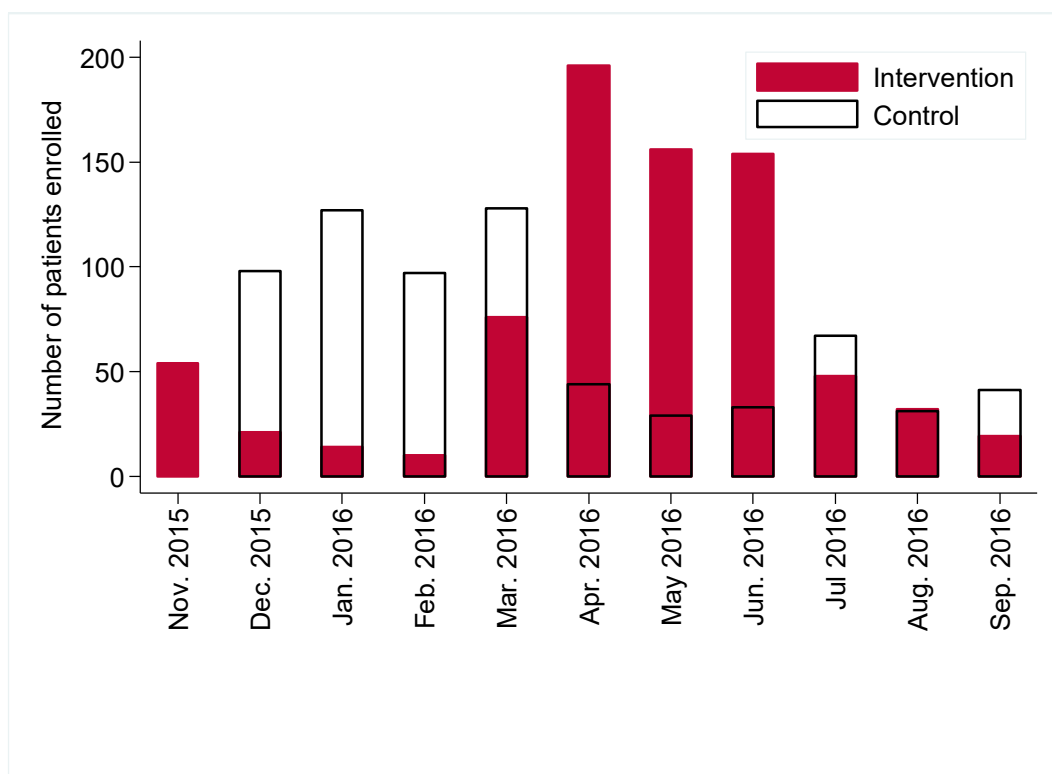


Table S1. Variables entered in the multivariate imputation model, IMPROVED trial.

Variable	Number of Observations per Imputation Set			
	Complete	Incomplete	Imputed	Total
6-month pneumococcal vaccination status	1003	472	472	1475
6-month influenza vaccination status	873	602	602	1475
History of influenza vaccination	1472	3	3	1475
Hospital admission	1468	7	7	1475
Study site	1475	0	0	1475
Age	1475	0	0	1475
Gender	1475	0	0	1475
ED visit diagnosis	1475	0	0	1475
Chronic respiratory disease	1475	0	0	1475
Congestive heart failure	1475	0	0	1475
History of stroke	1475	0	0	1475
Immunosuppression	1475	0	0	1475
Chronic renal failure	1475	0	0	1475
Cirrhosis	1475	0	0	1475
Cancer	1475	0	0	1475
History of pneumonia	1475	0	0	1475
History of chronic sinusitis	1475	0	0	1475
History of meningitis	1475	0	0	1475
Institution dwelling	1475	0	0	1475

Table S2. Characteristics of Emergency Departments participating in the IMPROVED trial

Emergency Departments Characteristics	All (<i>n</i> =18)	Intervention (<i>n</i> =9)	Control (<i>n</i> =9)
University-affiliated hospitals, <i>n</i>	9	5	4
Annual ED visits ≥40,000, <i>n</i>	10	5	5
Paris and suburbs, <i>n</i>	6	3	3
Number of patients included, median (range)	98 (18–145)	100 (18–145)	88 (24–100)

Table S3. Comparison of primary and secondary outcomes in casewise analysis; IMPROVED trial

Outcome		Intervention, n/N (%)		Control, n/N (%)		Odds Ratio (95% CI)		Absolute Difference (95% CI)		P-Value
Self-reported pneumococcal vaccination	6-month	38/549	(6.9)	24/454	(5.3)	1.33	(0.79 to 2.26)	1.6	(-1.3 to 4.6)	0.28
Self-reported 6-month influenza vaccination		239/474	(50.4)	148/399	(37.1)	1.91	(1.12 to 3.25)	15.9	(3.0 to 28.8)	<0.001

Abbreviations: CI = confidence interval.

* Odds ratio and absolute difference point estimates along with 95% confidence intervals were derived from logistic regression for dependent binary variable with study arm entered as independent variable. To account for patient clustering within ED, we used random intercept model.

Table S4. Comparison of primary and secondary outcomes restricted to the subgroup of ‘at risk’ patients in intention-to-treat analysis; IMPROVED trial

Outcome	Intervention (n = 241)	Control (n = 212)	Odds Ratio * (95% CI)		Absolute Difference * (95% CI)		P-Value
Self-reported 6-month pneumococcal vaccination, %	7.5	7.0	1.08	(0.48 to 2.43)	0.5	(-4.8 to 5.9)	0.85
Self-reported 6-month influenza vaccination, %	49.0	43.8	1.23	(0.75 to 2.01)	5.2	(-7.0 to 17.3)	0.41
6-month all-cause mortality, %	13.3	10.9	1.26	(0.71 to 2.23)	2.4	(-3.6 to 8.4)	0.43
12-month all-cause mortality, %	20.7	20.3	1.02	(0.58 to 1.79)	0.4	(-8.7 to 9.5)	0.94

Abbreviations: CI = confidence interval.

* Odds ratio and absolute difference point estimates along with 95% confidence intervals were derived from logistic regression for dependent binary variable with study arm entered as independent variable. To account for patient clustering within ED, we used random intercept model. Missing values for self-reported pneumococcal and influenza vaccination were replaced by multiple imputation.

Table S5. Comparison of baseline characteristics according to self-reported 6-month pneumococcal vaccination; IMPROVED trial.

	Self-Reported 6-Month Pneumococcal Vaccination *				
	No		Yes		
	(n = 941)		(n = 62)		P-Value
	n or med (% or IQR)		n or med (% or IQR)		
Age (year)	74	(69–81)	75	(69–81)	0.46
Gender (female)	460	(48.9)	33	(53.2)	0.51
Study site					
Location in Paris and suburbs	314	(33.4)	21	(33.9)	0.94
University hospital	516	(54.8)	41	(66.1)	0.08
ED annual volume ≥40,000	546	(58.0)	41	(66.1)	0.21
Enrollment between November and April	564	(59.9)	29	(46.8)	0.04
Reason for ED visit					0.004
Respiratory tract infection	44	(4.7)	11	(17.7)	
Non-respiratory tract infection	21	(2.2)	2	(3.2)	
Medical reason	595	(63.2)	39	(62.9)	
Traumatic reason	203	(21.6)	8	(12.9)	
Non-traumatic surgery	14	(1.5)	1	(1.6)	
Psychiatry	3	(0.3)	0	(0.0)	
Other	61	(6.5)	1	(1.6)	
At least one underlying condition	265	(28.2)	24	(38.7)	0.08
Chronic respiratory disease	48	(5.1)	6	(9.7)	0.14
Heart failure	96	(10.2)	11	(17.7)	0.06
Immunosuppression	6	(0.6)	4	(6.5)	0.002
History of stroke	61	(6.5)	6	(9.7)	0.30
Chronic renal failure	41	(4.4)	3	(4.8)	0.75
Cirrhosis	7	(0.7)	0	(0.0)	>0.999
Cancer	60	(6.4)	4	(6.5)	>0.999
History of pneumonia	38	(4.0)	5	(8.1)	0.18
History of meningitis	8	(0.9)	0	(0.0)	>0.999
History of chronic sinusitis	20	(2.1)	7	(11.3)	0.001
Institution dwelling	7	(0.7)	1	(1.6)	0.40
History of influenza vaccination					<0.001
Current season IV	435	(46.2)	45	(72.6)	
IV > 1 year	160	(17.0)	8	(12.9)	
No history of IV	345	(36.7)	9	(14.5)	
Missing data	1	(0.1)	0	(0.0)	
At risk of invasive pneumococcal infection	224	(23.8)	21	(33.9)	0.07
Hospitalization					0.06
Yes	501	(53.2)	27	(43.6)	
No	438	(46.6)	34	(54.8)	
Missing data	2	(0.2)	1	(1.6)	

Abbreviations: IV = influenza vaccination.

* Information on self-reported pneumococcal vaccination was available for 1,003 patients. Values for the primary outcome were missing for 87 patients who died within 6 months, 275 who were lost to follow-up at 6 months, and 110 who did not answer.

Table S6. Adjusted odds ratio of self-reported pneumococcal and influenza vaccination associated with intervention arm in intention-to-treat analysis; IMPROVED trial (N=1,475)

Outcome	Adjusted Odds Ratio * (95% CI)		P-Value
Self-reported 6-month pneumococcal vaccination	1.28	(0.72 to 2.25)	0.40
Self-reported 6-month influenza vaccination	1.73	(1.16 to 2.58)	0.007

Abbreviations: CI = confidence interval.

* Adjusted odds ratio point estimates along with 95% confidence interval were derived from multivariable logistic regression for dependent binary variable with study arm entered as independent variable. To account for patient clustering within ED, we used random intercept model. Odds ratios were adjusted for baseline ED (location in Paris and suburbs, university affiliation, annual volume $\geq 40,000$) and patient (age, gender, enrollment between November 1st and April 30th, reason for ED visit, underlying conditions, history of pneumonia, history of chronic sinusitis, history of meningitis, institution dwelling, history of influenza vaccination, and hospital admission) characteristics. Missing values were replaced by multiple imputation.

Table S7. Comparison of baseline patient characteristics according to self-reported 6-month influenza vaccination; IMPROVED trial.

	Self-reported 6-month influenza vaccination*				
	No		Yes		
	(n=486)		(n=387)		P-value
	n or med (% or IQR)		n or med (% or IQR)		
Age (year)	74	(68–80)	76	(70–83)	<0.001
Gender (female)	224	(46.1)	208	(53.7)	0.03
Study site					
Location in Paris and suburbs	155	(31.9)	128	(33.1)	0.71
University hospital	252	(51.9)	223	(57.6)	0.09
ED annual volume ≥40,000	271	(55.8)	232	(59.9)	0.21
Enrollment between November and April	344	(70.8)	192	(49.6)	<0.001
Reason for ED visit					0.13
Respiratory tract infection	33	(6.8)	20	(5.2)	
Non-respiratory tract infection	11	(2.3)	8	(2.1)	
Medical reason	291	(59.9)	247	(63.8)	
Traumatic reason	100	(20.6)	89	(23.0)	
Non-traumatic surgery	10	(2.1)	6	(1.6)	
Psychiatry	1	(0.2)	2	(0.5)	
Other	40	(8.2)	15	(3.9)	
At least one underlying condition	129	(26.5)	119	(30.7)	0.17
Chronic respiratory disease	24	(4.9)	21	(5.4)	0.75
Heart failure	47	(9.7)	47	(12.1)	0.24
Immunosuppression	4	(0.8)	6	(1.6)	0.35
History of stroke	22	(4.5)	33	(8.5)	0.02
Chronic renal failure	24	(4.9)	17	(4.4)	0.71
Cirrhosis	4	(0.8)	3	(0.8)	>0.999
Cancer	35	(7.2)	19	(4.9)	0.16
History of pneumonia	17	(3.5)	17	(4.4)	0.50
History of meningitis	5	(1.0)	2	(0.5)	0.47
History of chronic sinusitis	12	(2.5)	12	(3.1)	0.87
Institution dwelling	5	(1.0)	4	(1.0)	>0.999
History of influenza vaccination					<0.001
Current season IV	102	(21.0)	320	(82.7)	
IV > 1 year	103	(21.2)	47	(12.1)	
No history of IV	281	(57.8)	19	(4.9)	
Missing data	0	(0.0)	1	(0.3)	
At risk of invasive pneumococcal infection	118	(24.3)	96	(24.8)	0.86
Hospitalization					0.82
yes	224	(46.1)	185	(47.8)	
No	261	(53.7)	201	(51.9)	
Missing data	1	(0.2)	1	(0.3)	

Abbreviations: IV = influenza vaccination.

* The secondary outcome of self-reported influenza vaccination was available in 873 patients. Values for the primary outcome were missing for 87 patients who died within 6 months, 275 who were lost to follow-up at 6 months, and 240 who did not answer.