

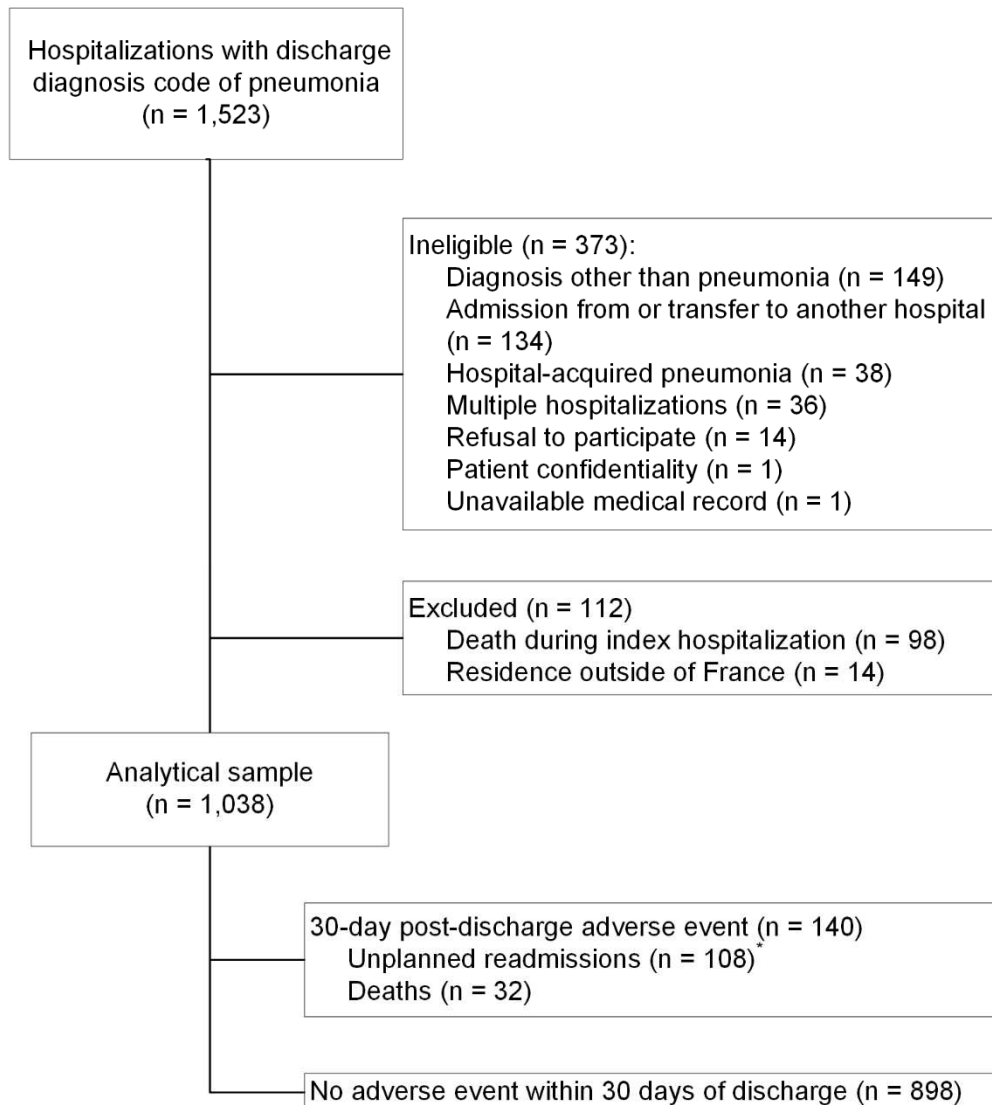
Appendix A. Variables entered in multivariate imputation by chained equations model

Variable	No. observations per imputation set			
	Complete	Incomplete	Imputed	Total
Study site	1038	0	0	1038
Age	1038	0	0	1038
Gender	1038	0	0	1038
Nursing home resident	1029	9	9	1038
Neoplastic disease	1038	0	0	1038
Liver disease	1038	0	0	1038
Renal disease	1038	0	0	1038
Congestive heart failure	1038	0	0	1038
Cerebrovascular disease	1038	0	0	1038
Home oxygen therapy prior to admission	1037	1	1	1038
ICU admission	1038	0	0	1038
Length of stay	1038	0	0	1038
Instability criteria at discharge				
Temperature	993	45	45	1038
Heart rate	984	54	54	1038
Respiratory rate	27	1011	1011	1038
Systolic blood pressure	992	46	46	1038
Diastolic blood pressure	991	47	47	1038
Oxygenation saturation rate	814	224	224	1038
PaO ₂	186	852	852	1038
Supplemental oxygen	1036	2	2	1038
Oxygen flow	1031	7	7	1038
Mental status	1038	0	0	1038
Ability to maintain oral intake	1038	0	0	1038
30-day post-discharge adverse events				
Mortality	1038	0	0	1038
Unplanned readmission	1038	0	0	1038

Abbreviations: ICU = intensive care unit; PaO₂ = partial pressure of arterial oxygen.

Appendix B. Study cohort

* Sixteen additional deaths occurred during the course of hospital readmission.



Appendix C. Baseline characteristics of survivors of hospitalisations for community-acquired pneumonia (n = 1038)

Characteristics	
Male gender, <i>n (%)</i>	587 (56.6)
Age, median (IQR), <i>year</i>	77 (63–86)
Nursing home resident, <i>n (%)</i>	154 (14.8)
Comorbid Conditions, <i>n (%)</i>	
Neoplastic disease	115 (11.1)
Liver disease	43 (4.1)
Cerebrovascular disease	143 (13.8)
Congestive heart failure	132 (12.7)
Renal disease	156 (15.0)
Physical examination findings on admission, <i>n (%)</i>	
Temperature < 35 or ≥ 40°C	25 (2.4)
Respiratory rate ≥ 30 per min	153 (14.7)
Systolic blood pressure < 90 mmHg	83 (8.0)
Pulse rate ≥ 125 per min	102 (9.8)
Altered mental status	201 (19.4)
Laboratory and X-ray findings on admission, <i>n (%)</i>	
Arterial pH < 7.35	46 (4.4)
Blood urea nitrogen ≥ 11 mmol/L	266 (25.6)
Sodium < 130 mmol/L	46 (4.4)
Glucose ≥ 14 mmol/L	49 (4.7)
Hematocrit < 30%	67 (6.5)
PaO ₂ < 60 mmHg or oxygen saturation < 90%	231 (22.3)
Pleural effusion	180 (17.3)
Pneumonia Severity Index risk class, <i>n (%)</i>	
I-III	398 (38.3)
IV	447 (43.1)
V	193 (18.6)
ICU admission, <i>n (%)</i>	129 (12.4)
Length of stay, median (IQR), <i>d</i>	8 (4–13)

Abbreviations: ICU = intensive care unit; IQR = interquartile range (i.e., 25-75th percentiles); PaO₂ = partial pressure of arterial oxygen

Appendix D. Physical examination findings at discharge among survivors of hospitalisations for community-acquired pneumonia (n = 1038)

Physical examination findings at discharge	Median (IQR) or No. (%)	No. (%) missing values
Temperature, °C	36.9 (36.6–37.2)	45 (4.3)
Pulse rate, <i>per min</i>	83 (73–94)	54 (5.2)
Respiratory rate, <i>per min</i>	23 (19–28)	1011 (97.4)
Systolic blood pressure, <i>mmHg</i>	122 (110–138)	46 (4.4)
Diastolic blood pressure, <i>mmHg</i>	69 (60–77)	47 (4.5)
Oxygen saturation, %	95 (93–96)	224 (21.6)
PaO ₂ , <i>mmHg</i>	68 (61–77)	852 (82.1)
Supplemental oxygen	131 (12.6)	2 (0.2)
Inability to maintain oral intake	56 (5.4)	0 (0)
Altered mental status	66 (6.4)	0 (0)

Abbreviations: IQR = interquartile range (i.e., 25-75th percentiles), PaO₂ = partial pressure of arterial oxygen

Appendix E. Main reasons for unplanned readmissions among survivors of hospitalisations for community-acquired pneumonia (n = 108)

Primary reason	No. (%) [*]
Readmission caused by a new affection	52 (48.1)
Complication of surgical care	0 (...)
Complication of nonsurgical care	5 (4.6)
Drug-related adverse event	10 (9.3)
Premature discharge	16 (14.8)
Missing or erroneous diagnosis or therapy	22 (20.4)
Other inadequate discharge	26 (24.1)
Failure of post-discharge follow-up care	19 (17.6)
Inadequate patient behavior	5 (4.6)
Relapse or aggravation of pneumonia	76 (70.4)
Social readmission	4 (3.7)

^{*} Numbers and percentages of patients for whom the primary reason for unplanned readmission was independently assigned by one to four panellists (See Methods section).

Appendix F. Agreement coefficient point estimates (95% confidence interval) for binary definitions of clinical instability at discharge among survivors of hospitalisations for community-acquired pneumonia (n = 1038)

Agreement coefficient*

Fleiss Kappa	0.47	(0.44–0.50)
Conger Kappa	0.47	(0.44–0.51)
Krippendorff Alpha	0.47	(0.43–0.50)
Brennan and Prediger	0.57	(0.54–0.61)
Gwet	0.65	(0.61–0.68)

* Missing values for the instability criteria at discharge were imputed as zero (See Methods section).

Appendix G. Univariable associations of primary and secondary study outcomes with clinical instability at discharge among survivors of hospitalisations for community-acquired pneumonia (n = 1038)

Author, year	Death or unplanned readmission within 30 days of discharge*		Unplanned readmission within 30 days of discharge*		Death within 30 days of discharge*	
	No. instabilities	n/N (%)	OR (95% CI)	n/N (%)	OR (95% CI)	n/N (%)
<i>Halm et al, 2002</i> ¹⁵						
0	77/718 (10.7)	1.00 (...)	65/718 (9.1)	1.00 (...)	17/718 (2.4)	1.00 (...)
≥ 1	63/320 (19.7)	2.04 (1.42–2.93)	43/320 (13.4)	1.56 (1.04–2.35)	31/320 (9.7)	4.42 (2.43–8.05)
<i>Dagan et al, 2006</i> ¹⁴						
0	75/704 (10.7)	1.00 (...)	64/704 (9.1)	1.00 (...)	16/704 (2.3)	1.00 (...)
≥ 1	65/334 (19.5)	2.03 (1.41–2.91)	44/334 (13.2)	1.52 (1.01–2.28)	32/334 (9.6)	4.56 (2.48–8.36)
<i>Jasti et al, 2008</i> ¹⁶						
0	96/818 (11.7)	1.00 (...)	75/818 (9.2)	1.00 (...)	28/818 (3.4)	1.00 (...)
≥ 1	44/220 (20.0)	1.88 (1.27–2.78)	33/220 (15.0)	1.75 (1.13–2.71)	20/220 (9.1)	2.82 (1.57–5.08)
<i>Capelastegui et al, 2008</i> ^{12,†}						
[0–1]	113/905 (12.5)	1.00 (...)	89/905 (9.8)	1.00 (...)	37/905 (4.1)	1.00 (...)
≥ 2	27/133 (20.3)	1.79 (1.12–2.84)	19/133 (14.3)	1.53 (0.90–2.59)	11/133 (8.3)	2.12 (1.06–4.21)
<i>Capelastegui et al, 2009</i> ¹³						
0	74/612 (12.1)	1.00 (...)	59/612 (9.6)	1.00 (...)	23/612 (3.8)	1.00 (...)
≥ 1	66/426 (15.5)	1.33 (0.93–1.90)	49/426 (11.5)	1.22 (0.82–1.82)	25/426 (5.9)	1.60 (0.90–2.83)

Abbreviations: CI = confidence interval; OR = odds ratio.

* Missing values for the instability criteria at discharge were imputed as zero (See Methods section).

† Clinical instability was defined by a score ≥ 2 based on one major criterion (temperature $>37.5^{\circ}\text{C}$, 2 points) and three minor criteria (systolic blood pressure <90 mm Hg and/or diastolic blood pressure <60 mm Hg, respiratory rate >24 breaths/min, and oxygen saturation $<90\%$ and/or $\text{PaO}_2 <60$ mmHg, 1 point each).

Appendix H. Odds ratios (95% confidence interval) of study outcomes associated with clinical instability at discharge among survivors of hospitalisations for community-acquired pneumonia after multiple imputation of missing values (n = 1038)

Author, year No. instabilities	Death or unplanned readmission within 30 days of discharge		Unplanned readmission within 30 days of discharge		Death within 30 days of discharge	
	Primary analysis*	MICE	Primary analysis*	MICE	Primary analysis*	MICE
<i>Halm et al, 2002</i> ¹⁵						
0	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)
≥ 1	2.04 (1.42–2.93)	2.23 (0.89–5.60)	1.56 (1.04–2.35)	1.83 (0.64–5.26)	4.42 (2.43–8.05)	5.23 (1.49–18.32)
<i>Dagan et al, 2006</i> ¹⁴						
0	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)
≥ 1	2.03 (1.41–2.91)	2.03 (0.76–5.41)	1.52 (1.01–2.28)	1.75 (0.55–5.54)	4.56 (2.48–8.36)	3.31 (1.27–8.67)
<i>Jasti et al, 2008</i> ¹⁶						
0	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)
≥ 1	1.88 (1.27–2.78)	1.82 (0.65–5.06)	1.75 (1.13–2.71)	1.84 (0.57–5.97)	2.82 (1.57–5.08)	1.98 (0.80–4.92)
<i>Capelastegui et al, 2008</i> ^{12†}						
[0–1]	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)
≥ 2	1.79 (1.12–2.84)	1.76 (1.08–2.87)	1.53 (0.90–2.59)	1.55 (0.88–2.71)	2.12 (1.06–4.21)	2.57 (1.26–5.25)
<i>Capelastegui et al, 2009</i> ¹³						
0	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)	1.00 (...)
≥ 1	1.33 (0.93–1.90)	1.85 (0.76–4.54)	1.22 (0.82–1.82)	1.69 (0.59–4.85)	1.60 (0.90–2.83)	2.54 (0.74–8.66)

Abbreviations: MICE = multivariate imputation by chained equations.

* Missing values for the instability criteria at discharge were imputed as zero (See Methods section).

† Clinical instability was defined by a score ≥ 2 based on one major criterion (temperature $>37.5^{\circ}\text{C}$, 2 points) and three minor criteria (systolic blood pressure <90 mm Hg and/or diastolic blood pressure <60 mm Hg, respiratory rate >24 breaths/min, and oxygen saturation $<90\%$ and/or $\text{PaO}_2 <60$ mmHg, 1 point each).

Appendix I. Univariable associations of any readmission and mortality with clinical instability at discharge among survivors of hospitalisations for community-acquired pneumonia (n = 1038)

Author, year	Death or any readmission within 30 days of discharge*		Any readmission within 30 days of discharge*		Death within 30 days of discharge*	
	No. instabilities	n/N (%)	OR (95% CI)	n/N (%)	OR (95% CI)	n/N (%)
<i>Halm et al, 2002</i> ¹⁵						
0	133/718 (18.5)	1.00 (...)	121/718 (16.9)	1.00 (...)	17/718 (2.4)	1.00 (...)
≥ 1	81/320 (25.3)	1.49 (1.09–2.04)	63/320 (19.7)	1.21 (0.86–1.69)	31/320 (9.7)	4.42 (2.43–8.05)
<i>Dagan et al, 2006</i> ¹⁴						
0	131/704 (18.6)	1.00 (...)	120/704 (17.0)	1.00 (...)	16/704 (2.3)	1.00 (...)
≥ 1	83/334 (24.9)	1.45 (1.06–1.98)	64/334 (19.2)	1.15 (0.83–1.61)	32/334 (9.6)	4.56 (2.48–8.36)
<i>Jasti et al, 2008</i> ¹⁶						
0	157/818 (19.2)	1.00 (...)	136/818 (16.6)	1.00 (...)	28/818 (3.4)	1.00 (...)
≥ 1	57/220 (25.9)	1.47 (1.04–2.08)	48/220 (21.8)	1.40 (0.97–2.02)	20/220 (9.1)	2.82 (1.57–5.08)
<i>Capelastegui et al, 2008</i> ^{12,†}						
[0–1]	179/905 (19.8)	1.00 (...)	156/905 (17.2)	1.00 (...)	37/905 (4.1)	1.00 (...)
≥ 2	35/133 (26.3)	1.45 (0.95–2.20)	28/133 (21.1)	1.28 (0.82–2.00)	11/133 (8.3)	2.12 (1.06–4.21)
<i>Capelastegui et al, 2009</i> ¹³						
0	119/612 (19.4)	1.00 (...)	104/612 (17.0)	1.00 (...)	23/612 (3.8)	1.00 (...)
≥ 1	95/426 (22.3)	1.19 (0.88–1.61)	80/426 (18.8)	1.13 (0.82–1.56)	25/426 (5.9)	1.60 (0.90–2.83)

Abbreviations: CI = confidence interval; OR = odds ratio.

* Missing values for the instability criteria at discharge were imputed as zero (See Methods section).

† Clinical instability was defined by a score ≥ 2 based on one major criterion (temperature $>37.5^{\circ}\text{C}$, 2 points) and three minor criteria (systolic blood pressure <90 mm Hg and/or diastolic blood pressure <60 mm Hg, respiratory rate >24 breaths/min, and oxygen saturation $<90\%$ and/or $\text{PaO}_2 <60$ mmHg, 1 point each).

Appendix J. Overview of primary studies reporting on clinical instability at discharge among survivors of hospitalisations for community-acquired pneumonia

Author, year	Halm <i>et al</i> , 2002 ¹⁵		Dagan <i>et al</i> , 2006 ¹⁴		Jasti <i>et al</i> , 2008 ¹⁶		Capelastegui <i>et al</i> , 2008 ¹²		Capelastegui <i>et al</i> , 2009 ¹³		Present study	
Country	USA		Israel		USA		Spain		Spain		France	
Recruitment period	1991-1994		2002		1998-1999		2003-2006		2003-2007		2014	
No. study sites	4		1		7		1		1		2	
No. patients alive at discharge	680		373		577		870		1117		1038	
Age, mean (SD), y	58	(19)	63	(12)	70	(16)	70	(16)	69	(17)	72	(18)
Male gender, <i>n</i> (%)	331	(48.7)	201	(53.9)	263	(45.6)	561	(64.5)	...	(...)	587	(56.6)
PSI risk classes IV-V, <i>n</i> (%)	194	(28.5)	206	(55.2)	268	(46.4)	447	(51.4)	543	(48.6)	640	(61.7)
LOS, median (IQR), <i>d</i>	7	(5–10)	5	(3–7)	5	(3–8)	3	(...)	3	(...)	8	(4–13)
Instability at discharge, <i>n</i> (%) [*]	130	(19.1)	82	(22.0)	59	(10.2)	89	(10.2)	399	(35.7)	320	(30.8)
30-day adverse event, <i>n</i> (%)	80	(11.8)	39	(10.5)	...	(...)	...	(...)	133	(11.9)	214	(20.6)
30-day readmission, <i>n</i> (%) [†]	67	(9.9)	28	(7.5)	70	(12.1)	72	(8.3)	81	(7.3)	184	(17.7)
30-day mortality, <i>n</i> (%)	23	(3.4)	11	(2.9)	...	(...)	29	(3.3)	55	(4.9)	48	(4.6)

Abbreviations: IQR =interquartile range (i.e., 25–75th percentiles); LOS = length of stay; SD = standard deviation.

^{*} Criteria for clinical instability at discharge varied across primary studies (See Figure 1). As part of the present study, clinical instability at discharge was defined according to

Halm *et al*, 2002.¹⁵

† Readmission was defined as any readmission within 30 days of discharge for all but one study. Jasti *et al* (2008), defined readmission as any readmission within 30 days of index hospital admission.