

Supplemental Digital Content 2

Table 1. Predictive Performance of the ARISCAT Model and Predictors in the PERISCOPE Cohort, by Composite and Individual PPC Outcomes: Adjusted ORs, Discrimination of the Model, In-Hospital Mortality, and Postoperative LOS

	Composite	Components of PPC Composite				
		Respiratory Failure	Suspected Pulmonary Infection	Pleural Effusion	Atelectasis	
		N=404*	N=241	N=120	N=159	N=122
		OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age (yr)						
≤ 50	1	1	1	1	1	
51 – 80	1.46 (1.10 – 1.93)	1.49 (0.86 – 2.53)	1.88 (1.12 – 3.14)	1.32 (0.84 – 2.07)	1.44 (0.87 – 2.39)	
> 80	1.48 (0.96 – 2.28)	1.61 (1.13 – 2.29)	2.07 (1.01 – 4.23)	1.85 (0.97 – 3.56)	1.48 (0.69 – 3.16)	
Preoperative SpO₂						
≥ 96%	1	1	1	1	1	
91% – 95%	2.15 (1.67 – 2.77)	2.71 (2.02 – 3.64)	2.19 (1.46 – 3.28)	1.42 (0.94 – 2.11)	1.57 (1.02 – 2.41)	
≤ 90%	4.15 (2.18 – 7.93)	4.24 (2.07 – 8.69)	2.53 (0.91 – 6.99)	5.64 (2.33 – 13.64)	4.21 (1.54 – 11.45)	

Respiratory infection in the last month

No	1	1	1	1	1
Yes	1.17 (0.75 – 1.83)	1.04 (0.60 – 1.80)	1.48 (0.75 – 2.93)	0.98 (0.48 – 2.03)	1.55 (0.78 – 3.10)

Preoperative anemia (Hb ≤ 10 g/dl)

No	1	1	1	1	1
Yes	1.75 (1.14 – 2.68)	1.37 (0.81 – 2.30)	2.43 (1.35 – 4.36)	1.60 (0.85 – 3.05)	2.52 (1.33 – 4.78)

Surgical incision

Peripheral	1	1	1	1	1
Upper abdominal	2.10 (1.62 – 2.73)	1.75 (1.27 – 2.39)	2.03 (1.12 – 3.69)	3.56 (2.27 – 5.58)	2.51 (1.53 – 4.11)
Intrathoracic	8.5 (6.23 – 11.58)	3.66 (2.46 – 5.45)	2.22 (1.47 – 3.35)	15.2 (9.36 – 24.11)	10.44 (6.29 – 17.31)

Duration of surgery (h)

≤ 2	1	1	1	1	1
> 2 – 3	2.01 (1.48 – 2.71)	1.80 (1.24 – 2.61)	2.27 (1.39 – 3.72)	2.57 (1.53 – 4.30)	1.83 (1.03 – 3.28)
> 3	4.15 (3.15 – 5.46)	3.30 (2.34 – 4.65)	3.65 (2.29 – 5.82)	7.06 (4.52 – 11.04)	5.23 (3.24 – 8.44)

Emergency procedure

No	1	1	1	1	1
Yes	2.48 (1.81 – 3.41)	3.07 (2.14 – 4.38)	2.45 (1.50 – 4.02)	2.26 (1.51 – 4.36)	1.80 (0.98 – 3.32)

Discrimination†	0.80 (0.78 to 0.82)	0.75 (0.72 – 0.78)	0.78 (0.74 – 0.81)	0.87 (0.85 – 0.90)	0.86 (0.83 – 0.89)
------------------------	---------------------	--------------------	--------------------	--------------------	--------------------

Postoperative LOS, median (IQR), d	9 (6 – 15)	9 (3 – 40.8)	12 (7 – 20.8)	13 (8 – 21)	9.5 (6 – 18.3)
---	------------	--------------	---------------	-------------	----------------

In-hospital mortality, n (%)	34 (8.4)	30 (12.4)	14 (11.7)	13 (8.2)	13 (10.7)
-------------------------------------	----------	-----------	-----------	----------	-----------

* A total of 725 complications were recorded in these 404 patients; 65% of the patients had more than one PPC, 35% had 3 or more PPCs.

† C-statistic, ARISCAT model applied to the overall PERISCOPE cohort.

ARISCAT = Assess Respiratory Risk in Surgical Patients in Catalonia; CI = confidence interval; Hb = hemoglobin concentration; IQR = interquartile range; LOS = length of stay; OR = odds ratio; PERISCOPE = Prospective Evaluation of a Risk Score for postoperative pulmonary COmplications in Europe; PPC = postoperative pulmonary complication; SpO₂ = oxyhemoglobin saturation measured by pulse oximetry breathing air in supine position.

Table 2. Predictive Performance of the ARISCAT Model and Predictors in the PERISCOPE Cohort for Composites of Paired PPCs: Adjusted ORs, Discrimination of the Model, In-Hospital Mortality, and Postoperative LOS

	Composites of Paired PPCs*					
	Respiratory Failure + Pulmonary Infection	Respiratory Failure + Pleural Effusion	Respiratory Failure + Atelectasis	Pulmonary Infection + Pleural Effusion	Pulmonary Infection + Atelectasis	Pleural Effusion + Atelectasis
	N=285	N=326	N=302	N=242	N=208	N=222
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age (yr)						
≤ 50	1	1	1	1	1	1
51 – 80	1.51 (0.93 – 2.47)	1.48 (1.09 – 2.02)	1.42 (0.86 – 2.32)	1.82 (1.25 – 2.64)	1.55 (0.87 – 2.79)	1.58 (1.07 – 2.34)
> 80	1.59 (1.15 – 2.19)	1.53 (0.96 – 2.45)	1.61 (1.16 – 2.22)	1.85 (1.06 – 3.23)	1.59 (1.08 – 2.35)	1.79 (0.99 – 3.22)
Preoperative SpO ₂						
≥ 96%	1	1	1	1	1	1
91% – 95%	2.37 (1.79 – 3.12)	2.35 (1.79 – 3.08)	2.51 (1.914 – 3.30)	1.69 (1.23 – 2.31)	2.18 (1.58 – 3.01)	1.39 (0.98 – 1.97)
≤ 90%	4.58 (2.36 – 8.88)	4.54 (2.31 – 8.93)	3.79 (1.88 – 7.65)	3.24 (1.47 – 7.18)	4.01 (1.82 – 8.83)	6.53 (3.05 – 13.97)
Respiratory infection in the last						

month						
No	1	1	1	1	1	1
Yes	1.21 (0.75 – 1.98)	0.99 (0.59 – 1.64)	1.32 (0.82 – 2.12)	1.27 (0.74 – 2.19)	1.62 (0.95 – 2.75)	1.28 (0.72 – 2.29)
Preoperative anemia (Hb ≤ 10 g/dl)						
No	1	1	1	1	1	2
Yes	1.91 (1.01 – 2.58)	1.34 (0.83 – 2.18)	1.68 (1.05 – 2.69)	1.75 (1.04 – 2.93)	2.51 (1.54 – 3.01)	2.30 (1.36 – 3.89)
Surgical incision						
Peripheral	1	1	1	1	1	2
Upper abdominal	1.92 (1.44 – 2.56)	2.07 (1.56 – 2.76)	1.88 (1.40 – 2.53)	2.55 (1.82 – 3.55)	2.51 (1.77 – 3.56)	2.96 (2.04 – 4.29)
Intrathoracic	3.45 (2.37 – 5.02)	7.52 (5.38 – 10.51)	6.00 (4.24 – 8.49)	8.48 (5.82 – 12.34)	6.25 (4.16 – 9.37)	13.65 (9.18 – 20.31)
Duration of surgery (h)						
≤ 2	1	1	1	1	1	2
> 2 to 3	1.95 (1.39 – 2.73)	1.81 (1.29 – 2.54)	1.8 (1.29 – 2.58)	2.45 (1.67 – 3.60)	2.15 (1.43 – 3.24)	1.99 (1.29 – 3.11)
> 3	3.26 (2.37 – 4.48)	4.16 (3.09 – 5.62)	3.82 (2.81 – 5.21)	5.19 (3.67 – 7.35)	4.42 (3.07 – 6.38)	6.35 (4.39 – 9.17)
Emergency procedure						
No	1	1	1	1	1	1
Yes	2.69 (1.92 – 3.7)	2.83 (2.02 – 3.96)	2.78 (1.97 – 3.92)	2.69 (1.79 – 4.03)	2.23 (1.46 – 3.42)	1.98 (1.23 – 3.17)
Discrimination†	0.76 (0.73 – 0.78)	0.79 (0.77 – 0.82)	0.78 (0.76 – 0.81)	0.83 (0.81 – 0.86)	0.83 (0.81 – 0.86)	0.86 (0.84 – 0.89)
Postoperative LOS, median (IQR), d	9 (6 – 15)	10 (6 – 15)	9 (6 – 15)	12 (7 – 19)	11 (7 – 18.3)	11 (7 – 18.3)
In-hospital mortality, n (%)	31 (10.9)	33 (10.1)	32 (10.6)	23 (9.5)	21 (9.5)	21 (9.5)

* In this simulation, the pairs of PPCs form a composite, i.e., a patient might have either of the two PPCs or both.

† C-statistic, ARISCAT model applied to the overall PERISCOPE cohort.

ARISCAT = Assess Respiratory Risk in Surgical Patients in Catalonia; CI = confidence interval; Hb = hemoglobin concentration; IQR = interquartile range; LOS = length of stay; OR = odds ratio; PERISCOPE = Prospective Evaluation of a Risk Score for postoperative pulmonary COmplications in Europe; PPC = postoperative pulmonary complication; SpO₂ = oxyhemoglobin saturation measured by pulse oximetry breathing air in supine position.

Table 3. Predictive Performance of the ARISCAT Model and Predictors in the PERISCOPE Cohort for Three- and Four-Component Composites: Adjusted ORs, Discrimination of the Model, In-Hospital Mortality, and Postoperative LOS

	Three- and Four-Component Composites*				
	Respiratory Failure + Pulmonary Infection + Pleural Effusion	Respiratory Failure + Pulmonary Infection + Atelectasis	Pulmonary Infection + Pleural Effusion + Atelectasis	Respiratory Failure + Pleural Effusion + Atelectasis	Respiratory Failure + Pulmonary Infection + Pleural Effusion + Atelectasis
	N=361	N=339	N=289	N=362	N=391
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age (yr)					
≤ 50	1	1	1	1	1
51 – 80	1.50 (0.95 – 2.36)	1.41 (0.89 – 2.25)	1.67 (0.99 – 2.82)	1.48 (0.94 – 2.36)	1.44 (0.92 – 2.25)
> 80	1.54 (1.15 – 2.08)	1.52 (1.13 – 2.06)	1.75 (1.24 – 2.47)	1.54 (1.14 – 2.07)	1.54 (1.16 – 2.05)
Preoperative SpO₂					
≥ 96%	1	1	1	1	1
91% – 95%	2.14 (1.65 – 2.78)	2.37 (1.83 – 3.08)	1.76 (1.31 – 2.38)	2.24 (1.72 – 2.91)	2.14 (1.66 – 2.76)
≤ 90%	4.19 (2.17 – 8.08)	4.41 (2.29 – 8.49)	4.67 (2.29 – 9.53)	4.28 (2.28 – 8.60)	4.29 (2.24 – 8.21)

Respiratory infection in the last**month**

No	1	1	1	1	1
Yes	1.18 (0.75 – 1.88)	1.34 (0.85 – 2.11)	1.37 (0.83 – 2.27)	1.16 (0.72 – 1.85)	1.23 (0.79 – 1.93)

Preoperative anemia (Hb ≤ 10 g/dl)

No	1	1	1	1	1
Yes	1.48 (0.945 – 2.33)	1.84 (1.19 – 2.85)	2.15 (1.34 – 3.45)	1.68 (1.07 – 2.63)	1.75 (1.13 – 2.69)

Surgical incision

Peripheral	1	1	1	1	1
Upper abdominal	2.13 (1.63 – 2.79)	2.02 (1.53 – 2.66)	2.63 (1.93- 3.59)	2.12 (1.61 – 2.80)	2.18 (1.68 – 2.84)
Intrathoracic	6.978 (5.04 – 9.63)	5.71 (4.08 – 7.97)	10.15 (7.14 – 14.43)	8.69 (6.30 – 11.99)	8.24 (6.02 – 11.29)

Duration of surgery (h)

≤ 2	1	1	1	1	1
> 2 to 3	1.95 (1.42 – 2.68)	1.96 (1.42 – 2.70)	2.20 (1.53 – 3.16)	1.78 (1.29 – 2.47)	1.92 (1.41 – 2.62)
> 3	4.01 (3.01 – 5.34)	3.66 (2.73 – 4.92)	5.31 (3.86 – 7.32)	4.40 (3.30 – 5.85)	4.19 (3.18 – 5.53)

Emergency procedure

No	1	1	1	1	1
Yes	2.68 (1.94 – 3.70)	2.57 (1.85 – 3.57)	2.40 (1.63 – 3.53)	2.61 (1.87 – 3.64)	2.55 (1.85 – 3.51)

Discrimination†	0.79 (0.77 – 0.81)	0.78 (0.76 – 0.81)	0.84 (0.82 – 0.86)	0.80 (0.78 – 0.83)	0.80 (0.78 – 0.82)
------------------------	--------------------	--------------------	--------------------	--------------------	--------------------

Postoperative LOS, median (IQR), d	9 (6 – 15)	9 (6 – 15)	10 (7 – 18)	9 (6 – 15)	9 (6 – 15)
---	------------	------------	-------------	------------	------------

In-hospital mortality, n (%)	33 (9.1)	33 (9.7)	27 (9.3)	34 (9.4)	34 (8.7)
-------------------------------------	----------	----------	----------	----------	----------

* In this simulation, the groups of PPCs form a composite outcome, i.e., a patient might develop any single one of the PPCs or more than one.

† C-statistic, ARISCAT model applied to the overall PERISCOPE cohort.

ARISCAT = Assess Respiratory Risk in Surgical Patients in Catalonia; CI = confidence interval; Hb = hemoglobin concentration; IQR = interquartile range; LOS = length of stay; OR = odds ratio; PERISCOPE = Prospective Evaluation of a RIsk Score for postoperative pulmonary COmPlications in Europe; PPC = postoperative pulmonary complication; SpO₂ = oxyhemoglobin saturation measured by pulse oximetry breathing air in supine position.

Table 4. Predictive Performance of the ARISCAT Model and Predictors in the PERISCOPE Cohort for Development of Two Complications: Adjusted ORs, Discrimination of the Model, In-Hospital Mortality, and Postoperative LOS

	Two Complications Detected Simultaneously or Close in Time					
	Respiratory failure & pulmonary infection	Respiratory failure & Pleural effusion	Respiratory failure & Atelectasis	Pulmonary infection & Pleural effusion	Pulmonary infection & Atelectasis	Pleural Effusion & Atelectasis
	N= 78	N= 74	N= 61	N= 38	N= 34	N= 59
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age (yr)						
≤ 50	1	1	1	1	1	1
51 – 80	2.28 (1.13 – 4.61)	1.72 (0.86 – 3.41)	1.42 (0.70 – 2.85)	0.70 (0.30 – 1.64)	2.26 (0.84 – 6.18)	0.89 (0.45 – 1.77)
> 80	2.46 (0.97 – 6.22)	2.27 (0.91 – 5.69)	1.85 (0.70 – 4.89)	2.11 (0.76 – 5.88)	3.53 (0.97 – 12.76)	1.38 (0.52 – 3.70)
Preoperative SpO₂						
≥ 96%	1	1	1	1	1	1
91% – 95%	1.56 (0.34 – 7.10)	1.79 (1.06 – 3.05)	1.79 (1.01 – 3.22)	2.77 (1.32-5.84)	0.95 (0.42 – 2.18)	1.97 (1.10 – 3.52)

≤ 90%	3.22 (1.98 – 5.24)	6.06 (2.14 – 17.19)	6.59 (2.17 – 19.97)	9.44 (2.58 – 34.48)	1.33 (0.16 – 10.98)	2.42 (0.47 – 12.33)
Respiratory infection in the last month						
No	1	1	1	1	1	1
Yes	1.09 (0.42 – 2.78)	1.09 (0.42 – 2.85)	0.72 (0.22 – 2.39)	0.79 (0.18 – 3.60)	1.06 (0.25 – 4.54)	1.12 (0.38 – 3.29)
Preoperative anemia (Hb ≤ 10 g/dl)						
No	1	1	1	1	1	2
Yes	2.11 (1.01 – 4.40)	1.88 (0.76 – 4.10)	1.92 (0.82 – 4.51)	3.48 (1.47 – 8.25)	2.87 (1.04 – 7.93)	1.31 (0.48 – 3.59)
Surgical incision						
Peripheral	1	1	1	1	1	2
Upper abdominal	1.93 (1.14 – 3.26)	2.98 (1.65 – 5.39)	2.27 (1.19 – 4.31)	2.83 (0.94 – 8.52)	1.64 (0.73 – 3.70)	3.73 (1.73 – 8.06)
Intrathoracic	2.10 (1.02 – 4.32)	6.58 (3.37 – 12.82)	5.67 (2.77 – 11.61)	4.33 (1.99 – 9.41)	2.87 (1.10 – 7.52)	16.12 (7.40 – 35.12)
Duration of surgery (h)						
≤ 2	1	1	1	1	1	2
> 2 to 3	2.05 (1.08 – 3.91)	3.33 (1.65 – 6.74)	1.63 (0.72 – 3.67)	2.16 (0.78 – 5.99)	1.68 (0.58 – 4.89)	3.34 (1.13 – 7.76)
> 3	4.36 (2.44 – 7.79)	7.59 (3.99 – 14.42)	5.14 (2.67 – 9.89)	7.44 (3.21 – 17.23)	5.57 (2.42 – 12.83)	7.61 (3.57 – 16.19)
Emergency procedure						
No	1	1	1	1	1	1
Yes	3.57 (2.00 – 6.37)	3.58 (1.86 – 6.86)	2.46 (1.19 – 5.12)	2.22 (0.92 – 5.38)	2.21 (0.85 – 5.81)	3.45 (1.55 – 7.66)
Discrimination *	0.78 (0.73 – 0.83)	0.86 (0.82 – 0.89)	0.83 (0.78 – 0.88)	0.86 (0.81 – 0.91)	0.79 (0.72 – 0.86)	0.89 (0.85 – 0.92)

Postoperative LOS, median (IQR), d	12.5 (7 – 27)	14 (8.8 – 32)	14 (7.5 – 35.5)	19 (13 – 40)	16 (7 – 47.3)	14 (8 – 29)
In-hospital mortality, n (%)	13 (17.1)	10 (13.5)	11 (18)	4 (10.8)	6 (17.6)	5 (8.5)

* C-statistic, ARISCAT model applied to the overall PERISCOPE cohort.

ARISCAT = Assess Respiratory Risk in Surgical Patients in Catalonia; CI = confidence interval; Hb = hemoglobin concentration; IQR = interquartile range; LOS = length of stay; OR = odds ratio; PERISCOPE = Prospective Evaluation of a Risk Score for postoperative pulmonary COmplications in Europe; PPC = postoperative pulmonary complication; SpO₂ = oxyhemoglobin saturation measured by pulse oximetry breathing air in supine position.