### Supplementary Material

# Automated Algorithms for Seizure Forecast: A Systematic Review and Meta-Analysis

#### Ana Sofia Carmo, Mariana Abreu, Maria Fortuna Baptista, Miguel de Oliveira Carvalho, Ana Rita Peralta, Ana Fred, Carla Bentes and Hugo Plácido da Silva

This Supplementary Material provides the forest plots for Brier Skill Score (BSS) and Area Under the ROC Curve (AUC), stratified according to type of input data (Surrogate Measures of the Preictal State vs Cyclic Distribution of Events), source of data (i.e. dataset used), input data (EEG vs heart rate vs seizure times vs other inputs), forecast horizon (<1h, 1h, 24h), train/test approach (retrospective vs prospective/pseudo-prospective), and study (i.e. algorithms proposed by the same study). The dashed line illustrates the estimated overall score, and the diamonds represent either the overall or subgroup summary. Additional information provided includes the horizon of the forecast, the sample size, total number of seizures, and the train-test approach (which was either (pseudo-)prospective, P, or retrospective, R). (\*) Identifies the work of Leguia et al. that only reported the median number of seizures (143, interquartile range of 13-1233).

#### Subgroup analysis: Type of input data

First author, year	Forecast horizon	Sample size	Seizures	R/P		Weight (%)	BSS (95% CI)
surrogate measures o	of preictal st	ate					
Costa, 2024	<1h	40	224	Ρ	+	8.52	0.01 (-0.03-0.06)
Cousyn, 2022	24h	10	38	Ρ		7.43	0.72 (0.58-0.85)
Karoly, 2017	<1h	9	2692	Ρ	•	8.58	0.05 (0.02-0.09)
Leguia, 2022	24h	161	(*)	R	<b>•</b>	8.67	0.08 (0.07-0.09)
Leguia, 2022	24h	161	(*)	R	<b>•</b> 1	8.67	0.08 (0.06-0.10)
Subtotal (I^2 = 99.82	%, p=0.15	)				41.87	0.18 (-0.07-0.43)
cyclic distribution of e	events						
Karoly, 2017	<1h	9	2531	Ρ	◆ I	8.65	0.05 (0.03-0.07)
Leguia, 2022	24h	161	(*)	R	◆ <mark>I</mark>	8.67	0.10 (0.09-0.11)
Xiong, 2023	1h	6	2514	Ρ	<b>*</b>	8.57	0.05 (0.01-0.09)
Xiong, 2023	1h	13	2247	R	◆ I	8.66	0.04 (0.02-0.06)
Xiong, 2023	24h	6	2514	Ρ		7.45	0.17 (0.04-0.31)
Xiong, 2023	24h	13	2247	R		7.59	0.20 (0.07-0.33)
Subtotal (I^2 = 87.37	%, p<0.01	)			$\diamond$	49.59	0.07 (0.04-0.11)
both							
Karoly, 2017	<1h	9	2492	Ρ	+	8.54	0.11 (0.07-0.15)
Subtotal (I^2 = 0 %, p	o < 0.01 )				$\diamond$	8.54	0.11 (0.07-0.15)
Overall (I^2 = 99.5 %,	p < 0.01 )				$\diamondsuit$	100.00	0.13 (0.03-0.23)
					0.00 0.25 0.50 0.75 BSS		

Fig. 1: Forest plot of BSS of seizure forecast algorithms, overall and stratified by type of input data.

First author, year	horizon	size	Seizures	R/P		Weight (%)	AUC (95% CI
surrogate measures	of preictal st	ate			1		
Cousyn, 2023	24h	15	47	R	· ·	4.06	0.79 (0.71-0.8
Karoly, 2017	<1h	9	1383	R		4.80	0.79 (0.74-0.8
Leguia, 2022	24h	161	(*)	R	•	5.28	0.65 (0.64-0.6
Leguia, 2022	24h	161	(*)	R	<ul> <li>I</li> </ul>	5.26	0.63 (0.62-0.6
Nasseri, 2021	1h	6	278	R		3.33	0.75 (0.64-0.8
Viana, 2022	1h	6	103	R		4.70	0.73 (0.67-0.7
Viana, 2022	1h	6	103	R	+ <u>1</u>	2.90	0.65 (0.51-0.7
Subtotal (I^2 = 96.82	%, p < 0.01	)			$\Leftrightarrow$	30.33	0.71 (0.65-0.7
cyclic distribution of	events						
Chen, 2022	<1h	12	1976	Ρ		4.64	0.75 (0.69-0.8
Chen, 2022	<1h	15	2398	R		4.97	0.91 (0.87-0.9
Karoly, 2020	<1h	50	5450	Ρ		5.25	0.85 (0.84-0.8
Leguia, 2022	24h	161	(*)	R	↓ ◆I	5.28	0.69 (0.68-0.7
Payne, 2020	<1h	8	1236	Ρ		4.32	0.68 (0.61-0.7
Payne, 2020	<1h	8	1236	Ρ		4.69	0.69 (0.64-0.7
Payne, 2020	<1h	8	1236	Ρ		4.36	0.55 (0.48-0.6
Payne, 2020	<1h	8	1236	Ρ	<b>+</b>	4.27	0.63 (0.55-0.7
Xiong, 2023	1h	6	2514	Ρ		4.67	0.76 (0.71-0.8
Xiong, 2023	1h	13	2247	R	<b>——</b>	4.47	0.71 (0.64-0.7
Xiong, 2023	24h	6	2514	Ρ		2.93	0.74 (0.60-0.8
Xiong, 2023	24h	13	2247	R		4.10	0.70 (0.62-0.7
Subtotal (I^2 = 96.97	%, p < 0.01	)			$\langle \rangle$	53.95	0.73 (0.67-0.7
both							
Stirling, 2021	1h	8	1078	Ρ		3.22	0.65 (0.53-0.7
Stirling, 2021	1h	11	1493	R		4.57	0.74 (0.68-0.8
Stirling, 2021	24h	8	1078	Ρ		3.43	0.59 (0.47-0.7
Stirling, 2021	24h	11	1493	R	+ <u>1</u>	4.49	0.66 (0.60-0.7
Subtotal (I^2 = 55.7 )	%, p < 0.01)				$\triangleleft$	15.71	0.67 (0.61-0.7
					·		0.71 /0.00.0.7

Fig. 2: Forest plot of AUC of seizure forecast algorithms, overall and stratified by type of input data.

### Subgroup analysis: Data source

First author, year	Forecast horizon	Sample size	Seizures	R/P		Weight (%)	BSS (95% CI)
self-collected							
Cousyn, 2022	24h	10	38	Ρ	· · · · ·	7.43	0.72 (0.58-0.85)
Xiong, 2023	1h	6	2514	Ρ	• [	8.57	0.05 (0.01-0.09)
Xiong, 2023	1h	13	2247	R	◆ <u>1</u>	8.66	0.04 (0.02-0.06)
Xiong, 2023	24h	6	2514	Ρ		7.45	0.17 (0.04-0.31)
Xiong, 2023	24h	13	2247	R	· 	7.59	0.20 (0.07-0.33)
Subtotal (I^2 = 99.04 %	%, p = 0.06	)				39.7	0.23 (-0.01-0.47)
NeuroVista trial							
Karoly, 2017	<1h	9	1383	Ρ	<b>♦</b>	8.54	0.11 (0.07-0.15)
Karoly, 2017	<1h	9	1383	Ρ	◆ <mark>1</mark>	8.65	0.05 (0.03-0.07)
Karoly, 2017	<1h	9	1383	Ρ	+ I	8.58	0.05 (0.02-0.09)
Subtotal (I^2 = 70.68 %	%, p < 0.01	)			$\diamond_1^{I}$	25.77	0.07 (0.03-0.10)
NeuroPace trial and 24	1/7 EEG Sul	bQ trial					
Leguia, 2022	24h	161	(*)	R	<b>*</b>	8.67	0.10 (0.09-0.11)
Leguia, 2022	24h	161	(*)	R	<b>•</b>	8.67	0.08 (0.07-0.09)
Leguia, 2022	24h	161	(*)	R	•	8.67	0.08 (0.06-0.10)
Subtotal (I^2 = 61.92 %	%, p<0.01	)			٥	26.01	0.09 (0.07-0.10)
EPILEPSIAE database							
Costa, 2024	<1h	40	224	Ρ	+	8.52	0.01 (-0.03-0.06)
Subtotal (I^2 = 0 %, p	= 0.57 )				$\diamond$	8.52	0.01 (-0.03-0.06)
Overall (I^2 = 99.5 %,	p < 0.01 )				$\diamondsuit$	100.00	0.13 (0.03-0.23)
					0.00 0.25 0.50 0.75 BSS		

Fig. 3: Forest plot of BSS of seizure forecast algorithms, overall and stratified by data source.

Acroly, 2020     <1h       Subtotal (1/2 = 0%, p < 0.01)       Subtotal (1/2 = 42.3%, p < 0.01)       Subtotal (1/2 = 9.01)       Subtotal (1/2 = 40.01)       Subtotal (1/2 = 0.01)       Subtotal (1/2 = 9.01)       Subtotal (1/2 = 9.01)       Subtotal (1/2 = 9.01)       Subtotal (1/2 = 9.01)       Subtotal (1/2 = 9.02)       Subtotal (1/2 = 9.02)	ial 50 50 15 6 8 11 8 11 6 13 6 13 13 9	5450 47 278 1078 1493 1078 1493 2514 2247 2514 2247	P R P R P R P R		5.25 5.25 4.06 3.33 3.22 4.57 3.43 4.49 4.67 4.47 2.93 4.10	0.85 (0.84-0.86 0.85 (0.84-0.86 0.79 (0.71-0.88 0.75 (0.64-0.87 0.65 (0.53-0.76 0.65 (0.53-0.76 0.59 (0.47-0.70 0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Saroly, 2020 <th< td=""><td>50 15 6 8 11 8 11 6 13 6 13 13 )</td><td>5450 47 278 1493 1078 1493 2514 2247 2514 2247</td><td>P R P R P R P R</td><td></td><td>5.25 5.25 4.06 3.33 3.22 4.57 3.43 4.49 4.67 4.47 2.93 4.10</td><td>0.85 (0.84-0.86 0.85 (0.84-0.86 0.79 (0.71-0.86 0.75 (0.64-0.87 0.65 (0.53-0.76 0.65 (0.53-0.76 0.65 (0.64-0.77 0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87</td></th<>	50 15 6 8 11 8 11 6 13 6 13 13 )	5450 47 278 1493 1078 1493 2514 2247 2514 2247	P R P R P R P R		5.25 5.25 4.06 3.33 3.22 4.57 3.43 4.49 4.67 4.47 2.93 4.10	0.85 (0.84-0.86 0.85 (0.84-0.86 0.79 (0.71-0.86 0.75 (0.64-0.87 0.65 (0.53-0.76 0.65 (0.53-0.76 0.65 (0.64-0.77 0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Subtotal (*2 = 0 %, p < 0.01)	15 6 8 11 8 11 6 13 6 13 13 )	47 278 1078 1493 1078 1493 2514 2247 2514 2247	R P R P R P R P R		5.25 4.06 3.33 3.22 4.57 3.43 4.49 4.67 4.47 2.93 4.10	0.85 (0.84-0.86 0.79 (0.71-0.86 0.75 (0.64-0.87 0.65 (0.53-0.76 0.59 (0.47-0.70 0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Ausseri, 2023     24h       Ausseri, 2021     1h       Stirling, 2021     24h       Stirling, 2023     1h       Kiong, 2023     24h       Storbotal (I^2 = 42.3 %, p < 0.01	15 6 8 11 8 11 6 13 6 13 )	47 278 1078 1493 1078 1493 2514 2247 2514 2247	R P R P R P R		4.06 3.33 3.22 4.57 3.43 4.49 4.67 4.47 2.93 4.10	0.79 (0.71-0.86 0.75 (0.64-0.87 0.65 (0.53-0.76 0.74 (0.68-0.80 0.59 (0.47-0.70 0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Cousyn, 2023     24h       Aasseri, 2021     1h       Stirling, 2021     1h       Stirling, 2021     24h       Stirling, 2021     24h       Stirling, 2021     24h       Storling, 2023     1h       Kiong, 2023     24h       Kiong, 2023     24h       Storling, 2023     24h       Kiong, 2023     24h       Storlotal (*2 = 42.3 %, p < -0.01	15 6 8 11 6 13 6 13 13	47 278 1078 1493 1078 1493 2514 2247 2514 2247	R P R P R P R		4.06 3.33 3.22 4.57 3.43 4.49 4.67 4.47 2.93 4.10	0.79 (0.71-0.88 0.75 (0.64-0.87 0.65 (0.53-0.76 0.74 (0.68-0.80 0.59 (0.47-0.70 0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Aasseri, 2021     1h       Stirling, 2021     1h       Stirling, 2021     24h       Stirling, 2021     24h       Stirling, 2021     24h       Stirling, 2021     24h       Kiong, 2023     1h       Kiong, 2023     24h       Kiong, 2023     24h       Kiong, 2023     24h       Subtotal (*2 = 42.3 %, p < 0.01	6 8 11 8 11 6 13 6 13 )	278 1078 1493 1078 1493 2514 2247 2514 2247	R P R P R P R		3.33 3.22 4.57 3.43 4.49 4.67 4.47 2.93 4.10	0.75 (0.64-0.87 0.65 (0.53-0.76 0.74 (0.68-0.80 0.59 (0.47-0.70 0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Stirling, 2021     1h       Stirling, 2021     24h       Stirling, 2021     24h       Stirling, 2021     24h       Stirling, 2023     1h       Kiong, 2023     1h       Kiong, 2023     24h       Subtotal (1^2 = 42.3 %, p < 0.01	8 11 8 11 6 13 6 13 )	1078 1493 1078 1493 2514 2247 2514 2247	P R P R P R		3.22 4.57 3.43 4.49 4.67 4.47 2.93 4.10	0.65 (0.53-0.78 0.74 (0.68-0.80 0.59 (0.47-0.70 0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Stirling, 2021     1h       Stirling, 2021     24h       Stirling, 2023     1h       Kiong, 2023     24h       Kiong, 2023     24h       Kiong, 2023     24h       Kiong, 2023     24h       Subtotal (*2 = 42.3 %, p < 0.01	11 8 11 6 13 6 13 )	1493 1078 1493 2514 2247 2514 2247	R P R P R		4.57 3.43 4.49 4.67 4.47 2.93 4.10	0.74 (0.68-0.80 0.59 (0.47-0.70 0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Stirling, 2021     24h       Stirling, 2021     24h       Kiong, 2023     1h       Kiong, 2023     24h       Kiong, 2023     24h       Kiong, 2023     24h       Subtotal (1^2 = 42.3 %, p < 0.01	8 11 6 13 6 13 )	1078 1493 2514 2247 2514 2247	P R R R		3.43 4.49 4.67 4.47 2.93 4.10	0.59 (0.47-0.70 0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Stirling, 2021     24h       Kiong, 2023     1h       Kiong, 2023     24h       Kiong, 2023     24h       Subtotal (*2 = 42.3 %, p < 0.01	11 6 13 6 13 )	1493 2514 2247 2514 2247	R P R R		4.49 4.67 4.47 2.93 4.10	0.66 (0.60-0.72 0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Kiong, 2023     1h       Kiong, 2023     24h       Kiong, 2023     24h       Kiong, 2023     24h       Subtotal (*2 = 42.3 %, p < 0.01	6 13 6 13 )	2514 2247 2514 2247	P R P R		4.67 4.47 2.93 4.10	0.76 (0.71-0.82 0.71 (0.64-0.77 0.74 (0.60-0.87
Kiong, 2023     1h       Kiong, 2023     24h       Kiong, 2023     24h       Subtotal (I^2 = 42.3 %, p < 0.01	13 6 13 )	2247 2514 2247	R P R		4.47 2.93 4.10	0.71 (0.64-0.77 0.74 (0.60-0.87
Kiong, 2023     24h       Kiong, 2023     24h       Bubtotal (I^2 = 42.3 %, p < 0.01	6 13 ) 12	2514 2247	P		2.93 4.10	0.74 (0.60-0.87
Kiong, 2023     24h       Subtotal (*2 = 42.3 %, p < -0.11	13 ) 12	2247	R		4.10	
Subtotal (*2 = 42.3 %, p < 0.01	) 12			$\diamond$		0.70 (0.62-0.78
HeuroVista trial       Chen, 2022     <1h	12				39.27	0.71 (0.68-0.75
Shen, 2022     <1h	12					
Chen, 2022     <1h		1976	Ρ	<b>.</b>	4.64	0.75 (0.69-0.81
Karoly, 2017     <1h	15	2398	R		4.97	0.91 (0.87-0.95
Payne, 2020     <1h	9	1383	R	I →→	4.80	0.79 (0.74-0.84
Payne, 2020     <1h	8	1236	Ρ		4.32	0.68 (0.61-0.76
Payne, 2020     <1h	8	1236	Ρ		4.69	0.69 (0.64-0.75
Payne, 2020     <1h	8	1236	Ρ		4.36	0.55 (0.48-0.63
Subtotal (I^2 = 93.71 %, p < 0.0"	8	1236	Ρ	<b></b>	4.27	0.63 (0.55-0.70
JeuroPace trial and 24/7 EEG Sub           .eguia, 2022         24h           .eguia, 2024         .eguia, 24h           .eguia, 2025         .eguia, 24h           .eguia, 2026         .eguia, 24h           .eguia, 24h         .eguia, 24h           .eguia, 24h         .eguia, 24h           .eguia, 24h         .eguia, 24h           .eguia, 24h         .eguia, 24h           .eguia, 24h<	1)			$\langle \rangle$	32.05	0.72 (0.63-0.80
eguia, 2022 24h eguia, 2022 24h eguia, 2022 24h Subtotal (I^2 = 97.42 %, p < 0.0 K4/7 EEG SubQ trial	ubQ trial					
eguia, 2022 24h eguia, 2022 24h Subtotal (I^2 = 97.42 %, p < 0.0 K4/7 EEG SubQ trial	161	(*)	R	<b></b>	5.28	0.69 (0.68-0.70
eguia, 2022 24h Subtotal (I^2 = 97.42 %, p < 0.0 '4/7 EEG SubQ trial	161	(*)	R	•	5.28	0.65 (0.64-0.66
Subtotal (l^2 = 97.42 %, p < 0.0 <sup>-</sup> 24/7 EEG SubQ trial	161	(*)	R	•	5.26	0.63 (0.62-0.64
24/7 EEG SubQ trial	1)			$\diamond^{\dagger}$	15.82	0.66 (0.62-0.69
/iana, 2022 1h	6	103	R		4.70	0.73 (0.67-0.78
/iana, 2022 1h	6	103	R		2.90	0.65 (0.51-0.79
Subtotal (I^2 = 8.3 %, p < 0.01)	~			$\Leftrightarrow$	7.6	0.71 (0.66-0.77
Overall (I^2 = 97.29 %, p < 0.01	-			$\diamond$	100.00	0.71 (0.68-0.75

Fig. 4: Forest plot of AUC of seizure forecast algorithms, overall and stratified by data source.

## Subgroup analysis: Input data

First author, year	Forecast horizon	Sample size	Seizures	R/P		Weight (%)	BSS (95% CI)
seizure times and oth	ers				l l		
Xiong, 2023	1h	6	2514	Ρ	◆ <sup>1</sup>	8.57	0.05 (0.01-0.09)
Xiong, 2023	1h	13	2247	R	• I	8.66	0.04 (0.02-0.06)
Xiong, 2023	24h	6	2514	Ρ	<u>_</u>	7.45	0.17 (0.04-0.31)
Xiong, 2023	24h	13	2247	R	_ <b>_</b>	7.59	0.20 (0.07-0.33)
Subtotal (I^2 = 87.56	%, p=0.01	)			$\diamond$	32.27	0.09 (0.02-0.16)
seizure times							
Karoly, 2017	<1h	9	1383	Ρ	•	8.65	0.05 (0.03-0.07)
Leguia, 2022	24h	161	(*)	R	◆ <mark>I</mark>	8.67	0.08 (0.06-0.10)
Subtotal (I^2 = 82.97	%, p<0.01	)			$\diamond_1^1$	17.32	0.06 (0.03-0.10)
EEG and seizure time	s						
Karoly, 2017	<1h	9	1383	Ρ	+	8.54	0.11 (0.07-0.15)
Subtotal (I^2 = 0 %,	p < 0.01)				<b>\$</b>	8.54	0.11 (0.07-0.15)
EEG							
Costa, 2024	<1h	40	224	Ρ	+	8.52	0.01 (-0.03-0.06)
Cousyn, 2022	24h	10	38	Ρ		7.43	0.72 (0.58-0.85)
Karoly, 2017	<1h	9	1383	Ρ	*	8.58	0.05 (0.02-0.09)
Leguia, 2022	24h	161	(*)	R	▲	8.67	0.10 (0.09-0.11)
Leguia, 2022	24h	161	(*)	R	◆ <mark>I</mark>	8.67	0.08 (0.07-0.09)
Subtotal (I^2 = 99.82	%, p=0.14	)			$\langle$	41.87	0.19 (-0.06-0.44)
Overall (I^2 = 99.5 %,	p < 0.01)				$\diamondsuit$	100.00	0.13 (0.03-0.23)
					0.00 0.25 0.50 0.75 BSS		

Fig. 5: Forest plot of BSS of seizure forecast algorithms, overall and stratified by input data.

First author, year	horizon	size	Seizures	R/P		Weight (%)	AUC (95% CI)
seizure times and ot	hers						
Payne, 2020	<1h	8	1236	Ρ		4.32	0.68 (0.61-0.76)
Stirling, 2021	1h	8	1078	Ρ		3.22	0.65 (0.53-0.78)
Stirling, 2021	1h	11	1493	R		4.57	0.74 (0.68-0.80)
Stirling, 2021	24h	8	1078	Ρ	I	3.43	0.59 (0.47-0.70)
Stirling, 2021	24h	11	1493	R		4.49	0.66 (0.60-0.72)
Xiong, 2023	1h	6	2514	Ρ	L.	4.67	0.76 (0.71-0.82)
Xiong, 2023	1h	13	2247	R		4.47	0.71 (0.64-0.77)
Xiong, 2023	24h	6	2514	Ρ		2.93	0.74 (0.60-0.87)
Xiong, 2023	24h	13	2247	R	_	4.10	0.70 (0.62-0.78)
Subtotal (I^2 = 35.52	²%, p<0.01	)			$\diamond$	36.2	0.70 (0.67-0.73)
seizure times					l I		
Karoly, 2020	<1h	50	5450	Ρ	•	5.25	0.85 (0.84-0.86)
Leguia, 2022	24h	161	(*)	R	◆ I	5.26	0.63 (0.62-0.64)
Payne, 2020	<1h	8	1236	Ρ		4.69	0.69 (0.64-0.75)
Subtotal (I^2 = 99.37	′%, p<0.01	)			$\langle \rangle$	15.2	0.73 (0.59-0.86)
others							
Nasseri, 2021	1h	6	278	R		3.33	0.75 (0.64-0.87)
Payne, 2020	<1h	8	1236	Ρ	_ <b>-</b>	4.36	0.55 (0.48-0.63)
Payne, 2020	<1h	8	1236	Ρ	<b>_</b> _	4.27	0.63 (0.55-0.70)
Subtotal (I^2 = 78.64	₩, p<0.01	)				11.96	0.64 (0.53-0.74)
HR					l l		
Cousyn, 2023	24h	15	47	R		4.06	0.79 (0.71-0.88)
Subtotal (I^2 = 0 %,	p < 0.01)					4.06	0.79 (0.71-0.88)
EEG and others					1		
Viana, 2022	1h	6	103	R	_ <b>_</b>	4.70	0.73 (0.67-0.78)
Subtotal (I^2 = 0 %,	p < 0.01)				$\Leftrightarrow$	4.7	0.73 (0.67-0.78)
EEG							
Chen, 2022	<1h	12	1976	Ρ	+++	4.64	0.75 (0.69-0.81)
Chen, 2022	<1h	15	2398	R	I I →-	4.97	0.91 (0.87-0.95)
Karoly, 2017	<1h	9	1383	R	I I — <b>—</b> —	4.80	0.79 (0.74-0.84)
Leguia, 2022	24h	161	(*)	R	l ∳l	5.28	0.69 (0.68-0.70)
Leguia, 2022	24h	161	(*)	R	◆ <sup>1</sup>	5.28	0.65 (0.64-0.66)
Viana, 2022	1h	6	103	R	+ <u>1</u>	2.90	0.65 (0.51-0.79)
Subtotal (I^2 = 99.14	⊧%, p<0.01	)			$\Leftrightarrow$	27.87	0.74 (0.66-0.83)
Overall (1^2 = 97.29	%.p<0.01)	,			<u>ب</u>	100.00	0.71 (0.68-0.75)

Fig. 6: Forest plot of AUC of seizure forecast algorithms, overall and stratified by input data.

### Subgroup analysis: Forecast horizon

First author, year	Forecast horizon	Sample size	Seizures	R/P		Weight (%)	BSS (95% CI)
24h							
Cousyn, 2022	24h	10	38	Ρ	· · · ·	7.43	0.72 (0.58-0.85)
Leguia, 2022	24h	161	(*)	R	•	8.67	0.10 (0.09-0.11)
Leguia, 2022	24h	161	(*)	R	•	8.67	0.08 (0.07-0.09)
Leguia, 2022	24h	161	(*)	R	<b>*</b>	8.67	0.08 (0.06-0.10)
Xiong, 2023	24h	6	2514	Ρ	<b>I∳</b>	7.45	0.17 (0.04-0.31)
Xiong, 2023	24h	13	2247	R		7.59	0.20 (0.07-0.33)
Subtotal (I^2 = 99.78	%, p = 0.02	)				48.48	0.22 (0.03-0.41)
1h					1		
Xiong, 2023	1h	6	2514	Ρ	+	8.57	0.05 (0.01-0.09)
Xiong, 2023	1h	13	2247	R	•	8.66	0.04 (0.02-0.06)
Subtotal (I^2 = 0 %,	p < 0.01)				٥	17.23	0.04 (0.03-0.06)
<1h							
Costa, 2024	<1h	40	224	Ρ	+ i	8.52	0.01 (-0.03-0.06)
Karoly, 2017	<1h	9	1383	Ρ	1 	8.54	0.11 (0.07-0.15)
Karoly, 2017	<1h	9	1383	Ρ	+ 1	8.65	0.05 (0.03-0.07)
Karoly, 2017	<1h	9	1383	Ρ	+	8.58	0.05 (0.02-0.09)
Subtotal (I^2 = 73.74	%, p < 0.01	)			$\diamond^{1}_{1}$	34.29	0.06 (0.02-0.09)
Overall (I^2 = 99.5 %,	p < 0.01)				$\diamondsuit$	100.00	0.13 (0.03-0.23)
					0.00 0.25 0.50 0.75 BSS		

Fig. 7: Forest plot of BSS of seizure forecast algorithms, overall and stratified by forecast horizon.

First author, year	Forecast horizon	Sample size	Seizures	R/P		Weight (%)	AUC (95% CI)
24h					1		
Cousyn, 2023	24h	15	47	R	L	4.06	0.79 (0.71-0.88)
Leguia, 2022	24h	161	(*)	R	<b>♦</b> I	5.28	0.69 (0.68-0.70)
Leguia, 2022	24h	161	(*)	R	•	5.28	0.65 (0.64-0.66)
Leguia, 2022	24h	161	(*)	R	•	5.26	0.63 (0.62-0.64)
Stirling, 2021	24h	8	1078	Ρ		3.43	0.59 (0.47-0.70)
Stirling, 2021	24h	11	1493	R		4.49	0.66 (0.60-0.72)
Xiong, 2023	24h	6	2514	Ρ		2.93	0.74 (0.60-0.87)
Xiong, 2023	24h	13	2247	R	<b>-</b>	4.10	0.70 (0.62-0.78)
Subtotal (I^2 = 95.25	%, p<0.01	)			$\diamond_{I}^{I}$	34.83	0.67 (0.64-0.71)
1h							
Nasseri, 2021	1h	6	278	R		3.33	0.75 (0.64-0.87)
Stirling, 2021	1h	8	1078	Ρ		3.22	0.65 (0.53-0.78)
Stirling, 2021	1h	11	1493	R		4.57	0.74 (0.68-0.80)
Viana, 2022	1h	6	103	R		4.70	0.73 (0.67-0.78)
Viana, 2022	1h	6	103	R		2.90	0.65 (0.51-0.79)
Xiong, 2023	1h	6	2514	Ρ		4.67	0.76 (0.71-0.82)
Xiong, 2023	1h	13	2247	R	_ <b>+</b> _	4.47	0.71 (0.64-0.77)
Subtotal (I^2 = 0 %, )	o < 0.01 )				$\diamond$	27.86	0.73 (0.70-0.76)
<1h					l I		
Chen, 2022	<1h	12	1976	Ρ	<u> </u>	4.64	0.75 (0.69-0.81)
Chen, 2022	<1h	15	2398	R		4.97	0.91 (0.87-0.95)
Karoly, 2017	<1h	9	1383	R		4.80	0.79 (0.74-0.84)
Karoly, 2020	<1h	50	5450	Ρ	•	5.25	0.85 (0.84-0.86)
Payne, 2020	<1h	8	1236	Ρ		4.32	0.68 (0.61-0.76)
Payne, 2020	<1h	8	1236	Ρ		4.69	0.69 (0.64-0.75)
Payne, 2020	<1h	8	1236	Ρ	_ <b>-</b>	4.36	0.55 (0.48-0.63)
Payne, 2020	<1h	8	1236	Ρ		4.27	0.63 (0.55-0.70)
Subtotal (I^2 = 96.31	%, p<0.01	)			$\Leftrightarrow$	37.3	0.74 (0.66-0.82)
Overall (I^2 = 97.29 %	5, p < 0.01)				$\diamondsuit$	100.00	0.71 (0.68-0.75)
					1		
					0.5 0.6 0.7 0.8 0.9 AUC		

Fig. 8: Forest plot of AUC of seizure forecast algorithms, overall and stratified by forecast horizon.

## Subgroup analysis: Train-test approach

First author, year	Forecast horizon	Sample size	Seizures	R/P		Weight (%)	BSS (95% CI)
retrospective							
Leguia, 2022	24h	161	(*)	R	•	8.67	0.10 (0.09-0.11)
Leguia, 2022	24h	161	(*)	R	•	8.67	0.08 (0.07-0.09)
Leguia, 2022	24h	161	(*)	R	<b>*</b>	8.67	0.08 (0.06-0.10)
Xiong, 2023	1h	13	2247	R	* I	8.66	0.04 (0.02-0.06)
Xiong, 2023	24h	13	2247	R		7.59	0.20 (0.07-0.33)
Subtotal (I^2 = 89.98	%, p<0.01	)			$\diamond_1^{I}$	42.26	0.08 (0.05-0.11)
prospective							
Costa, 2024	<1h	40	224	Ρ	+ 1	8.52	0.01 (-0.03-0.06)
Cousyn, 2022	24h	10	38	Ρ	<b>_</b>	7.43	0.72 (0.58-0.85)
Karoly, 2017	<1h	9	1383	Ρ		8.54	0.11 (0.07-0.15)
Karoly, 2017	<1h	9	1383	Ρ	•	8.65	0.05 (0.03-0.07)
Karoly, 2017	<1h	9	1383	Ρ	+ i	8.58	0.05 (0.02-0.09)
Xiong, 2023	1h	6	2514	Ρ	+ 1 + 1	8.57	0.05 (0.01-0.09)
Xiong, 2023	24h	6	2514	Ρ		7.45	0.17 (0.04-0.31)
Subtotal (I^2 = 99.18	%, p=0.08	)			$\langle \rangle$	57.74	0.16 (-0.02-0.34)
Overall (I^2 = 99.5 %,	p < 0.01 )				$\diamondsuit$	100.00	0.13 (0.03-0.23)
					0.00 0.25 0.50 0.75 BSS		

Fig. 9: Forest plot of BSS of seizure forecast algorithms, overall and stratified by train-test approach.

First author, year	Forecast horizon	Sample size	Seizures	R/P		Weight (%)	AUC (95% CI)
retrospective					1		
Chen, 2022	<1h	15	2398	R	-	4.97	0.91 (0.87-0.95
Cousyn, 2023	24h	15	47	R	↓ ↓◆	4.06	0.79 (0.71-0.88
Karoly, 2017	<1h	9	1383	R	I I — <b>—</b> —	4.80	0.79 (0.74-0.84
_eguia, 2022	24h	161	(*)	R	I •I	5.28	0.69 (0.68-0.70
.eguia, 2022	24h	161	(*)	R	◆	5.28	0.65 (0.64-0.66
eguia, 2022	24h	161	(*)	R	♦ 1	5.26	0.63 (0.62-0.64
Vasseri, 2021	1h	6	278	R		3.33	0.75 (0.64-0.87
Stirling, 2021	1h	11	1493	R		4.57	0.74 (0.68-0.80
Stirling, 2021	24h	11	1493	R		4.49	0.66 (0.60-0.72
/iana, 2022	1h	6	103	R	_ <b>_</b>	4.70	0.73 (0.67-0.78
/iana, 2022	1h	6	103	R		2.90	0.65 (0.51-0.79
Kiong, 2023	1h	13	2247	R	<b>↓</b>	4.47	0.71 (0.64-0.77
(iong, 2023	24h	13	2247	R		4.10	0.70 (0.62-0.78
Subtotal (I^2 = 97.8	8 %, p < 0.01	)			\$	58.21	0.72 (0.68-0.77
prospective					1		
Chen, 2022	<1h	12	1976	Ρ	$\frac{1}{1}$ $\bullet$	4.64	0.75 (0.69-0.81
Karoly, 2020	<1h	50	5450	Ρ	•	5.25	0.85 (0.84-0.86
Payne, 2020	<1h	8	1236	Ρ		4.32	0.68 (0.61-0.76
Payne, 2020	<1h	8	1236	Ρ		4.69	0.69 (0.64-0.75
Payne, 2020	<1h	8	1236	Ρ	<b>_</b>	4.36	0.55 (0.48-0.63
Payne, 2020	<1h	8	1236	Ρ		4.27	0.63 (0.55-0.70
Payne, 2020 Stirling, 2021	<1h 1h	8 8	1236 1078	P P		4.27 3.22	0.63 (0.55-0.70
Payne, 2020 Stirling, 2021 Stirling, 2021	<1h 1h 24h	8 8 8	1236 1078 1078	P P P		4.27 3.22 3.43	0.63 (0.55-0.70 0.65 (0.53-0.78 0.59 (0.47-0.70
Payne, 2020 Stirling, 2021 Stirling, 2021 (iong, 2023	<1h 1h 24h 1h	8 8 8 6	1236 1078 1078 2514	P P P		4.27 3.22 3.43 4.67	0.63 (0.55-0.70 0.65 (0.53-0.78 0.59 (0.47-0.70 0.76 (0.71-0.82
Payne, 2020 Stirling, 2021 Stirling, 2021 Kiong, 2023 Kiong, 2023	<1h 1h 24h 1h 24h	8 8 6 6	1236 1078 1078 2514 2514	P P P P		4.27 3.22 3.43 4.67 2.93	0.63 (0.55-0.70 0.65 (0.53-0.78 0.59 (0.47-0.70 0.76 (0.71-0.82 0.74 (0.60-0.87
Payne, 2020 Stirling, 2021 Stirling, 2021 Kiong, 2023 Kiong, 2023 Subtotal (I^2 = 90.2	<1h 1h 24h 1h 24h 24h 24h	8 8 6 6	1236 1078 1078 2514 2514	P P P P		4.27 3.22 3.43 4.67 2.93 41.78	0.63 (0.55-0.70 0.65 (0.53-0.79 0.59 (0.47-0.70 0.76 (0.71-0.82 0.74 (0.60-0.87 0.70 (0.64-0.75

Fig. 10: Forest plot of AUC of seizure forecast algorithms, overall and stratified by train-test approach.

## Subgroup analysis: Study

First author, year	Forecast horizon	Sample size	Seizures	R/P			Weight (%)	BSS (95% CI)
Xiong, 2023								
	1h	6	2514	Ρ	*		8.57	0.05 (0.01-0.09)
	1h	13	2247	R	• [		8.66	0.04 (0.02-0.06)
	24h	6	2514	Ρ	_ <u>_</u>		7.45	0.17 (0.04-0.31)
	24h	13	2247	R	<u> </u>		7.59	0.20 (0.07-0.33)
Subtotal (I^2 = 87.56	5%, p=0.01	)			$\diamond$		32.27	0.09 (0.02-0.16)
Leguia, 2022					i i			
	24h	161	(*)	R	•		8.67	0.10 (0.09-0.11)
	24h	161	(*)	R	•		8.67	0.08 (0.07-0.09)
	24h	161	(*)	R	•		8.67	0.08 (0.06-0.10)
Subtotal (I^2 = 61.92	2 %, p < 0.01	)			0		26.01	0.09 (0.07-0.10)
Karoly, 2017					1			
	<1h	9	1383	Ρ	+		8.54	0.11 (0.07-0.15)
	<1h	9	1383	Ρ	<b>*</b>		8.65	0.05 (0.03-0.07)
	<1h	9	1383	Ρ	+		8.58	0.05 (0.02-0.09)
Subtotal (I^2 = 70.68	8 %, p < 0.01	)			¢!		25.77	0.07 (0.03-0.10)
Cousyn, 2022					i i			
	24h	10	38	Ρ			7.43	0.72 (0.58-0.85)
Subtotal (I^2 = 0 %,	p < 0.01)					$\diamond$	7.43	0.72 (0.58-0.85)
Costa, 2024								
	<1h	40	224	Ρ	+   		8.52	0.01 (-0.03-0.06)
Subtotal (I^2 = 0 %,	p = 0.57 )				$\diamond$		8.52	0.01 (-0.03-0.06)
Overall (I^2 = 99.5 %	o, p < 0.01)				$\diamondsuit$		100.00	0.13 (0.03-0.23)
					0.00 0.25 0.5	0 0.75		
					BSS			

Fig. 11: Forest plot of BSS of seizure forecast algorithms, overall and stratified by study.

First author, year	Forecast horizon	Sample size	Seizures	R/P		Weight (%)	AUC (95% CI)
Xiong, 2023							
	1h	6	2514	Ρ		4.67	0.76 (0.71-0.82)
	1h	13	2247	R		4.47	0.71 (0.64-0.77)
	24h	6	2514	Ρ		2.93	0.74 (0.60-0.87)
	24h	13	2247	R	<b>↓</b>	4.10	0.70 (0.62-0.78)
Subtotal (I^2 = 2.75 %	, p < 0.01)					16.17	0.73 (0.69-0.77)
Viana, 2022					I I		
	1h	6	103	R		4.70	0.73 (0.67-0.78)
	1h	6	103	R		2.90	0.65 (0.51-0.79)
Subtotal (I^2 = 8.3 %,	p < 0.01)				$\Leftrightarrow$	7.6	0.71 (0.66-0.77)
Stirling, 2021							
	1h	8	1078	Ρ	i	3.22	0.65 (0.53-0.78)
	1h	11	1493	R		4.57	0.74 (0.68-0.80)
	24h	8	1078	Ρ		3.43	0.59 (0.47-0.70)
	24h	11	1493	R		4.49	0.66 (0.60-0.72)
Subtotal (I^2 = 55.7 %	, p < 0.01)				$\diamond$	15.71	0.67 (0.61-0.73)
Payne, 2020					l l		
	<1h	8	1236	Ρ		4.32	0.68 (0.61-0.76)
	<1h	8	1236	Ρ		4.69	0.69 (0.64-0.75)
	<1h	8	1236	Р	_ <b>—</b>	4.36	0.55 (0.48-0.63)
	<1h	8	1236	Ρ		4.27	0.63 (0.55-0.70)
Subtotal (I^2 = 70.86 %	%, p < 0.01	)			$\bigcirc$	17.64	0.64 (0.58-0.71)
Nasseri, 2021							
	1h	6	278	R		3.33	0.75 (0.64-0.87)
Subtotal (I^2 = 0 %, p	< 0.01)					3.33	0.75 (0.64-0.87)
Leguia, 2022							
	24h	161	(*)	R	I ♦I	5.28	0.69 (0.68-0.70)
	24h	161	(*)	R	↓ ◆ ↓	5.28	0.65 (0.64-0.66)
	24h	161	(*)	R	↓ ↓	5.26	0.63 (0.62-0.64)
Subtotal (I^2 = 97.42 %	%, p < 0.01	)			$\diamond_1^{I}$	15.82	0.66 (0.62-0.69)
Karoly, 2020					1		
	<1h	50	5450	Ρ	•	5.25	0.85 (0.84-0.86)
Subtotal (I^2 = 0 %, p	< 0.01)				$\diamond$	5.25	0.85 (0.84-0.86)
Karoly, 2017							
	<1h	9	1383	R		4.80	0.79 (0.74-0.84)
Subtotal (I^2 = 0 %, p	< 0.01 )				$\diamond$	4.8	0.79 (0.74-0.84)
Cousyn, 2023							
	24h	15	47	R		4.06	0.79 (0.71-0.88)
Subtotal (I^2 = 0 %, p	< 0.01 )				$\sim$	4.06	0.79 (0.71-0.88)
Chen, 2022					l l		
	<1h	12	1976	Ρ		4.64	0.75 (0.69-0.81)
	<1h	15	2398	R		4.97	0.91 (0.87-0.95)
Subtotal (I^2 = 95.1 %	, p < 0.01)					9.61	0.83 (0.67-0.99)
Overall (I^2 = 97.29 %	, p < 0.01)				$\diamond$	100.00	0.71 (0.68-0.75)
					i		
					0.0 0.0 0.7 0.8 0.9 1.0 ALIC		

Fig. 12: Forest plot of AUC of seizure forecast algorithms, overall and stratified by study.