

ANNEXE 2 : OUTILS DE DÉPISTAGE PRÉHOSPITALIER DE L'AVC

Tableau 2A : Outils normalisés de dépistage préhospitalier de l'AVC en phase aiguë

Assessment Tool Author	Items/Scoring	Sample	Reference Standard	Results (validity & reliability)
Cincinnati Pre-Hospital Stroke Scale (CPSS) Kothari et al. 1999	3 items: presence/absence of facial palsy; unilateral arm weakness; and speech impairment. Items simplified versions from the NIHSS. Abnormality demonstrated on one or more items is indicative of suspected stroke	171 patients with suspected stroke recruited through ED and inpatient neurology units. Mean age was 57.8 years, 58% male. Stroke/TIA prevalence: 49 (28.7%) Patients were assessed by 24 prehospital care providers (17 paramedics and 7 EMTs) and 2 NIH certified physicians, resulting in 860 total assessments.	Final discharge diagnosis of stroke	Validity Physicians: Sensitivity 1 abnormality 66%, 95% CI 49-80% 2 abnormalities 26%, 95% CI 14-43 % 3 abnormalities 11%, 95% CI 3-26% Physicians: Specificity 1 abnormality 87%, 95% CI 80-92% 2 abnormalities 95%, 95% CI 90-98% 3 abnormalities 99%, 95% CI 95-100% Prehospital care workers: Sensitivity 1 abnormality 59%, 95% CI 51-67% 2 abnormalities 27%, 95% CI 21-35% 3 abnormalities 13%, 95% CI 8-20% Prehospital care workers: Specificity 1 abnormality 88%, 95% CI 86-91% 2 abnormalities 96%, 95% CI 96-99% The validity 6 this scale has been evaluated further, by both the scale developers and independent researchers. Reliability ICC for total scores among all prehospital workers was 0.92, 95% CI 0.89-0.93 ICC for total scores between prehospital workers and physicians was 0.92, 95% CI 0.89-0.93
Face Arm Speech Test (FAST)	3 items derived from the CPSS: facial palsy, arm weakness, speech disturbance. Assessment of speech is not dependent on the repetition	487 patients admitted by ambulance, primary care physicians and ED referrals with suspected	WHO criteria	Validity Sensitivity: Diagnostic sensitivity of FAST associated with paramedic use was estimated to be 79%. PPV (arrival by ambulance): 78%, 95% CI 72-84%

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Assessment Tool Author	Items/Scoring	Sample	Reference Standard	Results (validity & reliability)
Harbinson et al 2003	of a stock phrase, as per CPSS, but assessed during by EMS during normal conversation with the patient. Abnormality demonstrated on one or more items is indicative of suspected stroke	stroke. Mean age was 72 years, 52% were female Stroke/TIA prevalence: 356 (73.1%). FAST was completed by paramedics over a 6-month period		The validity of this scale has been evaluated further, by independent researchers. Reliability Not assessed in this publication, but has been subsequently evaluated.
Los Angeles Prehospital Stroke Screen (LAPSS) Kidwell et al. 2000 (Prospective validation study) Ontario Prehospital Stroke Screen (OPSS) Chenkin et al. 2009	6 items: 4 screening/history items (age>45 years, no history of seizures, symptom duration <24 hours, ambulation status at baseline not bedridden or wheelchair bound), blood glucose (between 60 and 400) level, a clinical assessment (of 3 items to identify obvious asymmetry: facial palsy, grip, arm strength). If the patient has positive criteria, a blood glucose level within the specified range and unilateral weakness on the clinical exam items, they are a positive screen for stroke. At least one of the following symptoms must be present: unilateral leg/arm weakness or drift; slurred speech or muteness; unilateral facial droop), and the patient can be transported to arrive at a stroke centre within 3.5 hours of symptom onset.	206 patients (of 1,298 total runs) with neurological symptoms, who were noncomatose, with nontraumatic cause, who had a LAPSS screen conducted. Mean age was 67 years, 52% were male. Stroke/TIA prevalence: 36 (17.5%) LAPSS was completed by 18 paramedics over a 7-month period. 325 patients transported to a stroke centre, who had been screened as positive by paramedics using the OPSS. Patients were identified through a National Stroke Registry. Mean age was 73.7 years, 47.4% were male. Stroke prevalence: 187 (58%)	Hospitalized patients with final diagnosis of stroke Final discharge diagnosis	Validity Sensitivity: 91%, 95% CI 76-98% Specificity: 97%, 95% CI 93-99%) PPV: 86%, 95% CI 70-95% NPV: 98%, 95% CI 95-99% Accuracy: 96%, 95% CI 92-98% + LR: 31, 95% CI 16-147 - LR: 0.09, 95% CI 0-0.21 This validity of this scale has been evaluated further, by both the scale developers and independent researchers. Reliability Not assessed Validity Since all patients included in the sample, were screened as positive, sensitivity and specificity could not be calculated. PPV for acute stroke (1,2, or 3 positive signs): 89.5%, 95% CI 85.7-92.7% No additional validation studies have been conducted on this scale. Reliability Not assessed
		An unknown number of		

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Assessment Tool Author	Items/Scoring	Sample	Reference Standard	Results (validity & reliability)
		EMS workers conducted OPSS over a one-year period		
Melbourne Ambulance Stroke Screen (MASS) Bray et al. 2005	Combination of items from CPSS and LAPSS. The presence of any physical assessment item + a response of "yes" to all history items indicates a positive screen	100 MASS assessments were conducted on patients with suspected stroke (total of 5,957 paramedic calls during the study period) Stroke/TIA prevalence: 73 (73%) 18 paramedics conducted MASS assessments over a one-year period	Final discharge diagnosis	Validity Sensitivity: 90%, 95% CI 81-96% Specificity: 74%, 95% CI 53-88% PPV: 90%, 95% CI 81-96% NPV: 745, 95% CI 53-88% +LR: 3.49, 95% CI 1.83-6.63 -LR: 0.13, 95% CI 0.06-0.27 Accuracy: 86% (Validity of LAPSS and CPSS was also assessed. CPSS had highest sensitivity at 95%, LAPSS had highest specificity at 85%) This validity of this scale has been evaluated further, by the scale developers. Reliability
Medic Prehospital Assessment for Code Stroke (MedPACS) Studneck et al. 2013	The scale was developed by combining the strongest elements of CPSS and LAPSS and included: eligibility criteria-no prior history of seizure; onset of symptoms ≤25 hours, blood glucose 60-400 mg/mL and a physical exam (facial droop, arm/leg weakness; speech difficulty; and gaze preference) The presence of any physical assessment item + a response of "yes" to at least one eligibility criterion item indicates a positive screen	416 patients with suspected stroke, transported to one of 7 hospitals. Mean age was 66.8 years, 45.7% were male. Stroke prevalence: 186 (44.7%) EMS reports and stroke GWTG-S registries were reviewed over a 6-month period	Final discharge diagnosis	Not assessed Validity Sensitivity: 74.2%, 95% CI 67.2-80.2% Specificity: 732.6%, 95% CI 26.7-39.1% PPV: 47.1%, 95% CI 41.3-53.0% NPV: 61.0, 95% CI 51.8-69.6% + LR: 1.10, 95% CI 0.973-1.24 - LR: 0.791, 95% CI 0.582-1.07 The validity of the CPSS was also assessed (SN: 79%, SP: 24%) No additional validation studies have been conducted on this scale. Reliability Not assessed
Recognition of Stroke in the Emergency Room Scale (ROSIER)	7-items: 2 clinical history items (loss of consciousness, convulsive fits/syncope) and 5 neurological signs of stroke (facial palsy/weakness, arm weakness,	160 consecutive patients with suspected stroke presenting to the Emergency Department (ED)	Final diagnosis made by stroke consultant after review of symptoms and	Validity (Prospective validation study) Sensitivity: 93%, 95% CI 89-97% Specificity: 83%, 95% CI 77-89% PPV: 90%, 95% CI 85-98% NPV: 88%, 95% CI 83-93%

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Assessment Tool Author	Items/Scoring	Sample	Reference Standard	Results (validity & reliability)
Nor et al. 2005	leg weakness, speech disturbance and visual field defect). A -1 is awarded for each clinical history item present and a +1 for each neurological sign. Total scores range from -2 to +5. A score >0 is associated with possible stroke.	Stroke/TIA prevalence: 101 (63.1%) Assessments were conducted by ED physicians during a one-year period	imaging findings	(Validity of LAPSS, FAST and CPSS was also assessed. CPSS had highest sensitivity at 85%, LAPSS had highest specificity at 85%). The validity of this scale has been evaluated further by independent researchers. Reliability Not assessed

PPV: Positive Predictive Value; NPV: Negative Predictive Value; LR Likelihood Ratio

Tableau 2B : Autres outils de dépistage : Échelle de coma de Glasgow

Assessment Tool	Number and description of Items	Time to Administer	Reliability/validity	Interpretation of Scores	Sensitivity and Specificity	Training Required
Glasgow Coma Scale (GCS) Teasdale & Jennett 1974 ¹	15 items in 3 categories: motor response (6 items), verbal response (5 items), and eye opening (4 items). Points are awarded for the best response in each category. Categories are summed to provide a total score.	Approximately 1 minute.	Interobserver reliability: Scale authors reported low rates of disagreement, but noted variations in motor responses based on stimulus used ² . Reported agreements ranged 0.48 (verbal) to 0.72 (eye opening) ³ and from 0.39 – 0.79. ⁴ Percentage agreements have been reported as 90% overall, and as ranging from 83.8% (eye opening, right) to 98.7% (best motor response – left). ⁵ In addition, similar rates of between observer agreement have been reported in groups of experienced nurses (98.6% - 100%), newly graduated nurses (94.3%-96.2%) and student nurses (77.3% - 100%). ⁶ Construct Validity: In review of GCS, evidence supports	GCS scores range from 3 – 15, where 3 represents total unresponsiveness and 15 represents alert and fully responsive. Scores may be divided into categories by severity: 13-15 = mild; 9-12=moderate and ≤8 represents severe injury. ²¹	Not reported	Yes.



Assessment Tool	Number and description of Items	Time to Administer	Reliability/validity	Interpretation of Scores	Sensitivity and Specificity	Training Required
	Items		association between extent of brain damage and depth of coma as assessed on GCS. GCS scores significantly associated with length of coma (p<0.0001). ⁷ Predictive Validity: GCS score is a significant predictor of death following stroke ^{8,9} or traumatic brain injury (modified by age and mechanism of injury) ¹⁰ , though eye-opening may be less strongly associated than either the motor or verbal score components ¹¹ . GCS scores are also predictive of survival (AUC=0.89), though eye-opening may not add to predictive accuracy ¹² . GCS scores have been demonstrated to be predictive of Glasgow Outcome scores at 6			
			months to 1 year post injury ^{7, 13-16} , Disability Rating Scale scores at discharge ¹⁷ and at 6 months ¹⁸ , FIM scores at discharge ^{17, 19} and employment status at one-year ²⁰ .			

Tableau 2C : Échelles de gravité de l'AVC en milieu préhospitalier

Assessment Tool Author	Items/Scoring	Sample	Reference Standard	Results
Field Assessment	6-items, 5 based on NIHSS	741 consecutive	CTA	A cut-point of ≥4 on FAST-ED had best performance
Stroke Triage for		patients enrolled in the		
Emergency	1. Facial palsy (0-1)	STOPStroke study, who		Sensitivity: 0.61
Destination	2. Arm weakness (0-2)	were admitted to 2		Specificity: 0.83
(FAST-ED)	3. Speech changes (0-2)	university-based		PPV: 0.72
· ·	4. Eye deviation (0-2)	hospitals with unilateral,		NPV: 0.82



Assessment Tool	Items/Scoring	Sample	Reference Standard	Results
Author Lima et al. 2016	5. Denial/neglect (0-2) 6. Time (documentation for decision making) not scored Total possible score: 9	complete occlusion of the M1 and M2 segments of the MCA or basilar artery, with onset of symptoms within 24 hours. Prevalence of LVO: 240 (33%)	Standard	Accuracy: 0.79 AUC:0.813 Performance of FAST-ED was also compared with NIHSS, RACE and CPSS scale
FAST-VAN Wasyliw et al. 2018	FAST + VAN (see description below)	172 consecutive stroke patients recruited from a single centre.	СТА	80 patients were positive for LVO, 58 were negative, based on CTA. PPV was 58%
Vision, Aphasia, and Neglect (VAN) Teleb et al. 2016	Patients are asked to raise both arms up and hold them up for 10 s. If the patient demonstrates any level of drift, weakness or paralysis, the assessment continues. Otherwise, patient is VAN -ve and screen ends. Items Visual disturbances: field cut, double vision, new-onset blindness (present/absent) Aphasia: Expressive, receptive, mixed (present/absent) Neglect: Forced gaze, unable to feel both sides at same time or doesn't recognize arm, ignoring one side (present/absent) Scoring: None If weakness present + ≥1 positive finding =VAN +ve	62 acute stroke codes at a single facility Prevalence of LVO: 19 (30.6%)	СТА	Performance of VAN was also compared with NIHSS ≥6 For VAN +ve patients Sensitivity: 1.00 Specificity: 0.90 PPV: 0.74 NPV: 1.00 Accuracy: 0.92 NIHSS≥6 Sensitivity: 1.00 Specificity: 0.79 PPV: 0.58 NPV: 1.00 Accuracy: 0.84
Prehospital Acute Stroke Severity Scale (PASS)	3 NIHSS items : 1. Incorrect month and/or age? (Level of consciousness (NIHSS item >0) 1 point	3,127 patients included in the Danish Stroke Registry (2010-2015) who were treated with t- PA. 2/3 of sample was	CTA/MRA	A cut-point of ≥2 on the PASS had the best predictive value: Using the Derivation cohort Sensitivity 0.66, 95% CI 0.62-0.66

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Assessment Tool Author	Items/Scoring	Sample	Reference Standard	Results
Hastrup et al. 2016	 Gaze palsy and/or deviation (NIHSS item gaze>0) 1 point Arm weakness (NIHSS item arm weakness >0) 1 point Total possible score : 3	used for scale development and 1/3 for validation Prevalence of LVO: 35%		Specificity: 0.83, 95% CI 0.81-0.85 AUC: 0.74, 95% CI 0.72-0.76 OR=9.22, 95% CI 7.5-11.40 PPV/NPV: 0.68/0.81 +LR/-LR: 3.84/0.42 The values were similar when using the validation cohort
The Los Angeles Motor Scale (LAMS) Nazliel et al. 2008	3 items : 1. Facial droop (absent=0, present=1) 2. Arm drift (absent=0, drifts down=1, falls rapidly=2) 3. Grip strength (normal=0, weak=1, no grip=2) Total possible score 5	119 patients included in a clinical trials registry at a stroke centre from 1996-2003, and patients included in the Get with the Guidelines Registry in 2005. Patients were included if they were last known well within 12 hours of presentation to the ED and had a final diagnosis of ischemic stroke in the anterior circulation Prevalence of LVO: 74 (62%)	MRA/CTA, or catheter angiography	AUC: 0.854 A cut point of ≥4 had the best predictive value for detecting LVO Sensitivity: 81% Specificity: 89% Accuracy: 85% +LR: 7.36 -LR: 0.21
Cincinnati Prehospital Stroke Severity Scale (CPSSS) Katz et al. 2015	 NIHSS items: Conjugate gaze deviation (≥1 on NIHSS item for gaze) points Incorrectly answers to at least of 2 LOC questions (NIHSS age or current month) and does not follow at least 1 of 2 commands (close eyes, open and close hand) ≥1 NIHSS items LOC 1b and 1c. 1 point Cannot hold arm (left, right or both) up for 10 seconds (≥2 NIHSS motor arm). 1 point 	Derivation cohort-624 patients with mild to severe stroke from 2 NINDS t-PA trials. Validation cohort-650 patients from the IMS-III trial Prevalence of LVO: 34% (validation cohort)	СТА	Severe stroke AUC: 0.89 A cut point of ≥2 had the best predictive value for severe stroke Using the derivation cohort Sensitivity: 89% Specificity: 73% + LR/-LR: 3.30/0.15 Using the validation cohort: Sensitivity: 92% Specificity: 51% + LR/-LR: 1.89/0.1



Assessment Tool Author	Items/Scoring	Sample	Reference Standard	Results
Pérez de la Ossa et al. 2014 Rapid Arterial oCclusion Evaluation Scale (RACE)	 NIHSS items: Facial palsy (absent=0, mild=1, mod/severe=2) Arm motor function (normal/mild=0, moderate=1, severe=2) Leg motor function (normal/mild=0, moderate=1, severe=2) Head and gaze deviation (absent=0, present=1) Aphasia (R hemiparesis: performs both tasks correctly=0, performs 1 task correctly=1, performs neither tasks=2); Agnosia (Left hemiparesis: patient recognizes arm/impairment=0, does not recognize arm or impairment=1, does not recognize arm and impairment=2) Total possible score 9 	Derivation cohort-654 patients with acute stroke or stroke mimic for whom a stroke code had been activated by EMS or a community hospital. Validation cohort-357 patients transferred by EMS to a stroke centre Prevalence of LVO: 178 patients (27%) had a LVO in derivation cohort vs. 76 (21.3%) in the validation cohort.	Transcranial Doppler, CT or MRA	In the derivation cohort, there was a strong correlation between RACE and NIHSS (<i>r</i> =0.76, p<0.01) In the validation cohort, a cut point of ≥5 had the best predictive value for detecting LVO Sensitivity: 85% Specificity: 68% PPV: 42% NPV: 94% The AUC for the RACE scale was 0.82, 95% CI 0.77-0.87 for the detection of LVO
3-Item Stroke Scale (3ISS)	3 items : Disturbance of consciousness (no=	180 patients presenting to a stroke unit in 2002 with symptoms of stroke	MRI/MRA/CT	A cut point of ≥4 had the best predictive value for detecting MCA occlusions Sensitivity: 67%
Singer et al. 2005	0, mild =1, severe= 2) Gaze and head deviation (absent= 0, incomplete gaze/head deviation=1, forced gaze/head deviation= 2) Hemiparesis (absent=0, moderate=1, severe= 2) Total possible score 6	within ≤6 hours (28 patients had ICH). Prevalence of LVO: 27 (15%)		Specificity: 92% PPV: 74% NPV: 89% Accuracy: 86% Inter-rater reliability: Intraclass correlation coefficient was 0.947; K for individual items were 0.77, 0.77 and 0.84

PPV: Positive Predictive Value; NPV: Negative Predictive Value; LR Likelihood Ratio; AUC Area under curve

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Références du tableau A

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Références du tableau 2B

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Références du tableau 2C

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Liens utiles:

- Cincinnati Prehospital Stroke Scale (CPSS) http://www.strokecenter.org/wp-content/uploads/2011/08/cincinnati.pdf Lien direct pour consulter l'échelle.
- 2) http://www.strokeassociation.org/idc/groups/stroke-public/@wcm/@private/@hcm/@gwtg/documents/downloadable/ucm_428607.pdf Lien de l'American Stroke Association. Il s'agit d'instructions pour permettre d'évaluer l'AVC à l'aide de l'échelle CPSS.
- 3) http://www.acep.org/uploadedFiles/ACEP/Practice_Resources/disater_and_EMS/EMS_week/ems_week_materials/08factsheets.pdf Des cartes au sujet des échelles CPSS et Los Angeles Prehospital Stroke Screen (LAPSS) se trouvent à la deuxième page.
- 4) http://www.strokecenter.org/wp-content/uploads/2011/08/LAPSS.pdf Un lien pour consulter l'échelle LAPSS.
- 5) Une évaluation de l'échelle Glasgow Coma Scale (GCS) se trouve sur le site <u>www.abiebr.com</u>. Une autre évaluation de l'échelle GCS se trouve au www.strokengine.ca.

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