Early Management of Transient Ischemic Attack in Emergency Departments in France

Julie Gennesseaux, Guillaume Giordano Orsini, Sophie Lefour, Serge Bakchine, Quentin Marion, Coralie Barbe, Stéphane Gennai

Early management of transient ischemic attack in emergency departments in France

Authors:

Julie GENNESSEAUX[1], MD, jgennesseaux@chu-reims.fr

Guillaume GIORDANO ORSINI[1], MD, ggiordano-orsini@chu-reims.fr

Sophie LEFOUR[2], MD, slefour@chu-reims.fr

Serge BAKCHINE[2], MD, PhD, sbakchine@chu-reims.fr

Quentin MARION[1], MD, qmarion@chu-reims.fr

Coralie BARBE[3], MD, PhD, cbarbe@chu-reims.fr

Stéphane GENNAI[1], MD, PhD, sgennai@chu-reims.fr, phone number: +33 (0)6 03 59 06 14

[1] Emergency Department, Reims University Hospital, 45 rue Cognacq-Jay 51100 Reims

[2] Department of Neurology, Reims University Hospital, 45 rue Cognacq-Jay 51100 Reims

[3] Department of Research and Public Health, Reims University Hospital, 45 rue Cognacq-Jay 51100 Reims

Corresponding author: Stéphane GENNAI

Key words: transient ischemic attack; emergency department; organization; primary care

ABSTRACT

Introduction

Emergency departments play a key role in the diagnosis and treatment of transient ischemic attacks, but limited data are available about the early management of such patients in emergency wards. Therefore, we aimed to evaluate emergency physicians' management of transient ischemic attack and analyze variations factors.

Methods

A multicenter survey among emergency physicians of the Grand Est region network (Est-RESCUE) was conducted from January 28th to March 28th, 2019. Medical and administrative data were collected by the same network and the national directory of medical resources.

Results

Among 542 emergency physicians recipients, 78 answered (14%) and 71 were finally included, practicing in 25 public hospitals homogeneously distributed across the territory, including 3 university hospitals. A cerebral magnetic resonance imaging was obtained for 75-100% of patients by 4.3% of responders, 36.4% of which were performed within more than 24 hours. A cardiac monitoring was prescribed in 75-100% of cases by 32.4% of responders. A neurologic consultation was routinely requested by 84.6% of responders practicing in a university hospital and 36,8% of responders practicing in a community hospital ($p=0.02$). Patients were hospitalized in a neurovascular unit in 75-100% of cases by 17.4% of responders, which happened more likely in university hospitals ($p<0.001$).

Conclusion

Transient ischemic attack suffers from management disparities across territories, due to limited access to technical facilities and neurologic consultations. Therefore, international recommendations are too often not followed. Implementation of territorial neurovascular tracks may help to standardize the management of these patients.

INTRODUCTION

Transient ischemic attack (TIA) is one of the most important factor of acute ischemic stroke (AIS) [1]. Emergency departments (ED) play a major role in its early management [2].

In 2009, the American Heart Association and the American Stroke Association (AHA/ASA) agreed on a new definition of TIA, defined by the absence of a cerebral tissue lesion, and no more by the time from the onset [3]. This definition implicated a 24/7 access to magnetic resonance imaging (MRI), not provided in several hospitals. Consequently, some experts suggested to revise the previous definition of TIA, reducing the time from the onset to one hour, and considering that symptoms lasting more than 24 hours were related to an AIS, leaving the unanswered question of TIA lasting from 1 to 24 hours [4]. Therefore, TIA diagnosis remains difficult, certitudes depending on anamnesis, neurologic semiology, and MRI findings.

Moreover, to find an etiology and to instore adequate treatments, guidelines suggest performing a carotid imaging and searching for an atrial fibrillation (AF) within the first 24 hours [5], to limit further AIS. When TIA is diagnosed, antiplatelet agents are strongly recommended, as they reduce the risk of disabling and of fatal AIS by 80% [6]. Aspirin stands as the first choice, but some recent clinical trials outlined the interest of its association with Clopidogrel to prevent AIS at 3 months [7]. In all cases, Aspirin must be administrated within 24 hours following the diagnosis of TIA. However, its ideal posology, has not been determined yet.

Emergency physicians (EP) are the cornerstone of the early management of TIA. Their implication must stick to the guidelines, while facing structural limitations such as the availability of specific imaging, neurovascular and cardiologic consultations. To help EP urged to select patients to hospitalize while discharging the others, decision tools have been created to identify high risk patients for further AIS, but their poor reliability to identify low risk patients, failed to achieve this goal [5].

The best place to perform all necessary medical tests to patients presenting a TIA has not been established yet. However, TIA clinics demonstrated their ability to reduce further AIS [8], but they are exceptions in France, TIA remaining managed in public hospitals. Also, the major issue seems more likely to organize a fast checkup rather than the place where it occurs [9].

To identify strengths and weaknesses in the early management of TIA in the Grand Est region in France, we created a survey on behalf of the Est-RESCUE network, made up of EP practicing in the same region. The first objective was to evaluate medical purposes regarding the early management of TIA. Secondary objectives were to compare medical practices depending on physicians' experience, hospital type (university or peripheral) and specificities (number of TIA consultations, imaging availability, existence of neurovascular and cardiologic consultations).

METHODS

A descriptive observational multicenter study was conducted, based on a survey created with help from neurologists, public health and EP implicated in the early management of TIA, and the regional neurovascular physician referee.

All EP registered in the Est-RESCUE network and working in a public or private ED admitting adults, were recipients of the survey. Data about health institutions of the Grand Est region were extracted from the Est-RESCUE network and the national directory of medical resources. EP working only in prehospital settings were excluded.

The survey was sent by E-mail on January 28th, 2019. It included 27 items form with questions about the medical demography, health institution, ED where physicians practiced, available and employed diagnosis tools, the possibility of a neurovascular and a cardiologic consultation, treatments started in ED, patient orientation (hospitalization ward or discharge), referring to EP habits. EP satisfaction regarding the management of their TIA patients, was collected using a scale from 0 (completely unsatisfied) to 10 (completely satisfied). An electronic reminder was sent every two weeks until the end of the data collection in March 28th, 2019.

Statistical analysis was realized with SAS software® version 9.4 (SAS Institute Inc., Cary, NC, USA). Data were described by mean and standard deviation for quantitative variables, and by number and percentage for qualitative variables. Associations between parameters were studied by univariate analysis using Wilcoxon tests, Kruskal Wallis tests, Chi2 or Fisher exact tests, as appropriate. A p value < 0.05 was considered statistically significant.

RESULTS

Among 542 EP recipients, 78 (14%) answered the survey. Seven were excluded due to exclusive prehospital practice. Finally, 71 EP were included. They worked among 25 of the 64 health institutions of the Grand Est region offering an ED admitting adults.

Socio-professional characteristics of responders

Participants were male (n=39, 54.9%), of mean age 38.9 ± 8.8 y/o, attending physicians (59.2%), and head of ED (18.3%). Mean clinical practice was 10.4 ± 9.0 years. They either worked in both prehospital and hospital settings (n=60, 84.5%) or in hospital settings only (n=11, 18.3%).

Hospital characteristics

The 25 hospitals were homogeneously distributed in the Grand Est region: 7 in Champagne-Ardenne, 12 in Lorraine and 6 in Alsace. All were public, 3 were university hospitals where 19.7% of responders

practiced. Mean number of beds was 620 ± 367. Mean monthly TIA ED admissions in 2017 was 10.7 ± 8.2, with a 67.1% hospitalization rate.

All responders' hospitals had a short stay unit (< 24 hours), among which 20 (80%) permitted a cardiac monitoring. Nineteen hospitals (76%) had a cardiology ward, 12 (48%) a neurology ward and 9 (36%) a neurovascular unit. All responders' hospitals had access to a head computed tomography (CT) 24/7, 4 (16%) had no MRI and 8 (32%) were not able to perform a complete cardiovascular workup including a transthoracic sonography (TTS) and a duplex ultrasound of cervical vessels (DUS).

Professional practice for patients presenting a transient ischemic attack, patient emergency exit terms, and physician satisfaction regarding their management

Paraclinical exams

Fifty-seven (80.3%) responders obtained head CT for 75-100% of patients (Figure 1). CT angiography (CTA) was much less obtained, and 3/70 (4.3%) responders obtained MRI for 75-100% of patients. Reported delay of MRI and CT access was respectively > 24 hours for 16/44 responders (36.4%) and < 3 hours for 40/68 responders (58.8%) (Figure 2).

An electrocardiogram (ECG) was performed by 70 (98.6%) responders within 3 hours. A cardiac monitoring was prescribed in 75-100% of cases by 32.4% of responders. Also, 52 (75.4%) and 45 (64.3%) responders declared that 0-25% of patients had a TTS and a Doppler ultrasound (DUS) performed in ED, respectively. When applicable, the delay to obtain a TTS or DUS was > 24 hours for 15/35 (42.9%) and 18/40 (45.0%) responders, respectively.

Specialist advice

A neurologic advice was systematically obtained by 32 (45.7%) responders, 13 (18.6%) declared never obtaining it. It was given in < 3 hours for 44/56 (78.6%) responders. Cardiologic advice was never obtained for 36/69 (52.2%) responders.

Medication

An antiplatelet agent was prescribed in 68/70 (97.1%) cases in the absence of AF or current anticoagulant treatment. Among these 68 responders, aspirin was systematically used. In AF condition, 58/70 (82.7%) responders prescribed an anticoagulant treatment. Heparin was mostly used (47/54, 87.0%), more frequently than new oral anticoagulants (24/53, 45.3%) and antivitamin K (5/48, 10.4%). Responders prescribed an antihypertensive agent and statins from ED in 19/70 (27.1%) and 2/70 (2.9%) cases, respectively.

Use of a predictive score of recurrence

Decisions were supported by $ABCD^2$ score calculation for 25/70 (35.7%) responders. No other decision tool was used for 69/70 (98.6%) responders.

Post-emergency department evolution of patients

Hospitalization was requested in 75-100% of cases by 31/70 (44.3%) responders. Patients were hospitalized in 75-100% of cases in a neurovascular unit for 12/62 (19.4%) responders, general neurology ward for 4/55 (7.3%) responders, cardiology for 6/53 (11.3%) responders, other medical ward for 7/57 (12.3%) responders or a short stay unit for 8/67 (11.9%) responders.

Physician satisfaction

EP satisfaction regarding the management of their TIA patients was 5.1 ± 2.5.

Comparison of professional practice

According to physician' seniority

Analyzing the answers according to physician' seniority (≥ 2 years *versus* < 2 years) did not reveal any difference in terms of cerebral imaging and cardiovascular tests prescriptions (TTS and DUS), or treatment (Table 1). More experienced physicians (≥ 2 years) tended to request more frequently a systematic neurologic advice than less experienced one's (28/55, 50.9% vs 4/15, 26.7%; p=0.09). Responders prescribing a cardiac monitoring in 75-100% of cases tended to be more frequently experienced physicians (21/55, 38.2% versus 2/16, 12.5%; p=0.05). Responders declaring that 25-100% of patients were hospitalized in neurovascular unit were more frequently less experienced physicians (13/14, 92.9% vs 28/48, 58.6%; p=0.02). Satisfaction was not associated with physician's experience (5.1 ± 2.3 for experienced physicians *versus* 5.1 ± 2.0; p=0.97).

According to the type of hospital (university versus community hospital)

CT were more often realized in < 3 hours in university hospitals (36/54, 66.7 versus 4/14, 28.6; p=0.01) (Table 2). Responders prescribing a cardiac monitoring in 75-100% of cases were more frequent in community hospitals (0/14, 0% *versus* 23/57, 40.4%; p=0.003). Neurologic advice was more often systematically requested in university hospitals (11/13, 84.6% versus 21/57, 36.8%; p=0.002). Responders declaring a hospitalization in a neurovascular unit in 25-100% of cases were more frequent in university hospitals (13/13, 100% *versus* 28/49, 57.1%; p=0.003). Satisfaction tended to be higher for EP practicing in university hospitals (6.1 ± 2.0 in university hospitals *versus* 4.9 ± 2.2 in community hospitals, p=0.08).

According to hospital specificity

Responders prescribing a CTA in 75-100% of cases worked in ED admitting less TIA (4.0 ± 1.4 versus 11.2 ± 8.3; p=0.01). Responders prescribing a cardiac monitoring in 75-100% of cases worked in ED admitting less TIA (7.3 ± 6.4 versus 12.3 ± 8.6; p=0.0007). The mean number of TIA admitted in ED did not impact CT, MRI, DUS or TTS ED rates (p=0.28, p=0.30, p=0.20 and p=0.41, respectively) (Table 3). The timeframe to obtain a CT or CTA was longer in hospitals admitting more TIA (p=0.001 and p=0.002, respectively). A systematic neurologic advice was more frequent in hospitals including a neurovascular

unit (24/38, 63.2% versus 8/32, 25.0%; p<0.001) or a neurology ward (24/41, 58.5% versus 8/29, 27.6%; p<0.001).

DISCUSSION

Implementation of guidelines for TIA admitted in ED is still difficult. However, TIA remains a diagnosis and therapeutic emergency, with high risk of recurrence, especially within the first 48 hours. AHA/ASA guidelines insist on MRI and etiologic screening as fast as possible for every patient. Yet, we showed that only 4.3% of EP had access to MRI for 75-100% of TIA patients, compared to 80.3% for CT, and when MRI is realized, it is often with a delay over 24 hours. Nonetheless, to date, no study specified the optimal timeframe to realize cerebral imaging.

Less than a quarter of responders had a cardiovascular workup in ED for their patients, and a large majority did not prescribe a cardiac monitoring. However, guidelines recommend washing out a carotid stenosis in the best timeframe possible (< 24 hours), because it is responsible for 15% of TIA and AIS and predicts recurrence [5]. Thus, having a DUS for TIA patients is essential in ED. Without a complete cardiovascular workup (ECG, TTS, DUS), ECG is often the only exam completed in ED, allowing a cardio-embolic risk evaluation, but it usually does not make possible the diagnosis of paroxystic AF. The question of a systematic cardiac monitoring remains.

About therapeutics, we showed that 97.1% of EP prescribed an antiplatelet agent in ED (in the absence of AF or current anticoagulant treatment), preferring Aspirin to Clopidogrel, and both antihypertensive treatment and statins were poorly prescribed. This may be linked to the absence of blood pressure monitoring and exploration of lipid abnormalities in ED, and to guidelines recommending not to treat without a complete previous etiologic workup. Yet, in myocardial infarction, statins promote remodeling of damage tissue and their prescription are consensual. In AIS, a recent meta-analysis showed that an early treatment by statins is associated with lower final infarct volume [10]. However, to date, there is no consensus on this topic.

A neurologic advice was systematically asked by less than 50% of responders, although a management in a neurovascular track is recommended. The absence of neurologists in the hospital where the ED stood was the main limit for such request.

The decision of hospitalization did not depend on decision tools such as $ABCD^2$ score, hardly used by responders anyway. Indeed, recent studies questioned its validity for high risk patients and suggested other scores such as $ABCD^3$ or $ABCD^3$-I, which consider a potential carotid stenosis, a possible recurrence within seven days following the initial episode, and MRI findings [11]. Prevalence of AIS after TIA remains a major issue, predictive tools failing to improve the decision-making process in ED.

On top of that, we showed that the hospitalization rate in neurovascular units was low, even if in hospitals managing a high mean number of TIA, but this rate increases.

The principal limit of our study was inherent in its design (survey), with a 14% participation rate. Nevertheless, this rate is most likely the same than other surveys [2], and collected data allow us to show a first original panorama of TIA management at the scale of a large French territory. Also, only EP working in public hospitals answered, preventing us to obtain data from private hospitals.

In the end, TIA management in French public hospitals is not optimal, with several discrepancies between hospitals. MRI, recommended in the first 24 hours, is poorly achieved compared to CT, and in delays often too long. The urgent cardiovascular workup is also little achieved, despite guidelines recommending searching for carotid stenosis and AF, to limit further thrombo-embolic risks. In addition, the absence of a systematic expert opinion often leaves the EP alone initiating a therapy and deciding the hospitalization, rarely in a neurovascular unit, due to the lack of such units in hospitals and the small amount of available beds.

Recently implanted in France, TIA clinics appear as way forward. They proved their efficiency to prevent the risk of recurrence after a first episode of TIA [8]. They allow a fast and complete neurologic and cardiologic workup in less than 48 hours (including cardiac monitoring) and provide therapeutic education. Besides this option, the creation of protocols adapted to territories between neurologists, cardiologists, radiologists and EP may help standardizing the management of TIA, combining medical will and available resources.

BIBLIOGRAPHY

1. Amarenco P, Lavallée PC, Labreuche J, Albers GW, Bornstein NM, Canhão P, Caplan LR, Donnan GA, Ferro JM, Hennerici MG, Molina C, Rothwell PM, Sissani L, Školoudík D, Steg PG, Touboul PJ, Uchiyama S, Vicaut É, Wong LK; TIAregistry.org Investigators. One-year risck of stroke after transient ischemic attack or minor stroke. N Engl J Med. 2016;374(16):1533-42.
2. Oostema JA, Brown MD, Reeves M. Emergency department management of transient ischemic attack: a survey of emergency physicians. J Stroke Cerebrovasc Dis. 2016;25(6):1517-23.
3. Easton JD, Saver JL, Albers GW, Alberts MJ, Chaturvedi S, Feldmann E, Hatsukami TS, Higashida RT, Johnston SC, Kidwell CS, Lutsep HL, Miller E, Sacco RL; American Heart Association; American Stroke Association Stroke Council; Council on Cardiovascular Surgery and Anesthesia; Council on Cardiovascular Radiology and Intervention; Council on Cardiovascular Nursing; Interdisciplinary Council on Peripheral Vascular Disease. Definition and evaluation of transient ischemic attack: a scientific statement for healthcare professionals from the American Heart Association/American Stroke Association Stroke Council; Council on Cardiovascular Surgery and Anesthesia; Council on Cardiovascular Radiology and Intervention; Council on Cardiovascular Nursing; and the Interdisciplinary Council on Peripheral Vascular Disease. The American Academy of Neurology affirms the value of this statement as an educational tool for neurologists. Stroke. 2009;40(6):2276-93.
4. Mohr JP. History of transient ischemic attack definition. Front Neurol Neurosci. 2014;33:1-10.
5. American College of Emergency Physicians Clinical Policies Subcommittee (Writing Committee) on Suspected Transient Ischemic Attack: Lo BM, Carpenter CR, Hatten BW, Wright BJ, Brown MD. Clinical policy: critical issues in the evaluation of adult patients with suspected transient ischemic attack in the emergency department. Ann Emerg Med. 2016;68(3):354-370.

6. Rothwell PM, Algra A, Chen Z, Diener HC, Norrving B, Mehta Z. Effects of aspirin on risk and severity of early recurrent stroke after transient ischaemic attack and ischaemic stroke: time-course analysis of randomised trials. Lancet. 2016;388(10042):365-375.
7. Wang Y, Wang Y, Zhao X, Liu L, Wang D, Wang C, Wang C, Li H, Meng X, Cui L, Jia J, Dong Q, Xu A, Zeng J, Li Y, Wang Z, Xia H, Johnston SC; CHANCE Investigators. Clopidogrel with aspirin in acute minor stroke or transient ischemic attack. N Engl J Med. 2013;369(1):11-9.
8. Lavallée P, Amarenco P. TIA clinic: a major advance in management of transient ischemic attacks. Front Neurol Neurosci. 2014;33:30-40.
9. Chang BP, Rostanski S, Willey J, Kummer B, Miller E, Elkind M. Can I send this patient with stroke home? Strategies managing transient ischemic attack and minor stroke in the emergency department. J Emerg Med. 2018;54(5):636-644.
10. Malhotra K, Safouris A, Goyal N, Arthur A, Liebeskind DS, Katsanos AH, Sargento-Freitas J, Ribo M, Molina C, Chung JW, Bang OY, Magoufis G, Cheema A, Shook SJ, Uchino K, Alexandrov AV, Tsivgoulis G. Association of statin pretreatment with collateral circulation and final infarct volume in acute ischemic stroke patients: A meta-analysis. Atherosclerosis. 2019;28275-79.
11. Kiyohara T, Kamouchi M, Kumai Y, Ninomiya T, Hata J, Yoshimura S, Ago T, Okada Y, Kitazono T; Fukuoka Stroke Registry Investigators. $ABCD^3$ and $ABCD^3$-I scores are superior to $ABCD^2$ score in the prediction of short- and long-term risks of stroke after transient ischemic attack. Stroke. 2014;45(2):418-25.

FIGURE LEGENDS

Figure 1: Number of emergency physicians according to the proportion of patients having imaging for transient ischemic attack

CT: computed tomography

CTA: computed tomography angiography

MRI: magnetic resonance imaging

Figure 2: Number of emergency physicians according to the period of delay of imaging for transient ischemic attack

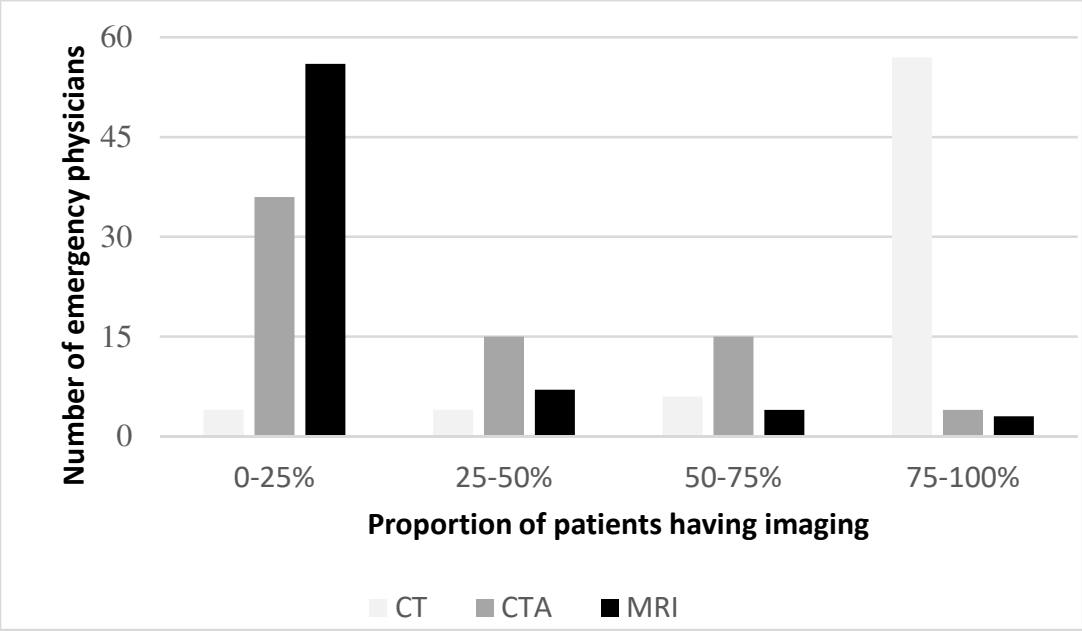
CT: computed tomography

DUS: duplex ultrasound of cervical vessels

MRI: magnetic resonance imaging

TTS: transthoracic sonography

Figure 1: Number of emergency physicians according to the proportion of patients having imaging for transient ischemic attack



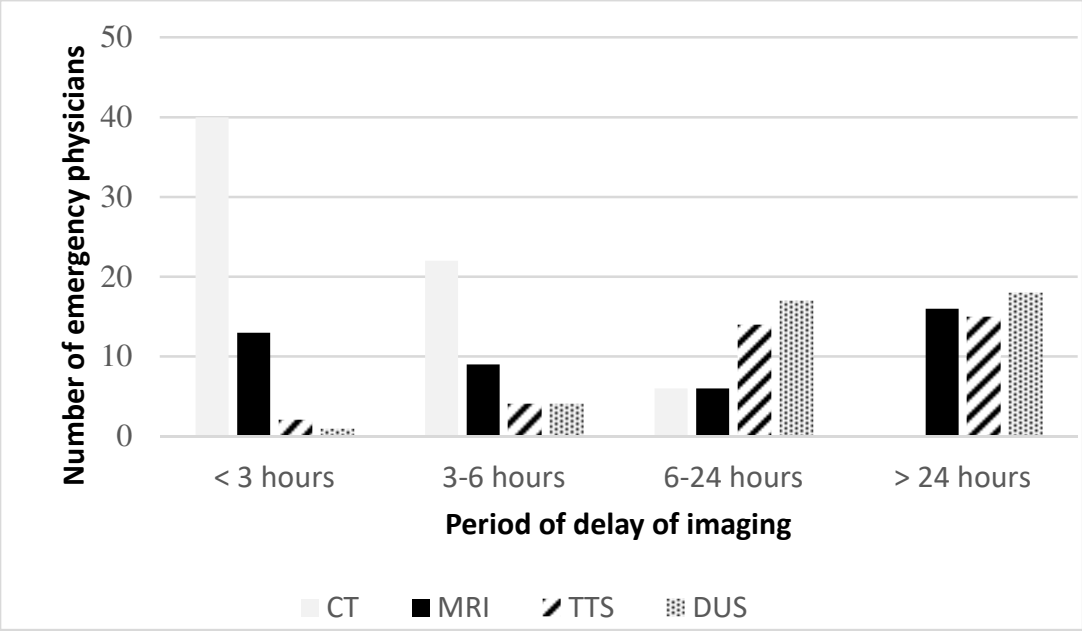
Legend

CT: computed tomography

CTA: computed tomography angiography

MRI: magnetic resonance imaging

Figure 2: Number of emergency physicians according to the period of delay of imaging for transient ischemic attack



Legend

CT: computed tomography

DUS: duplex ultrasound of cervical vessels

MRI: magnetic resonance imaging

TTS: transthoracic sonography

Table 1: Comparison of professional practices according to emergency physicians' seniority

Variables [1]	Seniority ≥ 2 years (N=55)	Seniority < 2 years (N=16)	p
CT			0.55
0-25%	3 (5.5)	1 (6.3)	
25-50%	2 (3.6)	2 (12.5)	
50-75%	5 (9.1)	1 (6.3)	
75-100%	45 (81.8)	12 (75.0)	
MRI			0.53
0-25%	44 (81.5)	12 (75.0)	
25-50%	4 (7.4)	3 (18.8)	
50-75%	3 (5.6)	1 (6.3)	
75-100%	3 (5.6)	0 (0.0)	
TTS			0.62
0-25%	38 (71.7)	14 (87.5)	
25-50%	4 (7.6)	1 (6.3)	
50-75%	5 (9.4)	1 (6.3)	
75-100%	6 (11.3)	0 (0.0)	
DUS			0.40
0-25%	32 (59.3)	13 (81.3)	
25-50%	5 (9.3)	0 (0.0)	
50-75%	7 (13.0)	2 (12.5)	
75-100%	10 (18.5)	1 (6.3)	
Cardiac monitoring			0.16

0-25%	16 (29.1)	6 (37.5)	
25-50%	8 (14.6)	2 (12.5)	
50-75%	10 (18.2)	6 (37.5)	
75-100%	21 (38.2)	2 (12.5)	
Neurologic advice			0.24
Yes, always	28 (50.9)	4 (26.7)	
Yes, most of time	14 (22.4)	7 (46.7)	
Yes, sometimes	3 (5.4)	1 (6.7)	
No, never	10 (18.2)	3 (20.0)	
Use of ABCD^2 score			0.89
Yes, always	4 (7.4)	1 (6.3)	
Yes, most of time	9 (16.7)	1 (6.3)	
Yes, sometimes	8 (14.8)	2 (12.5)	
No, never	33 (61.1)	12 (75.0)	
Hospitalization			0.14
0-25%	3 (5.6)	3 (18.8)	
25-50%	11 (20.4)	2 (12.5)	
50-75%	18 (33.3)	2 (12.5)	
75-100%	22 (40.7)	9 (56.2)	
Hospitalization in a neurovascular unit			0.04
0-25%	20 (41.7)	1 (7.1)	
25-50%	13 (27.1)	4 (28.6)	
50-75%	8 (16.7)	4 (28.6)	
75-100%	7 (14.6)	5 (35.7)	

[1] Data are expressed as No (%)

Legend

CT: computed tomography

DUS: duplex ultrasound of cervical vessels

MRI: magnetic resonance imaging

TTS: transthoracic sonography

Table 2: Comparison of professional practices according to the type of hospital

Variables [1]	University hospital (N=14)	Community hospital (N=57)	p
CT			0.93
0-25%	1 (7.1)	3 (5.3)	
25-50%	0 (0.0)	4 (7.0)	
50-75%	1 (7.1)	5 (8.8)	
75-100%	12 (85.8)	45 (78.9)	
Time to obtain a CT			0.03
< 3h	4 (28.6)	36 (66.7)	
3h-6h	8 (57.1)	14 (25.9)	
6h-24h	2 (14.3)	4 (7.4)	
MRI			0.72
0-25%	12 (85.8)	44 (78.6)	
25-50%	1 (7.1)	6 (10.7)	
50-75%	0 (0.0)	4 (7.1)	
75-100%	1 (7.1)	2 (3.6)	
Time to obtain a MRI			0.11
< 3h	1 (16.7)	12 (31.6)	
3h-6h	0 (0.0)	9 (23.7)	
6h-24h	0 (0.0)	6 (15.8)	
> 24h	5 (83.3)	11 (28.9)	
TTS			0.93
0-25%	12 (85.8)	40 (72.7)	

25-50%	0 (0.0)	5 (9.1)	
50-75%	1 (7.1)	5 (9.1)	
75-100%	1 (7.1)	5 (9.1)	
DUS			0.85
0-25%	10 (71.4)	35 (62.5)	
25-50%	0 (0.0)	5 (8.9)	
50-75%	2 (14.3)	7 (12.5)	
75-100%	2 (14.3)	9 (16.1)	
Cardiac monitoring			0.003
0-25%	5 (35.7)	17 (29.8)	
25-50%	2 (14.3)	8 (14.0)	
50-75%	7 (50.0)	9 (15.8)	
75-100%	0 (0.0)	23 (40.4)	
Neurologic advice			0.03
Yes, always	11 (84.6)	21 (36.8)	
Yes, most of time	1 (7.7)	20 (35.1)	
Yes, sometimes	0 (0.0)	4 (7.0)	
No, never	1 (7.7)	12 (21.1)	
Hospitalization			0.52
0-25%	2 (15.4)	4 (7.0)	
25-50%	3 (23.1)	10 (17.5)	
50-75%	2 (15.4)	18 (36.6)	
75-100%	6 (46.1)	25 (43.9)	
Hospitalization in a neurovascular unit			< 0.001

0-25%	0 (0.0)	21 (42.9)
25-50%	1 (27.1)	16 (32.6)
50-75%	5 (16.7)	7 (14.3)
75-100%	7 (14.6)	5 (10.2)

[1] Data are expressed as No (%)

Legend

CT: computed tomography

DUS: duplex ultrasound of cervical vessels

MRI: magnetic resonance imaging

TTS: transthoracic sonography

Table 3: Influence of the number of patients monthly admitted in emergency departments for a transient ischemic attack on the timing of realization of cerebral imaging

	Mean	SD	p
CT			
< 3h	7.8	± 5.7	0.005
> 3h	15.2	± 9.6	
CTA			
< 3h	7.5	± 6.0	0.004
> 3h	13.9	± 9.3	
MRI			
< 3h	8.2	± 5.9	0.057
> 3h	12.0	± 8.2	

Legend

CT: computed tomography

CTA: computed tomography angiography

MRI: magnetic resonance imaging

SD: standard deviation