

Hermetet C.^{1,2}, Laurent E.^{1,2}, El Allali Y.³, Gaborit C.¹, Lecuyer AI.¹, Urvois-Grange A.⁴, Saint-Martin P.⁵, Biotteau M.^{1,6}, Le Touze A.⁷, Grammatico-Guillon L.^{1,8}

¹Epidemiology and Public Health Unit, Teaching hospital of Tours, Tours, France ²Research Team « Education, Ethics and Health » (EA 7505), University of Tours, Tours, France ³Department of paediatrics, Hospital of Blois, Blois, France ⁴Paediatric emergency Department, Teaching hospital of Tours, Tours, France ⁵Department of legal medicine, Teaching hospital of Tours, Chambray-lès-Tours, France ⁶University psychiatric clinic, Teaching hospital of Tours, Saint-Cyr-sur-Loire, France ⁷Paediatric burn unit, Teaching hospital of Tours, Tours, France ⁸University of Tours, Tours, France

Highlights

- The performances of an algorithm to detect non-accidental pediatric burns (maltreatment) using the French hospital discharge database **dropped when including neglect**, difficult to diagnose clinically.
- Training for healthcare professionals and qualitative studies on obstacles to the judicial authority (RJA) or worrying information (WI) should be added to this diagnostic study.

Introduction

- Child maltreatment:
 - Acts of commission: physical, sexual, psychological abuse
 - Acts of omission: physical, emotional, medical, educative neglect; inadequate parental supervision; exposure to violence
- Burns: high morbi-mortality among non-accidental (maltreatment) paediatric injuries
- Objectives:
 - Main: To assess the performance parameters of an algorithm to detect non-accidental paediatric burns (NAB) using the French Hospital Discharge Database (HDD)
 - Secondary: To describe the clinical cases of child maltreatment with no action taken during the analysed hospital stay

Methods

- Study population: Children aged 0 to 16 years old, with a coded burn (ICD-10) during ≥ 1 hospital stay at the Teaching hospital of Tours (France) from 2012 to 2017
- NAB multidisciplinary definition:
 - HDD cases: 2 definitions, «probable» / «possible» (Figure 1 and Table I)
 - Clinical cases: 3 definitions (levels): excluding child neglect, including neglect with restrictive definition, then with broad definition
- Performance parameters
 - Validation study: medical chart review
 - All the HDD cases
 - HDD non-cases matched on sex and age classes, 1:2 ratio
 - Parameters estimated for each of the 3 levels of clinical definition: sensitivity, specificity, positive and negative likelihood ratios
- Clinical cases:
 - Report to the judicial authority (RJA) or worrying information (WI) notified in the medical charts
 - Description of cases with no RJA/WI (type and mode of burn, type of violence)

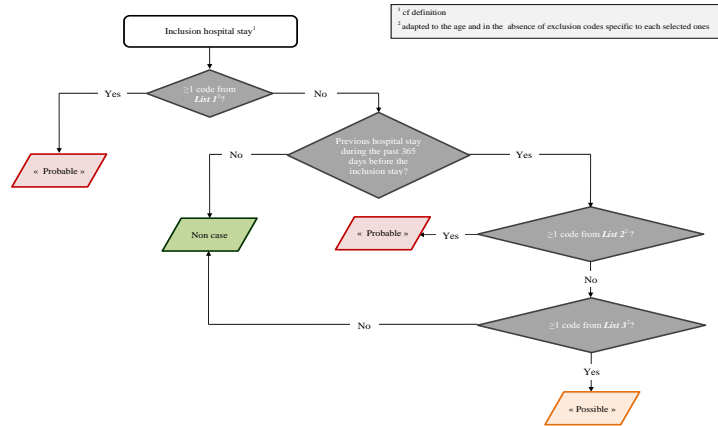


Figure 1 Decision tree

Table I List of codes (extracts)

Pathology / event	Codes	Elements to associate					List_1	List_2	List_3
		Exclusion codes (EOSC: excluding other selected codes)	Codes_1	Codes_2	Age				
Physical abuse									
Retinal haemorrhage	H356	Coded etiology (HTD, RVO) EOSC	I10, H348		0-2	1	2		
Perforation of tympanic membrane	H72	Coded etiology (barotrauma, otitis, foreign body (E, RTA...)) EOSC	T70, W94, H65-H66, T16, V01-V99		0-16	1	2		
Subarachnoid haemorrhage	I60	Coded etiology (AVM, RTA) EOSC	Q28, V01-V99		0-16	1	2		
Intracerebral haemorrhage	I61	Coded etiology (AVM, RTA) EOSC	Q28, V01-V99		0-16	1	2		
Other nontraumatic intracranial haemorrhage	I62	Coded etiology (AVM, RTA) EOSC	Q28, V01-V99		0-16	1	2		
Stroke, not specified as haemorrhage or infarction	I64	Coded etiology (AVM, Rendu-Osler) EOSC	Q28, I780		0-16	1	2		
Oesophagitis	K20	Coded etiology (GOR) EOSC	K21		0-1		2		

Results - Discussion

- 253 children included
- 236 with sufficient clinical information to be included in the validation study: 83 « probable » HDD cases, 0 « possible »; 153 HDD non-cases (Figure 2)

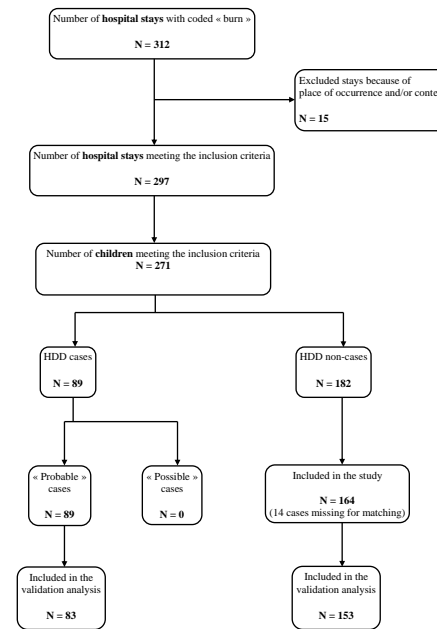


Figure 2 Flow-chart

Table II Estimation of the performance parameters of the algorithm for each of the 3 levels of maltreatment definition

Definition of child maltreatment	Validation sample (N)	Sensitivity % [95%CI]	Specificity % [95%CI]	LR+ [95%CI]	LR- [95%CI]
HDD cases including child neglect with a broad definition	83	47.9 [36.1-60.0]	70.6 [62.9-77.4]	1.6 [1.2-2.3]	0.7 [0.6-0.9]
HDD cases including child neglect with a more restrictive definition	83	63.6 [40.7-82.8]	67.8 [61.0-74.0]	2.0 [1.4-2.9]	0.5 [0.3-0.9]
HDD cases excluding child neglect	78*	90.0 [55.5-99.7]	67.8 [61.0-74.0]	2.8 [2.1-3.7]	0.1 [0.0-0.9]

CI: confidence interval; N: number of children; LR: likelihood ratio
*exclusion of five cases with isolated clinical child neglect

- Clinical cases with no RJA/WI with no notified reason (Table III):
 - From 0% (excluding child neglect) to >85% (including child neglect with broad definition)
 - All were isolated possible child neglect cases

Table III Description of clinical cases of child maltreatment not reported nor informed, according to the 3 levels of maltreatment definition

	With a broad definition of child neglect (N = 73)	With a more restrictive definition of child neglect (N = 22)	Excluding child neglect (N = 10)
Reasons for non RJA / non WI, n			
Number of cases not reported / not informed, n	67	15	5
Description of clinical cases not reported / not informed with no notified reason			
Type of burn, n	58	6	
Cautic	21	4	
Thermal	35	2	
Electric	2	0	
Frictional	0	0	
NS	0	0	
Mode of burn, n			
Ignition / flash back	15	1	
Contact	14	0	NA
Spilling / projection	6	1	
Immersion	1	0	
Ingestion	20	4	
NS	2	0	
Type of violence, n			
Physical	0	0	
Psychological	0	0	
Sexual	0	0	
Child neglect	58	6	
Isolated	58	6	

n: number of children; NA: not applicable; NS: not specified; RJA: report to the judicial authority; WI: worrying information

Discussion - conclusion

- Performances of the algorithm: tremendous variations, particularly of sensitivity, according to the inclusion or not of child neglect, difficult to assess clinically
- « Child neglect »: no consensual definition, leading in practice to a considerable latitude for the subjective judgment of the physician who examines the child
- This clinical difficulty could moreover explain the absence of actions, judicial or administrative, in the cases of isolated possible child neglect
- Perspectives:
 - Application of the algorithm in other French hospital centres, in order to improve the power of results and to discuss a potential « centre effect » in coding
 - Trainings for healthcare professionals, diffusion of detection tools and qualitative studies on obstacles to RJA/WI