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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)

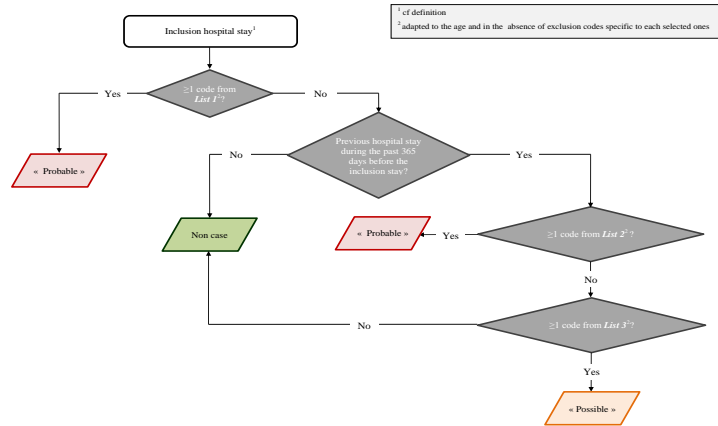


Figure 1 Decision tree

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)

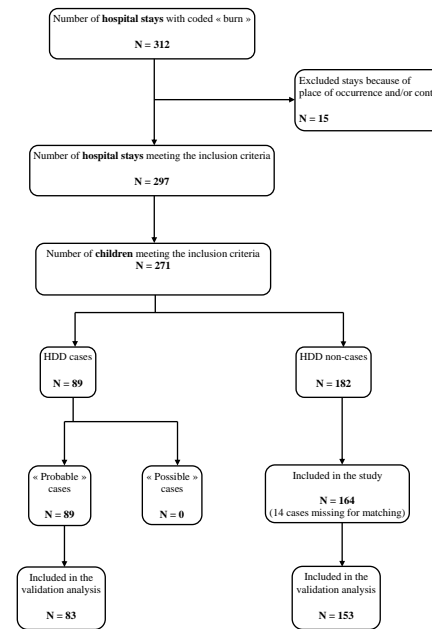


Figure 2 Flow-chart

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 | |
| Caucic | 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