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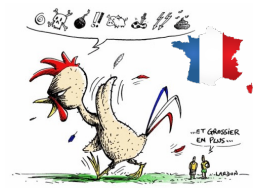
Prospective Study of Avalanche Deaths

Improving databases for a complete overview of the Rescue Chain

F. Albasini, M. Blancher, L. Krebs-Drouot, F. Huot, L. Richard, F. Jarry

ICAR 2023



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1. Medical Data Base

Medical Avalanche Data Base

Regional Register in the French Alps
Learning from the field

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French Wilderness Emergency Medecine Network

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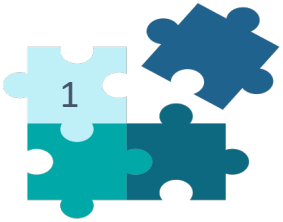
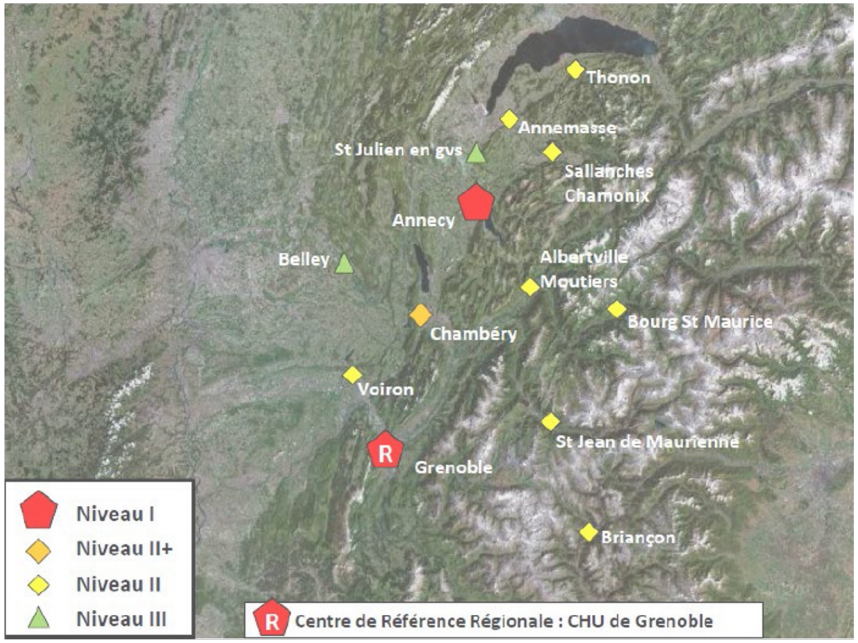


1. Medical Data Base

The Network



The Register

- Started in 2014
- Every avalanche victim who require on-site medical assessment should be included
- In hospital follow-up
- Exhaustivity > 90 %

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Data Base

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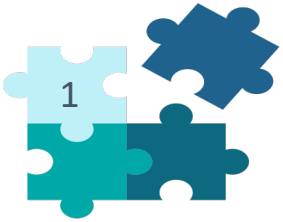
	2014-2015	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021	TOTAL
Number of Avalanche	33	19	27	55	32	32	70	**268**
Number of personn involved	82	46	41	103	49	42	122	485
Included patients	58	39	38	75	44	41	119	**414**
Patients burried								
* Partialy buried	21	12	15	22	12	5	49	136
* Partial Critical	6	4	2	15	1	6	12	46
* Complete burial	30	20	13	20	13	17	35	148
Number of Death	22	12	16	23	11	10	38	**132**
* On site death	18	10	15	22	9	7	34	115
Destination								
* Hospital	26	20	22	57	22	24	57	228
* Nearest GP Office	2	2	0	2	4	5	4	19
* Home	9	5	1	1	9	4	24	53
* unknown	3	0	0	3	0	1	2	9



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Mortality 27 %

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Diagnosis * 2014- 2021

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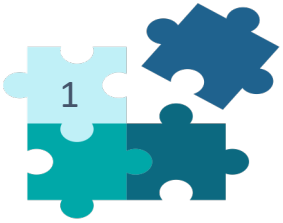
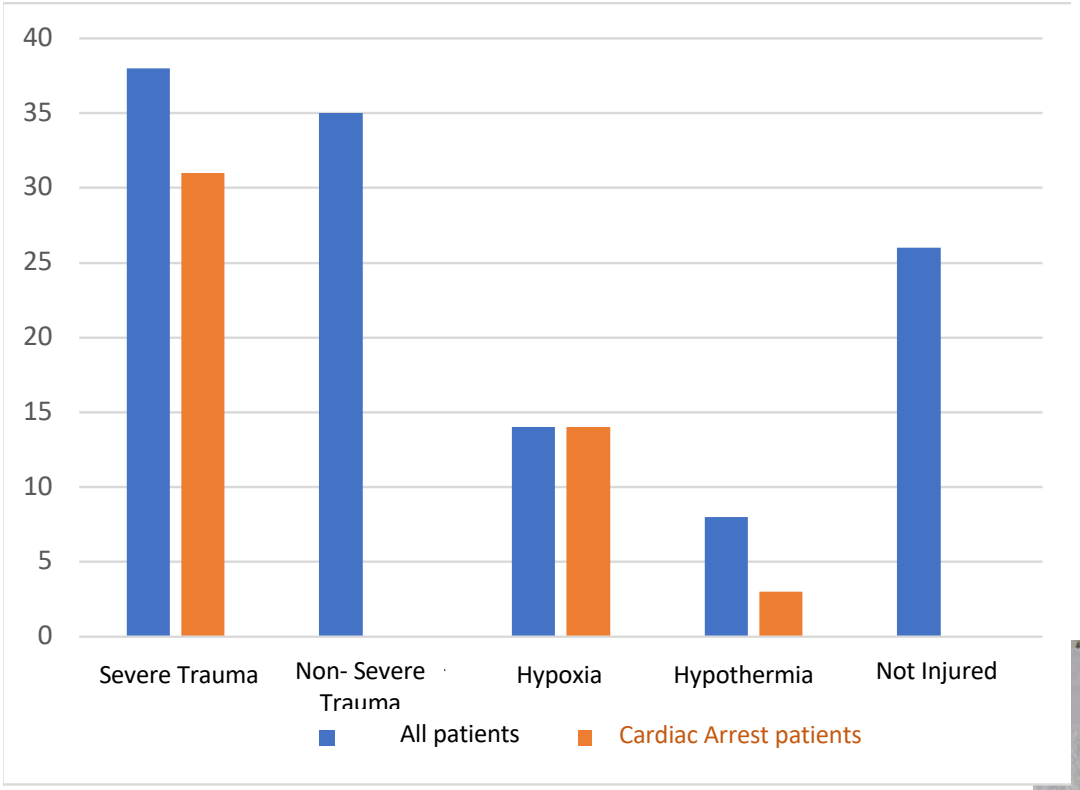


1. Medical Data Base



More proofs are needed

* Based on clinical finding and ICAR reco

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Trauma Severity in avalanche victims

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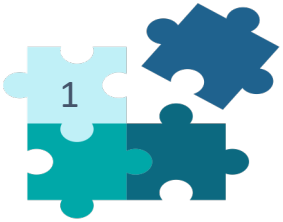

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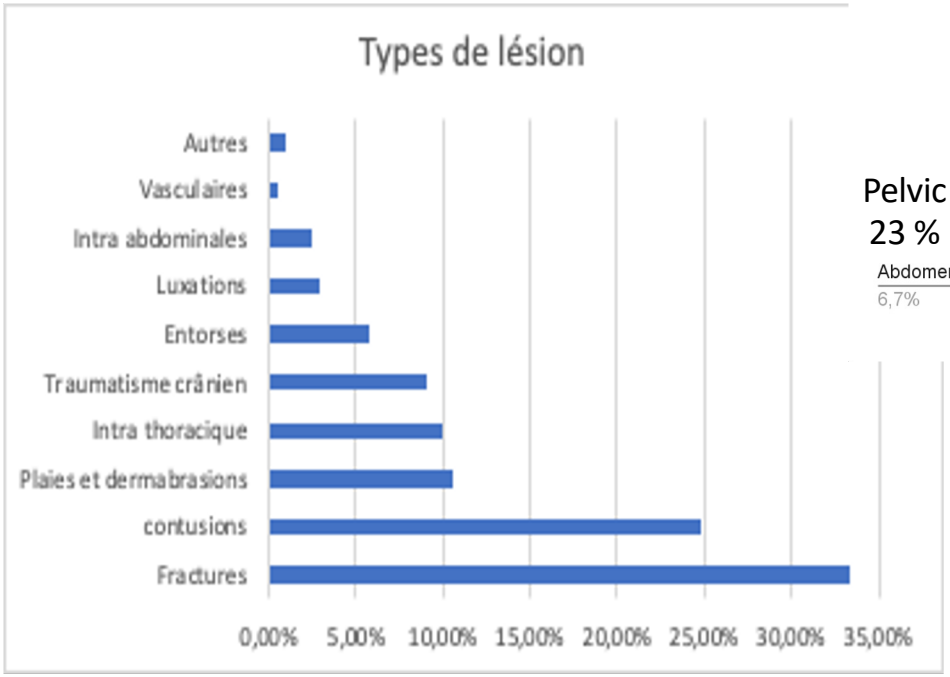

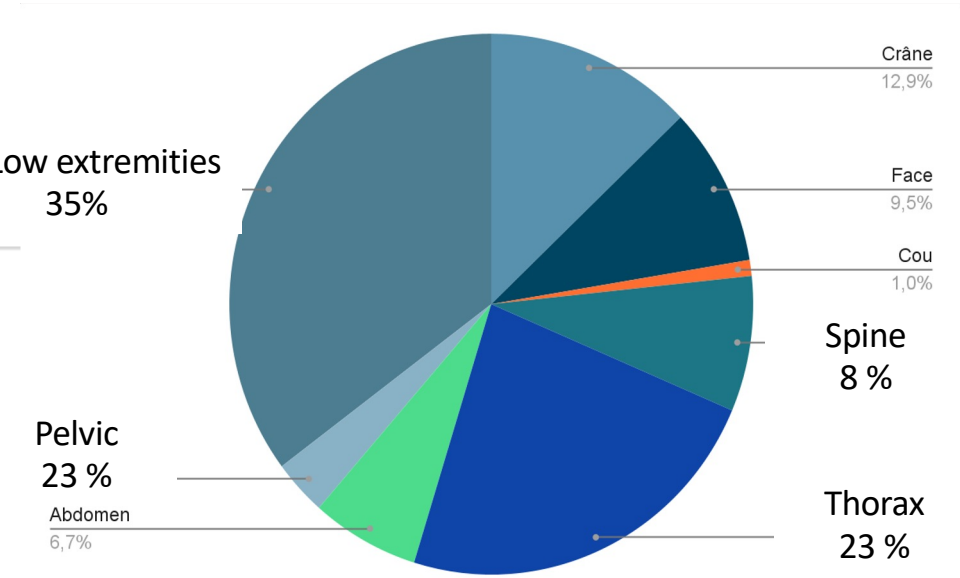

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Works based on this register

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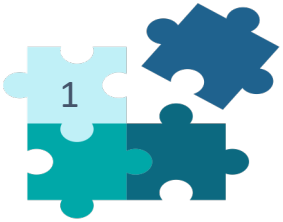
- **Post Traumatic Stress Disorder**
- **Quality indicators :**
  - ✓ Adherence to recommendations
  - ✓ Regional debriefings and feed back
  - ✓ Improving field management



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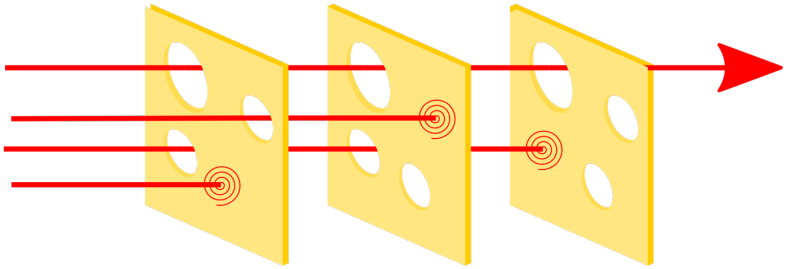

- **Trauma Severity in avalanche victims**
  - ✓ Avalanche = High Velocity Accident ?

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French Wilderness Emergency Medecine Network

Léonard et al. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine (2021) 29:96
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Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine

ORIGINAL RESEARCH Open Access

Survivors of avalanche accidents: posttraumatic stress disorder symptoms and quality of life: a multicentre study

Charlotte Léonard[1], Anaëlle Charriau-Perret[1], Guillaume Debaty[1,2], Loïc Belle[3], Cécile Ricard[4], Caroline Sanchez[1], Pierre-Marie Dupré[5], Gregory Panoff[6], Thierry Bougerol[7], Damien Viglino[1,8], Marc Blancher[1*] and the Northern French-Alps Emergency Network ("RENAU")

Abstract

Background: As any traumatic event, avalanches could trigger psychological disorders on survivors. Our objectives were to determine the prevalence of post-traumatic stress disorder among avalanche survivors and to evaluate post-traumatic stress disorder risks factors as well as the impact on quality of life.

Methods: A multicentre study was conducted in victims included in the North Alpine Avalanche Registry from 2014 to 2018. Data were collected through a standard questionnaire during semi-directed phone interviews. The primary outcome was the total score on the Impact of Event Scale Revised. Secondary outcomes were the Mental Component Scale and the Physical Component Scale scores of the Short Form 12 questionnaire.

Results: During the study period, 132 of 211 victims survived. Among the 107 victims included, 55 (51.4%) phone interviews were obtained. Six patients (10.9, 95% CI 1.76–20.05) had an Impact of Event Scale Revised score ≥ 33 indicating a strong probability for post-traumatic stress disorder. Median Mental Component Scale score was 39.0 (IQR 30.5–46.3) for post-traumatic stress disorder patients and 40.1 (IQR 36.5–43.4) for non post-traumatic stress disorder ($p = 0.76$). Median Physical Component Scale score was 39.4 (37.2–44.3) for post-traumatic stress disorder patients and 44.2 (39.1–46.8) for non post-traumatic stress disorder ($p = 0.39$). No significant difference in the quality of life in both populations was observed, and no independent risk factors of post-traumatic stress disorder was identified.

Conclusion: Avalanche accidents may induce post-traumatic stress disorders among survivors in a comparable prevalence to the most traumatic event already studied. Early recognition and preventive measures should be set up in order to reduce the psychological burden in these victims.

Trial registration: NCT03936738.

Keywords: Post-traumatic stress disorder, Avalanche, Quality of life, SF-12, And impact of event scale revised (IES-R)

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CHU GRENOBLE ALPES

Trauma Severity in avalanche victims

Avalanche = High Velocity Accident ?

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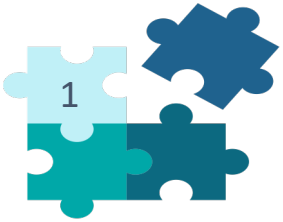

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Trauma Severity in avalanche victims

Avalanche = High Velocity Accident ? **Not always**

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1. Medical Data Base

Caractéristiques selon l'ISS			
(n = 171)	n (%)		*p*
	ISS ≤ 15 (n = 141 ; 82%)	**ISS > 15** (n = 30 ; 18%)	
Age (Year)			0,011
Mean	35,9	42,4	
Ecart-type	12,9	11,1	
Minimum	13	21	
Maximum	74	56	
Gender			0,668
Men	113(80%)	23 (77%)	
Women	28 (20%)	7 (23%)	
Période			0,847
Winter	124 (88%)	26 (87%)	
Autres mois	17	4	
Origine			0,017
Avalanche victims	**76** (90%)	**9 (10%)**	
Other accidents	**65** (46%)	**21 (24%)**	

Environment inputs ?

Tableau 4. Estimation des odds ratio des sévérité des traumatismes en fonction de leur origine (victime d'avalanche ou non), en prenant l'ISS>15 en référence

n = 171	Analyse Univariée			Analyse Multivariée		
	OR	IC95%	*p*	OR	IC95%	*p*
Victimes d'avalanches	0,367	0,157-0,856	0,02	0,336	0,140-0,803	0,014
Non victimes d'avalanches	2,728	1,168-6,371	0,02	2,977	1,245-7,121	0,014

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Medical Avalanche Data Base

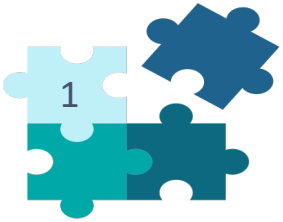
What else do we need to know ?

Cause of death : Hypothermia Vs Trauma Vs Asphyxia

- From what it might have been to what it was

Influence of Environment on medical outcome : Snow density, terrain, weather …

- Further data collections are needed



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1. Medical Data Base
2. Forensic

Forensic Approach

Dr **Lila Krebs- Drouot**

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Post Mortem Avalanche Study

Forensic approach for better knowledge

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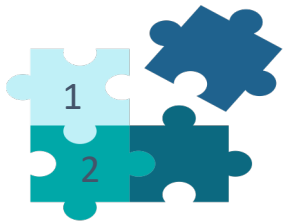
Background

Few data available on literature

Heterogeneity of data



1. Medical Data Base
2. Forensic

Study Protocol

Fatality and person data collection:

- Body CT-scan
- Legal autopsy

Complementary exams :

- Toxicology
- Biochemistry
- Pathology

Ethical committee approval ✓

Dr **Lila Krebs- Drouot**

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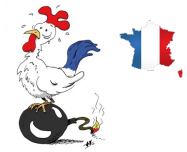
1. Medical Data Base
2. Forensic
3. New data collection

New Data collection

Fabrice Huot French Mountain Rescue - CRS Alpes
Ludovic Richard ENSA SNOSM



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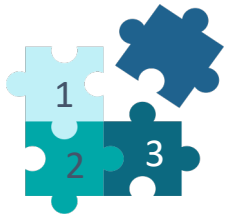

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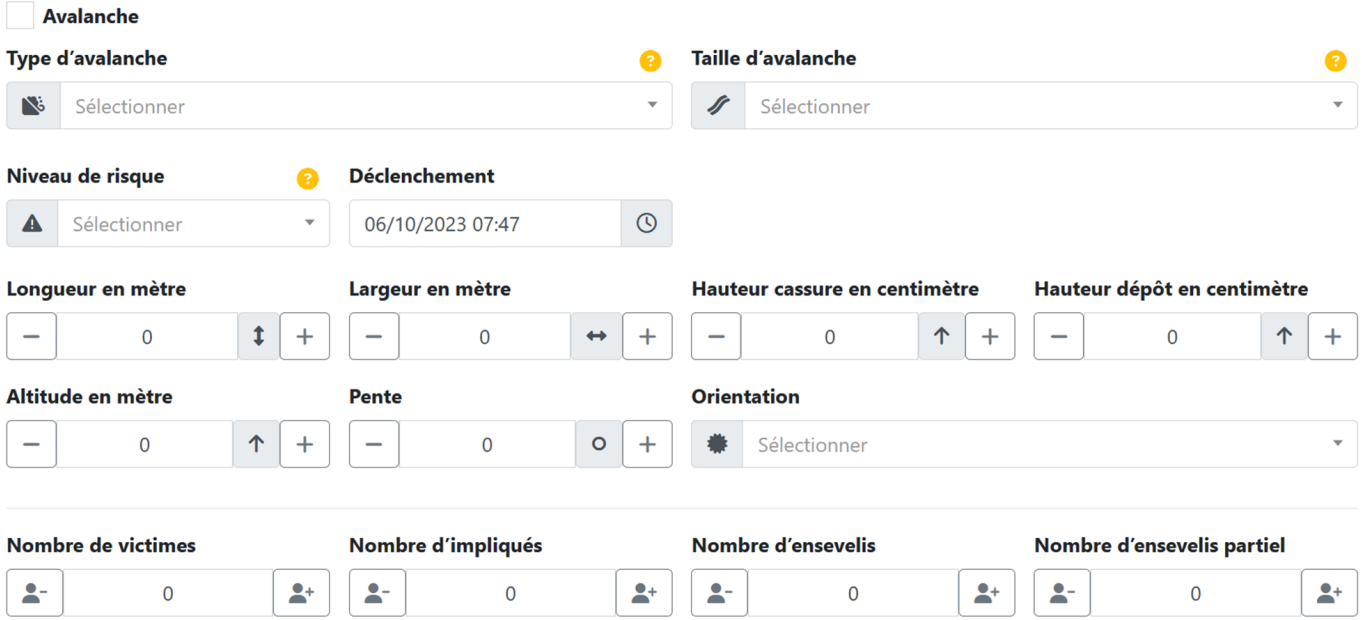
3. New data collection



New :

- Obstacles
- Snow density around victims (EAWS standard)
- Victim position
- Height of the victim fall

Fabrice HUOT - Ludovic RICHARD

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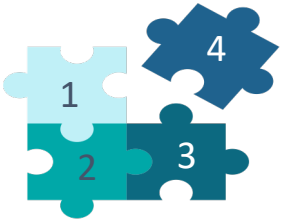

1. Medical Data Base
2. Forensic
3. New data collection
4. From data to prevention

Perspective

From Data to Prevention

Frédéric **Jarry**
French Avalanche Association (ANENA)

A national avalanche accident data base

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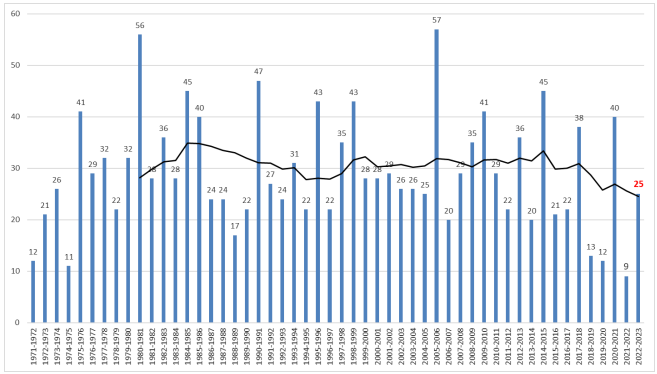
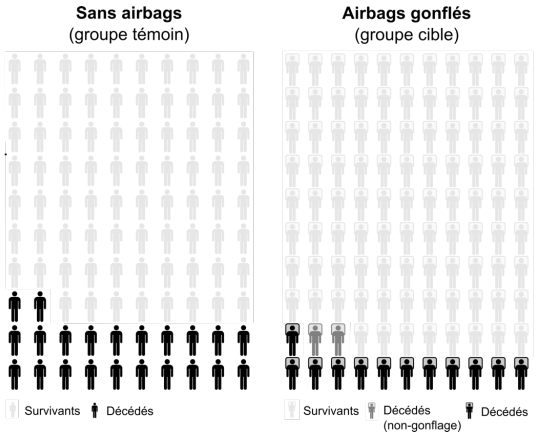
- **ANENA collects data since 1970-1971.**
- Cross-referencing of information provided by various sources: PGHM, CRS, fire department, ski patrols, individuals.
- Digitized since 1999.

⇨ Evolution of avalanche accidents in France (global and specific data)
⇨ Data used to develop prevention and training programs
⇨ Data made available for national or international studies





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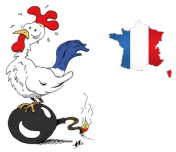
2. Forensic
3. New data collection
4. From data to prevention

Frédéric **Jarry**

Impact of medical studies and the new form on prevention ?



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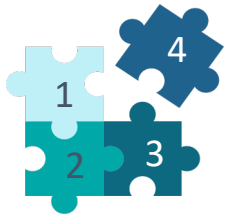
- **Contributions of the new collaborative form for ANENA's database:**

⇨ Facilitates and consolidates collection work

⇨ Reduces the risk of data loss and errors

⇨ **Data consolidation**



1. Medical Data Base
2. Forensic
3. New data collection
4. From data to prevention

- **Contributions of the prospective study on avalanche fatalities:**

⇨ Implementation of conclusions / lessons learned :

- in the corpus of field training curriculums
- in more precise prevention messages
- in specialized journal and into training manuals

⇨ **better care for the avalanche victims by companions**

ANENA

Frédéric **Jarry**

Conclusion

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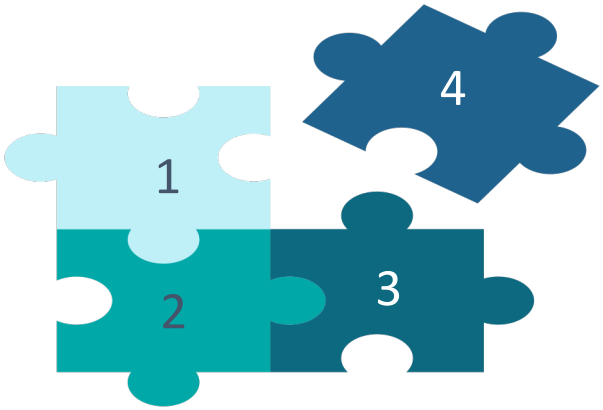
Gathering Data

Medical (Hospital) – Juridic (Rescuers) – Environment (State)

Improving Data collection



Improving quality indicators
Improving knowledge
Improving prevention messages
Improving decision making