

Trauma, Burns and Smoke: Is Mass-Casualty Triage Missing the Aircraft-Crash Survivor?

A field-ready severity framework for aircraft-crash survivors (ISCA-v0) and a comparison of four major crashes.

Sebastián Levi · Johanna Ninni · Florencia Secchi

Centro de Investigación en Emergencias (CIE), Buenos Aires, Argentina



CENTRO DE
INVESTIGACIÓN EN
EMERGENCIAS

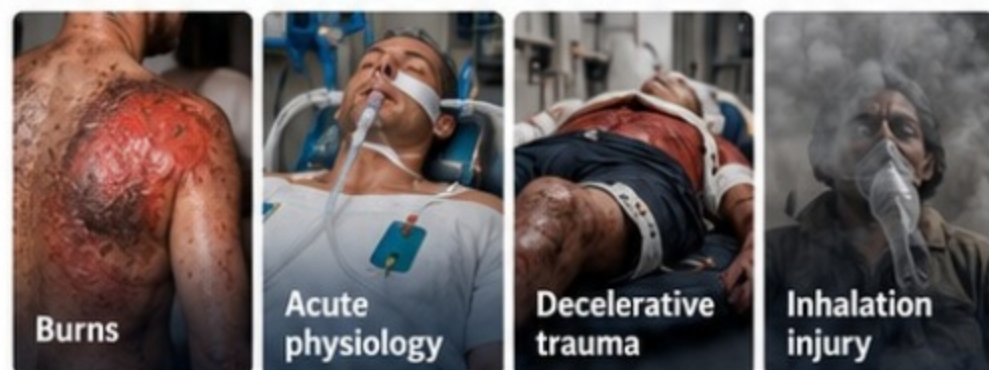
KEY MESSAGE

An aircraft-crash severity index matters only where people survive and trauma, burns and smoke coincide.
No triage tool has been validated for that profile.



1 THE GAP

A crash with fire creates four injury problems at once.



Mass-casualty triage (START, SALT, META) sorts fast, but its accuracy varies across scenarios and none is validated for this combination. [2–13].

Burn scores count inhalation as one yes/no term (+17 in revised Baux) [4]; ungraded, and it does not model its interaction with trauma.

3 THE FRAMEWORK: ISCA-v0

A second layer after initial triage.



Acute physiology

GCS · blood pressure · respiratory rate

Anatomical trauma

Mechanism, findings · NISS in hospital

Burn

Age · % body surface area (TBSA)

Inhalation injury

Field suspicion · bronchoscopic grade

ISCA-Field

After initial sorting, at the scene.

Age, GCS, systolic BP, respiratory rate, estimated %TBSA, suspected inhalation. No bronchoscopy, imaging or laboratory needed.

ISCA-Hospital

Admission and early re-evaluation.

Field variables plus NISS, definitive %TBSA (≥ 6 h) and grading inhalation injury (none / 1–2 / 3–4). Refines the profile; never delays urgent care.

Domains stay visible, so no domain hides another. ISCA-v0 is a profile of variables; a single number is built only if real data show added value.

4 HOW WE WILL DERIVE IT

- 1 Register protocol
- 2 Multicentre cohort, $n = 1,500$
- 3 Derive models
- 4 Internal validation
- 5 External validation



15 candidate parameters: splines, no stepwise selection. Riley sample size [15, 16]: 1,274 analysable patients, 1,416 allowing 10% loss. Multiple imputation, bootstrap validation, decision-curve analysis, then external validation [17].

2 FOUR CRASHES, ONE PATTERN

Survivors among occupants, public aggregate counts [5–7, 18].

Event	Location / Year	Survivors among occupants	Survival rate
LAPA 3142	Argentina, 1999 Deceleration + fire + gas plant		~39% (40 of 103)
LaMia 2933	Colombia, 2016 Trauma-dominant, no fire documented		8% (6 of 77)
TAM 3054	Brazil, 2007 High-energy impact + fire	No survivors on board	0% (0 of 187)
Pan Am 103	Lockerbie, UK, 1988 In-flight break-up; 1+ more died on the ground	No survivors on board	0% (0 of 259)

Only LAPA 3142 combined many survivors with trauma, burns and smoke. Counts vary by source (LAPA: 120–103 occupants). No patient-level data exist; context, not validation.

5 WHY IT MATTERS IN THE FIELD



Built for what a responder can assess

GCS, blood pressure, respiratory rate, burn-area estimate, smoke exposure. Nothing else.



Designed for scarce resources

Helps decide who needs a trauma or burn centre when victims are spread across several hospitals, as in LAPA 3142.



Keeps the sorting step intact

It does not replace START, SALT or META. It adds a clinical layer after them.



WHO WE NEED

Trauma and burn centres or registries able to share de-identified data: physiology, NISS, %TBSA, inhalation grade and CRR-24.

Correspondence: Sebastián Levi · seblevi84@gmail.com



HONEST LIMITS

ISCA-v0 is a development framework, not a validated score. There are no coefficients or cut-offs yet. The historical crashes are context only; they do not show discrimination.

REFERENCES

1. See full list [2–18] in the supplementary material.



Scan for full references
and supplementary material



CENTRO DE
INVESTIGACIÓN EN
EMERGENCIAS



GLOBAL DISASTERS
LOCAL SOLUTIONS
STRONGER TOGETHER