



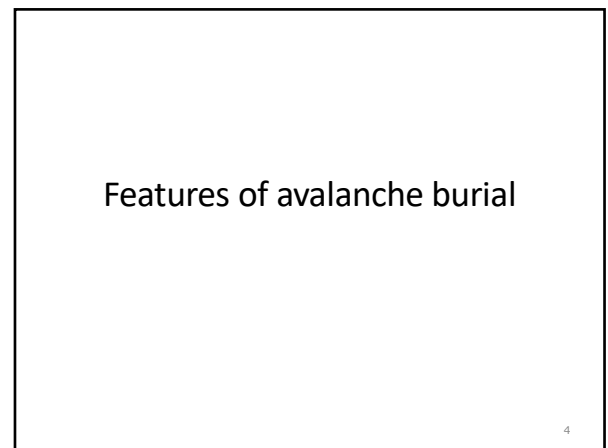
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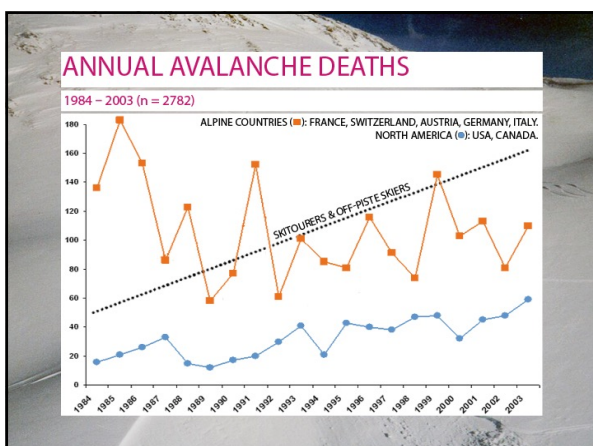
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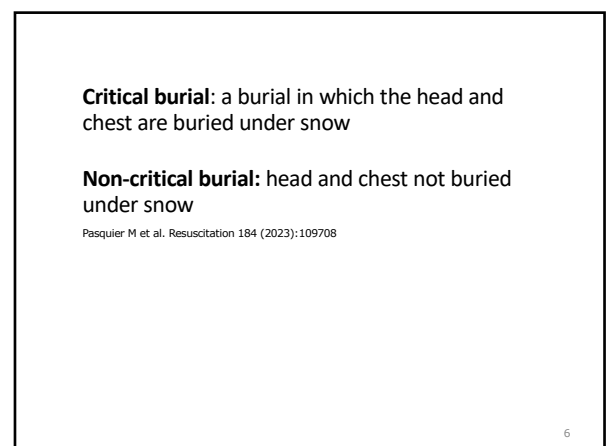
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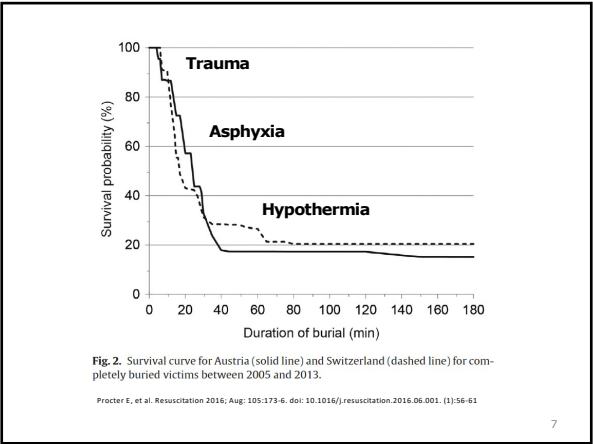
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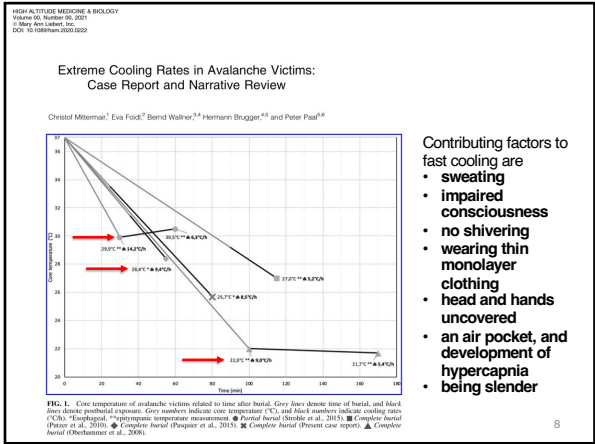
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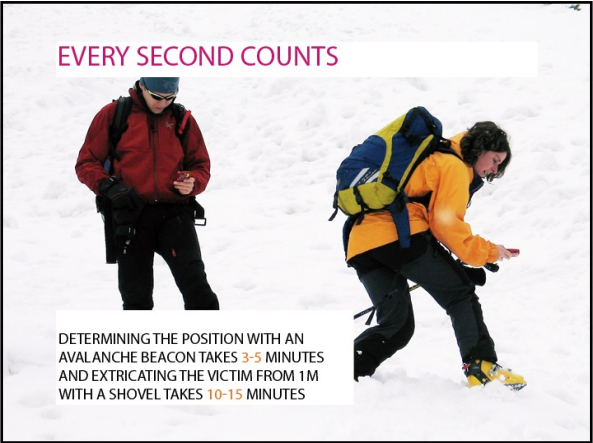
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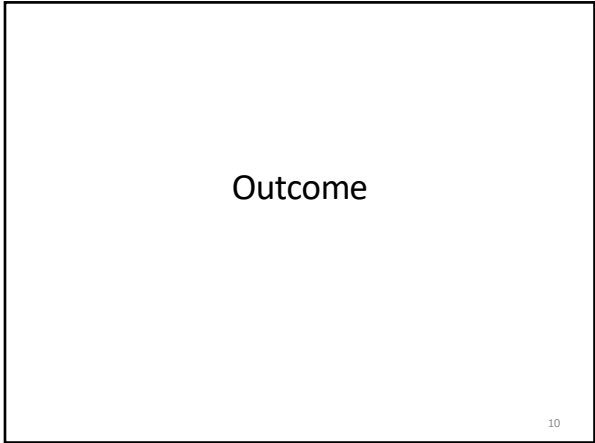
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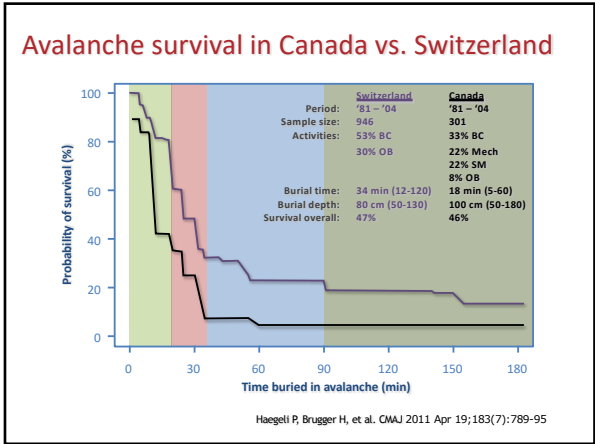
MORTALITY RATES

n = 2049

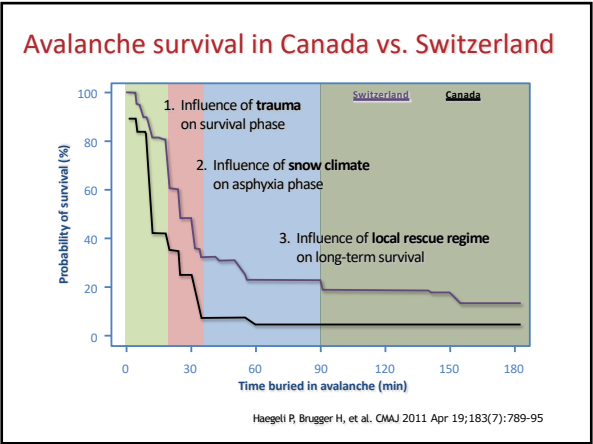
	TOTAL NUMBER OF VICTIMS	EXTENT OF BURIAL	
		Critical	Non-critical
EXTRICATED ALIVE	1603 (78.2%)	369 (48.7%)	1233 (95.6%)
EXTRICATED DEAD	446 (21.8%)	389 (51.3%)	57 (4.4%)
RESPECTIVE TOTALS	2049 (100%)	758 (37%)	1290 (63%)

ANALYSIS OF THE COMPREHENSIVE DATA ON VICTIMS EXTRICATED ALIVE OR DEAD IN ALL AVALANCHE ACCIDENTS IN SWITZERLAND 1981 - 2001 ACCORDING TO EXTENT OF BURIAL * ALL P-VALUES < 0.001 (PEARSON'S CHI-SQUARE) Brugger H, Durrer B, Adler-Kastner L, Falk M, Tschirky F. Resuscitation 2001

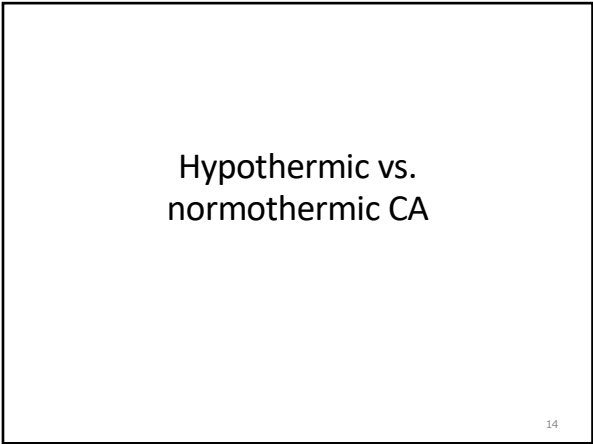
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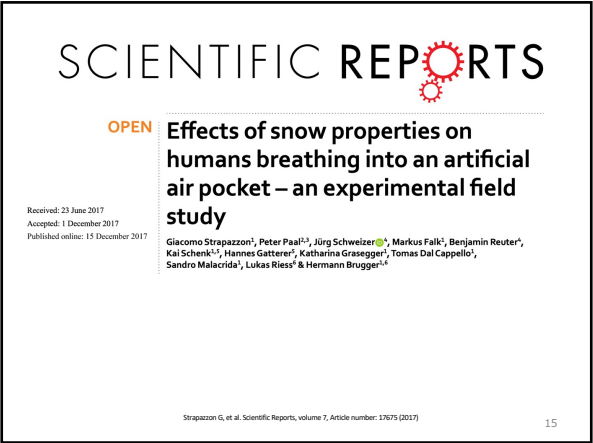
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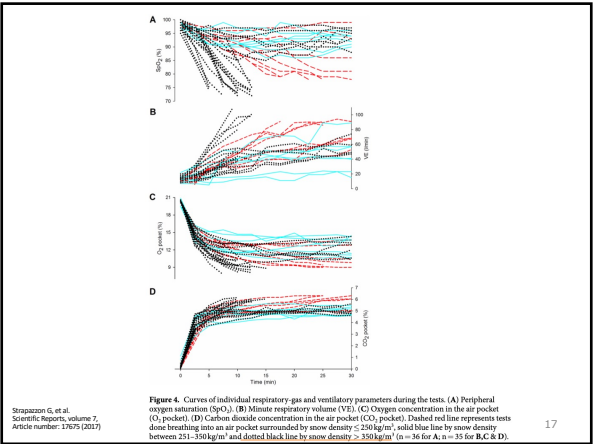
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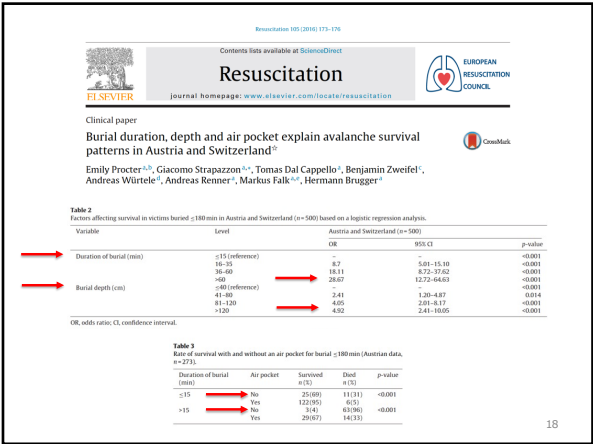
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Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation



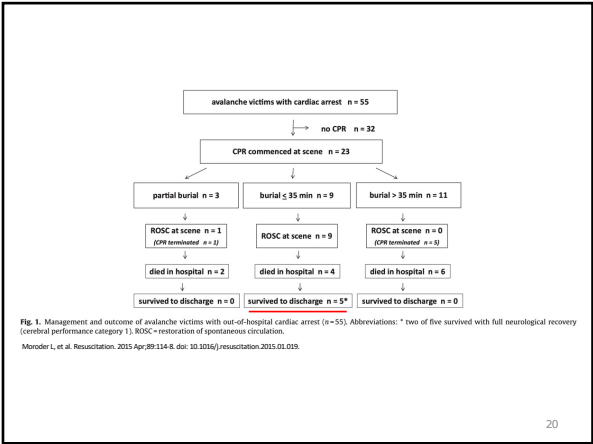
Clinical Paper

Outcome of avalanche victims with out-of-hospital cardiac arrest^{a,b}

Luca Moroder^a, Birgit Mair^{a,b}, Hermann Brugger^c, Wolfgang Voelckel^{b,d}, Peter Mair^{a,b,e}

^a Department of Anaesthesiology and Critical Care Medicine, Medical University of Innsbruck, Anichstrasse 35, 6020 Innsbruck, Austria
^b Christophorus Emergency Medical Helicopter Service, Schubertling 1-3, 1010 Vienna, Austria
^c Institute of Mountain Emergency Medicine, ISIM, Research, Walschütz 1, 39100 Bolzano, Italy
^d Department of Anaesthesiology and Critical Care Medicine, AHA Trauma Hospital Salzburg, Dr-Franz-Rehrl-Platz 4, 5010 Salzburg, Austria

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Patient characteristics and neurological outcome at hospital discharge of survivors (n=5) with restoration of spontaneous circulation after short duration of burial (up to 35 min).

Patient	Duration of burial (min)	ROSC after	GCS	SBP* (mmHg)	CT* (°C)	pH*	Lactate* (mmol L ⁻¹)	Total body CT scan*	ICU stay (days)	CPC
Male, 49 years	10	BLS	14	150	35	7.29	4.1	Lung oedema	2	1
Male, 25 years	15	BLS	3	80	31.5	7.31	8.8	Bilateral lung contusion, pneumothorax	2	1
Female, 30 years	15	BLS	3	110	30	7.12	12.0	Normal	16	4
Male, 26 years	20	BLS	4	140	28	7.02	11.9	Brain oedema	10	4
Male, 31 years	20	ALS	4	100	24	6.85	19.9	Pulmonary infiltration, aspiration, brain oedema	22	4

ROSC=restoration of spontaneous circulation, BLS=bystander CPR, ALS=advanced life support by emergency physician, GCS=best pre-hospital Glasgow Coma Score after ROSC, SBP=systolic blood pressure, CT=core body temperature, *at hospital admission, CPC=Cerebral Performance Category.

Moroder L, et al. Resuscitation. 2015 Apr;89:114-8. doi: 10.1016/j.resuscitation.2015.01.019.

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Hypothermic cardiac arrest

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Revised Swiss Staging

	Stage 1	Stage 2	Stage 3	Stage 4
Clinical findings ^a	"Alert" from AVTU	"Verbal" from AVTU	"Painful" or "Unconscious" from AVTU	"Unconscious" from AVTU AND
Risk of cardiac arrest ^b	Low	Moderate	High	Hypothermic cardiac arrest
Oxygen	According to good clinical practice, (goal: SpO ₂ > 94%) ^c	+	+	+
Carbohydrates	Warm sweet tea, sweet bars	Glucose 1x / L ^a	Glucose 1x / L ^a	-
Active rewarming	+	+	+	+
Passive rewarming	+	+	+	+
Active rewarming	(-)	+	+	+
Cautious mobilization / horizontal transport if possible	-	+	+	-
Defibrillation pads	+	+	+	+
Intubation			to be considered	+
Hypothermia CPR				+
Defibrillation				+ ^d

Musi M, et al Resuscitation 2021. May;162:182-187

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Available online at www.sciencedirect.com

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation



Clinical paper

Clinical characteristics and outcomes of witnessed hypothermic cardiac arrest: A systematic review on rescue collapse

C. Frei^a, T. Darocha^b, G. Debaty^c, F. Dami^d, M. Blancher^e, P.N. Carron^d, M. Oddo^e, M. Pasquier^{d,*}

- Hypothermic CA only <30° C
- Survival at hospital discharge 73%
- Neurologically favourable outcome 89%

Resuscitation. 2019 Apr;137:41-48. doi: 10.1016/j.resuscitation.2019.02.001.

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Resuscitation 90 (2015) 46–49

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EUROPEAN RESUSCITATION COUNCIL

Commentary and concepts

Delayed and intermittent CPR for severe accidental hypothermia^{a,b}

Les Gordon^{a,b}, Peter Paal^{c,d,e}, John A. Ellerton^{c,d}, Hermann Brugger^{f,g,h}, Giles J. Peek^{h,i,j}, Ken Zafren^{k,l,d}

^a University Hospitals of Morecambe Bay Trust, Royal Lancaster Infirmary, LA1 4BP, United Kingdom

^b Langdale Ambulance Mountain Rescue Team, United Kingdom

^c Department of Anaesthesiology and Critical Care Medicine, University Hospital Innsbruck, Austria

^d International Commission for Mountain Emergency Medicine (ICAR MEDCOM), Austria

^e Berbeck Medical Group, Penrith, Cumbria, United Kingdom

^f Institute of Mountain Emergency Medicine, ERM, Research, Bolzano, Italy

^g Medical University Innsbruck, Austria

^h East Midlands Regional Heart Centre, United Kingdom

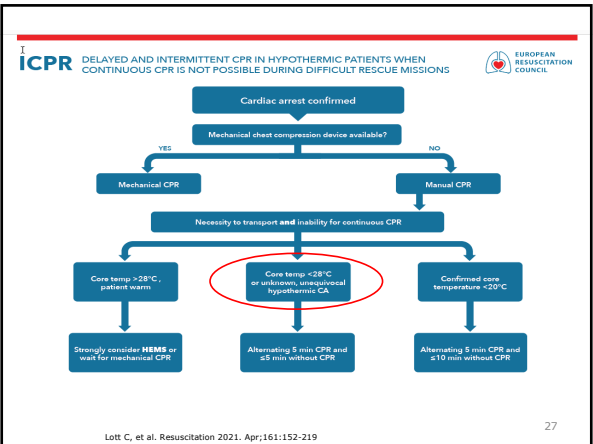
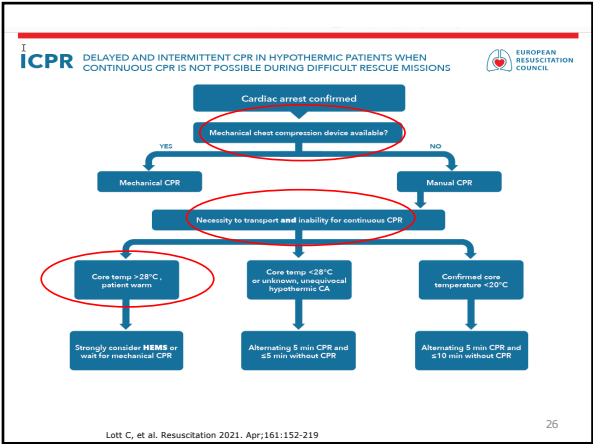
ⁱ Cleveland Hospital, Levensley LE3 9QP, United Kingdom

^j LandSD Steering Committee, United Kingdom

^k Division of Emergency Medicine, Department of Surgery, Stanford University School of Medicine, Stanford, CA, USA

^l Medical Director, Alaska Mountain Rescue Group, USA

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Treatment

Resuscitation 184 (2023) 109708

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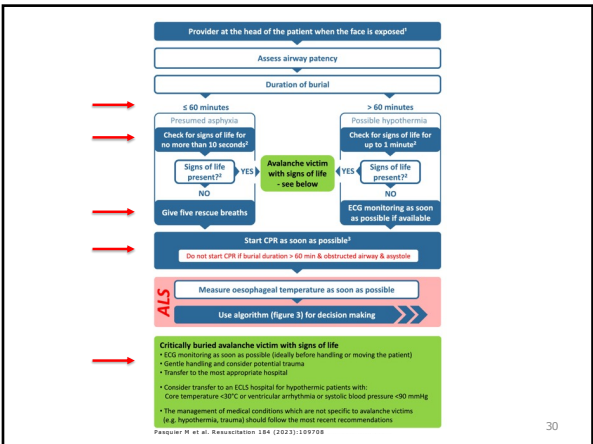
EUROPEAN RESUSCITATION COUNCIL

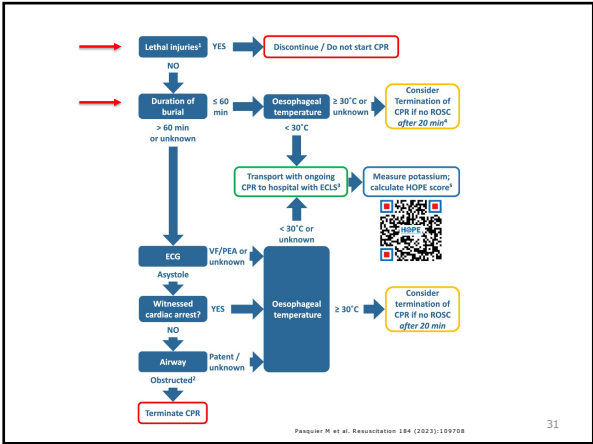
Review

On-site treatment of avalanche victims: Scoping review and 2023 recommendations of the international commission for mountain emergency medicine (ICAR MedCom)

M. Pasquier^{a,b,c}, G. Strapazzon^{c,d,e}, A. Kottmann^{f,g,h}, P. Paal^{h,i}, K. Zafren^{j,k,l}, K. Oshiro^{k,l}, C. Artoni^m, C. Van Tilburg^{n,o}, A. Sheets^{p,q,r}, J. Ellerton^s, K. McLaughlin^{t,u}, L. Gordon^{v,w}, R.W. Martin^{x,y}, M. Jacob^z, M. Musi^{aa}, M. Blancher^{ab}, C. Jaques^{ac}, H. Brugger^{ad,ae}

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Managing multiple avalanche casualties

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PLOS ONE

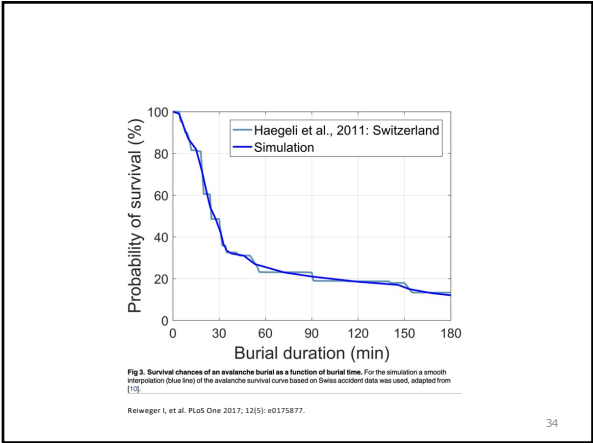
RESEARCH ARTICLE

A concept for optimizing avalanche rescue strategies using a Monte Carlo simulation approach

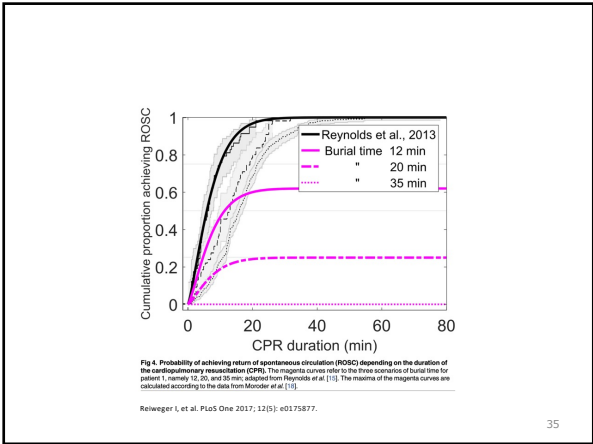
Ingrid Reiweger^{1,2,3,4*}, Manuel Genswein^{2,3,4}, Peter Paal^{3,4}, Jürg Schweizer⁵

Reiweger I, et al. PLoS One 2017; 12(5): e0175877.

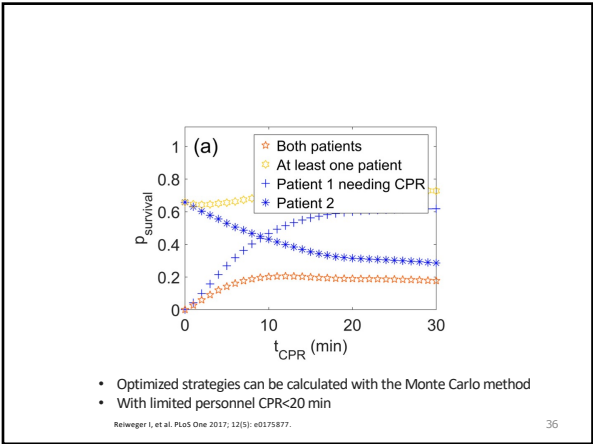
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Article

AvaLife—A New Multi-Disciplinary Approach Supported by Accident and Field Test Data to Optimize Survival Chances in Rescue and First Aid of Avalanche Patients

Manuel Genswein ^{1,*}, Darryl MacIsac ², Scott McIntosh ³, Ingrid Reiweger ⁴, Audun Hetland ⁵ and Peter Paul ^{6,†}

Genswein M, et al. Int J Environ Res Public Health. 2022 Apr 26;19(9):5257. doi: 10.3390/ijerph19095257.

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AvaLife

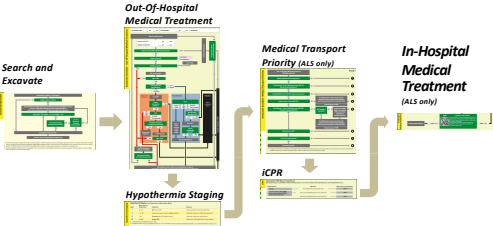
A Survival Chance Optimized Decision Support Tool
& Avalanche Patient Protocol

- Effective Search & Excavation & Medical Treatment
- Focus available resources on the most life-saving tasks
- Decision support tool with integrated patient protocol



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AvaLife Overview of Modules

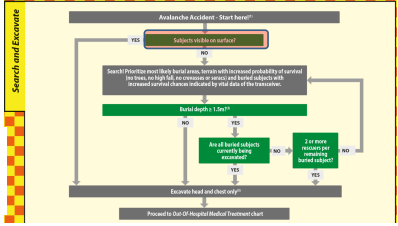




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AvaLife Modules

Search and Excavate

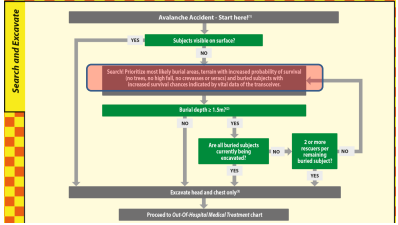




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AvaLife Modules

Search and Excavate

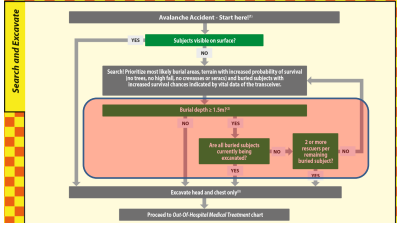




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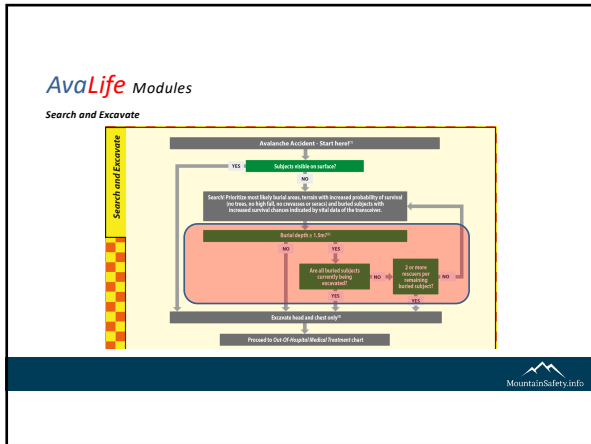
AvaLife Modules

Search and Excavate

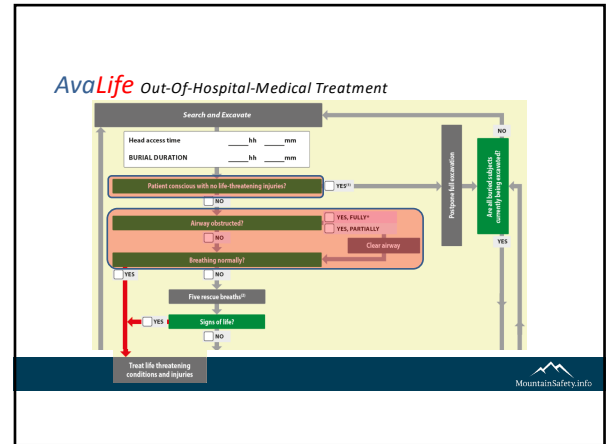




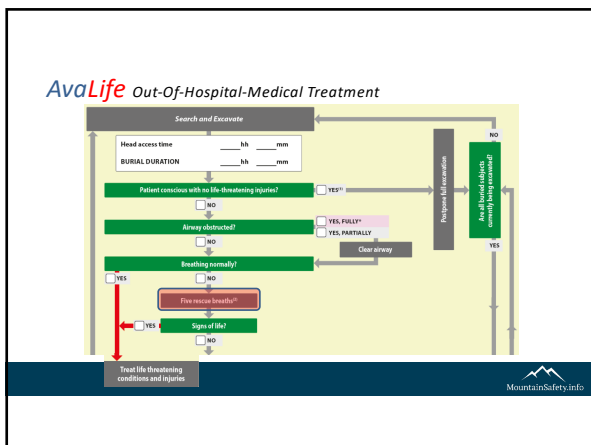
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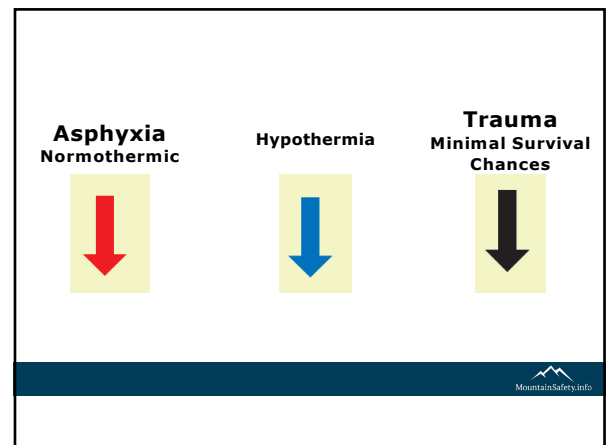
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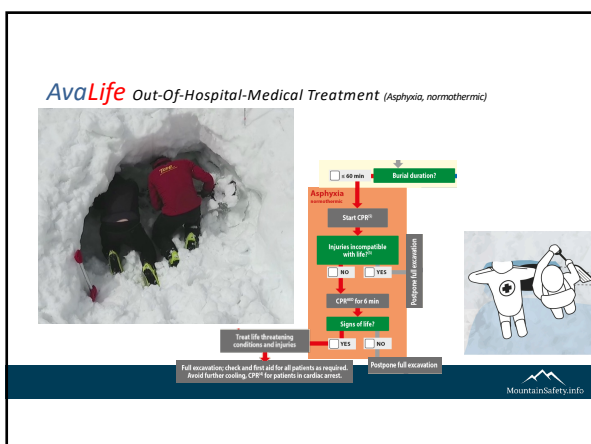
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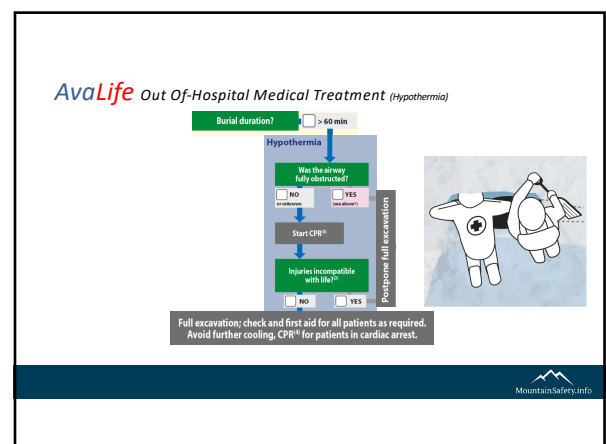
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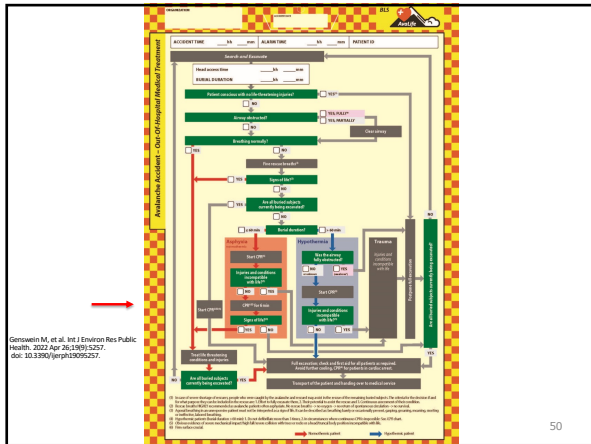
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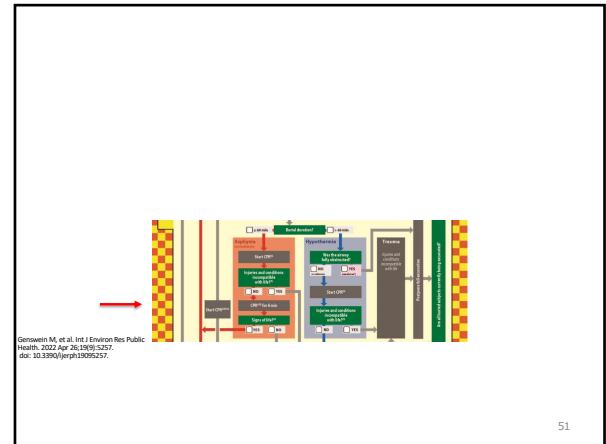
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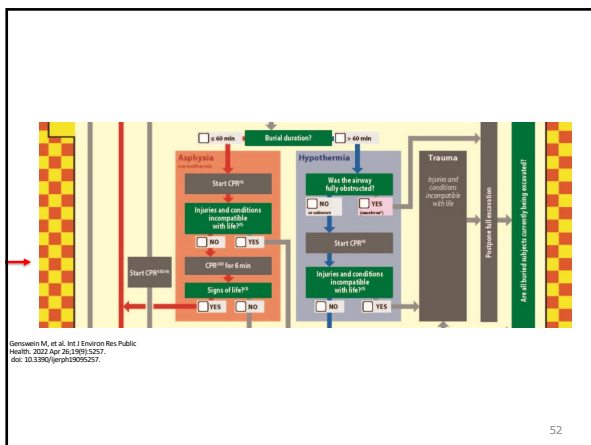
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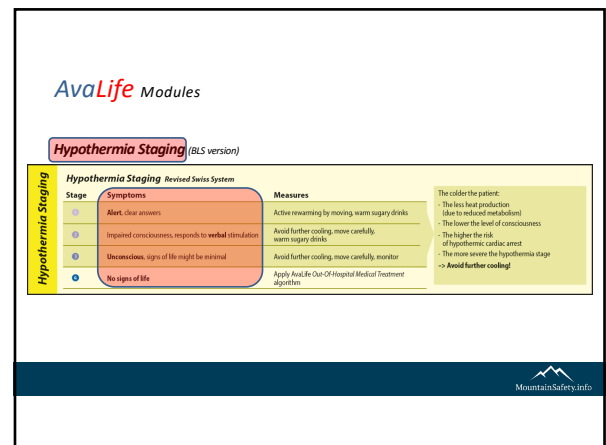
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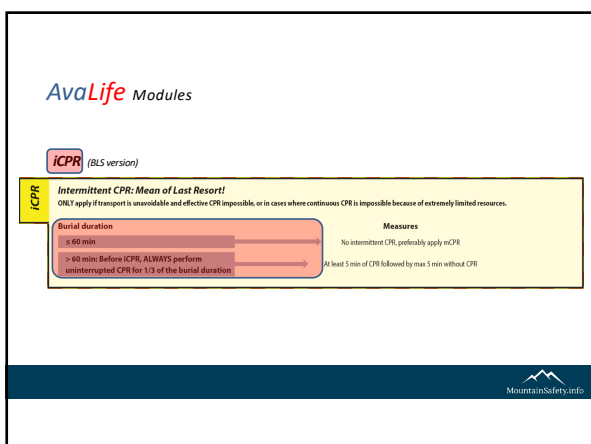
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Conclusions

- Asphyxiation common
- Good outcome with
 - short burial
 - ROSC on BLS or
 - long burial and hypothermia
- AvaLife can be used for single and multiple burial scenario with lack of resources
- CPR duration 6min in reverse triage, otherwise continuous unlimited CPR
- Treatment in appropriate hospital

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