Patient's Thermal Comfort

On National Ambulance Service's (NAS) vehicles.



Photo credit: www.phsc.co.uk

Disclaimer

MSc EMS UCD



UCD Centre for Emergency Medical Science

A National Centre of Excellence for Research, Development, Education & Training in Pre-Hospital Emergency Care



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Aim.

MSc EMS UCD

Primary aim:

Document NAS personnel Knowledge Attitude Practice.

Ultimate aim:

Assess education gap. Improve ambulance engineering and design.



Method

Literature search

Quantitative End-users' Survey Knowledge Attitude Practice

Qualitative Interviews.



Results

- 111 responses
 - 1 spoiled
- Response rate about 6% of all NAS "Patient & Clients Care".
- 1 interview

Demographics

Age bracket.		20 – 29		30 - 39 40 - 49		- 49	50 - 59 60 - 69) - 69	
	n=	16		31	4	40		1		
Years of		Student	2 – 4	5 - 9	10 - 14	15 – 19	20 – 24	25 – 29	>30	
practice.	n=	11 11	14	31	24	14	10	4	2	
PHECC		EMT		Paramedic		Paramedic		Advanced		
Licenses.				intern				Paramedic		
	n=	13		15		51		31		
In previous 12 months assigned primarily to work on:										
Transporting vehicle				Non-transporting vehicle			Mix of both type of vehicle			
n=101				n=7			n=2			
			F	Patient would be escorted in the transporting vehicle						
				<25% of times n=7						
				25% to 50% n=1						
			5	50% to 75%	n=1					

Previous experience

	Previous e	experience	
Work		Volunteer past or present	May include
			multiple
Nursing Midwifery	8	Civil Defence	27
Health care attendant / Porter	12	Order of Malta	26
Fire / Rescue Service	10	No	26
Social care	3	Irish Red Cross Ambulance	15
Pharmacy / Laboratory / Scientist	3	St John's ambulance corps	10
Therapist (occupation, physical, physio,	4	Mountain Rescue Service	4
play, radiation, psych/counselling)		Irish Coast Guards	3
Private Ambulance Service	3	RNLI	2
		Local CFR	2
Not in healthcare	58	Urban Search and Rescue	1
My first career	9	Sub-aquatic Rescue Service	1
Total participants	110	Motorsports Medical Rescue	1
		Cave Rescue Service	1

Knowledge

I feel that I received enough training for the maintenance of patient's Thermal Comfort during transport.

I feel that I received enough education regarding heat transfer in the human body.

I feel that I received enough education regarding the human body's thermoregulation.

I feel that I received enough training to operate the vehicle's patient compartment heater.



Strongly agree slightly agree

gree Undecided

slightly disagree

Strongly disagree

Q: The thermostat associated with ambulance heater (see picture) automatically maintains ambient air temperature I have set, combining the heater and the AC.

Of the 67% of responders satisfied with their training on the ambulance heater,





True False

Reference document: National Ambulance Service. (2017), *Clinical Staff vehicle guide & pre-shift check list.* Dublin.

I complemented my knowledge of hypothermia management with self-guided education.



AP / Non-AP (chi square 6.65, df=1, p value= 0.01)

Attitude

I feel that TC is an important part of patient care.

I feel that I understand the needs for patient's TC.

I understand that TC influences the patient's overall recovery.

It is to be expected that the patient will be cold in transport, and not much can be done.

Strongly agree slightly agree Undecided



Attitude

- I feel that it is important to control fever associated with infections or sepsis.
 - I feel that preventing further heat loss is a goal of my scope of practice.
 - I feel that preventing patient getting too warm is important.
 - I feel that reversing hypothermia is a one goal of my care.
 - For severely ill or injured patients, I feel that, in general, they may benefit from being cold.



Strongly agree slightly agree Undecided slightly disagree Strongly disagree

Practice:

Consideration for patient's thermal comfort, in the following scenarios as part of ABCDE

Neonatal resuscitation Pre-hospital birth in a public toilet (for mum... Polytrauma with difficult extrication Elderly with a suspected fracture found on the... Patient lost after hours of walking. Altered level of consciousness with signs of... Social admission for acopia (unable to cope... Patient with burns to torso and arms Patient found on street, altered level of... Child with breathing difficulty and stridor. Patient with signs of shock from internal... A sick child with pyrexia.

Always

During transport I might consider options.no opinion



- As part of my secondary survey, I would consider.
- Never in this scenario
- On reflection, now I would consider.

Practice:

Consideration for patient's thermal comfort, in the following scenarios as part of ABCDE

Neonatal resuscitation Pre-hospital birth in a public toilet (for mum... Polytrauma with difficult extrication Elderly with a suspected fracture found on the... Patient lost after hours of walking. Altered level of consciousness with signs of... Social admission for acopia (unable to cope... Patient with burns to torso and arms Patient found on street, altered level of... Child with breathing difficulty and stridor. Patient with signs of shock from internal... A sick child with pyrexia.

Always

During transport I might consider options.no opinion



In order to prevent my patient being cold during transport I use:

40%

50%

60%

70%

80%

90%

100%

30%

Removal of wet clothing Removal of cold clothing Fleece blanket Cotton blanket Wool blanket Duvet Foil / space blanket Vacuum mattress Heat packs Hat / Head covering Multiple of blankets Mixture of the above Ambulance heater Warm IV fluids Always

Occasionally (about 50% of the times)
 Very rarely (less than 10% of the times)
 Not available to me

0%

10%

20%

Frequently (more than 70% of the times)
 Unfrequently (less than 30% of the time)
 Never

Timing of switching ON the ambulance patient compartment's heater.



Frequently

Occasionally

■ Neutral, No opinion

Rarely Never

Timing of switching ON the ambulance patient compartment's heater.



Frequently

Occasionally

■ Neutral, No opinion

Rarely Never

Foil / Space blanket:



Always

Occasionally (about 50% of the times)

Very rarely (less than 10% of the times)

not available to me

Frequently (more than 70% of the times)
 Unfrequently (less than 30% of the time)
 Never

Foil / space blanket use



Always

- Occasionally (about 50% of the times)
- Very rarely (less than 10% of the times)
- Not available to me

Frequently (more than 70% of the times)
Unfrequently (less than 30% of the time)
Never

Ambulance Patient Compartment's heater

I feel it is sufficient for the common Irish weather.

I feel that it is efficient to prevent patients getting cold.

I feel that it warms up the air very quickly.

I feel that it warms up the stretcher very quickly.

I feel that it warms up the patient appropriately.



Strongly agree Slightly agree

ree Undecided

Slightly disagree

Strongly disagree

Equipment

I feel that I have sufficient equipment to maintain my patients' Thermal Comfort.

I feel that I have sufficient equipment to prevent further heat loss of a MODERATELY hypothermic patient (as per PHECC CPG 2017 5/6.4.21 and 4.4.21).

I feel that I have sufficient equipment to prevent further heat loss of a SEVERLY hypothermic patient (as per PHECC CPG 2017 5/6.4.21 and 4.4.21).

I feel that I have sufficient equipment to reduce the body temperature of a patient suffering from heat illness (as per PHECC CPG 2017 4/5/6.6.6 heat exhaustion / heat stroke).



Strongly disagree





Results

• Equipment

- 65% agree enough for TC
- 70% agree enough for moderate hypothermia
- 33% agree enough for severe hypothermia
- 42% agree enough for hyperthermia

To prevent Pt getting cold

- Ambulance heater most frequently use
- & Multitude of blankets
- Hats least used (32%). 29% had no access to any?

Significant statistics

- Association Membership of an auxiliary service
 - Foil / space blanket placed over clothing and blankets ($\chi 2 = 17.9$, df= 2, p=0.0002)
 - Foil / space blanket sandwiched between blankets (χ 2=25.07, df=2, p=0.0001)
- Association Advanced Paramedic clinical level
 - Considering TC as part of ABCDE for burns to arms and torso (χ 2=4.61, df=2, p=0.01)
 - Not taking self-directed hypothermia education (χ 2=6.65, df=1, p value= 0.01)

Qualitative data

- 35 free texts, one interview.
- Theme 1 Education.
 - More training on thermal comfort
 - More training with new ambulance heater
 - Consensus on packaging Pt / vapour barrier / clothing removal
 - Use of warm fluid
- Theme 2 Equipment.
 - Warmer blankets (electric, forced air, self warming or heavier)
 - Bubble wrap
 - Wide temperature range thermometers
 - Spare clothing, foil hats,
 - Group shelter
 - Humidifier (warm humidified oxygen delivery?)
 - Sterile sheets

Quantitative Data

- Theme 3 Ambulance design
 - Review distribution of heater's & air-con vents
 - Increase walls ceiling insulation
 - Heated seat
- Theme 4 Organisational
 - IV access skill for Paramedics
 - Warm Fluids, warm drinks and cold fluids
 - Specialist teams, equipment, vehicle for area of operation

Discussion

- Knowledge
 - Review textbooks, curricula and techniques with current evidence
 - Misconceptions?
 - Extending education thermoregulation, pathophysiology...?
- Attitude
 - No evidence of difference with background
 - Increased cognitive load with increasing assessment and treatment ?
- Practice
 - No evidence or SOP for temperature in ambulance
 - Conflicting needs: prevention of heat loss and physical assessment
 - Patient vs crew comfort
 - Treatment of pyrexia, hypothermia and burns?

Discussion

- Evidence for
 - Foil / space blankets
 - Heat packs
 - Warmed IV fluids
- Clothing insulation
- Thermodynamics
- Thermal engineering
- Human thermoregulation

Limitation

- Small study (6% of population)
 - Difficulty with distribution
- Self reporting
- Long survey
- Thermal Comfort vs Hypothermia
- Only hypothesis generating



IMAGE ID 28972588 ARTIST bomg

Conclusion

- Most practitioners appreciate TC
- Knowledge is reported good,

but improvement is requested and thought after.

- Worrying trends in expectations of management of pyrexia, hypothermia and burns.
- Linked to dissatisfaction with the ambulance equipment?
- Knowledge transmission, based on current evidence.
- Multi-modal
- More research required.



Recommendations

- Education
- Engineering
- Design
- Further research.



- Chart review of current treatment of pyrexia, burns and hypothermia.
- Scoping review of current evidence vs current education material, false news.
- Survey Patient vs Crew comfort.
- Analyse air thermal behaviour in duty ambulance.

Appendix One:

Picture 1: First foil blanket perpendicular to the stretcher, to allow for torso girth.

Picture 2: Second foil blanket parallel Picture 3: First fleece blanket to the stretcher, overhanging and perpendicular to stretcher. perpendicular to and overlapping the first (Forming a T).







Picture 6: Cotton sheet.

Picture 4 Second blanket perpendicular to the stretcher and overlapping the first blanket.

Picture 5: Third blanket parallel to the stretcher, over hanging.













Picture 9 First fold of the wrap at tl feet taking all three layers.









