Ambulance Transport Safety Summit

Bridging the gap between what we do and what is known

EMS Subcommittee of the TRB Ambulance Transport Safety Summit

October 29th , 2009

TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

Goal of the Summit

"Enhancing ambulance transport safety through shared knowledge of technical data"

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Usability – Human Factors

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EMS Subcommittee of the TRB Ambulance Transport Safety Summit

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Outline

Presentation overview

- Framework to consider human factors.
- Defining your population of users.
- Designing for operational paramedic tasks.
- Understanding how paramedics access, use & restow equipment.
- Balancing item accessibility with prevention of strike hazards.
- Design challenges.

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Framework – Occupant Protection

Human factors design requirements should be considered in the context of fundamental occupant protection "rules".

Seating
Forward or rearward facing in the moving ambulance.

Side facing seats not acceptable
....unless ambulance is stationary.

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Framework

Restraining objects
Objects to be restrained to
10 G in 6 directions (EN)
20 G forward &10 G sideways (AS)

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User Population

Who will use the ambulance

- Female participation rates of up to 30 to 40 %.
- Standing height difference between a 5th percentile female & 95th percentile male is approximately 16 ” / 400 mm.
  - seating height differences / seats fixed height
  - variable reach capacity

(implies priority positioning for equipment or seat / equipment mobility)

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User Population

Implications for design

- User size needs to be accommodated in design
  - for comfort
  - access to the patient & equipment…
  - …often with static seating features.
- Balancing head, torso, shoulder & arm clearances with reach distances.
- Anthropometry.
- Referencing within the ambulance.

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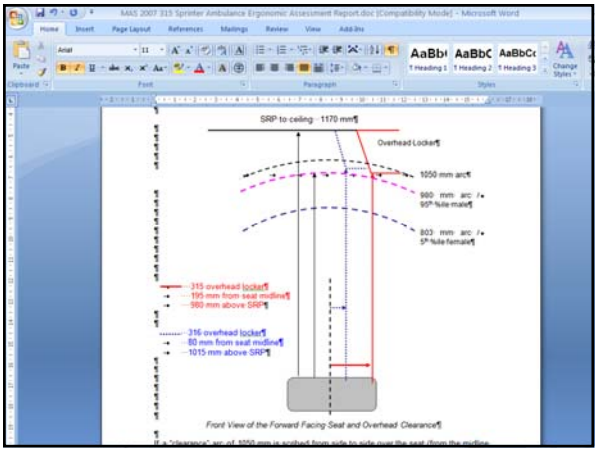

User Population

Other users

- What is the height, weight and “size” range of patients that are to be restrained on the stretcher.

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Task Analysis

Defining what paramedics / EMTs do

- Gain access to equipment
- Prepare it
- Use it to treat the patient
- Discard used elements
- Restow items
- Manipulate , control or operate other items (eg. communications)

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Task Analysis

Record & analyse this information

- These & other tasks should be described.
- Description will often extend beyond clinical instructions.
- First, simply define the relationship or interaction between the position of the paramedic & equipment.
- Then analyze & assess relative to these defined tasks.
- This should be result in a very long list!
- Relational databases can be helpful, for expanded use.
- Task frequency is relative but not the only determinant of priority for positioning (eg. criticality re clinical needs).

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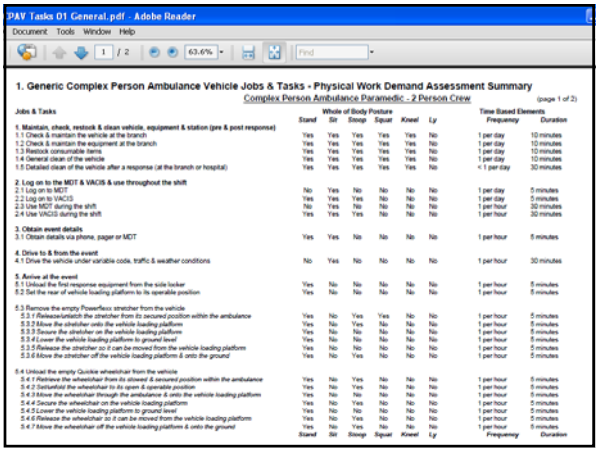
PAV Tasks 01 General.pdf - Adobe Reader

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1. Generic Complex Person Ambulance Vehicle Jobs & Tasks - Physical Work Demand Assessment Summary

Complex Person Ambulance Paramedic - 2 Person Crew (page 1 of 2)

Jobs & Tasks	Whole of Body Posture						Time Based Elements	
	Stand	Sit	Stoop	Squat	Kneel	Ly	Frequency	Duration
1. Maintain, check, restock & clean vehicle, equipment & station (pre & post response)								
1.1 Check & maintain the vehicle at the branch	Yes	Yes	Yes	Yes	Yes	No	1 per day	10 minutes
1.2 Check & maintain the equipment at the branch	Yes	Yes	Yes	Yes	Yes	No	1 per day	10 minutes
1.3 Restock consumable items	Yes	Yes	Yes	Yes	Yes	No	1 per day	10 minutes
1.4 General clean of the vehicle	Yes	Yes	Yes	Yes	Yes	No	1 per day	10 minutes
1.5 Detailed clean of the vehicle after a response (at the branch or hospital)	Yes	Yes	Yes	Yes	Yes	No	< 1 per day	30 minutes
2. Log on to the MDT & VACIS & use throughout the shift								
2.1 Log on to MDT	No	Yes	No	No	No	No	1 per day	5 minutes
2.2 Log on to VACIS	Yes	Yes	Yes	No	No	No	1 per day	5 minutes
2.3 Use MDT during the shift	No	Yes	No	No	No	No	1 per hour	30 minutes
2.4 Use VACIS during the shift	Yes	Yes	Yes	No	No	No	1 per hour	30 minutes
3. Obtain event details								
3.1 Obtain details via phone, pager or MDT	Yes	Yes	No	No	No	No	1 per hour	5 minutes
4. Drive to & from the event								
4.1 Drive the vehicle under variable code, traffic & weather conditions	No	Yes	No	No	No	No	1 per hour	30 minutes
5. Arrive at the event								
5.1 Unload the first response equipment from the side locker	Yes	No	No	No	No	No	1 per hour	5 minutes
5.2 Set the rear of vehicle loading platform to its operable position	Yes	No	No	No	No	No	1 per hour	5 minutes
5.3 Remove the empty Powerflex stretcher from the vehicle								
5.3.1 Release/unlatch the stretcher from its secured position within the ambulance	Yes	No	Yes	Yes	No	No	1 per hour	5 minutes
5.3.2 Move the stretcher onto the vehicle loading platform	Yes	No	Yes	No	No	No	1 per hour	5 minutes
5.3.3 Secure the stretcher on the vehicle loading platform	Yes	No	No	No	No	No	1 per hour	5 minutes
5.3.4 Lower the vehicle loading platform to ground level	Yes	No	No	No	No	No	1 per hour	5 minutes
5.3.5 Release the stretcher so it can be moved from the vehicle loading platform	Yes	No	No	No	No	No	1 per hour	5 minutes
5.3.6 Move the stretcher off the vehicle loading platform & onto the ground	Yes	No	Yes	No	No	No	1 per hour	5 minutes
5.4 Unload the empty Quickie wheelchair from the vehicle								
5.4.1 Retrieve the wheelchair from its stowed & secured position within the ambulance	Yes	No	Yes	No	No	No	1 per hour	5 minutes
5.4.2 Set/unfold the wheelchair to its open & operable position	Yes	No	Yes	No	No	No	1 per hour	5 minutes
5.4.3 Move the wheelchair through the ambulance & onto the vehicle loading platform	Yes	No	No	No	No	No	1 per hour	5 minutes
5.4.4 Secure the wheelchair on the vehicle loading platform	Yes	No	Yes	No	No	No	1 per hour	5 minutes
5.4.5 Lower the vehicle loading platform to ground level	Yes	No	No	No	No	No	1 per hour	5 minutes
5.4.6 Release the wheelchair so it can be moved from the vehicle loading platform	Yes	No	Yes	No	No	No	1 per hour	5 minutes
5.4.7 Move the wheelchair off the vehicle loading platform & onto the ground	Yes	No	Yes	No	No	No	1 per hour	5 minutes
	Stand	Sit	Stoop	Squat	Kneel	Ly	Frequency	Duration

Layout Implications

Balancing item accessibility with prevention of strike hazards

- Prioritise the placement of equipment & resources around the critical seating positions.
- Forward facing seat – needs to move forward & sideways for access to the patient, equipment & to improve clearance along compartment wall.
- Rear facing seat – needs to move forward for patient & equipment access. Foot clearance can be limited with this seat.

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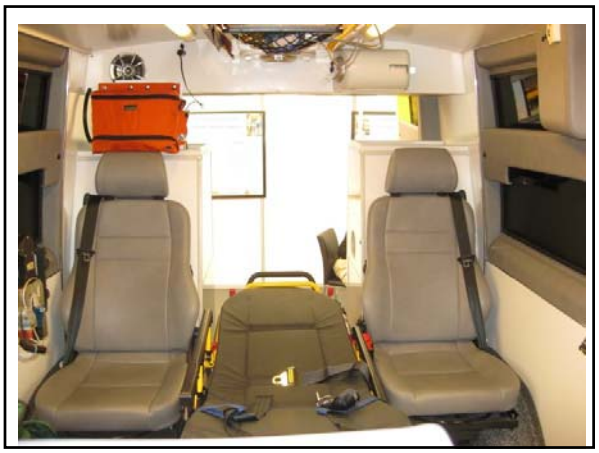

Summary

- Define what paramedics do to better understand their interaction with the patient & equipment.
- Acknowledge that to do this well you need resources, expertise & collaboration.
- Use this information to define ambulance layout requirements to "try" & balance body clearances with functional & safe reach capabilities (across 5th%ile female to 95%ile + males).

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Questions??

- Please raise your hand
- or type in the message box
- or send your questions via this link
  - http://www.emssafetyfoundation.org/TRB2009SummitQuestions.htm

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