EMS Leadership Academy SAFETY FORUM

FREE VIRTUAL CONFERENCE
MAY 1 & 2, 2020
EMSSafetyForum.com

Global Innovations and EMS Safety Research

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CEO, Objective Safety
Chair, TRB, EMS Safety Subcommittee, National Academies
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Innovation, Collaboration & Knowledge Transfer
www.EMSSafetyFoundation.org

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Much of what you shall hear today is thanks to the work of all of those in the:

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and the National Academies of Science, Medicine and Engineering Transportation Research Board's ANB10(5) EMS Safety Subcommittee

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Who am I?





- Nadine Levick MD, MPH, FACEM, FRACGP
- Emergency Medicine Physician and Public Health Academic, (USA- Johns Hopkins, Columbia/Harlem, Maimonidies, Montefiore; Australia – Royal Melbourne, Royal Childrens Hospitals, Royal Australian Flying Doctor Service; now Israel – Assuta Ashdod Hospital , Ben Gurion University)
- Inaugural Chair, EMS Transport Safety Subcommittee TRB, National Academies, USA
- Founding Principal Investigator of PECARN
- Founder of EMS Safety Foundation
- Founder of Objective Safety Information Portal
- Recipient, International Society of Automotive Engineers, Women's Leadership Award for EMS Safety

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Today's Outline

- Historical perspectives
- New World Order
- Key determinants
- Innovation dimensions
- Cheaper Better Safer
- Open source
- Challenges

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Leadership and Innovation

- "Being responsible sometimes means pissing people off… By procrastinating on the difficult choices, by trying not to get anyone mad, and by treating everyone equally "nicely" regardless of their contributions, you'll simply ensure that the only people you'll wind up angering are the most creative and productive people in the organization."

A Leadership Primer from General (Ret.) Colin Powell, Former Secretary of State, USA

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So what is safety?

- condition of being protected against undergoing or causing harm, injury or loss

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And.. what is innovation?

- Something new, original and more effective

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So what is design?

- a process of developing purposeful and innovative solutions that embody functional and aesthetic demands

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Joe Bourgraf, President, Ferno Group

- "To create an innovative and model EMS system…, we must engage in a collaborative and cross-functional conversation among the many contributing partners in the EMS industry. EMS suppliers should embrace and drive new innovation.. to improve the process and efficiency of delivering service, while advancing the level and outcome of emergency care"

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From low tech to high tech

- System of Safety
- Think of the overall impact
- Small low cost changes in practice
- Policies that augment safety
- Innovation in design from micro to macro
- Preparedness and Training

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EMS Risk and Design needs

- Transport Medicine

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New World Order

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Covid19, the 2020 Pandemic

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New Tragic Hazards for EMS April 21, 2020

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April 22, 2020

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May 1, 2020

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April 28, 2020 > 24 Covid19 USA EMS Provider deaths

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Very Important Principle

Ambulance transport safety is part of a SYSTEM, the overall balance of risk involves the safety of all occupants and the public

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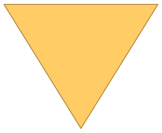
How does design happen in EMS

- Tradition
- Experience
- Vision
- Interdisciplinary



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EMS Safety's frontier -

- the interface of disruptive new tech and operational practice at all levels of the EMS system and across disciplines

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Gartners Hype Cycle 2017

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Gartners Hype Cycle 2019

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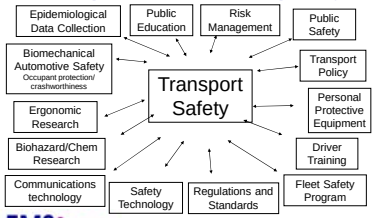
Ambulance Transport Safety IS Complex AND Multidisciplinary



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Key elements to transport safety

- Impact Biomechanics
- Transport Ergonomics
- Fleet Safety
- And now so key…effective PPE….

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Safety Dimensions we know

- Safe systems – CRM / transport system safety
- Risk perception
- Fleet and operations management
- Vehicle design safety
- Scene safety
- Patient Handling: physical & biological hazards
- Health and wellness
- Hours of service

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TRB EMS Safety Summit

http://www.EMSSafetyFoundation.org/2012TRBSummitMultimediawithLinks.pdf

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TRB TRANSPORTATION RESEARCH BOARD OF THE NATIONAL ACADEMIES

The 2012 TRB EMS Safety Summit

print this page & your smart phone will play the 8 sessions from the QR codes

1: Intro & Data and Recent Initiatives
2: Transport, Human Factors - Bridging Diverse Disciplines
3: Testing and Standards
4: New systems safety technology solutions & telematics
5: Fleet management strategies
6: Innovative Vehicle Design
7: Operationalizing Safety
8: Panel: How to optimize the safety of your existing fleet
Wrap up – from Prof. Art Cooper

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Now we have many new technologies

- Fleet management tools
- Vehicle design
- Visibility
- Drones
- AR
- VR
- AI
- Digital Health
- The Cloud
- The Crowd

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1980's Then….

And NOW!…

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USA 1980's Then….

And 2019…

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PREDICTABLE PREVENTABLE and NO ACCIDENT

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So ambulance design technical science…. Not really a new issue

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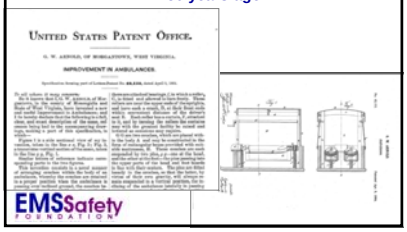
1864 Ambulance Design Patent

re: safety of ambulance design

> 150 years ago


UNITED STATES PATENT OFFICE.

IMPROVEMENT IN AMBULANCES.

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If you were to survey for what would enhance safety and efficiency then….

- Likely "more rest stations"
- Not likely – "the combustion engine"

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EMS Safety timeline

- Didn't know it was an issue – 60's-70's
- Knew it was an issue – but didn't really know what to do – 80's-90's
- Safety technical data rolls out – past 10 years
- **Change and adoption challenges – *we are here now***

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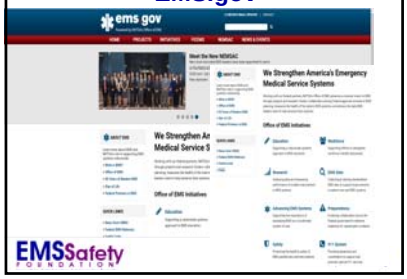
EMS.gov



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USA Absence of technical automotive safety performance standards and oversight

- Multiple different consensus, not technical vehicle standards
- Challenges in identifying best practice
- Myriad of unregulated commercial products
- No system safety performance standards
- Absent national safety oversight

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NAEMSP 2012

Safety and Operational Innovation: Integrating Global Best Practice and Interdisciplinary Technical Expertise into Ambulance Design

http://www.emssafetyfoundation.org/NAEMSP2012poster.pdf

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January 27, 2020

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April 23, 2020

43

April 27, 2020

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FMCSA –

Federal Motor Carrier Safety Administration

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In the USA there are more safety standards for moving cattle than for moving patients

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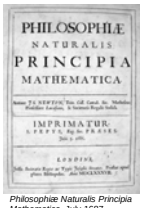
The Laws of Physics Prevail..



Philosophiæ Naturalis Principia Mathematica, July 1687

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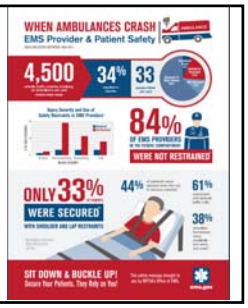
In the absence of a data capture system for EMS safety performance Government estimates can understate the situation



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Of course medics are not wearing their seat belts…

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Challenging design related Human Factors

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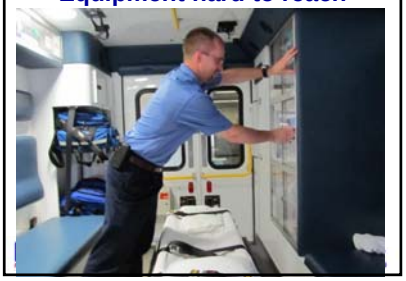
Equipment hard to reach



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Interior design exposes EMS to unnecessary automotive and ergonomic hazards

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Safety in EMS is MULTIDISCIPLINARY

clinical practice
public health
automotive safety
impact biomechanics
human factors
fleet safety

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Health Care Systems
Rm 511-A

Enhancing Ambulance Operational Practice with a Systems Safety Approach

Nadine Levick, MD MPH
Research Director, EMS Safety Foundation
CEO, Objective Safety
New York, NY

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Safe Systems Approach

Source: Road Safety Branch, Infrastructure and Surface Transport Policy, Department of Infrastructure, Transport, Regional Development and Local Government, Australia.

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Vision Zero

A conscious decision to eliminate death and serious injuries

- Leadership
- Setting up targets
- Knowledge
- Community Engagement

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Safety of the…

- Provider
- Public
- Patient

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Safety is a tool to save

- Lives
- Time
- Money

must be evidenced based

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Science of Safety Design

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The clever independent leg Mondial stretcher

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the result of the frequency analysis, green dots mark equipment used every time the ambulance is driven, orange

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Testing the real world

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Work Smarter NOT Harder

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Learning from our international colleagues

www.Rettmobil.com

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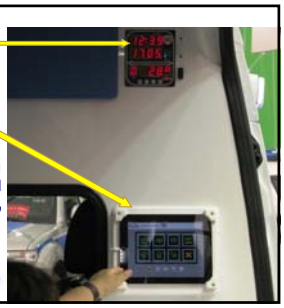
The old expensive and not versatile

and the new…

Rapidly and game changing technology and cheaper, better, very versatile



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Some examples of Global Innovation

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Fleet Mix ?

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The Motorcycle Medics

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Israeli Innovation

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Israel
Magen David Adom - MDA

- The MDA fleet
  - Mobile Advanced Life Support Units (MALSUs [Hebrew: "NATAN"])
  - Advanced Life Support Ambulances (ALSAs [Hebrew: "ATAN"])
  - Standard Ambulances
  - Mobile Mass Casualty Incident Units (MMCIUs [Hebrew: "TARAN"])
  - Command and Control Vehicle
  - Ambulances equipped with 4 X 4 wheel drive
  - All Terrain Vehicle – Ambulance (ATV - Ambulance)
  - MDA - Helicopter, Segway
  - Advanced Life Support Motorcycles
  - Supervisor Vehicle.

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MDA App – Medical Hx & Video transmit capacity

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MDA App with scene video connect

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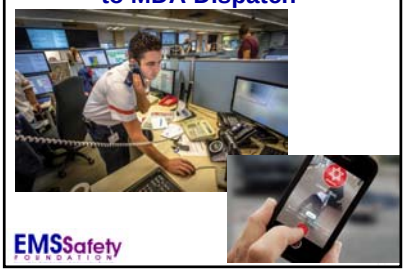
to MDA Dispatch



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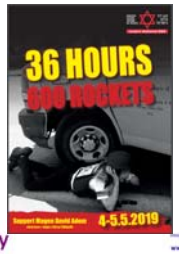
Constant preparedness a reality



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MDA Innovation
Eli Jaffe EMT-P, PhD – MDA Deputy Director General-Community & International Relations

Israeli EMTs train Americans to deal with mass casualties

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Mass casualty drills &
Eli Jaffe EMT-P, PhD's moulage T-Shirts

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New Models in the Corona Era

- 25- 30% EMS runs are non transport
- 30% of EMS transports to the ED are discharged home within 4 hours
- 24/7 national physician video interactive telemedicine support for these cohorts

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EMS Triage… no.. Voting booth

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A multicultural service

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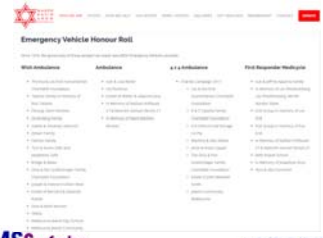
Innovative Fleet Funding



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Malaysian Ambulances

- Modern automotive vans
- No disruption of vehicle integrity
- Clever and data driven interior layout
- Structured system of policy

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Clever innovation can be very simple, yet cost efficient

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Some new aspects

- Vehicles – smarter, sleeker, safer – CHEAPER!
- Operations – new technology tools
- Interdisciplinary infrastructure – new global platforms

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Ambulance Safety Innovation Design Module 1.0

www.INDEMO.info

the future concepts you can have right now!!!

Better, safer and cheaper

INDEMO 1.0 POWERED BY EMS SAFETY FOUNDATION

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Configurable!

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LED lights on the stretcher

Simple equation

- Strip of LED lights + small battery + switch = $20
- Can see where the stretcher is going at night
- Fewer tripping injuries, fewer dropped patients

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Voice Activated

http://www.emssafetyfoundation.org/video/INDEMOredstrobe.mp4

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Telematics

- How much technology and data and of what type do you need to improve fleet safety performance

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Fleet telematics tools

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Next is now!

- Fleet mix
  - Drones
  - Vertical take off vehicles
- Voice activated commands
- Mixed reality
- Advanced Smart phone technology
- Connected health
- Wireless patient monitoring
- Health Information Exchange (HIE) Applications

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Virtual Reality First Aid/EMS

- Just released - Virtual Reality Scenarios that you can build, April 2020 – and with gratis Covid19
  - https://www.VRpatients.com
- Real First Aid, First Aid and MCI VR both physical simulation scenarios Jan 2018
  - https://www.realfirstaid.com.au/
- Haseeb Iqbal, Published on Jan 27, 2018
  - Virtual Reality CPR created for the Oculus Rift using Unreal Engine 4. Integrated with Leap Motion technology
  - https://www.youtube.com/watch?v=Vq7k-Kg7ulo
- IRC ircouncil, Published on Oct 10, 2017
  - Project by Italian Resuscitation Council
  - Scientific Supervision: Federico Semeraro, Andrea Scapigliati & Giuseppe Ristagno
  - VR development: Studio Evil s.r.l.
  - https://www.youtube.com/watch?v=reSpd1hrVXQ
- ResusCouncilUK, Published on Sep 8, 2017
  - A virtual reality game-in-a-film that teaches you to save a life. Step inside, save a life.
  - Play now - http://lifesavervr.org.uk/ https://www.trustedtraining4u.co.uk/vr-training http://dualgoodhealth.com/info/
  - https://www.youtube.com/watch?v=QuUavS3WSAI
- Virtual Education Systems, Published on May 16, 2017
  - This video is showcasing the abilities of VRPatients.
  - https://www.youtube.com/watch?v=K_hFS7Cocfg
  - https://virtualeducationsystems.com/
- Marco Vettorello, Published on Sep 3, 2017
  - First test of teaching defibrillation (AED) with the HTC Vive in a homemade Unity scenario
  - https://www.youtube.com/watch?v=pMPtIzzd9xw

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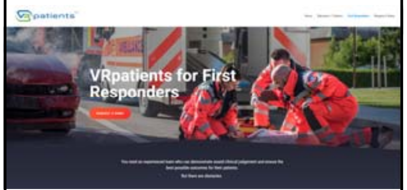
Virtual Reality Patients – EMS www.VRpatients.com



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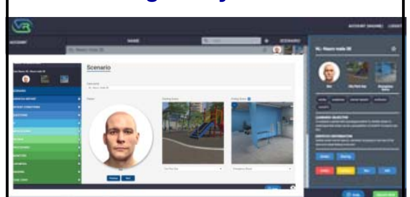
VR Training that you can create



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VR – CPR training

http://dualgoodhealth.com/info/

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VR EMS violence training

- AmbulanceVic,
  - Feb 2017, Virtual Reality training for all Ambulance Victoria paramedics to better protect them from violence as they respond to medical emergencies.
  - Ambulance Victoria is using Virtual Reality to help paramedics manage violence and aggression in the workplace.

www.globalfrontline.com.au

https://www.youtube.com/watch?v=lQhxrF5tvFA

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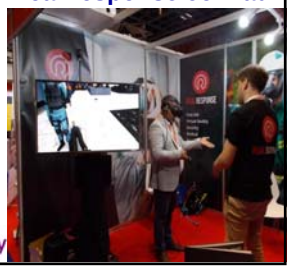
VR MCI - RealResponse.com.au



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Performance score card

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Virtual Reality
A new design tool too

Exploring the inside of a virtual ambulance

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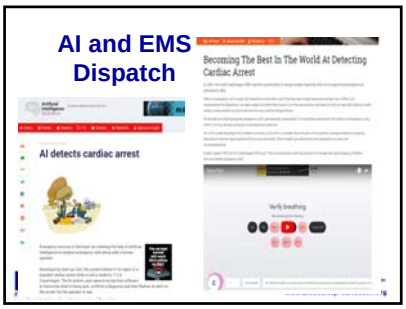

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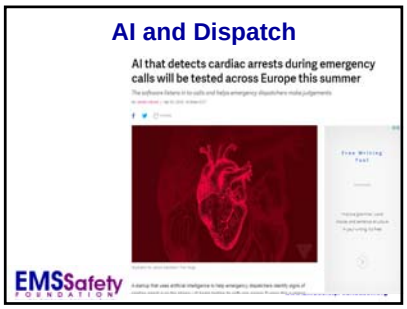

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Cardiac Arrest…. Engage bystanders!

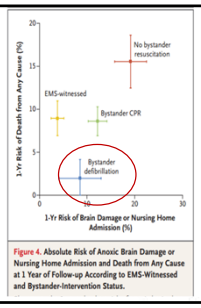

Figure 4. Absolute Risk of Anoxic Brain Damage or Nursing Home Admission and Death from Any Cause at 1 Year of Follow-up According to EMS-Witnessed and Bystander-Intervention Status.

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Unmanned Ambulance drones

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Manned Drones

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eHang passenger drone

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? The ambulance of the future

First passenger drone makes its debut at CES

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Very Important Principle

Ambulance transport safety is part of a SYSTEM, the overall balance of risk involves the safety of all occupants and the public

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Things can go wrong –

but when there are sound safety policies and technologies in place, and the system is well prepared, you can minimize harm

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Technical Collaboration is key

- We are NOT the experts in this science
- We cannot afford to play the silo game here, it is costing lives, time and money
- We MUST have a meaningful evidenced based approach to design, operations and policy
- We must be outcomes driven

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Conclusion

1) Safety must be inherent to operational process design and practice
2) Engagement of appropriate interdisciplinary expertise in systems design, transport safety human factors and safety analysis is essential
3) An understanding of the complex interplay between patient, provider and public safety from a systems perspective and culture is key to addressing effective and safe operational EMS performance.

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Your electronic handout/resource link with all text slides
Or if you are > 45 years
www.objectivesafety.net/PDFHO.htm
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http://www.objectivesafety.net
Your Handout and Additional Resources
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