


EMS System Safety and Innovation – the Cutting Edge

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1

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



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



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So what is safety?

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



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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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And.. what is innovation?

- Something new, original and more effective



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Today's Outline

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



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EMS Risk and Design needs

- Transport Medicine




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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

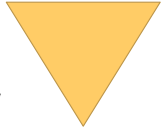



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How does design happen in EMS

- Tradition
- Experience
- Vision
- Interdisciplinary





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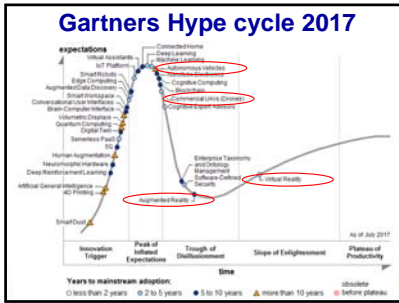
EMS Safety's frontier -

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



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11

1980's Then....

And NOW!...



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USA 1980's Then....

And 2019...



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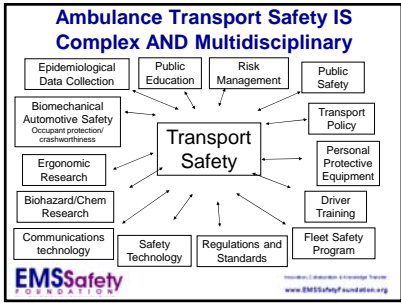
Safety in EMS is MULTIDISCIPLINARY

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



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14



15

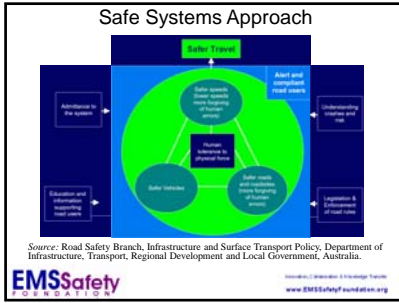
Joe Bourgraf, President, Ferno Group

- "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"

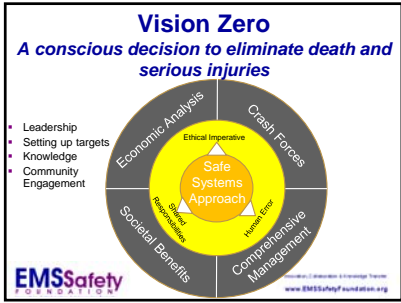


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Safety of the...

- Provider
- Public
- Patient

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Safety is a tool to save

- Lives
- Time
- Money

must be evidenced based

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Key elements to transport safety

- Impact Biomechanics
- Transport Ergonomics
- Fleet Safety

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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**

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**If you were to survey for what
 would enhance safety and
 efficiency**

- 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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Safety Dimensions we know

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

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USA Absence of safety performance standards and oversight

- Challenges in identifying best practice
- Myriad of unregulated commercial products
- No system safety performance standards
- Absent national safety oversight

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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

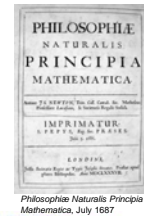


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The Laws of Physics Prevail..



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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37



38



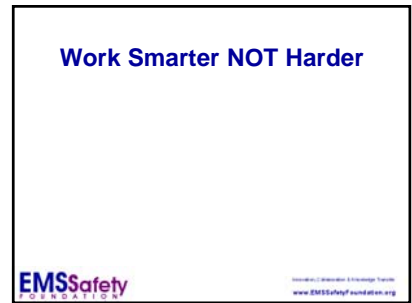
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42



43



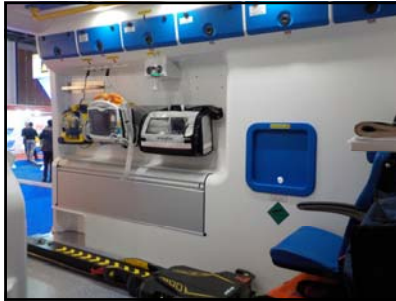
44



45



46



47

Some new aspects

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

48

**Ambulance Safety Innovation
 Design Module 1.0**
www.INDEMO.info
**the future concepts you can
 have right now!!!**
Better, safer and cheaper




49



50



51



52

Integration of new technology

- Fleet management tools
- Vehicle design
- Visibility
- The cloud
- The crowd
- AI
- AR
- VR

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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

ORBCOMM

Beyond Compliance: Driving Fleet Safety and Operational Performance with Trusted Telematics

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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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Fleet Mix ?

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The Motorcycle Medics

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Virtual Reality First Aid/EMS

- Real First Aid, First Aid and MCI VR both physical simulation scenarios Jan 2018
 - <https://www.youtube.com/watch?v=Vn7k3q7Jt0c>
- 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=Vn7k3q7Jt0c>
- IRC Council, Published on Oct 10, 2017
 - Project by Italian Resuscitation Council
 - Scientific Supervision: Federico Semeraro, Andrea Scapigliati & Giuseppe Risagaro
 - VR development: Studio Eye 4 s.r.l.
 - <https://www.youtube.com/watch?v=ed5d1tV7V0>
- ResusCouncilUK, Published on Sep 8, 2017
 - A virtual reality game-a-thon that teaches you to save a life. Stop, breathe, save a life.
 - Play now - <http://www.resuscitator.org.uk>, <https://www.resuscitator.org.uk/vr-training>
 - <https://www.youtube.com/watch?v=Qv1ar63W5A4>
- Virtual Education Systems, Published on May 16, 2017
 - This video is showcasing the abilities of VRPatients.
 - <https://www.youtube.com/watch?v=Kd1H30c0a>
 - <https://www.vrpatienteducation.com/>
- Marco Vetterello, 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=0MP3rzc0f0w>

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Virtual Reality Patients - EMS

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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=IQxrF5tvFA>



64



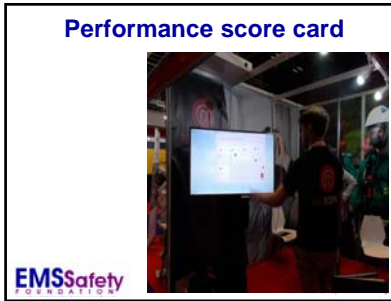
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68



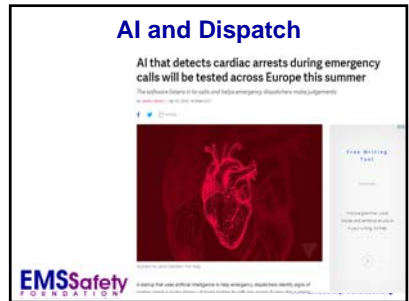
69



70



71



72

AI EMS Dubai 10X

Revealed: how AI will transform Dubai ambulance services

Emergency Response project aims to transform every Dubai incident into a potential lifesaver

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73

HIMSS 16

Conference & Exhibition
FEB 29 - MAR 4, 2016 | LAS VEGAS

TRANSFORMING HEALTH THROUGH IT

HIE Applications in Emergency Medical Services Settings

March 2, 2016

With Linda, CEO, Summit Medical First Responder
Dr. Mark Thibault, CEO, Oregon's Health and Board
Member, California

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74

Wearable tech..

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<http://www.visimobile.com/visi-product-info/>

visi MOBILE

PRODUCT INFORMATION

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CAD - Crowd and the Cloud

PULSE

Enhancing CADs so our customers can save time, money, property, and lives

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Integrated crowd sourcing

GENESIS PULSE

SAVING TIME. SAVING LIVES.

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Unmanned Ambulance drones

FlyPulse

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Manned Drones

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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

82

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



83

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

84

Conclusion

- Major advances in EMS safety research, New technologies, infrastructure and practice over the past 5 years
- Safety must be inherent to operational process design
- An understanding of the complex interplay between patient, provider and public safety from a systems perspective is key to addressing effective and safe operational EMS performance
- Engagement of appropriate interdisciplinary expertise in systems design, transport safety human factors and safety analysis is essential
- Development of substantive EMS safety standards is a necessity and a reality
- EMS is still way behind the state of the art in vehicle safety and occupant protection

85

Your electronic handout/resource link with all text slides



Or if you are > 45 years

86