



CANADIAN INSTITUTE
SAFETY, WELLNESS
& PERFORMANCE



CONESTOGA
SCHOOL OF BUSINESS

Ergonomic Design for Ambulances and Related Equipment: CSA D500:20

October 7, 2020

Presented by:

Amin Yazdani, PhD, CSP

Director

Canadian Institute of Safety, Wellness, and Performance

School of Business

Conestoga College Institute of Technology & Advanced Learning

CRE-MSD Network Researcher

Adjunct Assistant Professor, University of Waterloo and McMaster University

Canadian Standard for Paramedic Ground Emergency Response Vehicles and Equipment

SEPTEMBER 2020



Partnership:

- Center of research expertise for the prevention musculoskeletal disorders (CRE-MSD)
- CSA Group (Canadian Standards Association)
- Paramedic Association of Canada (PAC)
- Paramedic Chiefs of Canada (PCC)
- County of Frontenac
- Dessercom Inc.

Start-End: 01/2017 to 03/2021

Research team:

- CO-PIs: Amin Yazdani, Steven Fischer
- Project Manager: Bronson Du

Project Summary: Establish a Canadian Standard for Paramedic Ground Emergency Response Vehicles and Equipment.

Objective(s): Develop and promote a Canadian Standard that identifies the minimum human factors/ergonomics design and usage requirements for vehicles and equipment with consideration to paramedic and patient safety and infection control. Objectives include:

- Support manufacturers in designing and the procurement of emergency response vehicles and/or equipment in accordance with evidence-based practices;
- Direct paramedics in the safe and responsible usage of vehicles and/or equipment;
- Protect the health, safety & wellbeing of paramedics, and
- Protect public safety by improving patient safety and improving the capacity of emergency responders.

Outcome(s): This study will generate valuable information to facilitate future policy development and allow service providers to understand current methods in developing national standards.

Deliverable(s): The following deliverables signify completion of objectives:

- Environmental Scan, Literature Review and Needs Assessment Technical Reports
- Standards Development publication in both official languages
- Knowledge Transfer by way of a communications plan

Impact(s):

Public Safety and Security actors and communities have access to timely, relevant and credible information and advice. This feeds Canada's Safety and Security systems that are evidence-based, interconnected and resilient.



Prehospital Emergency Care

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Existing Science on Human Factors and Ergonomics in the Design of Ambulances and EMS Equipment

Bronson Du, Michelle Boileau, Kayla Wierts, Sue Hignett, Steven Fischer & Amin Yazdani

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Exploring the need for and application of human factors and ergonomics in ambulance design: Overcoming the barriers with technical standards

Bronson Du^a, Michelle Boileau^{b,c}, Kayla Wierts^{b,d}, Stephanie Beatrix Karch^{b,d}, Marcus Yung^a, Steven Fischer^{b,c}, Amin Yazdani^{a,b,d,e,*}

^a Canadian Institute for Safety, Wellness, and Performance, School of Business, Conestoga College Institute of Technology and Advanced Learning, Kitchener, ON, Canada

^b Centre of Research Expertise for the Prevention of Musculoskeletal Disorders, Waterloo, ON, Canada

^c Department of Kinesiology, University of Waterloo, Waterloo, ON, Canada

^d School of Public Health and Health Systems, University of Waterloo, ON, Canada

^e School of Geography and Earth Sciences, McMaster University, Hamilton, ON, Canada

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ABSTRACT

Ergonomic risk factors, such as excessive physical effort, awkward postures or repetitive movements, were the leading causes of injuries amongst EMS workers in the United States, of which 90% were attributed to lifting, carrying, or transferring a patient and/or equipment. Although the essential tasks of patient handling, transport, and care cannot be eliminated, the design of ambulances and associated equipment is modifiable. Our aims were to identify the extent of Human Factors and Ergonomic (HFE) considerations in existing ambulance design standards/regulations, and describe how HFE and the standards/regulations were applied in the EMS system. Through an extensive environmental scan of jurisdictionally relevant standards/regulations and key informant interviews, our findings demonstrated that existing standards/regulations had limited considerations for HFE. As a result, HFE principles continue to be considered reactively through retrofit rather than proactively in upstream design. We recommend that performance-based HFE requirements be integrated directly into ambulance design standards.

CSA Technical Committee:



Chair: Pierre Poirier (PAC)

Vice Chairs: Amin Yazdani (CISWP) & Gale Chevalier (County of Frontenac)

TC members: 40 members (30 voting members and 10 non-voting members)

CSA Project Manager: Ron Meyers

Scope:

- This Standard specifies requirements to facilitate the **application of ergonomics into ambulance design** and describes a user-centred design (UCD) process for establishing additional ergonomic requirements, as necessary.
- The objective of applying ergonomics is to **optimize overall system performance** by ensuring human performance and safety requirements are balanced with engineering and design requirements.

Ergonomic design for ambulances and related equipment

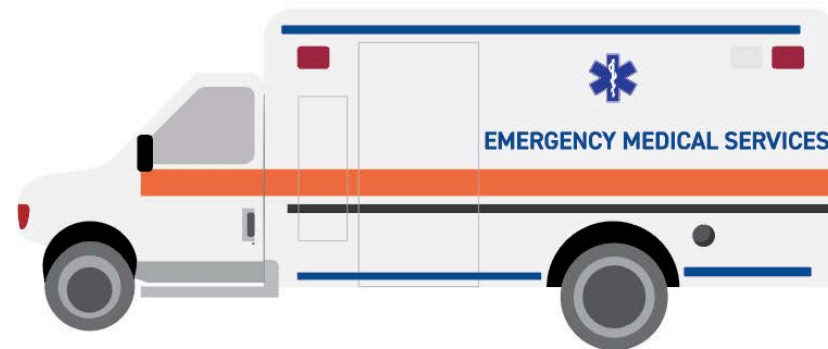


Key Requirements:

- Application of Ergonomics in Design
- General Patient Compartment and Driver Cabin Ergonomic Design
- Ergonomic Design – Patient Compartment
- Workplace Layout, Placement and Accessibility
- Driver Cabin Requirements

Annexes:

- Ergonomic Quality Control Checklist
- Task analysis methods to support user-centred design (UCD)
- Infection prevention and control (IPC) practices in ambulance design
- EMT Anthropometrics





THANK YOU!

Amin Yazdani, PhD, CSP

Director

Canadian Institute of Safety, Wellness, and Performance

School of Business

Conestoga College Institute of Technology & Advanced Learning

E: ayazdani@conestogac.on.ca



OCTOBER 2020

Worker and Public Safety: Standards Development

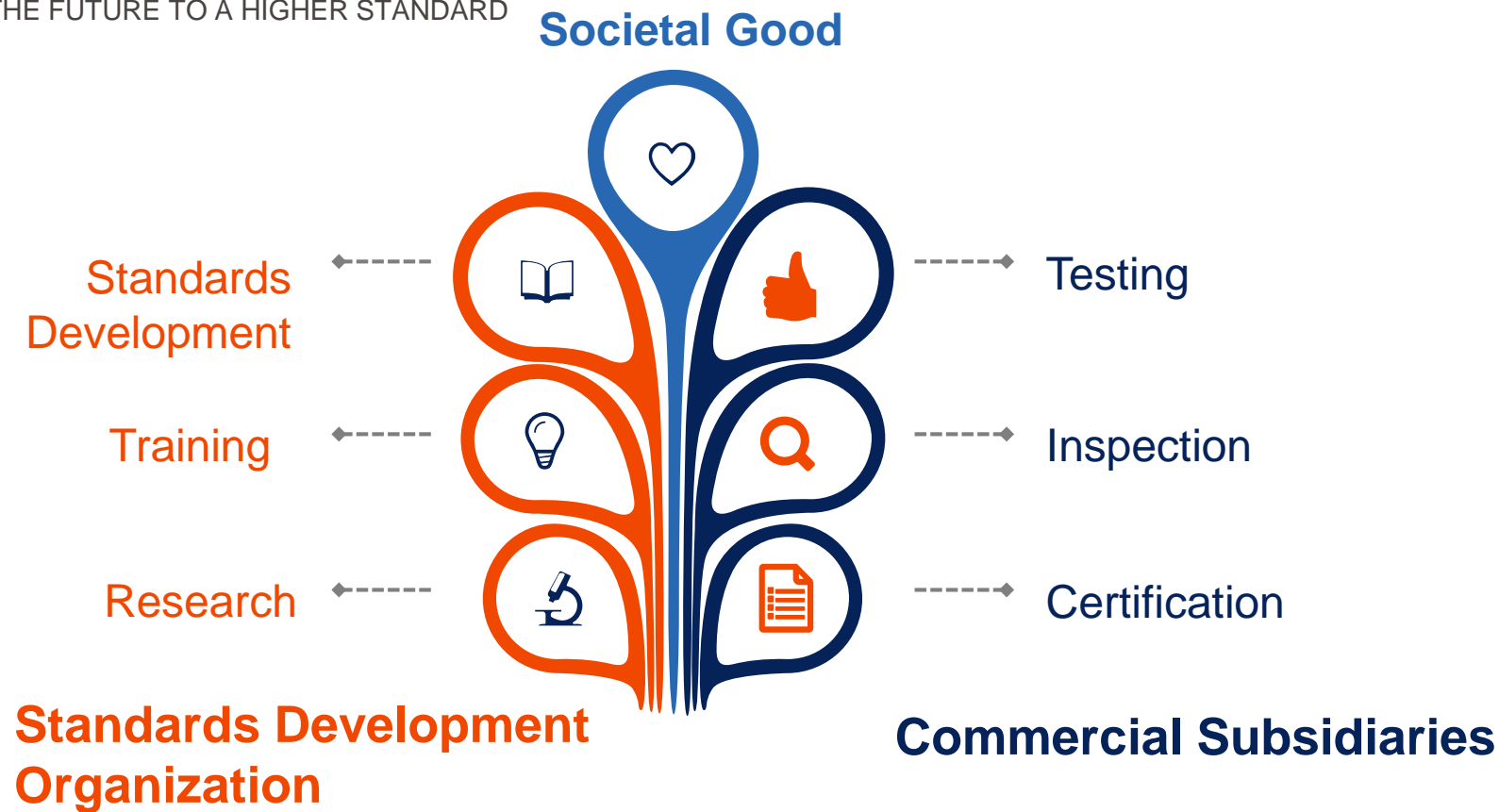
CSA D500 Webinar
October 7, 2020

Ron Meyers,
Project Manager, CSA Group



CSA Group At-a-Glance

HOLDING THE FUTURE TO A HIGHER STANDARD





Standards Development Organization



CSA Group: Member Driven. Globally Relevant.



Enhancing health, safety, the environment and trade in Canada and beyond

12

Areas of focus

+10,000

Dedicated members

+3,000

Standards

+1,115

Technical Committees

Holding the future to a higher standard

Standards and Guidance Solutions

Solutions through both accredited standards development and guidance development processes.

- Technical Guides
- Handbooks
- Workshop agreements
- Express documents
- Private standards



Why do organizations and governments adopt standards?

- Multi-stakeholder expert volunteer participation using a consensus based approach – CSA Group staff facilitate the accredited process
- Standards are evidence-based (supported by CSA Research)
- Less expensive approach / increased flexibility to respond to changes
- Ongoing systematic review (minimum of every 5 years)
- Promotes harmonization internationally



Worker and Public Safety Standards Program...

- 1 PGM / 4 PM / 1 Standards Intern / AA Support
- Published first general OHS Standard in 1948 (over 70 years)
- Over 59 active TCs (1800+ volunteer members), addressing more than 150 Standards
- Comprised of the Occupational Health and Safety (OHS) Portfolio of Standards and the Public Safety Portfolio of Standards (with 2 distinct Strategic Steering Committees)
- Approximately 50% of OHS Standards are referenced in regulation by the authorities having jurisdiction



Worker and Public Safety Program – Areas of focus with an OHS lens...

- **OHS Management System Standards**

- CSA Z45001:19 and CSA Z1000
- CSA Z1001 – Training
- CSA Z1002 – Risk Assessment
- CSA Z1005 – Incident Investigation
- CSA Z1006 – Confined Spaces
- CSA Z1010 – Management of Work in Extreme Conditions
- CSA Z1011 – Work Disability Management System

- **Standards for Public Safety Personnel**

- Paramedic Service Organizations
 - (e.g. D500 Ergonomic design for ambulances and related equipment)
- First Responders (e.g., Fatigue Management, Drones, etc.)
- Search and Rescue Volunteers Association of Canada

- **Machinery and Equipment Safety**

- Forestry
- Mining
- Workplace Electrical Safety

- **Occupational Diving Standards**

- **Personal Protective Equipment**

- **Elevation Hazards**

- Working at Heights
- Lifting and Hoisting

- **OHS Nanotechnology**

- **Worker Wellness**

- Psychological Health and Safety
- First Aid Kits and Training
- Management of Substance-related Impairment
- Carer Inclusive and Accommodating Organizations
- Fatigue Risk Management
- Ergonomics
- Work Disability Management System (Z1011)

National Standards Systems

Key principles:

- Process is open and inclusive
- Members develop technical content of standards
- Decisions are determined by consensus
- Standards are voluntary - unless referenced in regulation

National Standards body facilitates:

- Participation in international standards activity (IEC/ISO)
- Adoption of international standards where feasible



Directives – National Standards Development Process



Part 1: Participants and organizational structure

Part 2: Development process

Part 3: Drafting of standards

Part 4: CSA American National Standards

CSA Committee Structure



The diagram illustrates the CSA Committee Structure as a vertical hierarchy. It features five main boxes stacked vertically, each with a colored border and a white background. The boxes are connected by a vertical line. The top box is blue, the second is orange, the third is dark blue, the fourth is light blue, and the fifth is green. To the right of the bottom two boxes, a green arrow points to a separate box labeled 'Task Groups'. The background of the slide is a photograph of a large conference room with many people seated around a long table, facing a screen.

**CSA Group
Board of Directors**

Standards Development Council
(Oversight, Insight, Foresight)

Strategic Steering Committees (SSC)
(Strategic business direction, balanced matrix)

Technical Committees (TC)
(Drafting & approval of technical content, balanced matrix)

Technical Subcommittees (TSC)
(Drafting of technical content & consensus, no formal balanced matrix requirement)

Task Groups
Issues, working groups
formed by TCs, TSCs

Committee Composition

Balanced Matrix

- Total membership maintained in terms of relevant stakeholder interest categories, not affiliations.
- Each category has a minimum and maximum number of voting members.
- Ensures all points of view are represented in reasonable proportion, *and that the proportion is maintained*.

CSA Z1011 Technical Committee

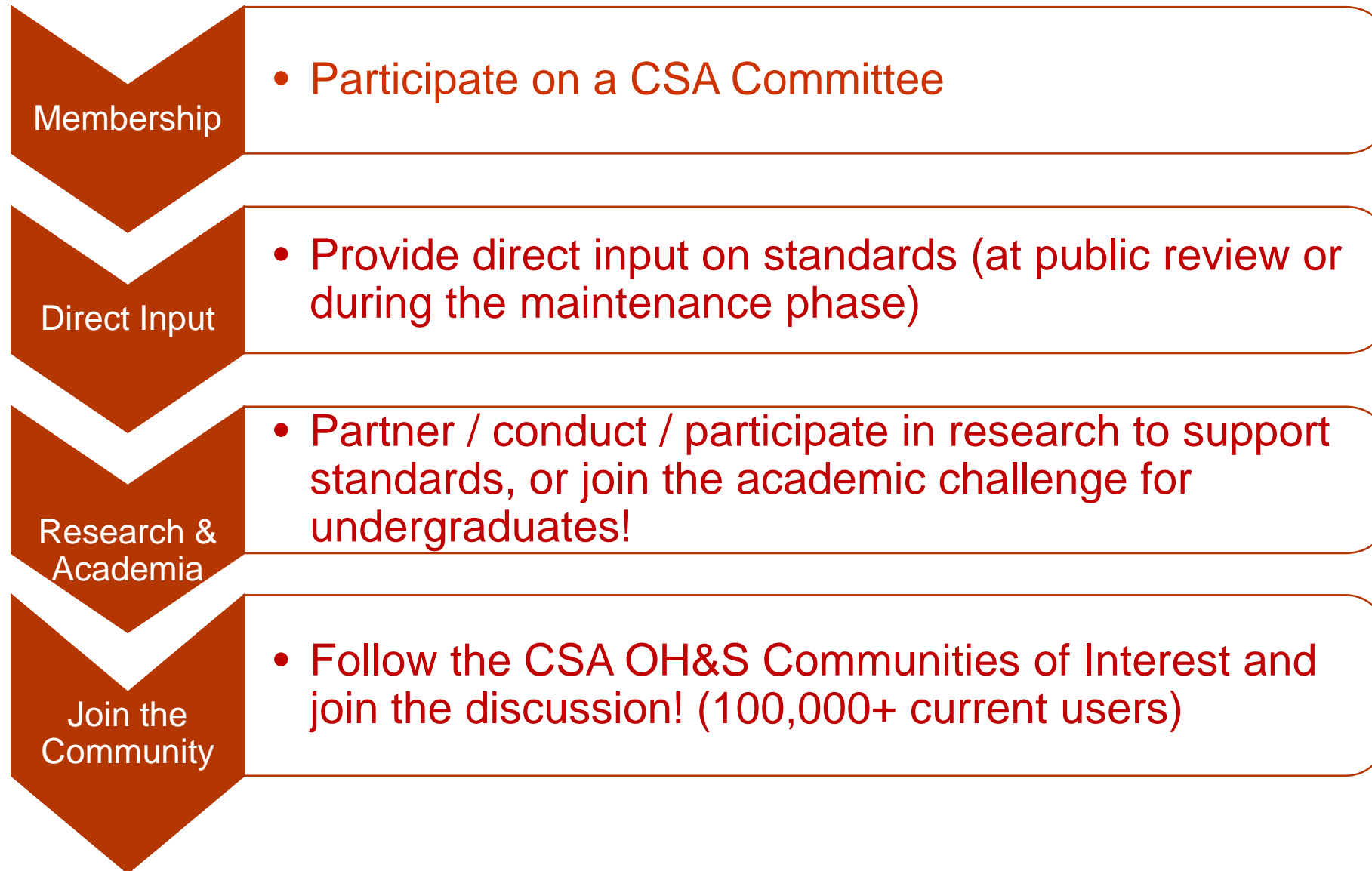
Interest Category	Min.	Max.	Actual
General Interest (GI)	3	6	5
Government and/or Regulatory Authority (GR)	3	6	3
Labour / User Interest (LU)	3	6	6
Professional Services (SP)	3	6	6
User Management (UM)	3	6	5



CSA Standards Development Process – The Cycle



How can you or your organization get involved?





Thank you.

Ron Meyers

Project Manager, Worker and Public Safety, Standards

178 Rexdale Boulevard

Toronto ON, M9W 1R3, Canada

1 416 747 2496

ron.meyers@csagroup.org

Introducing the New D500 Ergonomic Design for Ambulances and Related Equipment Standard: Benefits and Application for Paramedics

Pierre Poirier, Executive Director
2020 October 07



Paramedic Association of Canada
Association des Paramédics du Canada











**THINK
SAFETY**

ERGONOMICS



Introducing the New D500 Ergonomic Design for Ambulances and Related Equipment Standard: Benefits and Application for Paramedics

Gale Chevalier, Paramedic Chief
October 7, 2020





A busy day at Kingston Health Sciences Center













Introducing the New D500 Ergonomic Design for Ambulances and Related Equipment Standard: Benefits and Application for Paramedics

Impact on design

Renaud Carrier

October 11th 2020



Standards set the bar

- Base for safety standard
- Up to date features
- Brings more value to the user



D500 in ambulances

- Part rulebook
 - Clear directions
 - Base for safety
- Part guidebook
 - Helps to better address ergonomic considerations
 - Facilitates innovation



Impact on design - Benefits

Ergonomic considerations
integrated in design

- Access to patient
- Reach to controls
- Access to safety features

Impact on design - Benefits

Gives designers more flexibility to innovate in features and design within a framework

- Ingress & Egress
- Seating
- Storage
- Still requires certification (can be prohibitive to certain designs)

Impact on design - Benefits

Hold the product to a higher safety standard based on industry research

- Cot restraint
- Paramedic seating
- Equipment restraint
- Storage compartments



Impact on design - Benefits

- Encourage technology integration in products
 - Promotes awareness of available technologies



Conclusion

- Brings value to the users in ergonomics and safety
- Brings together literature in a coherent body of knowledge
 - Makes the information accessible to everyone
- Challenges the status quo
- Regulates products today and sets the way for future technologies and innovations