Muskoka redesigns ambulance exteriors with safety in mind

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In September 2008, Dr. Nadine Levick gave a presentation on ambulance vehicle safety to the Association of Municipal Emergency Medical Services of Ontario (AMEMSO) in London, Ontario.

Her talk captivated Director of Emergency Services Terri Burton who worked with her municipality and ambulance service, Medavie EMS Ontario, to increase the visibility of ambulances not only for public safety, but patient and paramedic safety.

The paramedic association appointed a lead paramedic, Vince Tremblay, to work with the district and the service to research materials and assist in the new design of ambulance exteriors. Paramedic Scott Trefry assisted with vendors and research.

Local paramedic input played a large part in the final design. Kevin King, General Manager of Ambulance Services adds: "It is my number one mandate to ensure paramedics have the tools necessary to do the job in a safe fashion with a primary focus on patient safety, and this new design will help ensure this goal is accomplished."

An innovative approach was implemented with Objective Safety's international team using a unique web-based consultation platform.

Dr. Nadine Levick of Objective Safety and John Killeen, of Ambulance Visibility in Australia, collaborated with Muskoka to provide both informational resources and specific guidance to enhancing their vehicles visibility. We learned a tremendous amount about the materials during our research and had to consider the following to go ahead with selection of the vinyl:

- Ability to withstand all types of weather including extreme Canadian winters;
- Wear and tear due to road surface contaminants including salt and sand;
- Ultra-violet (UV) sun bleaching;
- The vinyl's adhesive properties and overall durability;
- Human perception and response to the colours;
- Reflective properties which include colour, day and night brightness, colour wavelength within the spectrum, total percentage of light absorbed and reflected, and the angles of reflection;
- Manufacturing process, ease of application; and finally
- Paramedic use.

Because of our harsh climate changes and environmental changes, combined with the

MUSKOKA PROJECT PROVES ambulance services can greatly increase safety precautions by redesigning vehicles. *Photos courtesy Muskoka EMS*

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daily shift washing of vehicles which is done year-round, all graphics have a rounded edge. There are no square edges or cuts which a brush could get caught on.

Three of the major companies that manufacture reflective material in North America were evaluated: 3M, Avery and Reflexite. Each possessed the material properties we were looking for, but only one was able to comply with our projected field use.

We were looking for a material that had the ability to flex and conform with curves and shapes of different types of ambulance vehicles. Our choice was not limited to one single supplier.

The sheeting for the main body is primarily comprised of a high-visibility, day and night bright, and yellow-green fluorescent prismatic sheeting, which offers the highest rate of light return. This was applied to the lower portion and most visible part of the vehicle.

The outline and non-major components of the lettering such as numbering and flag decal were comprised of an engineered grade retro-reflective material commonly used on road signs which are made up of microscopic glass beads; this still offers an excellent retro-reflectivity, but with a lower percentage.

The key point in covering the vehicle was that the vehicle must be completely outlined so that its size and direction of travel would be noted in both bad weather and night conditions. High visibility striping went from the back to the front of the vehicle to show the size and length of the ambulance.

In Ontario, we follow standards set by the Ministry of Health and Long-Term Care. Standards including wording, font type and size, and display location, but they are non-specific when it comes to the rest of the design. This ability allowed us to take this far beyond a branding exercise and truly consider all aspects of public safety and visibility.

Our vinyl coverage increased from 20 per cent on the side of the vehicle to 80 per cent, and the rear increased from 30 per cent to 90 per cent high-visibility coverage.

We also added roof markings (vehicle number) and additional reflective material on the inside of all opening doors.

A consideration during this exercise was to address day/night vision and colour blindness of other pedestrians and drivers, the influence of colour, and depth perception. The human eye can see an unlimited distance; however, there are factors which affect what we do see. For example, we recognize certain colours. The high visibility fluorescent yellow we chose for our vehicles is not a colour found in nature or in an urban setting, therefore it draws the eye to it directly. This is similar for correct sign recognition. We recognize stop signs universally.

Retro reflective and fluorescent materials have been used widely on EMS vehicles. Depending on spectral distributions of the light produced by overhead lights and head lamps, the chromaticity of markings will shift at night. Colour coding is used widely for prompt driver recognition, for highway signs, pavement markings, and other traffic markers.

Human vision will not see red when the eyes have adapted to darkness, and will see red poorly when adapted to bright light.

Researchers found that lateral peripheral vision for detecting yellow is 1.24 times greater than red. One quarter of 10 per cent of the male population with red-green colour deficiencies cannot see red at all. Yellow is the most easily visible colour for both normal and colour-deficient groups under all testing conditions.

The spectral sensitivity curve shows the regions of maximum visual sensitivity of the eye for light wavelengths in different colours. Wavelengths or colours which stimulate the outlying peripheral photo-receptors earlier all fall within the greenish-yellow. Blue hues are detected next and the red regions are the last colours to be detected. Therefore our human vision is red-orange blind in darkness and low light conditions. Red can be perceived as black.

We chose the florescence of the yellow-green material because it is very visible in daylight and during dawn and dusk.

For more info, see www.ambulancevisibility.com and www.objectivesafety.net