# Four Recommendations for New NCAP Safety Ratings

*ASRI Briefing at NHTSA Public Meeting, October 2018*

Good Morning, my name is Kennerly Digges and I represent the Automotive Safety Research Institute

We have 4 recommendations:

1. Provide consumers an immediate **Silver Rating** for seniors,
2. Add a rating for R**ear Seat Occupants**.
3. Include a **Far-side safety rating**
4. Initiate a **Post-crash safety rating** system

## Silver NCAP

The US population over 65 is expected to increase from 40 million in 2010 to 72 million in 2030, an 80% increase.

Unless the auto safety needs of this growing population are addressed, they will become an increasing burden on our acute care facilities.

A Silver NCAP is needed to improve safety for this growing population.

The older population differs from their younger counterparts in three important ways:

Their injury tolerance is lower

Their body region most susceptible to injury and death is different

Their average crash severity is lower.

Our 2013 ESV paper shows that the chest injury rate for 65+ year olds is more than 4 times that of persons in the 15 to 43 age range.

Even the 44-64 age range has 2 times the chest injury rate.

The presently used NCAP chest injury risk criteria is for a 35 year old male and it is excessive for a senior.

In the short term, ASRI recommends an alternate computation of the star ratings derived from the NCAP 35 mph frontal barrier tests to make the ratings more relevant to the needs of seniors.

The recommended change would take the form of using chest and neck injury risk curves for older rather than younger occupants as recommended in our 2013 ESV Paper.

We also recommend moving the seat of the 5th passenger dummy to the center position and controlling the belt geometry for both dummies.

This supplementary rating scheme could be adopted immediately and would provide a first-generation Silver NCAP Rating.

The present NCAP test at 35 mph does not encourage systems that perform equally well at lower severities where older occupants are more frequently injured.

Therefore, we recommend a separate low speed frontal NCAP test, at a speed in the vicinity of 25 mph and with more stringent injury criteria.

A 2013 Stapp Paper found that among seriously injured belted occupants in frontal crashes, over 50% were in crashes less severe than 26 mph.

Older occupants are over represented in these low speed crashes.

Our 2007 AAAM Paper (Vulnerable Occupants) found that, for seniors, over 75% of the serious injuries occurred at seveities less than 26 mph. (50+)

A low speed test would be beneficial to all ages, (but especially to seniors) since it would encourage higher levels of safety at lower speeds where a majority of the serious injuries occur.

It should be an added to NCAP.

## Rear Seat NCAP

A number of recent papers show that the frontal stiffness of recent passenger vehicles has increased and the rear seat safety has decreased. [Samaha, SAE 2010, Saharie, Stapp 2009 and Accident Analysis 2014].

The restraint technology for the rear seating position has not kept up with technology in the front seating positions.

Historically, belted rear seat occupants were at a lower fatality risk than their belted front seated counterparts.

However, , belted occupants 25 years and older are significantly less protected in the rear seat compared to right front seat of 2000+ MY vehicles.

A Rear Seat NCAP would encourage more competition and innovation in the improvement of belted rear seat occupant safety.

We recommend that NCAP frontal tests include at least one $5^{th}$ percentile dummy in the rear seat.

Injury criteria should be similar to our recommendations for Silver NCAP in order to provide added safety for children and seniors.

A Rear Seat NCAP would encourage more innovation and reverse the decline of safety for rear seat occupants.

## Far-side NCAP

Extensive research and development exists to provide a basis for a far-side NCAP.

An international Far-side research project was completed in 2009 that included participation of Ford, General Motors, Autoliv, NHTSA, Australian MoT and 7 Universities in the US and Australia.

The research included comparative tests of cadavers with the WorldSID and Thor Dummies.

Either dummy was found to be suitably bio-fidelic in representative Far-side crashes.

The international project also included data analysis of Far-side injury frequency and risks, crash tests, computer models, and benefits analysis.

Computer modeling showed that Far-side restraint systems could also provide benefits in Rollovers.

Our 2005 SAE Paper found that the number of belted occupants with serious injuries in combined Far-side crashes and Rollovers was 123% of those injured in Near-side crashes.

EuroNCAP has developed a Far-side safety assessment protocol that is currently being evaluated. It is scheduled for incorporation in their ratings by 2020.

US NCAP should immediately incorporate the principal elements of the EuroNCAP test procedure in a US rating.

Far-side NCAP ratings would encourage innovation to address a population of injuries that are 123% of the Near-side injuries.

This is the largest injured population that has not been addressed by regulation or consumer information.

Far-side EuroNCAP should be adopted immediately.

## Post-Crash NCAP

The Haddon Safety Matrix, proposed by NHTSA's first Administrator, showed 9 opportunities for reducing highway casualties.

Haddon recommended initiatives to reduce casualties in all 9 cells of his matrix.

Three of the matrix cells involved vehicle factors.

They were: (1) Crashworthiness; (2) Crash Avoidance; and (3) Post Crash Safety.

NCAP currently addresses the first and is considering the second.

We recommend adding the third –Post Crash Safety- which is not currently being considered.

Haddon identified two vehicle factors in Post-Crash Safety – (1) Ease of Access and/or Egress and (2) Fire risk.

Since Haddon, a third factor has emerged – Automatic Crash Notification

We now recommend a Post-Crash NCAP with three components–

(1) the ease of egress from the crashed vehicle

(2) the post-crash fire safety that includes the prevention of leakage of all flammable fluids and of battery faults

(3) the effectiveness of the automatic crash notification system

### Vehicle Egress

We have proposed a door opening test procedure and associated rating factors in an earlier docket submission.

We will include our egress proposal in the docket submission of our current recommendations.

### Fire Safety

Extensive research on Fire Safety has been conducted by General Motors and subsequently by the Motor Vehicle Fire Research Institute as part of the CK Pickup Fire Safety Settlement Agreements during the time period 1996 to 2009.

This research forms the basis for justifying Fire Safety tests as part of NCAP.

The technical basis for the Fire Safety NCAP rating is contained in our 2009 ESV Paper. (Digges, K., and Stephenson, R., "The Basis for a Fluid Integrity NCAP Rating," Paper Number 09-0215, Proceedings of the 21st ESV Conference, June 2009.)

**Automatic Crash Notification**

In July 2018, ASRI submitted to the Docket, 18 research papers that that provide a foundation for an NCAP rating of the Automatic Crash Notification System.

With appropriate government guidance, ACN could save lives by notifying 911 operators of crashes with time critical injuries that need urgent response.

Possible levels of star awards are as follows:

1- Robustness of the system; does it transmit in rollovers with the vehicle on its roof and in areas with low cell phone signals.
2- The effectiveness of the system in its ability to rapidly notify emergency responders of crashes with time critical injuries

In summary we have 4 recommendations:

1. Provide consumers an immediate **Silver Rating** for seniors,

2. Add a rating for **Rear seat occupants.**

3. Include a **Far-side safety rating**.

4. Include a **Post-crash safety rating** of Fire Safety, Egress, and Crash Notification