Post-test training of older drivers – Comparison of US and European approaches

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Quantitative demographics

Proportions of over 65 in the population

	USA	Japan	Germany	France	Italy	UK
1980	11.2%	9.0%	15.6%	14.0%	13.1%	15.1%
1990	12.4%	12.0%	15.0%	14.0%	15.3%	15.7%
2000	12.5%	17.1%	16.4%	15.9%	18.2%	16.0%
2010	13.2%	21.5%	19.8%	16.6%	20.8%	17.1%
2020	16.6%	26.2%	21.6%	20.1%	24.1%	19.8%
2050	26.9%	42.3%	38.1%	32.7%	42.3%	34.0%

Qualitative demographics

better health condition

more financial resources

more wishes for autonomy and maintaining active community lifestyles.

driving one's car as long as possible

driving more as well

Increase of numbers, proportions and mileage of older drivers

Increase of number of women drivers

So, more drivers, more accidents ?

- No !
- National fatal crash involvement rate per licensed driver for drivers 70 and older has declined since 1997 up to 2008, and has done so at a significantly faster pace than the rate for drivers ages 35–54.
- Also for nonfatal injury crashes and property-damage-only crashes;
- both less likelihood of being involved in a crash and greater likelihood that they will survive when they do crash.

Fallacious beliefs …

- The “famous” U-curve with age of accident risk (traffic fatality per km driven) with age relies on a statistical artifact
- The relationship between risk and risk exposure is not linear
- Independently of age, drivers travelling more kilometers will typically have lower crash rates per kilometer than those driving fewer kilometers.
- When the crash rates of drivers of different ages are compared after being matched for yearly driving distance, most drivers aged 75 years and above are indicatively safer than all other drivers

Cohort effect

- « Today’s » older drivers are different than yesterday « older drivers » (more experience)
- Contemporary cohorts of older drivers have less important crash rates than past cohorts

Evolution of accident type with the cohorts

- *Evolution of accident type with the cohorts*
- Accident type distributions can be compared in successive cohorts of older drivers, with focus on intersection accidents
- The occurrence of intersection accidents thus is both an age-related and a cohort-related phenomenon: age-related (it increases with age), but with cohort-related variance in timing (it appears at a later age in recent cohorts)

Older road users' perception of risk

- Danish study (Siren and al, 2011) on risk perception of older drivers by focus groups
- Older persons tended to perceive risk as something external (e.g., bad infrastructure) that can sometimes be managed by internal means (e.g., skills). The results also indicated that while risk perception and driving behavior of older persons are connected, the connection is perhaps different from what has previously been suggested. Older drivers might self-regulate their driving, not as a result of perceiving themselves to have limitations but by perceiving other road users behaving dangerously.

Despite all this …

- Persistency of the association “older driver=dangerous driver”
- From exceptional and spectacular crashes, totally not representative of older drivers’ typical crashes, older drivers play unfortunately the role of “traffic safety scapegoats”.
- The political debate about driving cessation, its age, modalities and criteria come back all the time.
- This is an important question as driving cessation is often experienced as a « metaphor of death » by older drivers (Assailly and al, op cit, 2006), and we must know so who must decides and/or give advices.

How to decide driving cessation?

- mandatory medical exam after the age of 65 or 70: no !
- Better follow-up by their family doctor
- Majority of older drivers report not receiving advice about the potential impact of their medical condition, their medication on driving from their doctor. The findings indicate a need for improved dissemination of evidence-based health information and education for older drivers and their doctors.

Other ways to improve safety than retraining

- License restrictions
- Driving self-restrictions: avoidance of driving in bad weather (47.5%), at night (27.9%) and on highways or high-speed roads (19%).
- Intersection design (audit of blackspots of older drivers crashes): gap selection in left-turn across oncoming traffic; longer sight distances, introduction of fully-controlled turning signals, transformation in a roundabout, etc

Post-test training of older drivers in Europe and the US

What says the scientific literature on the evidence regarding the effectiveness of older driver refresher interventions on outcomes such as driving awareness, driving knowledge, driving performance, and crash rates ?

What is post-test training of older drivers?

- *1-educational intervention “classroom type”*
- *2-Educational program combined with on-road training*
- *3-Physical retraining intervention*
- *4) multi-faceted driving safety program*

1-educational intervention

“classroom type”

U.S. educational intervention "classroom type"

- the American Automobile Association (AAA) Driver Improvement Program includes topics on:
- driving risk, developing good visual habits, communication, adjusting speed, safety margins, driving emergencies, vehicle features, alcohol, medications, and aggressive drivers.

Educational intervention "classroom type"

Strong evidence from randomized controlled trials that an educational intervention curriculum improves driving awareness and self-regulation (deciding when and where to drive) versus no intervention

Strong evidence that it improves driving behavior.

Moderate evidence that it is not effective in reducing crashes.

2-Educational program combined with on-road training

US on-road training

- the American Automobile Association (AAA) Driver Improvement Program includes topics on:
- seat position, mirror adjustment, visibility, safety belts, viewing strategy, speed control, safe following distance, stopping distance, vehicle position, lane changes, turning, signaling, intersections, right of way, backing up, highway driving, and communication.

Canadian on-road training

- the 55-Alive/Mature Driving Program

  It is a group-based refresher course for older drivers, designed specifically to help improve driving skills and maintain independence. The program is taught by qualified instructors (one per site) in two, 3-to-4 hour sessions. The on-road education component involves two, 30-to-40 minute sessions with a certified instructor that focused on concepts discussed during the class sessions.

French educational program combined with on-road training

- The refresher programs of the “Prevention routiere” organization
- Objectives:
- .to update knowledge on highway code and driving
- .to be aware of technological evolutions, of the complexity of the driving task and of the effects of ageing on driving
- .to identify in real traffic situations one’s habits, skills and difficulties.
- This last point shows that post-test training can be understood in the perspective of the GDE matrix and of its third column (to improve driver self evaluation)

French educational program combined with on-road training

- Participants:
- Drivers 60 and older
- Course leaders
- One psychologist, one driving teachers' trainer, one driving teacher
- Technical supports
- Powerpoint, reflexometer (for reaction time), ergovision, SIMALC (for blood alcohol curve simulation), videos

French educational program combined with on-road training

- Conditions
- One day and a half, 12 participants

- The tool used for theoretical programs: A quiz “Conduite senior Restez mobile!”
- 1-Statistics
- 2-Detailed analysis of six real cases of older drivers accidents
- 3-Highway Code and road infrastructures
- 4-Health and driving
- 5-Vehicle equipments
- 6-Mobility

French educational program combined with on-road training

- Pedagogical method
- *Transfer of knowledge:*
- .accidents statistics, risk factors, data on older drivers, typology of older drivers accidents
- .effects of ageing on driving
- *On-road driving audit*
- 45 minutes of real traffic driving, observation by a driving teacher, debriefing in group with the driving teachers' trainer.

French educational program combined with on-road training

- *Practical workshops*
- Slides and quiz on the highway code
- Reaction time, vision test, blood alcohol concentration estimation
- *Self evaluation and feedback*
- Questionnaire of self evaluation, analysis with the group, debriefing

Belgian educational program combined with on-road training

- The CARA experience

- CARA is a recent innovation in Belgium, it is a center designed to both detect and treat problems of older drivers. Drivers are sent to this center, either by their insurance (after they had one or more accidents or when changing society) or by their doctor.
- The CARA on-road test Belgian consists of a standardized driving test of 35 km, which is filmed on video, driving instructors judge without knowing who is the driver. The trip combines driving in town and on motorways.

Belgian educational program combined with on-road training

- After the test, two raters complete an evaluation grid that was developed at the University of Groningen by Brouwer et al.: the TRIP (Test Ride for Investigating Practical Fitness-to-drive), the Belgian version contains 11 dimensions:

Belgian educational program combined with on-road training

- -Lateral position on the road (maximum score of 35 points)
- -Changes and choices of file (16 points)
- -The gap with the car in front (of 11 points)
- -Speed and adaptation (of 11 points)
- -Visual behavior and communication (eye movements, eye contact with other drivers on 36 points)
  -Perception and response to signaling (8 points)
- -Mechanical operations (direction of the steering wheel and pedals on 12 points)
- -The anticipation, the tactical behavior in changing situations (of 8 points)
- -Understanding and participation in traffic (of 8 points)
- -Left turns, in different situations (on 44 points)
- -Insertion in traffic, especially on motorways (20 points).

Belgian educational program combined with on-road training

- From these 11 dimensions, we can identify three main factors:
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  -A visual integration factor, which adds the scores of 3 dimensions (visual behavior and communication, perception and response to signaling, understanding and participation in traffic);
  -An operational factor, which adds the scores of 2-dimensions (lateral position on the road, mechanical operations);
- -A tactic factor, which adds the scores of four dimensions (the changes and choice of file, the gap with the car ahead, speed and adaptation, anticipation).

Research from the CARA experience

- Retrospective research (De Raedt, Ponjaert-Kristoffersen, 2001) has been conducted on 84 "active" drivers (60 men, 24 women) aged 65 to 96 years (average age: 78, 6)
- The conclusion of the Belgian experience is that the predictability of the road test and of neuropsychological tests is improved with the specificity of the accident.
- If the prediction of certain types of accidents is actually more accurate than the accidental involvement in general, it remains moderate.

Research from the CARA experience

- The measure of the difficulties of perceptual and cognitive functions can effectively predict the difficulties of driving that are causing accidents.
- The neuropsychological tests are more predictive than the road test.
- The neuropsychological tests measure better the functions underlying the errors that lead to accidents of older drivers; on the other hand, the tactical aspects of driving are difficult to measure in the laboratory and will be better addressed by a road test.

  The limits of prediction of the occurrence can be understood in relation to the hierarchical model presented by Michon.

Educational program combined with on-road training

There is moderate evidence from randomized controlled trials that an education intervention curriculum in combination with on-road training improves driving knowledge.

Strong evidence that it improves on-road driving performance.

No studies have investigated whether it reduces crash rates.

3-Physical retraining intervention

US Physical retraining intervention

- The intervention protocol targets the following physical domains and abilities:

  axial/extremity conditioning: cervical, trunk and axial rotation; cervical flexion and extension; shoulder flexion and abduction; hip flexion and abduction; knee flexion and extension; ankle dorsiflexion and plantarflexion; upper extremity coordination/dexterity and hand strength; and gait and foot abnormalities.

US Physical retraining intervention

- The protocol: two experienced physical therapists administer the intervention. Each conditioning and coordination domain consists of three progressive levels of exercises. A manual with pictorial and written instructions and relevance of each exercise to driving is provided to participants and reviewed with the therapist at weekly visits.

US Physical retraining intervention

- The therapist gradually increase the number of repetitions for each exercise once the participant demonstrated the ability to perform the exercises safely and correctly. The exercise program is designed to take 15 minutes daily.

Physical retraining intervention

- Moderate evidence from randomized controlled trials that physical retraining intervention improves driving knowledge in older drivers.
- Moderate evidence that it improves on-road driving performance in older drivers.
- There are no studies that have investigated whether a physical training intervention alone reduces crash risk.

4) multi-faceted driving safety program

US multi-faceted driving safety program

- A multi-faceted driving safety program that includes physical, behavioral, visuo-spatial, cognitive, driving-specific knowledge, and on-road retraining is SHARP (See, Hear, Attend, Respond, Perform).
- Not evaluated yet

Conclusions

Comparizon of US and European approaches

- The on road components of driving skills training programs are very similar in US and EU
- The EU programs have incorporated some principles and strategies based on the last theoretical models (Michon's hierarchical model and the G.D.E. matrix)
- The EU programs are lacking of evaluations, especially of follow-ups of older drivers after the programs completion

Conclusions

- Evidence-based practice is essential in making decisions regarding health care interventions
- In the case of older drivers, there is a pressing need for interventions aimed at safety.
- It is encouraging to see the recent growth of research in this domain.
- While the relatively few studies that were conducted in the 1990's and early 2000's focused primarily on a uni-modal intervention (most often classroom education), more recent studies are attempting to incorporate at least two training components such as class education combined with on-road training.

Conclusions

- What has as yet not been explored fully is the benefit of a multi-faceted intervention that includes education, motor, sensory, cognitive, and behavioral aspects, all of which have been shown to be important components of safe driving.

- Given that the task of driving involves a complex interplay of all of these, the need for such studies is clear.

- While multi-modal intervention studies are typically more difficult to design than uni-modal intervention studies, this should not deter researchers from attempting to answer the question of their effectiveness.

Conclusions

- As we develop refresher programs, we will need to evaluate their contents and benefits carefully. Some interventions may actually be detrimental rather than beneficial. The attributes of a program that contribute to a detrimental effect must be determined. This will enable program developers to better understand the “how to” of optimizing educational programs, thereby maximizing the beneficial impact for specific sub-groups of older drivers.

Conclusions

- The emerging evidence that intervention can change knowledge and on-road driving behaviors of older drivers is highly encouraging.
- There is also a need to conduct studies that measure the impact of intervention on crash rates: these studies are currently missing from the scientific literature. This is an urgent research agenda that needs to translate quickly into the creation of community-based programs that are easily accessible and affordable for older drivers.

Conclusions

- It is time for a strategic public and private sector collaboration that supports older drivers safety programs. The implicated stakeholders, including the general public, older citizens, the health care system, legislators, and insurance companies amongst others, working together, can build a comprehensive plan that has both behavioral and monetary incentives encouraging participation in programs aimed at keeping older drivers safe.

Thanks for your attention!