

MOBILITY SCOOTERS FOR AN AGEING SOCIETY

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1. SUMMARY

This study reviewed and evaluated the use of mobility scooters in their operating environment. A literature review of North American and international definitions and regulations regarding the use of scooters was undertaken. Questionnaires were developed to survey selected Canadian government organizations, major transportation providers/carriers, users, scooter suppliers/dealers, and provincial and municipal governments. To complement the survey data, an additional stakeholder forum on mobility scooters was held in Qualicum Beach, British Columbia (BC), which is predominantly a retirement community that is abundant in scooter users. There was agreement that mobility scooters need to be clearly defined in terms of their speed and transportability, but should not be registered as vehicles nor require users to be licensed. Recommendations included holding a stakeholder forum to validate proposed definitions and charting the next steps for implementation; developing training manuals and universal battery connectors; updating standards and mandating safety features and attachment points for scooters; and specifying realistic payload requirements for large and heavy scooters. Recommendations also included developing specific scooter signage on rights-of way and dimensions for scooter parking spaces.

Key Words: Mobility scooters, regulations, pedestrians, vehicles

2. PURPOSE OF THE STUDY

In developed countries with an ageing population, mobility is one of the major concerns for older adults who are unable to drive their cars anymore. Some may be healthy seniors who are semi-ambulatory or they may be persons with disabilities. Research indicates that the use of mobility scooters become a preferred mode choice to maintain 'automobility'. A study undertaken by Transport Canada in 2010 examined the use of mobility scooters from the perspectives of the user, the vehicle, and the environment [Rutenberg et al, 2011]. This paper will discuss the research methodology, the results of the survey and the conclusions and recommendations.

The purpose of the study was to analyze and assess the environment for three- and four-wheel mobility scooters, and to identify future needs for user safety.

The four main parameters examined were:

- the scooter,
- the user,
- the environment and
- the key stakeholders

3. METHODOLOGY

The methodology included a national and international literature review, consultations through surveying public and private sector stakeholders via questionnaire and feedback received from a stakeholder forum in Qualicum Beach, BC. The literature review, survey and forum results were analyzed. Conclusions and recommendations were formulated, taking into account:

- the federal legislative and regulatory authority on passenger and vehicle safety,
- the provincial responsibilities in regulating vehicle use and
- the municipal jurisdiction over municipal roads and pedestrian facilities.

To conduct the consultations, eight questionnaires were developed and issued to selected Canadian government departments, major transportation providers/carriers, scooter dealers, provincial and municipal governments and user groups.

A total of eighteen (18) questionnaires were distributed to the following stakeholders:

- Canadian Council of Motor Transport Administrators (CCMTA) (1)
- Canadian Standards Association (CSA) (1)
- Canadian Transportation Agency (CTA) (1)
- Federation of Canadian Municipalities (FCM) (1)
- Industry Canada (1)
- scooter manufacturer (1)
- scooter users and associations (7)*
- transportation providers (5)

* Of the seven (7) questionnaires distributed to scooter users and associations, three (3) responded.

To complement the questionnaire responses, an additional stakeholder forum on mobility scooters was held in Qualicum Beach, BC, which is predominantly a retirement community that is abundant in scooter users.

In total, 26 participants attended the scooter forum held in Qualicum Beach, BC, in October 2010. The participants included:

- representatives from the Town of Qualicum Beach (Mayor, 2 planners and 3 councillors [Municipality]);
- scooter users (7);
- BC Ministry of Transport; Traffic Safety (2);

- Greyhound Bus Lines (1);
- local law enforcement agent (1 Royal Canadian Mounted Police (RCMP) constable);
- manufacturer/dealer (2 representatives from one dealer);
- BC Transit (4 representatives) and
- Transport Canada Project Team (3 persons).

4. RESULTS

4.1 Results of Literature Review

The analysis of the literature review revealed the lack of a uniform definition for mobility scooters both nationally and internationally. In Australia and Sweden scooter use is distinguished by speed. In most countries, users of mobility scooters are considered pedestrians and are therefore not required to be licensed to operate a scooter. The scooters do not need vehicle registration; and vehicle- or driver-specific insurance is not required. Unlike users of power and electric wheelchairs who are unable to walk, the mobility scooter is popular with a wider spectrum of the population: for ambulatory elderly persons, semi-ambulatory older and young people, and persons with disabilities for their social-recreation, shopping or medical trips. However, no statistical data on user profile was found in the literature.

The built environments in which mobility scooter users operate are rights-of-way (ROW) from origin to destination. This includes parking and internal circulation within enclosed compounds (e.g. indoor shopping mall). Generally there is a lack of design guidelines for scooters. Certain design provisions in the Canadian Standards Association's (CSA) 2004, Accessible Design for the Built Environment standard are applicable to facilitate circulation [CSA, 2004]. However, there are a lack of standards specifically for scooters on ROWs, entrances to buildings and parking. Signalization specific for mobility scooters is also lacking. Some signage examples from the Manual on Uniform Traffic Control Devices (MUTCD) are applicable for scooter users. However, the MUTCD does not provide specific signs for the safe operation of scooters [MUTCD, 2004].

With regards to transporting scooters on board vehicles, considerations include the CSA's 1992 Transportable Mobility Aids for Occupancy in Moving Vehicles, which contains specifications for transportable wheelchairs and scooters [CSA, 1992]. In Canada, Europe, Australia and Asia, the predominant securement systems in public transit for mobility scooters are rear-facing systems, which do not require tie-downs or an occupant restraint system, except for three-wheelers. In other countries, especially the U.S., most of the securement systems are forward-facing, which require that vehicle tie-downs and occupant restraint systems be used. Securement systems for mobility scooters are required on intercity buses and trains. Typically, on intercity travel modes, the scooter is stowed and the passenger is transferred to a regular seat. There is a lack of information on carrier and terminal operator websites for scooter users such as how to prepare for a trip, what to expect at terminals and what type of service is provided.

The literature review found gaps in the legislative and regulatory frameworks for mobility scooters. In Canada, only municipalities have the power to enact bylaws on

the use of mobility scooters. Neither the federal nor the provincial governments have applicable legislations since mobility scooters are not yet considered vehicles. Maintenance of infrastructure (typically the responsibility of municipalities) is an important factor for the safe use and operation of mobility scooters. Currently no comprehensive database exists for regulations or regulatory plans based on national, provincial and municipal concerns about the use of mobility scooters. To undertake such a compilation would require firstly a universally accepted definition as a prerequisite, and secondly the establishment and maintenance of an extensive data collection, reporting and analysis system. The Canadian Transportation Agency (CTA) monitors complaints regarding barriers to accessible transportation. They have received cases regarding damage to mobility aid components due to assembly and disassembly during stowage and transit on board small aircraft.

There is only one mobility scooter manufacturer in Canada. About 80 models are imported without regulations from several manufacturers in the U.S., Mexico, Europe and Asia with an increasing supply now coming from China and Taiwan. No statistical data exists for sales projections versus an increase in the number and profile of seniors or people with reduced mobility for the next two decades. Statistics Canada estimates that the population of people over 65 years old will reach about 25 percent of total population within the next 20 years [Turcotte et al, 2006]. The increasing use of mobility scooters underscores the urgent need of personal mobility aids by seniors to fulfill their daily transportation needs. This research found that no inventory on the number of mobility aids sold in Canada exists. To create an inventory of motorized mobility aids in Canada would require a nationwide survey of all manufacturers, distributors and dealers. Exchange of previously owned equipment through various means (e.g. the Internet and classified advertisements) would be virtually impossible to monitor unless the equipment was formally registered and licensed.

There are a few new evolving technologies that can be applied to improve the functionality of mobility scooters. One potential technology is the HOT Drive System from Honda [Honda, 2010]. Its independently driven wheels could increase maneuverability for four-wheel scooters.

No systematic accident recording for mobility scooters exists in Canada. If a collision, crash or incident between a mobility scooter user and a motor vehicle occurs, it is recorded as a motor vehicle accident. Only in the province of Victoria in Australia, was systematic accident recording for scooters found [Monash University, 2006].

4.1.1 Scooter Parameter

The national and international literature review indicated that scooter is a very broad term covering a great variety of vehicles, ranging from electric and small engine gas-powered one-wheelers (Honda U3-X); two-wheelers (Segways, E-bikes, Vespa type vehicles, mopeds); three-wheelers (electric scooters, Toyota i-Real, Nolet cruiser, T3 Motion); and four-wheelers (electric scooters) [Honda, 2010].

	
<p>Figure 1 3-wheel Mobility Scooter, Invacare Source: www.wheelchairselect.com/Invacare-C173474.html</p>	<p>Figure 2 3-wheel T3 Motion Source: www.scootgreen.com/?p=63</p>
	
<p>Figure 3 4-wheel Mobility Scooter, Honda ML200</p>	<p>Figure 4 Large 4-wheel Scooter</p>
<p>Source: www.world.honda.com/monpal/</p>	<p>Source: www.mobilitysmart.cc/mobility-scooters/large-mobility-scooters/the-royale-4-wheel-mobility-scooter-p-11799.html</p>

4.1.2 User Parameter

A large number of scooter users include individuals who cannot drive their cars anymore and consider a mobility scooter a substitute. Unlike users of power and electric wheelchairs who are unable to walk, the mobility scooter is popular with a wider spectrum of the population: for ambulatory elderly persons, semi-ambulatory older and young people, and persons with disabilities for their social-recreation, shopping or medical trips. There is also an increased use by obese persons in developed countries, when the occupant's weight combined with a heavy mobility scooter can exceed 250 kg.

4.1.3 Environment Parameter

There are two types of environments in which mobility scooters operate:

- 1) the ROWs from origin to destination, typically from a residence to shops, doctors, friends, etc., parking spaces and entrances to transportation terminals and buildings and
- 2) internal circulation within large buildings or enclosed compounds [Steyen et al, 2008].

Obstacles for users of mobility scooters on a ROW can include snow and ice; cracks, uneven surfaces, potholes and construction zones; and utility poles and poorly placed street furniture.

4.2 Results of Consultations by Questionnaire

The consultations indicated that there was agreement among participants that the term mobility scooters need to be clearly defined regarding their speed and transportability, but should not be registered as vehicles nor require users to be licensed. A proposed definition of mobility scooters is as follows:

“A mobility scooter is a powered device intended to facilitate the transport, in a seated posture, of ambulatory, semi-ambulatory, elderly or persons with disabilities. A mobility scooter is equipped with a seat with armrests, a means to maneuver safely on various surfaces, and appropriate safety features. A mobility scooter has a maximum speed of 10 km/hr and is designed with dimensions that facilitate travel in public transportation modes. The first generation of scooters typically has 3 or 4 wheels, and is steered by a tiller/handlebar.”

The majority of respondents indicated that:

- The use of scooters on sidewalks and roads should be allowed.
- Scooters should not be allowed to operate on highways.
- They are against vehicle plating/registration.
- They are against driver licensing.
- The speed should be limited to between 8 and 15 km/h.
- The maximum length of a scooter should not exceed 1300 mm.
- The maximum turning radius should not exceed 1500 mm.
- The maximum weight of scooter should not exceed 140 kg.
- Mandatory and structured training is not required for the purchaser of scooters, but the dealer is strongly recommended to provide it.
- The installation of safety features (e.g. a horn, signals, lights/reflectors) should be required.

4.3 Results of Qualicum Stakeholder Forum

There was a scarcity of respondent information from scooter users, municipalities and the motor transport administrators. As a result, a scooter forum was organized in Qualicum Beach, BC, to bring stakeholders together for discussion and to collect supplemental data.

4.3.1 Feedback from user group

The majority of respondents used four-wheel scooters (one respondent used a three-wheeler), on a daily basis and mostly during daylight hours. They used them for shopping, recreation, medical appointments and visiting friends. The majority travelled on sidewalks, bicycle paths and laneways. A rather special characteristic of this community is that laneways are shared by pedestrians, cars and bicycle without major conflicts being reported at this time. The user group was divided on the issues of training when purchasing a scooter and for the licensing of drivers. All agreed with the need to have safety features installed on their scooters.

4.3.2 Feedback from Dealer

Most scooter users are provincially funded, which requires an OT prescription. Usually the dealer applies the OT assessment to a customer's capabilities and provides the purchaser with training. Dimensions of scooters are not the concern of the dealer but are of great concern to customers. The dealer advises customers about scooter limitations for transportability at the time of purchase, and he suggests standardizing the scooter size and installing safety features for night and inclement weather operation.

4.3.3 Feedback from Municipality

The municipality has control over land use. Land use planning is key to resolving mobility issues for various road users. Land use bylaws are in place for multi-use trails and roadway designs. The challenge is how to cater to the needs of the different user types (e.g. scooters, skateboard, bicycles and pedestrians) within the various modes of transport. Speed should be the defining criteria for ROW access to the infrastructure (e.g. walking speed is up to 8 km/h); if electric vehicles such as scooters are of that speed, it would be acceptable to use the sidewalk. Keeping up with new mobility technologies (e.g. more hybrids) is an issue. Traffic signage for rules of the road that are specific to scooters (e.g. keep to the right, pass on the left) is necessary only if the volume of traffic becomes an issue. Standardized charging units are required if charging stations are to be built. The Insurance Corporation of British Columbia (ICBC) is currently assessing the situation of scooters for insurance purposes.

4.3.4 Feedback from British Columbia Ministry of Transportation

The Ministry is facing the same situation as it did 20 years ago for bicycles (e.g. prescribing helmet use, plating, bicycle lanes). The ICBC classifies scooters as motorized wheelchairs, which means they receive the same treatment as pedestrians. The ICBC is currently assessing the situation of scooters but it has no intention of requiring scooters to be plated yet.

4.3.5 Feedback from the Law Enforcement Agency

There seemed to be no bylaws in this small community for the use of scooters. No incidents were reported. If there were incidents they would be recorded as a pedestrian incident. Warnings and tickets are used to enforce the law. High importance was given to user and public awareness on the rules of scooter use on roads. Medium importance was given for training and the installation of scooter safety features, and low importance for scooter size and speed issues.

4.3.6 Feedback from Transit and Bus Operators

BC Transit was concerned with the transportability of scooters regarding the issues of dimensions, attachment points for securement, assistance required and the ability of users to manoeuvre within buses. They favoured a standard for scooters of 1220 mm long and 720 mm wide. They would like to see related CSA standards updated and adopted as regulations and relevant coroners' recommendations implemented.

Recommendations included holding a national stakeholder forum to validate the above proposed definitions and chart the next steps for developing training manuals, designing universal battery connectors; updating of standards, mandating safety features and attachment points for scooters, and specifying realistic payload

requirements for large and heavy scooters. Infrastructure recommendations were also made for the development of specific scooter signage on right-of-ways, as well as dimensions for scooter parking spaces.

5. DISCUSSION

The literature review indicated that there is no definition for the term, mobility scooter, in Canada or other countries researched. Most countries classify users of mobility scooters as users of pedestrian ROW. One exception is Hong Kong where scooter users are considered drivers of vehicles that require plating and licensing. Some countries permit the use of mobility scooters with low speeds on the sidewalk. The literature search did not discover a definition or any regulations, standards or dimensions for mobility scooters or their users, and provided limited information to address the objectives of this study.

The aim of the questionnaires was to obtain feedback from stakeholders for a proposed definition and for information on the limits for scooter dimensions, the Canadian standards associated with mobility scooters and the bylaws for their use. The results of the questionnaires show that the majority of the respondents agreed with the proposed definition for a mobility scooter, their use on pedestrian ROW and the suggestions for limiting a scooter's speed. Stakeholders agreed that mobility scooters should not be plated and users not be licensed. The survey did not provide answers from provincial departments of transport, municipalities or user associations.

There was consensus that speed be the deciding factor when defining a powered mobility aid and that a classification be used on pedestrian ROW. It was recommended that safety components that guard against inclement weather be installed. It was suggested that scooter length be limited and the dimensions standardized. User training, transit staff training, updating of standards and implementing the collection of accident data were also recommended.

Mobility scooter parameters	Mobility scooter as pedestrian	Remarks	Scooters as vehicles	Remarks
Speed	up to 10 km/h	average walking speed is about 5 km/h and can use pedestrian RoWs	over 10 km/h	too fast for pedestrians, can create conflicts, can use roads, need to be plated and driver to have license
Length	1300 mm	transportable on transit buses	more than 1300 mm	not transportable on transit buses
Weight	up 140 kg	transportable on transit buses	more than 140 kg	not transportable on transit buses
Turning radius	up to 1500 mm	transportable on transit buses	more than 1500 mm	not transportable on transit buses
Number of wheels	3 or 4	3 wheelers need to be secured on all transit buses	2 to 4	not applicable
Seat	yes with armrests	a convenient feature for seniors	Yes	with or without armrests
Safety features	lights, a horn and signals	they would be desirable	Yes	mandatory
Energy source	batteries	usage up to 80 km	batteries, gas engine, gyro	usage above 80 km

Table 1 Analysis of Results of Consultations with Stakeholders

6. CONCLUSION

In formulating the recommendations for a mobility scooter definition it became obvious that flexibility for future developments should be incorporated. New technologies, a change in user demographics and new energy sources may influence new designs. Definitions should be based on performance specifications rather than prescriptive specifications to keep the door open for future developments. The experience with implementing regulations from the *Americans with Disabilities Act* (ADA) has shown that too detailed specifications could restrict new developments and cause litigations.

The other underpinning questions are who will regulate the import of mobility scooters, who will classify the mobility scooters as a walking or vehicle mode, and who will educate the public? The import of scooters should probably be regulated by federal agencies to unify regulations across the country. All Canadian municipalities should agree on the definition through a national Mobility for an Aging Society (Mobile-Age) workshop to bring together all stakeholders including users.

Training manuals are required for scooter purchasers, front line personnel of air carriers and agents who disconnect batteries. However, it is also the user's responsibility to advise carrier staff and agents about the characteristics of their scooters (e.g. how to fold the tiller, remove the seat and disconnect the batteries).

Scooter use will increase significantly in the next decades as the baby boomer generation reaches their retirement age. Because of the present lack of a clear definition for mobility scooters and the lack of regulations for their use, increased conflicts with other participants on sidewalks, pedestrian ROWs and vehicles on roads could be anticipated. The following conclusions and recommendations list only the high priority items according to the six categories.

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