

Directors that was represented at CRAC. SCAT became an example of privatization in the purest sense.

CONCLUSION

SCAT covers 23 east-side neighborhood and business district associations as a program operating under CRAC. The area it serves is almost the entire east side of Detroit. It has been recognized by the Michigan Department of Transportation (MDOT), the Detroit Department of Transportation (DDOT), and Southeastern Michigan Transit Authority (SEMTA) as a viable alternate transportation service. SEMTA, DDOT, and the Detroit Police Department (DPD) have offered the following assistance:

- SEMTA—Donation of two vehicles from their own fleet of minibuses. Use of their mechanics and garages for repair of vehicles.
- DDOT—Retired drivers to operate vehicles.
- DPD—Reservists to operate vehicles.

SCAT AS A MODEL

What is the next step for SCAT? Two important events have occurred that will carry the program in new directions.

The MDOT has accepted the program as a model and has given SCAT a 2-year demonstration grant for an administrator and an assistant to institute the program in the southwest and northwest sectors in the city of Detroit. The task of the administrator and the assistant will be to replicate the program in these areas. After 2 years the new program will be expected to be as self-sufficient as is SCAT. Privatization will realize this goal.

The second kudo for the program is that other communities have asked for assistance in setting up SCAT programs for their elderly citizens.

The city of Southfield, Michigan, has asked SCAT to help them set up a comparable service for a portion of their senior population.

The model has been established. The private sector has created a viable and necessary transportation system in the wake of the trend toward privatization.

Barriers and Safety Risks for Elderly and Handicapped Travelers at Airports

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Current federal legislation prohibits discrimination in transportation opportunities on the basis of age or handicap. The elderly and the handicapped are an increasing proportion of the air travel market. Many air terminals are not designed to accommodate the special needs of these people. This severely limits their transportation opportunities. Airport terminals provide a service to a dynamic activity that flows from trip origin to the airplane. Most airports are designed and built according to local building codes that are for structures that house activities rather than accommodate movement. Consequently, most air terminals are not completely accessible, and many have significant hazards and barriers for elderly or handicapped passengers. The factors that influence airport accessibility for elderly and handicapped persons require a systematic study approach. The characteristics, barriers, and

hazards of air terminal components are individually evaluated. The joint interactions and compounding effects of characteristics, policies, barriers, and hazards are also studied. Architectural features and available terminal services limit accessibility for various subgroups of the elderly and the handicapped depending on their disability. The study concludes that when viewed in total there are many inconsistencies among the policies, services, and facilities that various air carriers and airports provide the elderly and the handicapped. The design features and architectural barriers built into many airport terminals present major hazards that affect the safety and health of these passengers.

Transportation accommodates the movement of people, materials, and ideas. Transportation interacts with all aspects of life and the environment and, if not accessible, can restrict the availability of societal activities and opportunities, including

employment (1). Accessible means that persons with moderate impairment, such as quadriplegia, blindness, and deafness, can access and use the facility. The elderly and the handicapped are an increasing proportion of the population, and their demand for opportunities for mobility is increasing (2). In 1973 the Rehabilitation Act was passed by the U.S. Congress (3-6). Sections of the act specify that recipients of federal funds may not discriminate on the basis of age or handicap and must provide equal employment opportunities. Before 1973 transportation planners and designers were not required to, and did not, consider the special design requirements of the elderly and the handicapped. The new Canadian Charter of Rights and Freedoms specifically prohibits discrimination on the basis of physical or mental disability (7). Legislation and political pressure on behalf of the elderly and handicapped population have forced society to change its attitudes toward this population and their special needs.

Many positive steps have been taken to make transportation systems "barrier free." Travel opportunities for the elderly and handicapped population have increased enormously compared with those available 10 or 15 years ago. However, this increase in mobility has created additional safety problems and risks that are a direct result of the new opportunities for mobility.

In this paper the transportation safety hazards to the elderly and handicapped population at airport passenger terminals are investigated. Airports have been selected as the focus for this study because of the sophistication and progressive attitude of the air transportation industry. However, similar hazards and safety problems exist at other transportation terminals, and the concepts presented in this paper are applicable to many of them (8).

DESCRIPTION OF STUDY

Objectives of Study

The primary objective of this paper is to demonstrate the lack of accessibility and safety for the elderly and the handicapped in air terminals. Airports are complex and dynamic flow systems that interact directly with the environment and operate to move people, baggage, freight, and airplane service equipment (9). A systematic approach is taken to structure the factors, interactions, and constraints that present hazards in airport terminals (10).

Present Legislation

There are many groups and organizations that are concerned with the legal and design aspects of accessibility for the elderly and the handicapped, for example, the Architectural and Transportation Barriers Compliance Board (4-6). These organizations have made tremendous strides in heightening society's awareness of the special needs of the elderly and handicapped population in North America. As a consequence, the elderly and the handicapped are enjoying mobility and independence that are unique to this lifetime and geographic location. The increase in mobility has also brought increased exposure to safety hazards in all modes of transportation. There are design

guidelines and legislation for accessible structures (11, 12). However, neither the legislation nor the guidelines have explicit provisions for passenger terminals under regular operations and emergency situations, either in policy or architectural design. Airport terminals provide a service to a dynamic activity that flows from trip origin to the airplane and vice versa. Current legislation and design standards are for structures that house activities rather than accommodate movement.

The safety issues associated with movement of the elderly and handicapped population in passenger terminals have not been extensively researched. The current policy of most airlines and airports is that in an emergency staff personnel will assist the elderly and handicapped population in passenger terminals after all other passengers have been assisted.

The Federal Aviation Administration of the U.S. Department of Transportation and corresponding agencies in Canada are cooperating closely in studying issues surrounding the emergency evacuation of regular and elderly and handicapped passengers from airplanes. Only the barriers, hazards, and airport operations that affect elderly or handicapped persons on the land side are addressed in this paper.

PROBLEM STATEMENT

The risks for elderly and handicapped air travelers represent a combination of airport accessibility and safety considerations.

Airport Accessibility

An airport may be barrier free but not fully accessible. "Barrier free" means free access for independent wheelchair users, but this does not mean that an airport is fully accessible. Fully accessible means severely impaired individuals such as high quadriplegics can access and use the facility. Consequently, there are additional safety hazards for those elderly and handicapped passengers who insist on using the facility even though it is not accessible, thereby increasing the risk to themselves and to others. Airports may be barrier free for wheelchair users, but the barrier free components may create additional obstacles for the visually impaired. For example, wash basins for wheelchair users project out farther than other basins and are not always detectable by cane.

Airport Safety

The major safety risk in both accessible and nonaccessible airports is a complete lack of emergency provisions for elderly and handicapped passengers, such as areas of refuge and policies for the safe evacuation of such passengers. In an emergency, the general public cannot be relied on to assist in the evacuation of elderly and handicapped passengers. In many airport facilities the elderly and the handicapped would require major assistance in evacuation. For example, airports that are designed with pier fingers do not typically have any means of safe egress for wheelchair passengers waiting at the departure gates. The elevators are located in the central core of the

airport; only stairs are provided at the gates for exit to the pavement.

In nonemergency situations there are safety risks for the elderly and the handicapped in how they are lifted, transferred, and escorted. When their special equipment is not handled properly, there are secondary safety problems because for many disabled people their special equipment is an extension of themselves. For example, for many wheelchair users the chairs function as their legs, and they are sized and shaped specially for them. Wheelchair users cannot use just any wheelchair. A related problem is that most airport transfer wheelchairs have four small wheels that do not permit the user to propel the wheelchair without the assistance of airport personnel or others. Consequently, many passengers feel vulnerable, dependent, and helpless, and in an emergency situation these passengers are completely dependent on others for safe evacuation. Many wheelchair users refuse to be transferred from their own chairs until they are boarded on the aircraft because of their severe insecurity in an airport transfer chair. This creates additional problems for the air carriers who must handle the wheelchair safely and store it securely before takeoff. For many passengers, the mere act of a poorly executed transfer or sitting too long in a poorly fitting transfer chair can cause skin breakdown or decubiti ulcers that require long periods of bed rest or hospitalization to treat.

A loosely related safety issue is the inconsistency in policy among airline companies. Many elderly and handicapped passengers have started a trip with one airline, and when they have attempted to transfer to a second airline they have been refused access. The refusal by the second air carrier is not only a major inconvenience, it is also a health hazard (dehydration, bladder problems, and sitting tolerance); and equipment and luggage have gone ahead.

AIRPORT TERMINAL SYSTEMS

The study of airport accessibility requires a systematic approach. Numerous factors and conditions individually influence the accessibility and risk to elderly and handicapped passengers, and their effects are compounded. The synergetic nature of the interactions between the variables and conditions can best be treated using a systematic approach.

A suggested approach to evaluating the accessibility of an airport is to simulate trips by elderly and handicapped passengers through the various elements and services from their home until they board the plane. A flow chart of the major terminal components, and some of their major characteristics, is shown in Figure 1. The key components are airport access, parking, curb side, foyer, ticketing, gate access, customs and immigration, and the gate area. The relative emphasis that each of these components receives for accessibility by the elderly and the handicapped differs from operations and designs for the able-bodied. For example, the foyer component, which may be almost incidental or of little importance to able-bodied passengers, can present major barriers and risks to the elderly and the handicapped. Possible problematic elements are level changes, obstacles such as kiosks and furniture, congestion, distance to check-in, ingress-egress portals, luggage handling constraints, and floor-wall texture. Clear and concise signage to

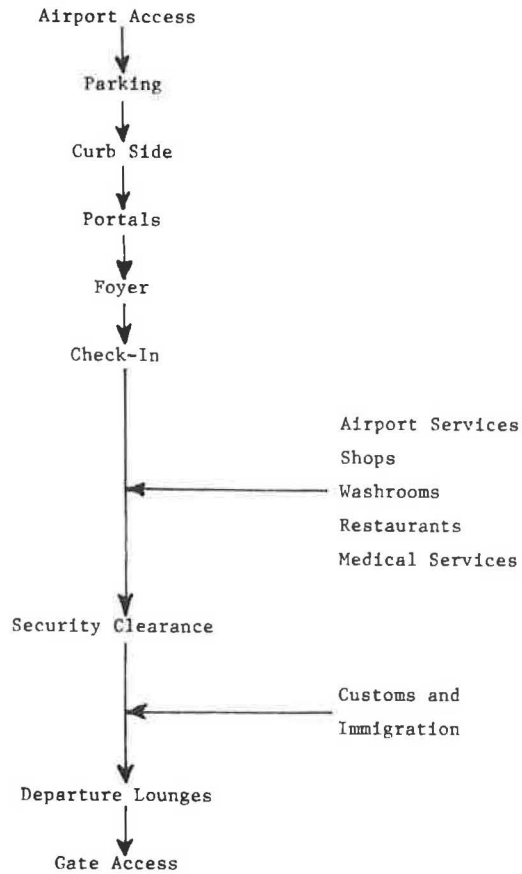


FIGURE 1 Components of terminal accessibility.

provide necessary information and directions to the elderly and the handicapped is especially important in the foyer area (13).

COMPONENTS OF TERMINAL ACCESSIBILITY

The accessibility characteristics and problems within each of the terminal components are not evaluated. Important considerations, typical problems, and diagnostic questions are discussed for each of these components to provide a checklist of acceptable standards of accessibility.

Access

Access to the airport is achieved by either driving oneself or being driven by another person. The most commonly used modes of ground transportation are automobile, rental car, taxi, bus, limousine, and train or rapid transit. Major issues and barriers to accessibility on modes and means of airport access are given in Table 1. The problems associated with airport access that are found include

- Most airports do not have accessible limousine or bus transportation. Therefore, wheelchair users are forced to take taxis, which are much more expensive and require transfers to and from wheelchairs. Wheelchair transfers are a major source

TABLE 1 BARRIERS AND ISSUES FOR SURFACE TRANSPORTATION ACCESS COMPONENTS

Component	Major Issues	Barriers
Airport access	Accessible ground transportation (with or without wheelchair transfer)	No accessible ground transportation other than private vehicles
Parking	Rental cars with hand controls	Long walk, fatigue
	Walking distance from parking lots to terminal	
Curb side	Parking spaces for handicapped	No spaces, no room to transfer
	Elevation changes without ramps or elevators	Must find another route around elevation changes
	Protection from weather	Snow, ice, water cause slipping
	Accessible wheelchair transportation	Disorientation for blind
	Geometry of curb	
	Elevation changes	May have to find another route around elevation change
Congestion	Curbside congestion, tripping	
Protection from weather	Snow, ice, rain, slipping	
Transfer space		

of hazards for users, particularly to and from cars where the curb geometry can pose even greater risk.

- Some large airports have rental car agencies that will rent cars with portable hand controls; however, this practice is not widespread.
- Drop-off and pickup zones with poorly designed curb cuts are severe hazards for the visually impaired. The curb cut can disorient and cause injury to the visually impaired passenger.
- Any elevation changes that are not treated with ramps or elevators constitute a barrier for wheelchair users.

Diagnostic questions to assure the accessibility of airports to the elderly and the handicapped include

- Are the modes of transportation to the airport “accessible”?
- Are the modes of transportation “wheelchair accessible” without a wheelchair transfer?
- Are there rental cars with hand controls available?
- Do the drop-off and pickup zones have curb cuts?
- Are there elevation changes that do not have either ramps or elevators?
- How frequent is accessible airport transportation service?
- Is the accessible airport transportation service advertised as accessible and are telephone numbers available?

Parking

The accessibility characteristics of airport parking seldom take account of the impact on the elderly and the handicapped. Problems associated with airport parking are often significant because of the area required for parking and the infrequent need to provide service for elderly and handicapped persons. Major issues and barriers that parking presents are given in Table 1. Typical problems are

- Wheelchair users who drive their own vehicles are often confronted with no curb cuts; elevation changes that are not

treated with ramps or elevators; and a lack of protection from the weather, particularly ice and snow, in getting from the parking lot to the terminal.

- Parking lots that are remote from the terminal are often serviced by shuttle buses that are not accessible to wheelchair users. Often, they have a high first step, which makes them difficult for people with mobility impairments to use.

Diagnostic questions to assure that the needs of the elderly and the handicapped are taken into account in providing parking include

- Is the distance from the parking lot, both long and short term, to the terminal buildings manageable for elderly and handicapped passengers if they must walk or wheel?
- Are the changes in elevation between the terminal and the parking lot treated with accessible elevators, ramps, and curb cuts?
- Is the path from the parking lot to the terminal protected from the weather?
- Is the transportation to and from parking lots wheelchair accessible, and does it have level entrances for the mobility impaired?
- If accessible transportation to and from parking lots is available, is it advertised and are the telephone numbers available?
- How are spaces for the disabled designated, and is proper use of these spaces enforced?
- How large are the designated spaces, and do they meet local building codes?

Curb Side

The curb side is often an area of traffic congestion; of pedestrian, baggage handling, and vehicle conflict; and of confusion. Major issues and barriers at curb side to access by the elderly and the handicapped are given in Table 1. The problems observed with curb-side accessibility include

- The visually impaired usually expect some consistency in sidewalks and curb cuts; however, some airports have unusual designs that can cause confusion and disorientation for the visually impaired.

- Curb-side congestion is hazardous for the blind because luggage is a severe tripping hazard.

- Vehicle congestion at curb side can cause difficulties for wheelchair passengers because they may be forced to transfer from a vehicle to a wheelchair in the roadway.

- Transfer areas that are not protected from the weather can be slippery due to rain, ice, and snow. These areas are hazardous for all travelers, but especially so for the elderly and the handicapped.

The accessibility of the curb side can be evaluated with the following diagnostic questions:

- Do the length, width, and shape of the curb cause disorientation for the visually impaired?
- Are the elevation changes between curb side and check-in treated with ramps and stairs, or elevators?
- Is there plenty of space to transfer from a vehicle at curb side?
- Are the sidewalks congested?
- Is the curb-side area protected from the weather?

Portals

The accessibility characteristics of portals to the terminal can be a problem for all travelers but may present a risk, hazard, or major inconvenience to the elderly and the handicapped. Major issues and barriers to the access of the elderly and the handicapped at terminal entrances and exits are given in Table 2. The problems associated with portals are demonstrated by the following examples.

- Revolving doors are a hazard for all elderly and handicapped passengers and a barrier for most.
- Nonautomatic doors that do not have any pressure assist

are usually heavy and difficult for most elderly and handicapped passengers to use.

- Wheelchair users can have difficulty going through double sets of nonautomatic doors if the door sets are not spaced far enough apart.

- Where there are few doors per drop-off and pickup site, elderly and handicapped passengers may be exposed to high volumes of pedestrian flow and congestion.

Diagnostic questions to assure effective service for the elderly and the handicapped include

- Are the doors automatic? Do they slide or swivel?
- How much force is required to push or pull nonautomatic doors?
- What is the width of the door?
- Is the door sill flush with the surface? If not, what are the lip height and shape?
- Is there a vestibule? If so, what is the spacing between sets of doors?
- How many doors are there per drop-off and pickup site?

Foyer

Problems in air terminal foyers are numerous and often of major impact, particularly for the visually impaired. Congestion and foyer design present impediments and unexpected hazards to the safe movement of the elderly and the handicapped from portals to check-in. Major issues and barriers to access in the terminal foyer are given in Table 2. Problems experienced include

- Level changes that are not treated with elevators or ramps are barriers for wheelchair users. All escalators should be doubled with stairs because the visually impaired will not use escalators.
- Elevators should be provided for elevation changes greater than 1 m.
- Obstacles such as kiosks and furniture are not always

TABLE 2 BARRIERS AND ISSUES FOR MAIN TERMINAL

Component	Major Issues	Barriers
Doors	Manual versus automatic Width of door, sill Vestibule design Number of doors and distance required to travel, especially from curb cut	Most manual doors have too heavy, revolving doors Narrow doors, high sill Small vestibules
Foyer	Congestion Long distance to check-in Elevation changes	No ramps, elevators for elevation changes Kiosks, tripping, knocking Confusing signage
Check-in	Kiosks, furniture Acoustics, signage Low check-in counter Facilities for hard of hearing Personnel for visually impaired	Company policy Wheelchair handling Disorientation for visually impaired

detectable by cane and are hazardous to the visually impaired.

- Congestion in the foyer makes it difficult for all travelers to move about, but for the elderly and the handicapped it can cause confusion and disorientation.
- The distance to check-in and the use of ambiguous or unclear signage increase travel time and distance for the mobility impaired.
- Floor and wall texture has an important impact on the acoustical behavior of the air terminal. The visually impaired air traveler is not necessarily familiar with a particular air terminal and is more dependent on acoustical feedback or, in technical terms, the sound reverberation quality of the environment.
- Public address systems may be ineffective because of the acoustical behavior of the foyer. Verbal information should be available to the visually impaired traveler.

The accessibility of air terminal foyers can be evaluated using the following diagnostic questions:

- Are the level changes treated with elevators, stairs and escalators, or ramps?
- Are there obstacles such as telephone kiosks or furniture?
- Is there substantial congestion in the main foyer?
- Is there a long distance to walk to check-in?
- Are floor and wall textures acoustically treated?
- Is signage clear, concise and easily understood, both visually and verbally?
- Are there media to provide information and directions to the visually impaired or the hearing impaired?

Check-In

The most common difficulty for all elderly and handicapped air travelers is inconsistent airline policy on passenger acceptance. Some airlines, which realize that this segment is an increasing proportion of the air travel market, do as much as possible to assist elderly and handicapped passengers. There are still major air carriers that will not assist the elderly and the handicapped and that actively discourage wheelchair passengers.

There is inconsistency in how wheelchairs and batteries are transported, and also in how damage claims may be filed. Some major issues and barriers to the access of the elderly and the

handicapped at check-in are given in Table 2. Problems associated with check-in include

- Often, elderly and handicapped passengers are required to transfer into an airport transfer wheelchair at check-in. Many wheelchair users refuse because most transfer chairs have small wheels that the users cannot propel, and they feel very vulnerable and dependent.
- Airlines are required to supply their own approved oxygen canisters. Air travelers who require oxygen should be made aware before arriving at the airport that they need to purchase approved oxygen canisters.
- Visually impaired passengers usually require orientation assistance to find the proper departure gate.
- Hearing-impaired passengers may require signing or teletype services.

The accessibility characteristics of check-in facilities can be diagnosed with the following questions:

- Are check-in counters low enough to allow wheelchair users to maintain eye contact with the ticket agents?
- Is there baggage equipment available for wheelchair users?
- Are there ticket agents who can assist the hard-of-hearing?
- Are there personnel who can escort a visually impaired traveler to the departure area?

Airport Services

All airport services including administrative offices, washrooms, shops, restaurants, medical facilities, and telephones must be accessible in order for the elderly and the handicapped to enjoy the same quality of traveling experiences as the rest of the population. Some major issues and barriers presented by airport services are given in Table 3.

General Air Terminal Access

The characteristics of accessibility to the air terminal in general may be of concern. General air terminal access problems can restrict the accessibility of administrative offices and employment opportunities. Elevators should be provided to all floors

TABLE 3 BARRIERS AND ISSUES FOR TERMINAL SERVICES

Component	Major Issues	Barriers
Terminal access	Elevators to all floors Internal stairs (specific areas)	Escalators
Washrooms	Wheelchair accessible Unisex washrooms Accessible washrooms near gates	Access routes that have stairs, doors, narrow halls
Shops	Turnstiles, narrow aisles	Congestion, turnstiles
Restaurants	No steps or stairs Circulation space, high tables	Steps, stairs Low tables
Telephones	Menus Height (below 1.3 m)	

of the air terminal and parking garages so that mobility-impaired persons can have access to all of the services and administrative offices of the airport.

Access elevators should be dimensioned and equipped for use by elderly and handicapped passengers or airport employees who are elderly or handicapped. Other problems in terminal access and movement are

- Ramps, which are frequently used in air terminals, are hazardous for the blind and may also be difficult for some mobility-impaired persons. When ramps are used, they should be located away from the main path of travel.
- Visually impaired and some mobility-impaired individuals cannot use escalators because of the tripping hazard.

The accessibility of general air terminal facilities and services can be tested with the following diagnostic questions:

- Are there elevators to all floors of the air terminal and parking garages?
- Are the elevators dimensioned and equipped for use by the elderly and the handicapped?
- Are there any ramps? Are the ramps in the main travel path?
- Are there stairs parallel to escalators?

Washrooms

Problems of accessible washrooms in air terminals are similar to those encountered in other buildings. However, unisex washrooms for the disabled are recommended for air terminals so assistance can be provided by a spouse or a traveling companion. These washrooms are usually locked to prevent vandalism. Instructions should be provided in several languages in international airports on how they can be unlocked. Wheelchair-accessible washrooms should be located as near as possible to all departure lounges because most airplane washrooms are completely inaccessible to wheelchair users. Wheelchair passengers require washrooms just before departure and just after arrival. The major problem with air terminal washrooms is that often the paths of travel to accessible washrooms are blocked by stairs, steps, doors, narrow halls, and obstructions.

Characteristics of accessible washrooms can be identified through the following diagnostic questions:

- Are the washrooms wheelchair accessible?
- Are there wheelchair-accessible washrooms near all departure lounges?
- Are the access routes to the washrooms free of steps, doors, narrow halls, obstruction, and congestion?
- Are unisex washrooms available?

Shops

Shop access, like other services, should be available to elderly and handicapped passengers so that these passengers may have the same opportunities as other passengers for shopping (e.g.,

duty free shops). Problems of shop access experienced in other commercial buildings are of concern in airport shops:

- Often shop access is controlled by turnstiles that are a barrier for the mobility impaired.
- High counter tops and displays are not visible to wheelchair users and cause them to lose eye contact, which makes it difficult for them to make a purchase.
- Narrow and congested aisles are barriers for the mobility impaired.

Diagnostic questions to assure the accessibility of shops include

- Is access to the shops by turnstile?
- Are the counters visible to wheelchair users?
- Can wheelchair users move about the shop without knocking into display cases?

Restaurants

Restaurant access is perhaps more critical in air terminals than in other settings because lack of access to dining opportunities can be a major inconvenience and, for some, a health problem. Problems related to restaurant access are

- Often restaurant access is by steps or stairs; this makes them inaccessible to wheelchair users.
- If the tables are too close to each other, it is difficult for the mobility impaired to move to a table.
- Tables that are not high enough for wheelchair users to roll up to.
- The menus are not broad enough to accommodate special dietary needs (e.g., low salt, low calorie, or vegetarian).

Restaurant access can be evaluated with the following questions:

- Are the restaurants free of steps and stairs?
- Is there circulation space for wheelchairs?
- Are the tables high enough for a wheelchair to roll up under?
- Can the menu accommodate special dietary needs?

Medical Facilities

The importance of access to airport medical facilities is obvious. However, they are not always located with adequate consideration for the elderly and the handicapped. Occasionally the medical facility is located on a floor of the air terminal that is not serviced by an elevator, or the facility is reachable only by steps that make it inaccessible to wheelchair users.

Diagnostic questions about access to medical facilities include

- Are there medical facilities on a floor that is wheelchair accessible?

- Are the facilities themselves wheelchair accessible?
- Are trained medical personnel available?

Telephones

There should be telephones that are at or below 1.3 m for wheelchair users. Courtesy telephones should also be placed at this level. There should be telephones with amplifiers for use by the hard-of-hearing.

Security Clearance

Many elderly and handicapped passengers have hidden disabilities, such as pacemakers, that may require special treatment. Security personnel should be sensitive to the needs of such people. Some major issues and barriers presented by security clearance are given in Table 4. The problems of security access result because many elderly and handicapped passengers cannot pass through conventional security devices because of a mobility impairment or a medical condition.

The adequacy of security access can be determined by asking the following questions:

- Are security arrangements sensitive to the needs of the elderly and the handicapped?
- Are security arrangements sensitive to persons with hidden disabilities such as implants?

Customs and Immigration

Where customs and immigration must be cleared, there are often significant barriers to and impacts on elderly and hand-

icapped travelers. Some of these issues and barriers are listed in Table 4.

Problems with customs and immigration often arise because the facilities and services are modified to accommodate the elderly and the handicapped on an "as needed" basis. Consequently,

- In some major airports there is no direct elevator access between the arrival gate and the customs area. Wheelchair passengers are escorted by customs personnel along a circuitous route to the customs area and are separated from their traveling companions because of security and bonding arrangements.
- Wheelchair users often lose eye contact at customs counters and are put in a compromising situation.
- The hearing and speech impaired have difficulty with customs agents who usually are not trained to communicate with these passengers.
- Passengers must accompany their own baggage through customs; this can be difficult for wheelchair users if assistance is not available.

Diagnostic questions on adequate access in customs and immigration are

- Is there elevator access between arrival gates and the customs area?
- Are there counters that are low enough for wheelchair users?
- Are there arrangements for the hearing impaired and the visually impaired?
- Are there resting facilities for passengers who may encounter long delays at customs and immigration?
- Are there provisions for handling the baggage of elderly and handicapped passengers through customs?
- Are there foreign language interpreters available?

TABLE 4 BARRIERS AND ISSUES FOR MOVEMENT FROM MAIN TERMINAL TO DEPARTURE OR ARRIVAL GATES

Component	Major Issues	Barriers
Security	Special procedures Sensitive to hidden disabilities (implants, deafness, etc.)	Effect on pacemakers
Customs and immigration	Elevator access Baggage handling Low counters Arrangements for hearing impaired Foreign language interpreters	Difficulty of wheelchair access to customs Wheelchair passengers who must handle their own baggage
Inter-line transfer	Company policies on transferring passengers Assistance for visually impaired Accessible ground transportation between terminals Signage Distance	Inconsistent policy, passenger refusal No assist for visually impaired No accessible inter- and intra-terminal transportation Lack of information and guidance for hard-of-hearing Lack of suitable wheelchair service or shuttle service

Transfers

Issues and barriers presented to elderly and handicapped travelers can be significant. Table 4 gives some important related situations and considerations.

Transfers from one airplane to another, and particularly from one airline to another, can generate a number of problems for the elderly and the handicapped:

- The major problem is the inconsistency between air carriers in their passenger acceptance policies. Some elderly and handicapped passengers have started a trip with one carrier and have been refused access when they have tried to transfer to another carrier with the result that their luggage has been forwarded to their final destination and they have been left stranded.
- In transfers to another airline, there is often no clear understanding about which carrier will take responsibility for transferring a passenger between airlines.
- Confusing and ambiguous signage in airports causes disorientation for able-bodied, regular, as well as special travelers.
- The visually impaired generally require assistance to locate the departure gate for the airline to which they are transferring.
- Long transfer distances cause problems for all passengers particularly if the corridors are congested.
- People movers cannot be used by most elderly and handicapped travelers, so alternate accessible terminal transportation must be provided.
- Nonaccessible ground transportation between terminals constitutes a barrier for wheelchair users.

Some questions that may be asked to assure accessible airline transfers are

- Who takes responsibility, and when, for elderly and handicapped passengers during inter- and intra-airline transfers?
- Is there good signage in the air terminal for flight transfers?
- Are there any provisions for the visually impaired?
- Are there long distances involved in the transfers?

- Is there assistance available for transfer of elderly and handicapped passengers?
- Is there accessible ground transportation between terminals?

Gate Access

The movement to the departure and lounge gate area presents some difficulties and hazards for elderly and handicapped travelers. Table 5 gives some important issues and barriers.

Problems with gate access include

- Confusing signage that leads to disorientation for all travelers, but particularly for elderly and handicapped passengers.
- Obstructions and congestion in the path of travel that slow travel time for all travelers, and especially elderly and handicapped passengers, and increase the hazards for the visually impaired.
- Long walking distances in airline terminals that add to the fatigue levels of all passengers and increase the likelihood of missed flights.

Gate access can be evaluated with the following diagnostic questions:

- Is there clear and unobstructed signage for all the gates?
- Are there any obstructions in the path of travel?
- Are the corridors wide enough to accommodate the pedestrian traffic?
- Are there any ramps or stairs in the path of travel?
- How far is the walking distance from check-in to departure lounge?

Departure Lounges

The departure lounge area presents barriers and difficulties to elderly and handicapped travelers. Some issues and barriers are given in Table 5.

TABLE 5 BARRIERS AND ISSUES IN DEPARTURE LOUNGE AND GATE AREA

Component	Major Issues	Barriers
Gate access	Signage and acoustics Ramps and stairs Distance Congestion	Confusing signage Stairs and steps Long walking distance
Departure	Furniture, obstacles Facilities for hearing impaired	Poor furniture design for people who must wait, backache Furniture placed so that it is a tripping hazard, particularly for the visually impaired No provisions for announcements to hearing impaired
Safety	Check-in counter height Areas of safe refuge at departure Policy on assistance	Wheelchair transfers Only stair access to ground level in emergency Wheelchair transfers

Problems in the departure lounges often lead to inconvenience rather than major hazard:

- Wheelchair passengers often have difficulty communicating with airline personnel because of high check-in counters.
- Comfortable seats in departure lounges increase the tolerance of passengers who must wait a long time for delayed airplanes.
- The seating layout at the departure lounge is important for the visually impaired who often have difficulty orienting themselves in the new environment.
- Most wheelchair users prefer to remain in their own wheelchairs until they board the aircraft. It is important that they be assisted with dignity and respect. Airport wheelchairs are usually inappropriate for long periods of sitting. Also, they leave the user very vulnerable since the user cannot propel the chair independently.
- Hearing-impaired passengers will not be able to hear when their flight is called, and therefore require assistance from airline personnel.
- Furniture in departure lounges should have strong arm rests for support of body weight when rising to a standing position.

Characteristics of accessible departure lounges can be evaluated using the following diagnostic questions:

- Is the gate check-in desk accessible to wheelchair passengers?
 - Are the departure lounge seats comfortable?
 - Are the seats located to facilitate ease of movement for all passengers, particularly the visually impaired?
 - Are wheelchair passengers treated with dignity and respect, and will they be assisted by airline personnel in the event of an emergency?
 - Do airline personnel at the departure lounge have the facilities to communicate with the hearing impaired?

CONCLUSIONS

Current legislation in both Canada and the United States requires no discrimination in transportation opportunities on the basis of handicap. However, there is a problem with the implementation of the policies. In Canada, the air carriers have been tightly regulated and must carry elderly and handicapped passengers. In the United States, as a result of deregulation, air carriers have inconsistent policies. The inconsistent policies of air carriers present the greatest travel barriers to the elderly and the handicapped. Often the inconsistencies do not become apparent until a passenger has started a trip or is arranging a return trip home. There are discrepancies in the interpretation of policy. Passengers traveling with the same air carrier will

often be treated differently at different airports. For example, at one airport, the service representative will accept the passenger, but at another the passenger will be refused access to aircraft.

The other major barrier for elderly and handicapped travelers is the architectural barriers of air terminals. Most terminals are built according to local building codes and standards. The problem is that building codes are written for structures that house activities that are stationary rather than structures that serve movement or activities that flow. Air terminals function primarily to move people and goods from ground transportation to plane departure. The regular codes and standards are not adequate to accommodate the needs of elderly and handicapped travelers in the dynamic activity of the air terminal.

This paper has illustrated many of the problems and hazards that confront elderly and handicapped travelers. These problems are increasing because the elderly and the handicapped are one of the fastest growing segments of the population who travel by air.

REFERENCES

1. Rutenburg, Use, and M. Barker. *Travellers with Special Needs, Facility Design Compendium*. Transportation Development Centre, Transport Canada, Montreal, Quebec, Canada, 1982.
2. *Summary Report of Data from the National Survey of Handicapped People*. UMTA, U.S. Department of Transportation, 1978.
3. Nondiscrimination on the Basis of Handicap in Federally-Assisted Programs and Activities Receiving or Benefiting from Federal Financial Assistance. 49 C.F.R. §27, 1979.
4. Regulation: Minimum Guideline and Requirements for Accessible Design. 36 C.F.R. §1190, 1982.
5. *Standards for Telecommunication Devices for Deaf Persons in Transportation Facilities*. Architectural and Transportation Barriers Compliance Board. Washington, D.C., Jan. 26, 1984.
6. Statement of Organization and Procedures, Final Rule. 36 C.F.R. §1155, 1985.
7. E. Ratushny. *Air Accessibility Standards for Disabled and Elderly Persons*. Transport Canada, Ottawa, Ontario, Canada, Aug. 1984.
8. *Access Travel: Airports*, 4th ed. Airport Operators Council International, Inc., Washington, D.C., 1982.
9. A. Kanafani, A. Hanan, and H. A. Kivett. *The Planning of Passenger Handling Systems*. Second Short Course on Airport Planning and Design. University of California, Berkeley, 1972.
10. D. B. Brown. *Systems Analysis and Design for Safety*. Prentice-Hall, Inc., Englewood Cliffs, N.J., 1976.
11. *American National Standard Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People*. American National Standards Institute, New York, 1980.
12. *British Columbia Building Code*, Section 3.7, and *Building Requirements for Persons with Disabilities*. Ministry of Municipal Affairs, Victoria, British Columbia, Canada, 1984.
13. J. C. Kal. "Signs at Airports—From an Accessibility Viewpoint." Presented at the Aviation Community Task Force on Airport Signs Meeting of the Air Transport Association, Washington, D.C., March 1982.