

Vehicle Modifications: Useful Considerations for Life Care Planners

***Roger O. Weed, Ph.D., LPC, CLCP, CRC, CDMS, CCM, FNRCA, FIALCP
Lisa R. Engelhart, MS, CRC***

Abstract. *Most people with catastrophic injuries or complex health care needs that impact mobility will require specialized transportation adaptations. The needs range from minor modifications to very high tech and custom designed modified vans. This article, primarily based on a case study, will outline some of the basic issues associated with life care planning and transportation needs, with special emphasis on why some modified vans are very expensive to produce.*

Key Words: *Life care planning, vehicle modifications, transportation needs.*

Introduction

Transportation and vehicle modifications can be an essential part of the future care planning process to help a person with a disability return to as close to pre-injury status as possible as well as provide appropriate transportation and access to the health care system. As noted by Deutsch in 1999, "Life care planning encompasses various topics that assure the effectiveness of the overall plan" (as cited in Weed, 2004, p. 5). An entry commonly included in a life care plan that contributes to the overall effectiveness of the plan is transportation, which often requires specialized evaluation and purchase of equipment (Pierce, 1999; McCaigue, 2004). McCaigue (2004) notes, "Great emphasis is placed on assessing a person's ability to drive," because independent transportation is basic for "access to gainful employment and community resources" (pp. 108-109). Additionally, adaptive mobility for people who are mobility impaired and who will be either a passenger or driver can become a key and costly element in a life care plan. Needs can range from nothing, or minimal modification (e.g., hand controls or spinner knobs), to vans with extensive structural modifications and sophisticated technology. This article will highlight factors for life care planners and case managers to consider both when evaluating what type of vehicle a client needs today and estimating his/her future needs and costs. An explanation of why some adaptive driving equipment options are considerably more expensive than others also will be given.

Safety Factors from a Historical Perspective

In order to understand the basic history of vehicle modifications, Michael Dresdner, an industry expert, was interviewed for purposes of this article. A snapshot from the history of the United States mobility equipment industry highlights safety as a prime factor in the cost of modified vans generally and structurally modified vans in particular (M. Dresdner, personal

¹Michael Dresdner is the President of Handicapped Driver Services, Inc. (HDS), a former board member of the National Mobility Equipment Dealer's Association (NMEDA), and the current president of the Adaptive Driving Alliance.

communication, December 21, 2004). When adaptive equipment companies emerged as "garage shop" operations during the Viet Nam war era, they primarily served veterans with disabilities, many whom were willing to gain mobility by means that probably would be unimaginable today. For example, a person might have unsafely reclined his or her wheelchair to enter a vehicle and slouched to see through the windshield, or, moreover, did not have any mechanism for securing the wheelchair inside the vehicle. According to Dresdner, the Veterans' Administration (VA) originally was the sole funding source for early vehicle modifications and they, along with some state vocational rehabilitation agencies, began to develop safety guidelines as early as 1972. However, regulation was inconsistent and slow to emerge. From the early 1970s to the mid-1980s, there were no significant changes in the way that a wheelchair driver accessed a vehicle. In the 1980s, the standard vehicle in the mobility industry was the full-size Ford Econoline van, modified either by adding a powered floor pan or by structurally lowering the floor. In 1992, Ford replaced the Econoline's dual front and rear fuel tanks with a single tank located in the center of the chassis to provide more crash protection. This precluded lowering the floor in 1992 and newer Ford E-series vans. Reportedly, to avoid the appearance of ambivalence toward the disability community, Ford introduced an aft-of-axle fuel tank kit that allowed modifications, including lowered floors. Thus, for the first time in the history of the mobility industry, vehicle builders were able to use a crash-tested fuel system that complied with Federal Motor Vehicle Safety Standards (FMVSS). In addition, they were becoming increasingly aware of how essential these standards were to consumers' safety (M. Dresdner, personal communication, December 21, 2004). Nevertheless, as the federal government improved accident data collection, it revealed the extent to which the mobility industry still was non-compliant with the FMVSS. The National Mobility Equipment Dealers Association (NMEDA) responded by developing a structural modifier certification, a "Quality Assurance Program," and by conducting crash tests of structurally modified vehicles. Since then, regulation has steadily increased, not only because of the availability of accident data and crash safety testing, but also due to the growing involvement of major automobile manufacturers and conversion van specialists in the structural modification of vehicles. As a result, all types of modified vehicles are becoming safer, although their cost reflects the expense of compliance with rapidly evolving safety standards.

It is important to note that improving regulation and compliance have created a paradox, as reported in a recent Wall Street Journal article (Schatz, 2005) that cited "The Exemption From the Make Inoperative Prohibition." This 2001 National Highway Traffic Safety Administration (NHTSA) rule created limited exceptions to the "Make Inoperative" statute, which prohibits the alteration or removal of motor vehicle safety equipment or features that are required pursuant to the FMVSS (Exemption From the Make Inoperative Prohibition, 2002). In other words, known safety devices cannot deliberately be altered or removed from a vehicle under ordinary circumstances. However, this Exemption allows otherwise prohibited modifications, which, in essence, effectively allow people with disabilities to purchase adapted vehicles. The paradox is that while consumers can now enjoy the independence that mobility affords, their safety may be at stake. This is why it is essential for case managers and life care planners to identify the most technically knowledgeable and dependable modifiers, even though the cost of their products and services may be greater (M. Dresdner, personal communication, December 21, 2004).

Structural Factors

For purposes of the below discussion, the following definitions are provided as related to vehicle modifications:

- Alterers are companies, such as automobile manufacturers, and other parties that specialize in high volume, mobility-related structural modifications that are made prior to a vehicle's first retail sale.
- Dealers are mobility equipment retailers who sell vehicles directly to consumers.
- Structural modifications generally mean lowered floors, raised doors, and raised roofs.
- Non-structural modifications include, but are not limited to wheelchair lifts, mechanical or electronic driving aids, wheelchair restraint systems, and interiors.
- Driver rehabilitation specialist (DRS) signifies one who plans, develops, coordinates and implements driver rehabilitation services for individuals with disabilities (ADED, 2005). If one is a certified driver rehabilitation specialist (CDRS), they have met minimum education and experience requirements and have passed an examination offered by the Association for Driver Rehabilitation Specialists relating to this specialty area (see also resources at end of article).

Most of the vehicles sold by today's mobility dealers are lowered-floor full size vans and lowered-floor minivans, which dealers purchase from alterers who typically use base vehicles manufactured by major automakers such as Ford, Toyota, Chrysler, Dodge, and GM. These products include Braun Corporation's Entervan® and Rampvan™, the Toyota Sienna with a Rampvan® Conversion, and Vantage Mobility International's (VMI) NorthStar and Summit models (M. Dresdner, personal communication, December 21, 2004).

Mobility dealers sell these vehicles either "as is," or with additional non-structural modifications that are completed by the dealer to meet customers' unique needs as recommended with the help of a CDRS. Some dealers also continue to perform their own structural modifications, thereby "customizing" the vehicle for a particular person. Although mobility dealer-built full size vans offer certain features that currently may not be available when purchased from alterers, Dresdner notes the practice is rapidly becoming economically impractical due to liability exposure and the complexities of compliance with new safety standards, which are the result of continuing vehicle crash tests.

Structural modifications, whether performed by alterers or dealers, involve removing the original equipment manufacturer's (OEM) floor and repositioning the original body mounts that support the body of the vehicle on the frame and maintain its structural integrity. Base vehicles often are heavy-duty vans, like the Ford E-250, which better compensate for the weight of a larger person in a power chair who must be lifted from one side of the vehicle and positioned off-center inside. In fact, in 2003 Ford issued an advisory to inform mobility vehicle builders that the lighter E-150 van is not recommended if structural modifications are required because the combined weight of the structural components and passenger load could exceed the maximum allowable weight for the front and rear axles (Jowa, 2003). Therefore, even though a lowered-floor minivan might "work," a CDRS could reasonably recommend a structurally modified, full size van for a larger person who uses a powered wheelchair with rehabilitation aids.

In preparation for this article, one of the authors followed van modifications for a 6'2"

³Independent Mobility Services (IMS) built the Rampvan™ prior to acquisition by Braun Corp. in July, 2004.

client with a brain stem injury, whose seated height in his power wheelchair is 52 1/2". Modifications were followed from initial fitting to final delivery of the van and training for the client. In determining which vehicle would be most appropriate for the client, vehicle alternatives were considered including a Ford full size van and a Dodge Caravan minivan, one of the base vehicles on which a lowered-floor Entervan® might be built. However, without the addition of a raised roof and door, a 6" lowered-floor in the Ford would only provide a 52" clear door opening and only 54" in the Entervan® with a 10" lowered-floor. Either would have been too small to accommodate the client in this particular case. The Entervan®, or other lowered-floor minivans, may be more appropriate for shorter individuals who use non-powered wheelchairs, and could accommodate some powered wheelchairs that do not have the complex power-tilt/recline type features and mid-wheel drive with which this client's chair was equipped.

Due to the client's specific needs (seated height, weight, visibility, and desire to ride in the front passenger position), and in consultation with a CDRS, the Ford E-250 van was selected and modified with a 6" lowered-floor, as well as a raised door and roof, which together allowed as much as a 62" clear door opening, or approximately 6" larger than the client's minimal requirements for door size.

Customization and Design Issues

The higher cost of a structurally modified van relates in part to the amount of time that engineers and mechanics spend on design requirements. Dresdner (personal communication, December 21, 2004) reports that a customer purchasing a vehicle that requires complex modifications will need 20-40 hours of pre-sale counseling including a comprehensive driver evaluation and a 2-3 hour preliminary fitting by a CDRS. Furthermore, once structural modifications are complete, the process of fitting the person to the vehicle is complex and time consuming, but critical to ensuring maximum safety and utility. Dresdner cautions, "A quarter of an inch in [the] location [of mechanical or electronic driving aids] can make a huge difference for [a person with a disability]." Therefore, driving aids must be positioned precisely to suit the physical capabilities of a person who may have limited strength or limited range of motion, or both, and even though a passenger vehicle may not present the complexities of a driver vehicle, the person still must be fitted to the vehicle.

The delivery fitting can last from 2-3 days and may include adjustments such as replacing the original equipment manufacturer's shoulder belt, or installing a new upper anchorage point for the shoulder belt if the door was raised, or if it required relocation due to the client's size or positioning of the wheelchair. One of the authors observed several hours of a delivery fitting for a passenger vehicle, during which two expert modifiers tediously made changes and added technology. For example, the vehicle had an automatic electric wheelchair lock-down device and because the client used a powered Permobil wheelchair that had complex rehabilitation aids, the modifier spent two hours partially disassembling the wheelchair to install a bracket on the bottom. Additional time was required installing the device to the vehicle floor to allow precise placement of the client in his wheelchair.

Modifiers provide another essential service by training all users of both driver and passenger vans: The person with a disability must learn how to get in and out of the vehicle and use equipment specially designed for him or her, and caregivers must be instructed about normal, as well as emergency, use of all equipment. This education process includes reviewing owner's manuals and completing comprehensive delivery checklists, which ensures that the modifier

has provided the purchaser with complete and accurate instructions.

Considering the complexities of customization and modification, mobility equipment dealers cannot simply charge a fraction over a vehicle's cost. By definition, modifiers are low volume/high expertise businesses and if they were to apply the standard automobile dealers' high volume/low margin distribution model, they could not deliver the customized service that today's mobility customers demand. In addition, as Dresdner notes, carrying products liability insurance is a significant consideration "these days," even if a vehicle has not undergone extensive modification.

Selected Cost Estimates

According to Consumer Reports, the cost of an average vehicle is approaching \$28,000 (Up front: News, Trends, Advice, 2005). A person with limited arm use may only require a spinner knob for less than \$50. Similarly, hand controls may be the only adaptation needed and the expected cost is between \$600-800, although they rapidly are becoming more expensive due to FMVSS compliance issues and insurance costs. One often-overlooked detail is that a person driving with hand controls may also have spasticity (e.g., paraplegia) and a pedal block may need to be installed to prevent inadvertent acceleration or braking, or accidental entrapment of the person's foot under the brake pedal, thus preventing operation of the braking hand control. This additional expense is about \$375, plus installation.

A person with C5 tetraplegia who can drive independently generally will require low-effort steering, a servo gas braking system, and a lowered-floor in addition to the standard passenger devices, at a \$20,000-30,000 higher cost. A person with a C4-5 injury typically will require servo steering and servo gas brakes, at an estimated \$30,000-50,000 more than the base cost. Dresdner estimates that it could cost up to \$110,000 to modify a vehicle for an independent driver who uses the full spectrum of high-tech driving aids, such as a hand-operated joystick system and electronic touchpad.

Overall, the annual maintenance costs for a high-tech passenger vehicle will only be slightly higher than for a more conventional vehicle. According to Dresdner, when the equipment is new and under warranty in years one to three, there should be no cost unless the vehicle experiences extraordinarily hard service. In year four, an owner might pay \$500 more for maintenance. Maintenance and repairs in year five could be an additional \$800 should lift repairs be necessary; however, most problems are likely to be minor. Maintenance and repair costs in year six will depend on mileage and driving conditions, particularly if the lift and tie-down are exposed to dirt, and then costs could be considerably higher. Note: Some of the equipment, such as lifts and servo driving systems, have a service life expectancy and, due to liability issues, companies will not reinstall them into new vehicles even if they appear to be in good condition, nor repair them if they are beyond the service limits. Reportedly, new requirements for lift systems include cycle counters and a specific maintenance schedule.

Case Study

The client in this case study, Rick (permission was granted to use his real name and photos found later in this article), acquired a disability and associated inability to drive that resulted from a brain stem injury which functionally limits him equivalent to a high level tetraplegic. He also cannot turn his head past midline in one direction. If able to stand, Rick is approximately 6'2" and uses a Permobil® power chair, in which his seated height is 56". In his pre-



Photo 1, Dismantled Vehicle. Photo provided by Handicapped Driver Services.



Photo 2, Roof Modification. Photo provided by Handicapped Driver Services.

also had to be modified). Once the company capable of doing the modifications received the base vehicle, it undertook extensive dismantling including removal of the roof, floor and interior, and structural redesign of the chassis (see photo 1). In addition, the floor was lowered 6", and the door and roof were raised to allow for installation of the custom doors (see photo 2).

In order to limit the loss of interior space to the lift supports/arm, the modifier selected a Braun cassette style lift that, when not in use, is stored under the van floor (see photo 3). Although the lift generally is protected, it extends far enough below the van that rough roads or careless driving could damage the mechanism; therefore, it is not appropriate for all users, but generally is considered a very reliable device with excellent lifting capacity.

Accessory items included a rear air conditioner for Rick and an automatic wheelchair locking system for the primary caregiver, his wife, to relieve her from having to "wrestle" with his chair and manual tie-down straps. Although the EZ Lock docking system necessitated modifications to the wheelchair on the day of delivery, the result is that Rick can maneuver into the passenger position and automatically lock into place. A modified seat belt was added and, in the event that the passenger front seat is needed, the



Photo 3, Braun cassette style lift. Photo provided by lead author.

vious van, he was positioned behind the front seat and the tie downs for his chair were hand-secured. To enter the vehicle, Rick had to recline his chair to get through the 47" doorway, and once in position inside, he would return his chair to its upright position. As a result, his views through the windshield and the side windows were obstructed because he sat so high inside the raised roof. The main reason Rick was unable to ride "up front" was that his vehicle did not have a lowered floor, which allows a person to ride further forward in the passenger position. Another reason was that the platform of his lift, which encroached on passenger space, blocked his forward access.

After 16 years, almost 200,000 miles, and numerous maintenance problems, Rick ordered a new van. As previously stated, a Ford E250 Econoline van was selected because the combination of his body weight and the weight of his power chair demanded that the vehicle have a heavy-duty suspension. Therefore, a minivan was contraindicated. The vehicle was delivered after a delay of several months due to new crash testing requirements for the modified fuel system (to accommodate the substantial modifications, the fuel system

design allows for temporary replacement of the seat.

After all the structural modifications were completed, another sub-contractor added the interior. At time of delivery, Rick was asked to arrive early in the morning and did not leave until early evening. Among the final fitting projects were wheelchair modifications—the attachment of a bracket for the EZ Lock system—and precise placement of the locking mechanism on the floor of the van, which was performed by two skilled technicians who measured and wired the device after numerous trials with Rick and subsequent revisions. Custom seat belts also were installed and adjusted to fit Rick’s dimensions in his wheelchair. Final modifications of the interior and client/caregiver training about all of the vehicle’s features completed the project. Photo 3 shown above was taken during training on the day of delivery and illustrates the finished project. One interesting note is that Rick, who has impaired voice quality, reported that for the first time in 16 years, he can talk with his wife while they are driving, not only because he essentially is riding up front with her—he only sits about 12” behind her—but also because the new van is relatively quiet. His wife, on the other hand, retorts that she now has a “back seat driver” and perhaps a quiet vehicle is not as desirable as it would seem!

A summary of costs associated with this project can be viewed in Table 1 below. Note that high-tech aids, which a person with a high-level spinal cord injury generally would use, are not included in this example. As previously noted, the cost of that type of project could easily exceed \$100,000.

Table 1: Vehicle Modifications for Case Study: Rounded Costs

Equipment	Costs Rounded
Base Van, Ford E250	\$27,300
Interior conversion, HI-Top	\$7,750
Roof Support Structure	\$1,300
Executive Top	\$2,000
Custom Tall Side Doors	\$3,000
Braun 603A Cassette Lift	\$9,600
6” Dropped Floor	\$8,000
EZ Lock/Tie Downs/Custom Seat Belt	\$2,000
Wheelchair Dropped Floor Front	\$600
Air-conditioning, Back	\$850
TOTAL (not including tax)	\$62,400

*Does not include high tech aids or other custom modifications.

Below is an outline of general topics for the life care planner and/or case manager to consider when providing for transportation needs for a client with mobility impairment.

Checklist for Adaptive Driving and Passenger Equipment

A. Evaluation:

1. Certified driver rehab specialist (CDRS) evaluation
2. CDRS prescription for adaptive driving and passenger equipment

B. Prescription:

1. Type of vehicle
 - a) Lowered-floor minivan
 - b) Lowered-floor full size van (by alterer)
 - c) Lowered-floor full size van (by mobility equipment retailer-modifier)
2. Primary Driving aids (if client is able to drive)
 - a) Mechanical driving aids
 - b) High-tech (servo) driving aids
3. Secondary Driving Aids, e.g., touchpad systems

C. Client:

1. Passenger/Driver
 - a) Weight
 - b) Seated height in wheelchair (on properly inflated cushion)
 2. Type of wheelchair
 - a) Non-powered
 - i. Rigid
 - b) Collapsible Powered
 - i. Seated height of client in wheelchair (on properly inflated cushion)
 - ii. Weight of client in wheelchair
 - iii. Features, e.g., powered-recline, powered-seat, vent equipped, etc.
 3. Additional medical devices
 - a) Patient lift system, e.g., Hoyer
 - b) Portable ventilator
 - c) Oxygen
 - d) Refrigerator (to preserve medication)
 4. Level of independence (driver)
 5. Lifestyle considerations (full size van)
 - a) Outdoor activities and rural use might preclude under-vehicle lifts due to limited ground clearance
 - b) Unobstructed doorway allows able-bodied access to cargo area (people and service animals)
 - c) Privacy issues, e.g., window blinds if performing self-catheterization
 - d) Vocational/Avocational activities
 - e) Additional equipment to be transported based on lifestyle considerations
-

D. Modifier-Vendor:

1. NMEDA member
2. Quality Assurance Program (QAP) accreditation
3. Adaptive Driving Alliance (ADA) member (reciprocal service agreement)

E. Other Factors:

1. Client's financial resources compared to cost of ownership: insurance, maintenance, etc.
2. Stability of client's medical condition
3. Expected life of vehicle/devices
4. Wheelchair replacement schedule
5. Wheelchair cushion replacement schedule
6. Vehicle height compared to height of parking area at home/work
7. Vehicle owners vigilance and compliance with maintenance concerns

Conclusion

With the improvement in survival rates and life expectancy of individuals with catastrophic disabilities as well as the increased aging population, accessible vehicles are becoming more commonplace and new products are appearing virtually monthly. The entry of several vehicle manufacturers in this once very specialized field has allowed many people with impaired mobility to go to dealers, select a vehicle from among several on a lot, and drive home the same day. However, there continues to be a need for modification of available transportation choices and when structural modification is needed, many, many hours of consultation may be necessary before and during the construction process, which could potentially increase the cost of the vehicle by thousands of dollars. Most life care planners and case managers will not have the knowledge to evaluate clients' adaptive driving equipment needs because this technical area is extremely specialized. Pediatric client needs, although not specifically included in this article, present additional deliberation since size of the child, seriousness of the effects of the disability on mobility, and growth factors will determine selection of a vehicle and appropriate modifications. For example, a child who relies on a wheelchair as a positioning seating system will likely require an accessible van earlier than one who can travel comfortably in a booster seat.

Dresdner stresses the importance of teamwork including consultation with a CDRS who can help to ensure that recommendations are appropriate and that competent vendors properly implement the specified modifications (M. Dresdner, personal communication, December 21, 2004). However, as with any professional specialty area, the life care planner needs to assure competent recommendations with the client's and/or family's participation, when possible. Many life care planners may have the knowledge, experience and expertise necessary to make transportation related recommendations; however, regardless of the source of the recommendations, given the increasingly complex nature of this area, life care planners and case managers are encouraged to refer clients to accredited modifiers who comply with NMEDA standards, participate in the NMEDA quality assurance program (QAP) program, and are members of the Adaptive Driving Alliance.

Resources

1. The Association for Driver Rehabilitation Specialists (formerly the Association of Driver Educators for the Disabled, or ADED, the acronym by which it is still known) – A non-profit professional organization for those working in the field of driver education, driver training, and transportation equipment modifications for persons with disabilities. Offers the Driver Rehabilitation Specialist Certification Exam (CDRS).
711 S. Vienna St., Ruston LA 71270
(800) 290-2344
<http://www.driver-ed.org>
 2. National Mobility Equipment Dealers Association (NMEDA) – A non-profit trade association of mobility equipment dealers, driver rehabilitation specialists, and other professionals dedicated to broadening the opportunities for people with disabilities to drive or ride in vehicles modified with mobility equipment.
3327 Bearss Avenue, Tampa, FL 33618
(800) 833-0427
<http://www.nmeda.org>; nmeda@aol.com
 3. Adaptive Driving Alliance (ADA) – A nationwide group of vehicle modification dealers providing van conversions, hand controls, wheelchair lifts, scooter lifts, tie downs, conversion van rentals, paratransit and other adaptive equipment for drivers with disabilities and passengers.
4218 W. Electra Lane, Glendale, AZ 85310
(623) 434-0722
<http://www.adamobility.com>
 4. National Highway Traffic Safety Administration (NHTSA) – The federal government agency authorized to regulate the manufacture of automotive adaptive equipment and modified vehicles used by persons with disabilities.
400 Seventh St. S.W., Washington, DC 20590
(888) 327-4236
<http://www.nhtsa.dot.gov/cars/rules/adaptive/>
 5. Society of Automobile Engineers (SAE) – An international organization of engineers, business executives, educators, and students who share information and exchange ideas for advancing the engineering of mobility systems.
SAE World Headquarters, 400 Commonwealth Drive, Warrendale, PA 15096-0001
(724) 776-4841
<http://www.sae.org>
 6. The Braun Corporation – The Braun Corporation purchased Independent Mobility Systems (IMS) in July 2004, creating the world's largest mobility products company. IMS, a business unit of The Braun Corporation, continues to manufacture and support the Rampvan™ brand minivan conversion. The Braun Corporation sells the Entervan™ brand of mobility vehicles.
(800) THE-LIFT
<http://www.ims-vans.com/>, <http://www.entervan.com>; askbraun@braunlift.com
-

7. Handicapped Driver Services, Inc. (HDS) – A NMEDA-accredited Mobility Equipment Installer, Structural Vehicle Modifier, and High Tech Driving Systems Installer and a participant in the NMEDA Quality Assurance Program (QAP). Sells, rents, leases, and services adaptive vehicles and equipment. Accessibility Services Plaza
1310 Kennestone Circle N.W., Marietta, GA 30066
(877) HDS-VANS (432-8267); (770) 422-9674 (Local)
<http://www.hdsvans.com>; info@hdsvans.com

References

- Deutsch, P. (1999). An overview of related care and services in catastrophic injuries. In P. Deutsch & H. Sawyer (Eds.), *Guide to rehabilitation* (pp. 7.1 – 7.41). White Plains, NY: AHAB Press.
- Exemption From the Make Inoperative Prohibition, 67 Fed. Reg. 38423 (June 4, 2002). Retrieved February 14, 2005, from Factiva database via GSU Access: http://ezproxy.gsu.edu:2876/en/eSrch/ss_hl.asp
- Jowa, A. (2003). *Adaptive mobility E-150*. Retrieved May 15, 2005 from HYPERLINK <https://www.fleet.ford.com/truckbbas/non-html/Q97.pdf>
- McCaigue, I. S. (2004). The role of the occupational therapist in life care planning. In R.O. Weed (Ed.), *Life care planning and case management handbook* (2nd ed., p 89-144). Boca Raton, FL: CRC Press.
- Pierce, S. (1999). A comprehensive approach to transportation assessment. In P. Deutsch & H. Sawyer (Eds.), *Guide to rehabilitation* (pp. 6C.1 - 6C.10). White Plains, NY: AHAB Press.
- Schatz, A. (2005, January 7). Joe's van: A tragic accident spotlights a hole in auto regulation. *The Wall Street Journal*, pp. A1, A8.
- Up Front: News, Trends, Advice. (2005). Best vehicles for \$25,000 or less. *Consumer Reports*, 70(4), 9.
- Weed, R.O. (2004). Life care planning: Past, present, and future. In R.O. Weed (Ed.), *Life care planning and case management handbook* (2nd ed., pp. 1-13). Boca Raton, FL: CRC Press.

About the Authors

Roger Weed, Ph.D., LPC, CLCP, CRC, CDMS, CCM, FNRCA, FIALCP, is Professor and graduate rehabilitation counseling coordinator at Georgia State University in Atlanta, Georgia. He has authored or co-authored approximately 100 books, articles and book chapters. Dr. Weed also is the ethics chair for the International Academy of Life Care Planners (IALCP) and is one of the five founders of the first national training program leading to life care planning certification.

Lisa R. Engelhart, MS, CRC, recently completed her master's degree in rehabilitation counseling at Georgia State University. She has 24 years' experience handling workers' compensation catastrophic injury claims in primary and reinsurance settings.