

MINUTES  
Appalachian Search & Rescue Conference  
Board of Directors Meeting

August 26, 1995  
Charlottesville, Virginia

Meeting called to order at 1035 hours by ASRC President David Carter

ROLL CALL of ASRC delegates present:

Allegheny Mountain Rescue Group  
Richmond Search & Rescue Group  
Potomac Valley Rescue Group  
Southwest Virginia Mountain Rescue Group  
Tidewater Search & Rescue Group  
Maryland Search and Rescue Group  
Shenandoah Mountain Rescue Group

ASRC Delegates not present: Blue Ridge Mountain Rescue Group

#### TREASURER'S REPORT

See Attached

#### TRAINING REPORT

ASRC training simulation with Shenandoah National Park for September 23-24 was canceled by the Park due to their inability to provide staff for the training. A winter date, to be determined was suggested.

Mechtel (SMRG) made a motion (motion seconded) to try to reschedule the training simulating with SNP for January 27-28. And, if these dates are not suitable with SNP, move the simulation elsewhere.  
Motion carried.

#### COMMUNICATIONS COMMITTEE REPORT

The ASRC Aviation license has been renewed by the FCC. The renewal form with ASRC payment was mailed from ASRC to Steve Houck for his signature but never arrived at his home. Review of this is ongoing.

#### MEDICAL COMMITTEE REPORT

Rob Christie was not present till later. Conover (AMRG) handed out a patient treatment record form used by the Wilderness EMS Institute. With late arrival of Christie, he distributed new 3-part carbonated ASRC patient care report form to be used by ALL ASRC groups in any group activities the Group participates in. Cost of these forms is \$155 per 1,000. The goal in using these new forms is to develop a centralized ASRC tracking process so the ASRC can report to its several state medical agencies our true level of services. It was announced that Maryland is in the process of changing its medical protocols and that new procedures are being developed.

#### OPERATIONS COMMITTEE REPORT

The goal of the ASRC shall be to respond to 90% of all alert pages within 10 minutes and 99% of all alert pages within 15 minutes.

All ASRC Incident Commanders shall be declared Alert Officers as soon as they receive the ASRC Alert Officer Training Packet. Patrick Turner (BRMRG) is responsible for mailing to each ASRC Incident Commander the Alert Officer Training Packet by 31 October 1995. Patrick Turner shall include in the Training Packet the guidance for Incident Commanders serving as Alert Officers.

The ASRC Alert Officer standards shall be added to the Incident Staff training standards.

#### PRESIDENT'S REPORT

1 Few Groups have sent in their recommendations for Mission Statement. It was decided that if Groups do not send in information to Candi by September 15, the process will continue without their input.

- 2 Carter asked each ASRC Committee to write a proposed charter for their Committee and submit it to him by September 29.

## GROUP REPORTS

RSAR delegates indicated its Chair and Group Training Officers have left the program. Andy Bayne (TSAR GTO) is temporarily serving as GTO for RSAR.

PVRG asked for information regarding other Group's experiences with fund raising activities.

## MISSION SUMMARIES

New Kent Mission: Mission went well.

Maryland downed aircraft incident: First cooperative effort with Maryland CAP. Went well. Seemed to be a positive mission for both Groups. Support of State Park was appreciated.

Green Ridge State Forest incident: Called to mission by Maryland CAP for search for a missing cadet. Search was actually coordinated by Maryland DNR with excellent sharing of resources.

Virginia Beach lost weapon search: Discussion about whether ASRC should participate in these types of activities. This will be reviewed by Operations Committee.

Newport News lost person search: Lost person was from a psychiatric hospital in the area.

## NEW BUSINESS

### Operations Committee

Members of the Operations Committee subcommittee group for the Operations Manual are Bob Koester (BRMRG), Camille Birmingham (BRMRG), and Gary Mechtel (SMRG). Patrick Turner (BRMRG) and Peter McCabe (M/SAR) volunteered to assist with this group.

### Fund Raising

A general discussion took place regarding the need to increase ASRC revenues as expenses continue to exceed income. A number of suggestions were made including increasing the individual Group member dues to ASRC from \$1.00 to \$5.00 per year.

It was indicated that Burger King and Wall-Mart provide opportunities for Groups to earn money in their programs by giving the Groups a percentage of receipts which are given to the Groups during a period when the Group is in the store.

The purpose of the October 28 ASRC Board meeting shall be to discuss operations issues. During the December ASRC meeting, it is hoped a 2-day retreat can be planned to deal with several central issues.

The Business meeting was adjourned at 1230 hours.

Prepared by:

*Pw*

Peter McCabe  
M/SAR Delegate

MINUTES  
Appalachian Search & Rescue Conference  
General Membership Meeting

August 26, 1995  
Charlottesville, Virginia

Meeting was brought to order at 1405 hours.

The purpose of this meeting is to vote on a series of changes to the ASRC By-Laws. Please refer to 4 page proposal, dated April 20, 1995, by Mechtel, and one page undated proposal submitted by Patrick Turner. The following is a summary of the motions. The text of each motion is contained in the attached.

It was moved and seconded to make changes to Section 1 to enable the ASRC to develop, publish and enforce standards of procedure in the form of an ASRC General Administrative Manual. Motion was carried with 70 yes, 0 no and 1 abstention.

It was moved and seconded to make changes to Section 2 to enable other different SAR-type groups and programs to become members of the ASRC. Specifically, to enable affiliate groups to become ASRC members and have a single vote on the ASRC Board of Directors. Motion was carried with 68 yes, 0 no, and 2 abstentions.

It was moved and seconded to make changes to Section 3 to enable the ASRC and ASRC Groups to offer Associate Membership to individuals who wish to contribute time or services to the ASRC or an ASRC Group but do not want to become active ASRC members. Motion was carried with 67 yes, 0 no, and 2 abstentions.

It was moved and seconded to make changes in Section 2.8c to enable the Chairman and Vice Chairman to be elected from among the delegates with the Secretary and Treasurer being elected from the general membership of the Conference, and to create Section 2.11.c to state that in the event that the Secretary and/or Treasurer are not members of the Board of Directors, then they are automatically appointed to be non-voting members of the Board of Directors. Motion was carried with 70 yes, 0 no, and 1 abstention.

Meeting was adjourned at 1615 hours.

Prepared by:



Peter McCabe  
M/SAR Delegate

Section 2 changes.

- (1) Change  
Article III  
3 Groups  
(change "five" to "different")

Wording

" ... comprised of different types of Groups: Probationary ..."

- (2) Change  
Article I  
2.8  
(change item b to allow Affiliate groups to have a single vote.)

Wording

" ... shall elect from its active membership one voting delegate to be installed 1 April ..."

- (3) Add & Renumber  
Article III  
3.2  
(add a new item b and renumber the rest of section 3.2.)

Wording

" b. submit to the Board of Directors the following, (1) the Group's mission statement (2) suggested additions to the Training Guide to support the group's mission statement, and (3) suggested changes to the ASRC operations manual to support the group's mission statement. Any training guide changes and operations manual changes shall be reviewed by the ASRC Training Officer and Operations Officer, respectively and their reviews presented to the Board Of Directors. The Board Of Directors shall first approve the submissions (not necessarily adopt the submissions) listed above, prior to accepting in a new affiliate group."

Renumber

Renumber "b through f" to "c through g").

Section 3 changes and additions.

(1) Add

Article II  
8. Associate members  
(remove "(reserved)", and add the following)

Wording

" 8.1 Associate Membership may be offered by the ASRC and by each of its Groups to those individuals who wish to contribute time or services to the ASRC or to one of its Groups and yet do not want to become active members and fulfill all the duties and obligations of active membership.

8.2 The ASRC Board of Directors shall establish standard membership fees ~~and guidelines~~ for Associate Members who contribute time or services.

8.3 The ASRC Board of Directors shall establish guidelines for awarding Associate Membership to those individuals who contribute time or services to the ASRC or one of its Groups.

8.4 Associate Membership shall be granted to those individuals who meet the requirements of sections 8.1, 8.2, and 8.3 (above) and who secure a simple majority of the votes cast in a scheduled membership meeting of the Group to which they apply, or who secure an affirmative vote of the Board of Directors.

8.5 Associate Membership shall have no ASRC voting privileges."

Proposed Changes to the ASRC By-Laws

*Handwritten:*  
P  
FA Taxes  
LUTRACOR

Change 2.8.c from At the first meeting of the Board after 1 April, the voting delegates shall elect from among the delegates the officers of the Board of Directors. The following conditions shall apply: (1) officers shall be elected from Certified or Probationary Certified Groups; (2) officers shall have votes in accordance with constituent Group voting status; and (3) the Chairman or Vice Chairman, if and only if from a Group not holding voting status, shall be accorded a vote only at such times as needed to break a tie vote.

To: At the first meeting of the Board after 1 April, the voting delegates shall elect the officers of the Board of Directors. *The Chairman and the Vice Chairman shall be elected from among all the delegates. The Secretary and the Treasurer shall be elected from the general membership of the Conference.* The following conditions shall apply: (1) officers shall be elected from Certified or Probationary Certified Groups; (2) officers shall have votes in accordance with constituent Group voting status *if they are a delegate*; and (3) the Chairman or Vice Chairman, if and only if from a Group not holding voting status, shall be accorded a vote only at such times as needed to break a tie vote.

Create 2.11.c: *In the event that the Secretary and/or the Treasurer are not members of the Board of Directors, then they are automatically appointed to be non-voting members of the Board of Directors*

**Crestar Account Summary**

CUSTOMER SERVICE-OPERATIONS CENTER  
P O BOX 26150, RICHMOND, VA 23260



016045/C /1/R05/00003

CRESTAR BANK

APPALACHIAN SEARCH & RESCUE  
440 NEWCOMB HALL  
CHARLOTTESVILLE VA 22904

STATEMENT PERIOD  
07/11/95 - 08/07/95



24 hours, 1-800-CRESTAR (1-800-273-7827) or locally at 804-270-8176 (Richmond).  
(Telephone Deaf Device customers call 1-800-445-8184).

**CHECKING SUMMARY FOR ACCOUNT 816440468**

BEGINNING BALANCE	1,384.12	MINIMUM BALANCE	1,017.12
0 DEPOSIT(S) TOTALING	0.00+	AVERAGE BALANCE	1,242.15
INTEREST THIS PERIOD	0.00+		
3 DEDUCTION(S) TOTALING	367.00-		
OTHER DEDUCTIONS	0.00-		
SERVICE CHARGES THIS PERIOD	0.00-		
ENDING BALANCE	1,017.12		

DESCRIPTION OF ACCOUNT TRANSACTIONS	DATE	AMOUNT	BALANCE
BEGINNING BALANCE			1,384.12
CHECK 120	07/24	17.00-	1,367.12
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**CHECK NUMBER SUMMARY**

CHECK	AMOUNT	CHECK	AMOUNT	CHECK	AMOUNT
106	230.00	120*	17.00	121	120.00

\* DENOTES BREAK IN CHECK SEQUENCE

**ITEMS OF INTEREST**

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Crestar's premium tier rate on money market accounts is one of the best going. Call  
1-800-CRESTAR (1-800-273-7827) or ask your branch representative for today's rate.

**26 August 1995 Treasurer's Report**

Since the June meeting, we have had an income of \$172.00, \$45 from group dues, \$27 from individual dues, and \$100 from a donation from Miriam Ackley for our work on the Dolly Cacchione search. Thank you to AMRG for paying their dues. All groups have now paid their 1995 dues.

During the same time period, we have had debits totaling \$481. \$51 went to Metracall for monthly paging. \$230 went for postage, mailing supplies, and copying under Secretary for the General Membership Meeting announcements. \$80 went to renew our business license (WNUF), we are still awaiting our new license. \$120 went to renew our airplane license (KA) This one had been received and copies of the new license have been made for each group.

Our banking account is at Crestar bank with a balance of \$1075.12 in the bank. For the year, we have had an income of \$832. We have had debits totally \$843.37. This means that we are in the hole \$11.37 after 8 months. We still have 4 months to go and no foreseeable income. This is the budgetary situation we are in. The major expense the corporation incurs is radio license renewal. Without this drain on our account, we could have positive financial growth.

No progress as of yet on 501(c)3. Once again, since some seemed to have missed it, my new address is: P.O. Box 6051, Charlottesville, VA 22906. My telephone number is (804) 295-7901 for now.

Submitted respectfully,

Patrick Turner  
ASRC Treasurer

**INCOME**

Donations - Unassigned	100.00
Dues - Group	45.00
Dues - Individual	27.00
<b>TOTAL INCOME</b>	<b>172.00</b>

**EXPENSES**

Communications	
KA98781	120.00
WNUJ	80.00
Pagers	51.00
Secretary - Unassigned	230.00

From: Gary Mechtel  
Phone: 410-381-2593  
Purpose: Suggested changes to ASRC Bylaws  
Date: 4/20/95  
Version: 1

Purpose:

The ASRC BOD has been slowly evolving how we go about doing day-to-day business. This has resulted in new procedures being developed and added in an ad hoc fashion. A recent key effort has been the rewriting of the ASRC Operations Manual. Also, in parallel, the BOD has been reviewing our procedures and processes in light of where the BOD believes we ought to be directed in our long term strategic plan. From these efforts and other concerns, three high level issues have emerged.

First, the re-write of the ASRC Operations Manual has brought to light that many of our Administrative procedures are mixed in with our Operational Procedures. This has been rectified by creating a General Administration manual. It is desirable to have the ASRC Bylaws recognize such a manual. Some of the following suggested changes reflect this effort.

Secondly, the BOD has reviewed the ASRC's policies concerning affiliate groups. There have been suggested changes to our policy. The intent is to make the ASRC both more open to and more attractive to other SAR agencies. Recall the overall reason for this effort is to provide better services to the Lost and Injured. The ASRC BOD believes that as an organization, the ASRC has a lot to offer (training standards, similar operational procedures, and a wide number of services such as radio licenses, training, dispatch, contacts with outside agencies, MOUs, etc.).

The BOD directed me to draft a set of changes to the Bylaws to reduce the barriers to allowing other affiliate agencies into the ASRC. The second set of suggested changes fulfill this charter.

Finally, SMRG has requested that some minor changes be made to bylaws to support associate membership.

**Section 1 changes.**  
Changes for adding references for a General Administration Manual.

- (1) Addition To:  
Article I  
1. Groups  
(Add into the last sentence, just before the final period)

Wording  
", and the administration procedures specified in the ASRC General Administration Manual."

- (2) Addition To:  
Article I  
2.1 Board of Directors  
(add new item d, and renumber as necessary)

Wording  
"d. to establish, publish, and enforce standards of procedure for general administration procedures in the form the ASRC General Administration Manual."

Renumber  
renumber the rest of section 2.1 d through h to e through i.

- (3) Addition To:  
Article I  
2.2 Groups  
(Add into the last sentence, just before the final period)

Wording  
", and the administration procedures specified in the ASRC General Administration Manual."

End of section 1 changes.

**ASRC Board of Directors  
Agenda 26 August 1995**

Rules:                   1: Stick to the topic  
                          2: Limit to three minutes per topic  
                          3. Don't repeat what others say

Call to Order: Dave Carter  
Roll Call of Groups: Candi Cappozzi

Reports:

Treasurer: Patrick turner	Safety: William Dixion
Training: Candi Capozzi	Medical: Rob Christie
Communications: Steve Houck	Operations: Gary Mechtel

Chairman's Report: Dave Carter

**BUSINESS MEETING:**

**OLD BUSINESS:**

Status of 501 C 3 - Robert Koester  
Status of Vision Statement, Dave Carter  
Status of 1995 Simulation in Shenandoah National Park - Candi C.  
ASRC medical Forms - Rob Chrisite  
Status of Aircraft licensee - Steve Houck

**NEW BUSINESS:**

Proposals for new Staff, IC's  
Appointment of new training officers

**Summary of Recent Missions:**

New Kent Mission: Dave Carter  
Maryland A/C Mission: Dave Carter  
Maryland CAP Missing Cadet mission: Gary Mechtel

**OPERATIONS MEETING:**

**OLD BUSINESS**

Status of Operations Manual - Gary Mechtel

**NEW BUSINESS:**

Fixing the Alerting Officer Function: - Dave Carter

**General Announcements:**

?  
?



## Proposed Changes to the ASRC By-Laws

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1-800-CRESTAR (1-800-273-7827) or ask your branch representative for today's rate.

ORIGINAL ARTICLE

## Behavioral profile of possible Alzheimer's disease patients in Virginia search and rescue incidents

ROBERT J. KOESTER, MS<sup>1,2\*</sup> and DAVID E. STOOKSBURY, PhD<sup>1,3</sup>

<sup>1</sup>*Appalachian Search & Rescue Conference, Charlottesville, VA, 22908, USA*, <sup>2</sup>*Center for Research in Reproduction, School of Medicine, University of Virginia, Charlottesville, VA 22908, USA*, <sup>3</sup>*High Plains Climate Center, University of Nebraska-Lincoln, Lincoln, NE 68583-0728, USA*

We performed a retrospective study of the behavior of lost dementia of Alzheimer's type (DAT) patients who became the subjects of organized search and rescue efforts. We compared the DAT patients' behavior to the behavior of elderly lost victims who possessed normal cognitive abilities. Data for both populations were from the Virginia Department of Emergency Services lost-subject database. We found that normal elderly individuals on average traveled a greater straight-line distance (2.56 km) from the point last seen (PLS) than did DAT patients (0.88 km). The median straight-line distance from the PLS was the same for both populations (0.8 km). The mortality rate for DAT patients was 19%. Mortality was caused by hypothermia, dehydration, and drowning. No fatalities were found among DAT patients when they were located within 24 h. A mortality rate of 46% was found for patients requiring more than 24 h to locate. This 24-h survivability window suggests that lost DAT patients require an immediate and aggressive search response.

*Key words:* wandering, Alzheimer's disease, lost person behavior, missing person, behavioral profile

### Introduction

Our goals are to create a preliminary behavioral profile of lost dementia of Alzheimer's type (DAT) patients, to determine factors that impact survivability, and to create a database. Incident commanders in missing person searches rely on lost person behavior profiles and statistics for the initial deployment of resources, development of objectives, and predicting survivability. The major textbooks and field guides currently used by incident commanders combine both Alzheimer's individuals with elderly subjects or fail to give any numbers [1,2]. Unfortunately, search subjects suffering from Alzheimer's disease are grouped with elderly subjects or are undocumented.

Current estimates of Alzheimer's disease in the United States are 4 million, based on an estimated 10.3% of the population over the age of 65 [3]. In this scenario, 12–14 million Americans will be affected by the year 2040 [4]. The increase is believed to be due to an increase in awareness of the disease and an increase in the age of the US population [5]. Regional demographics also will affect the percentage of Alzheimer's cases found in each state. There appears to be a higher prevalence in rural areas [6] and among those with less

\*Address for correspondence: Center for Research in Reproduction, Box 391, School of Medicine, University of Virginia, Charlottesville, VA 22908, USA.

education [7,8]. It is this particular subset of DAT patients that often results in search and rescue incidents.

Alzheimer's disease (AD) is a disease of exclusion, as it can currently be definitively diagnosed only after the patients' death. However, DAT [9] or probable AD is well characterized and can be presumed using behavioral tests [10-12]. Wandering as a feature of behavior significantly increases with further deterioration of the DAT patient. Among mild cases of DAT, 18% of patients wander, whereas in severe cases, wandering afflicts up to 50% [13]. Other studies that have made estimates of the prevalence of wanderers range from 12% to 39% [14,15]. One study reported 26% of a group of AD patients getting lost in the outdoors in a week [16].

Wanderers are distinguishable from nonwanderers by constant disorientation, inability to know when they are lost, better social skills, and more activity [17]. These traits have serious consequences when the patient wanders into a wilderness or rural location. Looking at several factors that affect survival in patients with DAT, only the severity of DAT, behavioral problems, and wandering or falling correlate to decreased longevity [18]. One law enforcement agency reported 4 deaths out of 450 separate episodes of critical wandering [19]. Nova Scotia's Emergency Measures Organization reported a mortality rate of 7 out of 15 among "walk-a-ways" (Alzheimer's, other senile dementia, mentally retarded, psychosis). All fatalities were attributable to hypothermia [20]. In another study, 6 out of 29 patients died when search and rescue groups responded only after law enforcement search attempts were unsuccessful. Deceased patients appeared to have succumbed to hypothermia or to have drowned. Twelve patients were found alive, but required evacuation. Based on field diagnosis, all the patients suffered from hypothermia and/or dehydration. DAT patients have usually wandered before, are generally unresponsive even when uninjured, leave few physical clues, and wander across roads [21].

### **Materials and methods**

The Virginia Department of Emergency Services (DES) is responsible for coordinating search and rescue (SAR) activities throughout the state. In 1986, DES introduced a new management system that uses selected operations personnel to handle all requests for SAR assistance. The new management system initiated a record-keeping and database system [22]. This retrospective study looks at data from June 1986 with the first state-recorded mission to January 1992. Two hundred ninety-five incidents are covered.

### *Criteria for inclusion*

Only searches issued a DES mission number were included in our analysis. Mission number issuing occurs when DES dispatches state SAR resources to an incident. The DES Missing Person Reports, DES After Action Reports, and Virginia SAR Council Mission Summaries were the sources for all data. The incident commander or a general staff member generally completed these reports. The DES SAR office often completed missing information later. The SAR office furnished us copies of the original reports.

The caregiver's description of the patient was the sole basis for classification of a subject as a DAT patient. The patient had to be older than 40 years with the possible age of onset of dementia between 40 and 90 years of age. If there was a history of mental retardation or psychosis (before onset of dementia), the subject was excluded. Further classification of

the missing person as potentially suffering from degenerating dementia was made by the primary investigator based solely on the information provided on the data forms. Incident Commanders have no specific training to allow them to determine the validity of such claims. The data collection form has no specific question concerning a DAT description or mental status of the search patient. Therefore, it is completely voluntary for the compiler to fill in a DAT description in the "other pertinent information" blank. If the compiler did not mention Alzheimer's disease, dementia, or senility, the missing person was classified as either elderly (if > 60 years of age) or placed into another category (retarded, despondent, etc.). No attempt was made to isolate other potential causes of dementia.

#### *Data coding*

If the information provided on the state form leads to a classification of DAT, the following information is collected: state mission number, age, sex, race, time the patient was last seen, date patient was last seen, type of location where last seen (nursing home, residence, etc.), straight-line distance from patient last seen location to where patient was found, time patient located, search technique that located patient, description of terrain where patient was located, and a brief summary of patient's medical condition. We entered the data (handwritten forms) into a Microsoft Excel 4.0 spreadsheet [23].

#### *Statistical methods*

We performed the statistical analysis using the software package, StatView 512+ [24]. For descriptive purposes and for future reference, we present the mean, standard deviation, and standard error within categories. Analysis of variance (ANOVA) was performed with significant *F*-values being reported. The level of significance was the traditional  $p < 0.05$ . If the ANOVA was significant, the conservative Scheffe's test for differences between specific means was performed [25]. We report only significant *F*-values.

### **Results**

Forty-two (15%) of 295 recorded state incidents involved possible DAT sufferers (Fig. 1). One search involved two DAT patients who remained together. This particular category was the largest in the data set. In all 42 searches, the search effort or others located the patient. The other most prevalent search types included suicidal (12%), children (12%), drowning (11%), murders (9%), and hikers (8%). The drowning and murder cases usually reflected requests for dog teams only. The DAT searches occurred over a 5-year period. There has been an increase in both the numbers of DAT searches and the percentage of total search load (Table I).

We divided the patients into three classes based on their medical condition at the time of the find. Team leaders with basic first-aid training made the field classifications summarized below.

**Class One:** Require no medical treatment and can walk out without assistance

**Class Two:** Require medical assistance and an evacuation

**Class Three:** Dead on arrival

The medical condition of the DAT patients after being found varied greatly. Twenty patients (47%) could be escorted back to their residence and required no medical attention (class one). Fifteen patients (35%) required an evacuation team (class two). The

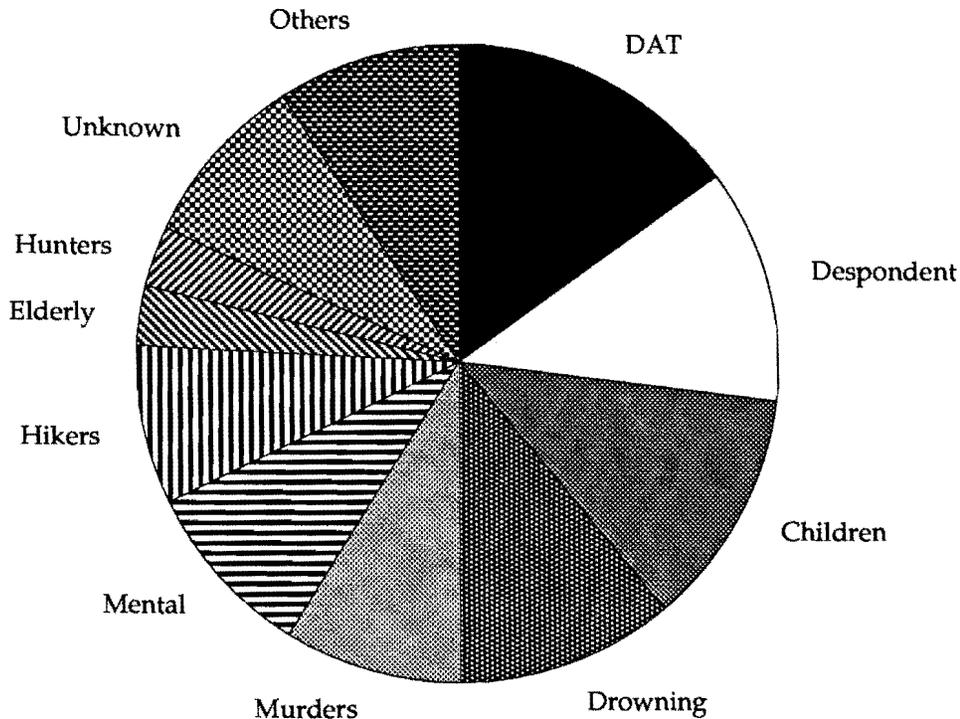


Fig. 1. Breakdown of Virginia searches.

state forms did not always specify the specific medical problem and the field diagnoses were not verified by hospital records. Experienced emergency medical technicians (EMTs) with supplemental training in wilderness disorders made the field diagnoses. DAT patients requiring an evacuation ( $n = 13$ ) suffered from hypothermia (67%) and/or dehydration (33%). In two cases, patients were field diagnosed as suffering from both disorders. All evacuated patients survived and were discharged from the hospital. Eight patients (19%) were found deceased (class three) and appeared to have succumbed to hypothermia ( $n = 6$ ) or drowned ( $n = 1$ ). For one patient, the cause of death was neither determined nor recorded. No evacuated or deceased patient demonstrated any trauma based on field evaluation. In searches for elderly subjects not suffering from DAT ( $n = 10$ ), six subjects

Table 1. Total searches and DAT searches

Year	Total searches	DAT searches	% DAT
1986	32	5	16
1987	33	1	3
1988	40	4	10
1989	49	8	16
1990	54	9	16
1991	87	16	18

**Table 2.** Elderly versus Alzheimer's distance traveled

	<i>Number</i>	<i>Median (km)</i>	<i>Mean (km)</i>	<i>Std. dev.</i>	<i>Std. error</i>
Alzheimer's	37	0.8	0.88	0.74	0.12
Elderly	11	0.8	2.56	3.05	0.92
<i>F-value = 9.92</i>					

were class one (60%); one subject was class two (10%) due to hypothermia and dehydration; and three subjects (30%) were deceased (heart attack, drowning, unrecorded).

There is no relationship between the age of the DAT patient and outcome (class) of the patient. There is also no relationship between the age of elderly patients and the outcome of the subjects.

Thirty-seven of the DAT searches and all 11 elderly searches had the patient's distance from the point last seen (PLS) recorded. The missing data points represent a failure to complete the data form correctly. The mean distance the DAT patient was found from the PLS is 0.9 km (0.6 mile). The median distance is 0.8 km (0.5 mile) with a range of 0–2.4 km (0–1.5 miles). For elderly cases without DAT, the mean distance found from the PLS is 2.6 km (1.6 miles). The median distance is 0.8 km (0.5 miles) with a range of 0–12.8 km (0–8.0 miles) (Table 2). There is no relationship between the DAT patient's age and distance from the PLS, or the distance from the PLS and patient class (Table 3).

There was a significant increase in morbidity and mortality as the total time elapsed to find the patient increased (Table 4). There was also a significant increase in morbidity and mortality as the time increased from when trained SAR resources were notified and the patient was located (Table 5). The one uninjured DAT patient located after a considerable delay was in an uninhabited former residence. Among those patients located within 24 h of last being seen, no deaths occurred (Table 6). In two cases, the search was suspended (on days 4 and 7) without the patient being found. These searches are not included in the analysis, though the body was eventually located within the search area. Most DAT patients were last seen at either their own residence or a nursing home (Table 7). In addition, all eight patients spotted on a road initially departed from a nursing home or residence. The terrain in which the patient was located was recorded in 36 cases (Table 8). The majority of patients were in drainages/creeks or heavy brush/briars. In the 4 cases in which patients were in a house, 2 were hiding in their own house and 2 traveled to a previous residence. In most searches, the patient was not found by search teams but found

**Table 3.** Distance DAT patients found from PLS by class

	<i>Number</i>	<i>Median (km)</i>	<i>Mean (km)</i>	<i>Std. dev.</i>	<i>Std. error</i>
Class 1	15	0.6	0.84	0.70	0.18
Class 2	14	0.6	0.81	0.85	0.23
Class 3	8	0.9	1.10	0.34	0.23

**Table 4.** DAT patients' class by total time to locate

	<i>Number</i>	<i>Mean (h)</i>	<i>Std. dev.</i>	<i>Std. error</i>
Class 1	18	19.8	31.62	7.45
Class 2	15	22.5	14.96	3.86
Class 3	5	102.7	38.42	17.18
Total $F = 19.50$				
Scheffe $F$	1 vs. 2	NS (0.41)		
	1 vs. 3	18.07		
	2 vs. 3	16.20		

wandering by others. This includes searches where the state issued a mission number but the patient was found before the arrival of search and rescue resources. Sweep and scratch (hasty) teams are the most successful organized technique used to find DAT patients (Table 9).

### Discussion

During the investigative component of the search, the caregivers provide the data characterizing missing persons as suffering from DAT. Investigators within Virginia are suspicious of the potential of DAT in all elderly subjects. The Lost Person Questionnaire, a standard data collection tool used on all state searches, prompts the investigator to pursue mental alterations. We did not use rigid criteria for inclusion as a dementia of Alzheimer's type in any of the cases. There was no follow-up behavioral testing due to both the circumstances of a search and the retrospective nature of this study. While several other conditions can cause dementia and, therefore, be confused with Alzheimer's disease (AD) [26], this has minimal impact on the usefulness of this study for search planners. During searches (by definition the subject is not present), a definitive classification as DAT is impossible unless it was made previously by a physician. Most persons with AD receive

**Table 5.** DAT patients' class by time for SAR resources to locate

	<i>Number</i>	<i>Mean (h)</i>	<i>Std. dev.</i>	<i>Std. error</i>
Class 1	18	9.9	9.66	2.28
Class 2	15	12.1	7.55	1.95
Class 3	6	70.3	39.19	16.00
Total $F = 32.03$				
Scheffe $F$	1 vs. 2	NS (0.68)		
	1 vs. 3	29.27		
	2 vs. 3	25.92		

**Table 6.** Survivability

	< 24 h	> 24 h	> 48 h	> 72 h
Class 1	16 (64%)	2 (15%)	1 (13%)	1 (17%)
Class 2	9 (36%)	5 (39%)	2 (25%)	0 (0%)
Class 3	0 (0%)	6 (46%)	5 (62%)	5 (83%)

care from a primary care physician or are not recognized as having the condition. Because most primary care physicians fail to use cognitive status tests [26], they only identify correctly 58% of the cases as possible dementia [27]. This is particularly true of patients who become lost in wilderness and rural settings, who often belong to a low socioeconomic group and receive less health care. Even after locating the patient, possible hypothermia and/or dehydration would confound the administration of a simple diagnostic test such as the Mini-Mental State Exam (MMSE). Even a well-constructed prospective study would face difficulties, because it would still be impossible to test deceased patients and difficult to follow-up on patients who required evacuation. Therefore, search managers will almost always be unable to differentiate between dementia caused by other reasons and DAT. Even establishing that the patient suffers a true dementia may be a challenge. If the predictive database (this study) potentially includes both groups, then this dilemma is controlled. However, future attempts to differentiate between Alzheimer's, Multi-infarct, or Parkinson's dementia may lead to more precise patient profiles.

The distribution of search incidents for the different patient profiles reflects two major study factors. In Virginia, state mission numbers are only given after local law enforcement efforts have failed to locate the subject. In addition, the terrain and number of trails and roads make it difficult to become truly lost in the state. In fact, the profiles of DAT, mentally retarded, despondent, psychotic, and children all represent decreased spatial and/or cognitive abilities and together account for 47% of the state case load. Using current estimates of the prevalence of AD [3] and the 1990 population of elderly within Virginia [28], an estimated 68500 Virginians suffer from DAT. This represents 1% of the population, compared to the 15% of all searches for DAT patients. The data allow development of a preliminary DAT patient profile. Patients usually disappear from their private residence or a nursing home. Once a patient becomes lost, he is usually found close to the PLS.

These data support the few anecdotal case studies reported in the literature [29,30]. In addition, they support the personal experience of the authors, reported elsewhere [21]. This finding is somewhat surprising, considering DAT sufferers may be healthier than

**Table 7.** Place last seen

Personal home	15 (39%)
Nursing home	12 (32%)
Roadway	8 (21%)
Relatives	2 (5%)
Camping	1 (3%)

**Table 8.** Environment of find

Bushes/briars	13 (33%)
Creeks/drainages	10 (28%)
Open field	5 (14%)
Roadway	5 (14%)
House	4 (11%)

other age controlled elderly [31] and by definition only suffer initially from a loss in cognitive domains [12]. A possible explanation is that moderate DAT patients showed shorter step length, lower gait speed, lower stepping frequency, greater step-to-step variability, and greater sway path [32]. Although the investigators have heard many reports of Alzheimer's patients walking great distances (10–15 miles), no such case appeared in the Virginia case load. As a larger data pool develops, the mean distance of 0.9 km will almost certainly increase. However, the median distance of 0.8 km may remain stable. It is unknown if patients spend considerable time wandering or if they walk a fairly direct path. The considerable number (28%) of DAT patients found in drainages or creeks supports the "following of a path of least resistance" hypothesis. This indicates that most persons walked downhill. Another 33% of the patients appeared to have become stuck in thick brush or briars (a feature untrained searchers often avoid). Together (61%), both terrain features indicate a scenario of the patient traveling a path of least resistance until they reach a creek or get stuck in briars.

The age of the patient had no predictive value in the patients' outcome (class) or distance from the PLS. This corresponds well to studies that show that age has no relationship with cognitive or behavioral disturbance or the rate of progression of DAT [33,34]. It would be worthwhile to investigate the relationship between the severity of DAT (mild, moderate, severe) with search outcome and distance from the PLS. The relationship between the class of the patient and distance from the PLS previously reported as significant [21] showed no relationship in this study. This relationship has little operational use, since during a search, the distance the patient is from the PLS is unknown.

The relationship between patients' outcome and the time elapsed to locate has clear implications. Family members must not hesitate to contact law enforcement officers when a DAT patient becomes missing. In turn, once law enforcement officials have determined the need for a search effort, they must not hesitate to activate specialized SAR resources. These resources include management teams, trackers, tracking dogs, air-scent dogs, helicopters, and clue aware scratch (hasty) teams. The 24-h window for optimal results requires an immediate and aggressive response from all parties concerned.

**Table 9.** Successful field techniques

Nonsearchers	10 (33%)
Sweep	8 (24%)
Scratch (hasty)	7 (12%)
Air-scent dog	4 (12%)
Helicopter	4 (12%)
Road patrol	1 (3%)

Unfortunately, the state forms do not consistently provide information about the exact medical condition of the patient when found. If the patient was deceased, the Incident Commander did not receive a copy of the autopsy or the autopsy did not specify the exact cause of death. In patients requiring evacuation, making a field diagnosis is often difficult. However, none of the data forms report trauma. This is rather surprising, considering the large number of DAT patients (29–36%) that experience serious falls [13,16]. In fact, falls are more likely to occur in DAT patients than in elderly controls [35]. The lack of any falls may be due to either the small data base, lack of autopsy results, or perhaps the difficulty in detecting evidence of a fall in a hypothermic patient. The only recorded disorders included hypothermia, dehydration, drowning, and unknown. Therefore, it appears DAT patients are most likely to succumb to the environment and not to any injuries or preexisting diseases.

To better predict DAT missing patient behavior requires a much larger data pool. As Alzheimer's disease continues to increase in prevalence, it unfortunately will become easier to collect data. It is important to recognize the critical role local terrain may have in distances covered. Virginia consists of a swampy tidewater region, rolling hills region, and a heavily forested mountainous region. We expect that the distances traveled by DAT patients will be greater in less densely vegetated regions. Numerous roads and paths crisscross even the most rugged wilderness regions, limiting the distance that one can travel without crossing a road. An obvious need to expand the database on a national basis in various types of terrain under more controlled prospective conditions must be pursued. More rigid criteria for classifying patients as DAT or possible dementia should be considered.

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