



Fire Risks Series

Fire Risks for the Older Adult

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FEMA

Fire Risks for Older Adults

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OVERVIEW OF THE 'FIRE RISKS' SERIES

This report is one in a series of four that discuss the increased fire risks for four groups of the general population:

- Older adults
- The mobility impaired
- The deaf or hard of hearing
- The blind or visually impaired.

Older adults—those over 65 years of age—represent one of the highest fire risk groups in the United States, in large part because they are the fastest growing segment of the U.S. population. Of course, many older adults may also fall into the other three groups since the elderly suffer some or all of these impairments to a much greater degree than do the general population.

People who are deaf or have hearing impairments, those who are blind or have vision impairments, and those with mobility impairments may face unique challenges in an emergency. Their ability to detect a fire or escape its effects may be hindered by their impairments. As a result, people with these impairments are at a greater risk of death or injury due to fire.

As might be expected, many of the fire safety issues are of concern for all four groups. This commonality is reflected in the reports, particularly in the fire safety tips, most of which apply to all the groups. These safety tips are presented in an appendix at the end of each report, organized in three sections: before the fire, during the fire, and fire prevention. The tips that are common to all four groups are summarized here:

Before the Fire

- Identify the nearest fire exit
- Install smoke alarms
- Live near an exit
- Plan and practice escape plans
- Involve the fire department

During the Fire

- Get out and stay out
- Test doors before opening them
- Stay low and go
- What to do if you are trapped
- Stop, drop, and roll

Fire Prevention

- Cooking
- Electrical safety
- Smoking
- Space heaters
- Heating
- Fireplaces

EXECUTIVE SUMMARY

Older adults represent one of the highest fire risk populations in the United States. As a result of progressive degeneration in physical, cognitive, and emotional capabilities, older adults present unique challenges in the fields of fire protection, prevention, and safety. Complications associated with aging increase the likelihood that an elderly person will accidentally start a fire and at the same time reduce his or her chances of surviving it. As the nation's elderly population grows, the fire death toll will likely rise in direct proportion to that growth unless measures are taken to ameliorate the risks associated with this group. The fire safety community must address the fire safety needs of older adults or be faced with the potential for a severe public health problem.

The key findings of this report are summarized below:

The Fire Problem and Older Adults

- People over the age of 65 are the fastest growing segment of the American population.
- Over 1,200 Americans over the age of 65 die as a result of a fire each year. Older adults comprise over 25 percent of fire deaths of all ages, and 30 percent of fire deaths that occur in the home.
- Fires and burns are a leading cause of deaths from unintentional injuries among older adults.
- Residential fires injure an average of 3,000 older adults each year.
- Fires caused by smoking are the leading cause of fire deaths in the elderly.
- Fires caused by cooking are the leading cause of fire-related injuries in the elderly.
- Elderly fire victims usually come in close contact with the heat source that starts the fire.
- Adults in the age group between 65 and 75 have a fire death rate twice that of the national average; between 75 and 85, three times the national average; and over 85, four times the national average.

Fire Risks

- The aging process, with its associated illnesses and impairments, leaves a person vulnerable to a variety of accidental injuries, including fires and burns.
- The likelihood of experiencing a severe disability increases with age. Impairments associated with the aging process, such as blindness or deafness, predispose the elderly to accidental injuries, including fires.
- Approximately 30 percent of noninstitutionalized older adults live alone, placing them at higher risk for accidental injury.

- Group assisted-living facilities and nursing homes pose unique fire risks to both their residents and firefighters.
- Nearly 20 percent of older adults live at or below the poverty line, and the relationship between poverty and fires is a compounding fire risk.
- Many older adults take multiple medications, the interaction of which can cause a variety of side effects, including confusion, that may alter the decision-making process and increase the potential for accidents.
- The impairments caused by the combination of alcohol and prescription drugs in older adults can be significant. Such impairments may lead to an increased likelihood of accidentally starting a fire, not detecting a fire, and not being able to escape a fire.

INTRODUCTION

This report investigates the nature of the fire problem faced by older adults in the United States. It also describes the characteristics of the elderly that expose this subset of the population as a disproportionately high fire risk. For the purposes of this report, the terms *older adult* or *elderly* refer to any individual over the age of 65.

This report is divided into three principal sections, the first of which analyzes the fire problems of older adults. This section discusses the growing elderly population, the number of fire casualties over the age of 65 each year, the characteristics of fires that injure the elderly, and the nature of elderly fire casualties.

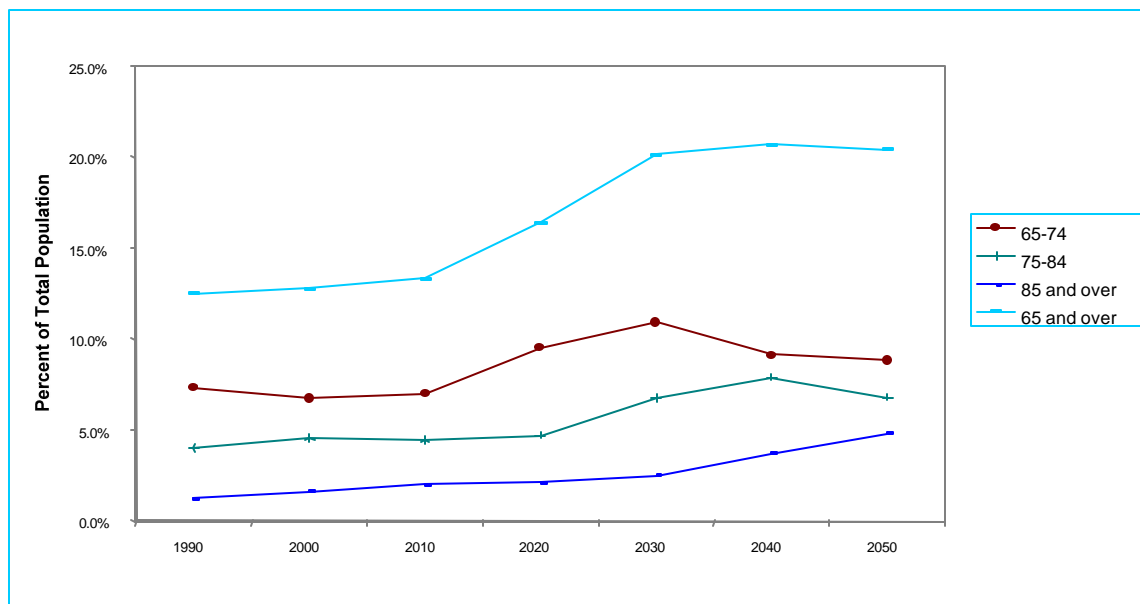
The second section discusses those aspects of the elderly population that place this group at such a high fire risk. Physical, cognitive, and behavioral changes associated with the aging process are discussed in relation to fire and burn injury incidence. In addition, demographic and socioeconomic variables commonly associated with the elderly population are evaluated as fire risks.

The final section provides tips to fire service professionals for enhancing fire safety for people with disabilities. A reproduction-ready appendix presents fire safety tips. Fire service professionals may photocopy the appendix for use in public education activities.

THE FIRE PROBLEM AND OLDER ADULTS

The Graying of America

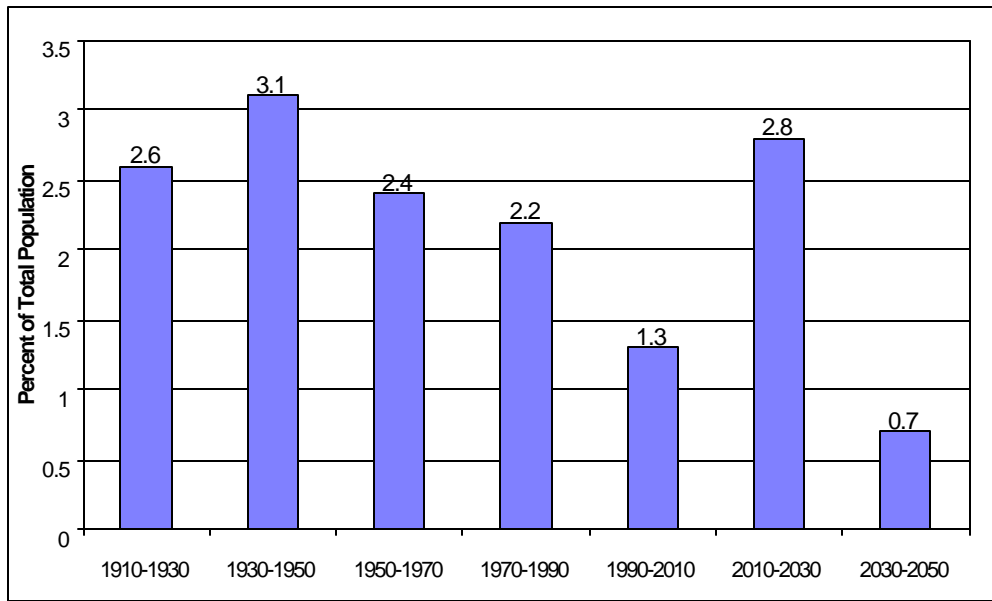
The elderly population in the United States, although currently growing at a moderate pace, will increase dramatically in the near future. Those who are aged 65 and older currently represent 12.5 percent of the total population and number 34 million, an all-time high (Reference 1). In what is known as the “graying of America,” we are fast becoming a nation of the elderly. Over the past century, the number of persons over the age of 65 has tripled (Reference 2). Between now and the year 2050, the elderly population is expected to double, reaching 80 million, or 20 percent of the American population (Figure 1).



Source: United States Bureau of the Census

Figure 1. Population Projections—Age 65 and Over

Most of this growth is expected to occur between the years 2010 and 2030, when the Baby Boom generation enters retirement. This group of 75 million people born between 1946 and 1964 currently constitutes nearly one-third of the entire U.S. population and will be entering their 60s between 2010 and 2030 (Reference 3). Over the course of these two decades, the elderly population is expected to grow by 2.8 percent annually, as opposed to 1.3 percent from 1990 to 2010 and 0.7 percent from 2030 to 2050 (Figure 2).



Source: United States Bureau of the Census

Figure 2. Average Annual Growth Rate of the Elderly Population—1910–2050

The “oldest old” (aged 85 and older) is the most rapidly growing age group among the elderly. Between 1960 and 1994, their numbers rose by 274 percent. In contrast, the elderly population in general rose by 100 percent, and the entire U.S. population grew by only 45 percent. By 2050, the oldest old will number 19 million, or 24 percent of the elderly and 5 percent of the total U.S. population (Reference 2).

In 1997, almost 2 million people in this country celebrated their 65th birthday, while only 1.7 million persons over the age of 65 died. This resulted in a net increase in the elderly population of over 200,000 people in just 1 year (Reference 4). Advancements in medicine and health care have allowed people to live longer, as evidenced by the ever-increasing life expectancy. Geriatric medicine in particular has significantly contributed to the prolonged average life span of Americans today. On average, Americans who reach age 65 can expect to live an additional 17 years (Reference 5).

Table 1 shows the steady climb in the average life expectancy over the past century—an increase of more than 60 percent. At the turn of the century, infectious disease was the leading cause of death and was largely responsible for limiting the average life span to about 50 years. Today, thanks to widespread immunizations and sophisticated medical research, we have eradicated all but a few of the most deadly killers of this century. In the latter half of this century, however, heart disease and cancer have replaced infectious disease as the leading causes of death in the United States. Further, as the average age of a population changes, so does the picture of health for that population. As people live longer and longer, there will be a substantial increase in the numbers who face dependency as the result of chronic illness or disability.

Table 1. Average Life Expectancy (from birth)

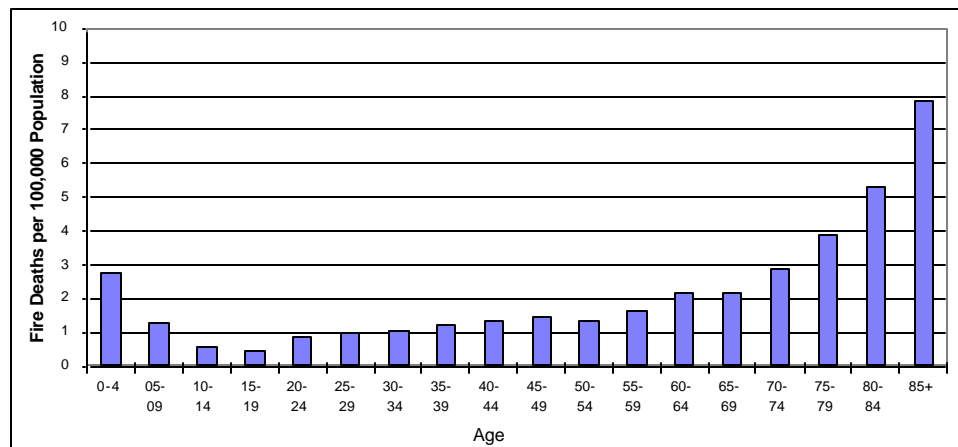
Year	Both Sexes	Male	Female
1900	49.7	48.2	51.1
1910	51.9	50.2	53.6
1920	57.4	56.3	61.6
1930	59.8	58.1	65.2
1940	62.9	60.8	65.2
1950	68.2	65.6	71.1
1960	69.7	66.6	73.1
1970	70.8	67.1	74.7
1980	73.7	70.0	77.4
1990	75.4	71.8	78.8
1995	75.8	72.5	78.9

Source: *National Vital Statistics Report*, National Center for Health Statistics, Vol. 47, No. 13, December 1998.

While the newly retired tend to live with relative ease and independence, nearly one out of every four Americans over the age of 85 resides in a nursing home. There are still other elderly who, although not institutionalized, rely on outside assistance to accomplish one or more daily functional activities. Furthermore, as the young adult population wanes, the pool of persons who can care for the elderly will shrink, making it increasingly difficult to provide resources to older adults that enable them to lead productive lives.

Elderly Fire Casualties

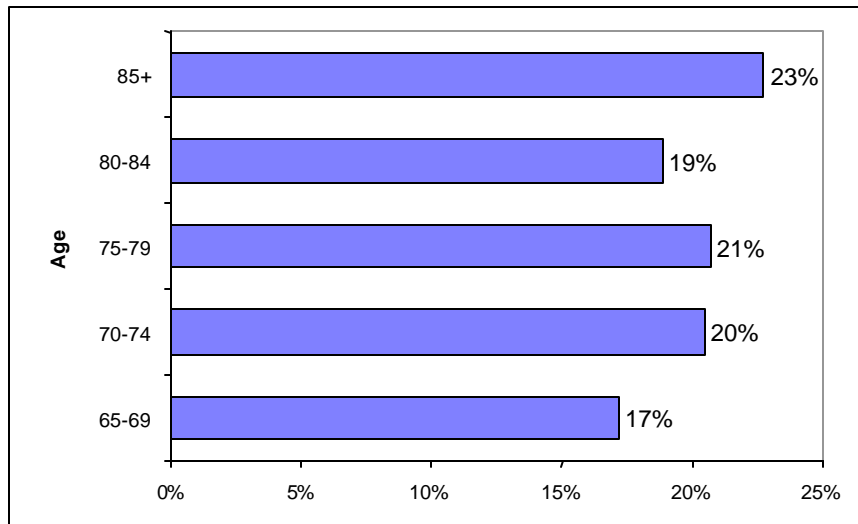
Unintentional injuries take the lives of approximately 30,000 elderly each year (Reference 6). Of those fatalities, fires and burns cause approximately 1,200 deaths per year. In comparison to the rest of the population, older adults have significantly higher fire death rates (Figure 3). The fire death rate for people over 60 is 20 percent higher than the national average. For those over the age of 75, the rate is double the national average, and for those over 85, the rate is four times the national average (Reference 7).



Source: Centers for Disease Control and Prevention, National Center for Health Statistics

Figure 3. Fire and Flame Death Rates—1995

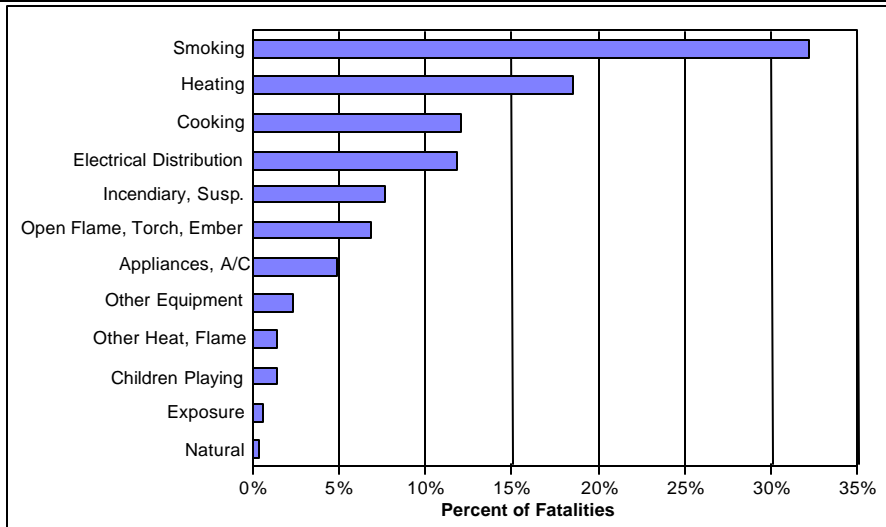
Older adults face an unusually high risk of dying in a fire. The elderly population has the highest risk of dying in a residential fire—where the majority of civilian casualties (fatalities and injuries) occur (Reference 7). The largest number of elderly fire fatalities (23 percent) occurs in victims over the age of 85, followed closely by those aged 75 to 79 (21 percent) and those aged 80 to 84 (19 percent) (Figure 4). As the elderly population swells, especially among the most elderly, a corresponding increase in fire deaths among older adults is likely.



Source: Centers for Disease Control and Prevention, National Center for Health Statistics

Figure 4. Distribution of Fire and Flame Deaths by Age Group for Ages 65 and Older—1995

Figure 5 depicts the leading causes of fire deaths for older adults. Fires caused by smoking are the leading cause of fire deaths among older adults. Approximately 15 percent of the elderly population smokes tobacco products (Reference 8). This behavior poses distinct health problems in the elderly, such as asthma, emphysema, and lung cancer. Additionally, medications that cause drowsiness or the use of alcohol increase the risk of starting a fire with a smoking material. Fires of this nature are particularly injurious as the most commonly ignited material is the victim's clothing or bedding, a situation that substantially reduces the victim's ability to extinguish or escape a fire before being overcome.

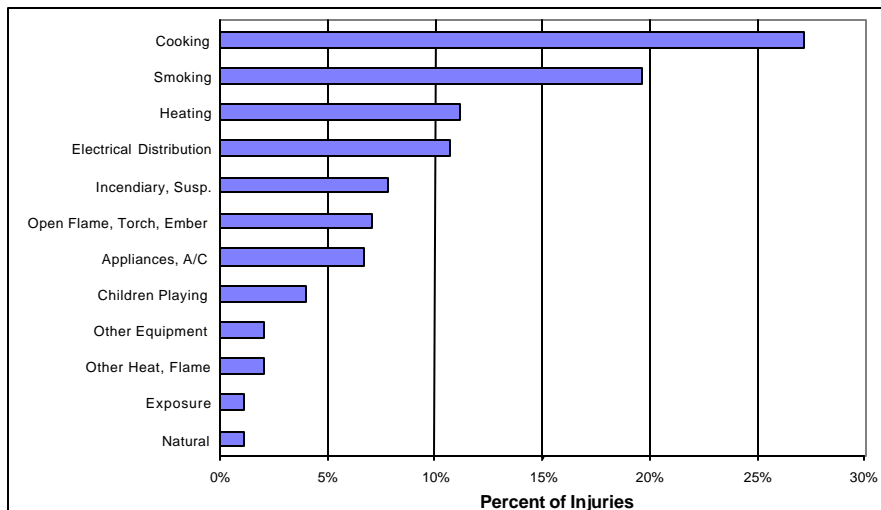


Source: U.S. Fire Administration, National Fire Incident Reporting System

Figure 5. Leading Causes of Fire Deaths in the Elderly

Cooking and heating fires are responsible for a smaller, yet significant portion of fire deaths in the elderly. Like carelessly handled smoking materials, cooking and alternative heating sources commonly ignite clothing or other materials on or near the victim.

Figure 6 compares the leading causes of fire-related injuries in the elderly population. Older adults suffer most fire-related injuries when they are cooking. Common scenarios are accidentally igniting loose-fitting sleeves, forgetting to turn the burner off, and leaving food cooking on the stove. Grease fires and hot oil scalds are also not uncommon. Depending on the severity of the injury and the speed with which medical assistance is rendered, these incidents may result in death as a result of complications that arise during a prolonged healing process. Smoking and heating fires are the second- and third-leading causes of fire-related injuries in older adults.



Source: U.S. Fire Administration, National Fire Incident Reporting System

Figure 6. Leading Causes of Fire Injuries in the Elderly

Casualty Characteristics

Nearly one-fifth of all people over 65 who die in fires are bedridden or challenged by some other physical disability (Reference 9). Impairments of this kind significantly reduce the older adult's ability to escape a fire. Older fire victims are more likely to be located in the same room in which the fire originated. In fact, nearly two-thirds of bedridden fire fatalities were located in the room where the fire originated (Reference 9).

According to current National Fire Incident Reporting System (NFIRS) data analyses, elderly fire victims tend to be in close contact with the source of the fire that kills them. In fires started by smoking, heating, and cooking—the three leading causes—victims are often injured or killed when their clothing, bedding, or upholstery ignite.

While smoke inhalation is the leading cause of fire deaths, there is a direct correlation between the age of the victim and deaths from burns: as the age of the fire victim increases, the percentage of burn-induced deaths also increases. Two-fifths of those aged 65 and over die from burns, contrasted with only one-fourth of the fire deaths among the rest of the population. Of these burn deaths, approximately 25 percent involved clothing ignition—a significant factor decreasing the ability of the victim to extinguish or escape the fire (Reference 10).

Two-thirds of fire deaths in the elderly occur when the victim is sleeping or trying to escape. One-third of fire injuries in the elderly occur as the victim is escaping, and a significant portion occur when the victim attempts to extinguish the fire. This pattern is similar to that of other age groups. Incapacitation, as a factor in fire casualties, affects the elderly four times as frequently as it does adults ages 10 to 64. Although it is often unknown whether the incapacitated fire victim was involved in causing the fire, the victim is nonetheless prevented from escaping (Reference 11).

FIRE RISKS

The Aging Process

Older adults experience myriad physical and cognitive changes associated with the aging process that place them at a heightened risk of starting a fire or being injured by a fire. Older bodies experience a decline in virtually every functional organ system, beginning at the cellular level. Perhaps the most detrimental loss is the progressive reduction in the body's homeostatic mechanisms. Such systems are responsible for maintaining equilibrium in the internal environment and aiding in the recovery from illness or injury. Burns in older adults are complicated by existing deficiencies in body water concentration, skin elasticity, temperature control, and healing mechanisms. As a consequence, the elderly have a higher morbidity and mortality associated with smaller body surface area burns than the younger population. Older adults have a burn death rate more than twice that of the rest of the population (Reference 12).

Sensory impairments are a common complication of aging. The elderly tend to experience diminished visual acuity, depth perception, hearing, and sense of smell, as well as deficits in mobility and balance. Any one of these deficiencies can make an individual more vulnerable to the dangers of fires and burns. For example, the inability to smell smoke coupled with existing respiratory problems increases the likelihood of succumbing to toxic fumes and smoke inhalation. Older adults, however, often experience many, if not all, of these deficiencies simultaneously.

Older adults have a diminished sensation of pain, further contributing to a delay in treatment of serious burn injuries. It has been shown that the mortality from burns for individuals over the age of 65 increases fivefold when treatment is delayed from 2 to 5 hours (Reference 13). In addition, an older adult may be less aware of burns as a result of decreased perception of heat and sensitivity to pain. Coupled with chronic illnesses, weak bones, and slower reflexes, the elderly population is significantly more likely to incur accidental injuries and less likely to survive them.

Dementia and age-related neurologic disorders can also increase an older adult's likelihood of being injured in a fire. Alzheimer's disease—a progressive, degenerative disease that attacks the brain and results in impaired memory, thinking, and behavior—affects 1 in 10 persons over 65 years old and nearly half of those over 85 (Reference 14). Because these conditions can cause individuals to experience an altered level of awareness, they may not recognize the danger presented by a fire or act accordingly.

It has been estimated that at least 10 percent of the elderly population suffers from depression (Reference 15). This psychiatric disorder substantially affects the social functioning and quality of life of older adults. Social isolation and functional disability related to the aging process are some of the reasons postulated for the incidence of depression in the elderly. A correlation between alcohol and smoking—both independent fire risks—in clinically depressed patients has been identified (Reference 16). The combined use of alcohol and drugs used to combat depression can lead to even riskier behavior and increased fire risk.

The elderly also exhibit certain behaviors that place them at greater risk for having a fire. Many older adults rely on alternative heat sources, such as space heaters and electric blankets, due to poor internal thermoregulatory mechanisms associated with aging. The use of a space heater increases the chances of starting a fire, especially if the unit is not maintained or operated properly. Repeated washing of electric blankets can compromise their wiring structure and create fire risks. An added complication is that many older adults live alone and are less likely to receive prompt help in fire emergencies.

Disabilities

The term *disability* is defined by the Americans With Disabilities Act of 1990 (Reference 17) as “a physical or mental impairment that substantially limits one or more of the major life activities.” The likelihood of developing a disability increases with age, as shown in Table 2. Nearly half of the population age 65 or over can be classified as having a disability. Nearly three-quarters of the population over the age of 80 have some level of disability. Also, as shown in Table 3, nearly one-third of all disabled persons are adults over age 65. As the population ages and continues to live longer, we can expect to see this number rise.

Table 2. Disability by Age

Age	Percent of Population		
	With a Non-Severe Disability	With a Severe Disability	With any Disability
Under 22	8	2	10
22-44	9	6	15
45-54	13	12	25
55-64	14	22	36
65-79	20	28	47
Over 80	18	54	72

Source: United States Bureau of the Census, *Population Profile of the United States: 1997*.

Table 3. Age Distribution of the Disabled

Age	Percent of Population
Under 22	15
22-44	26
45-54	13
55-64	14
65-79	22
Over 80	10

Source: United States Bureau of the Census, *Population Profile of the United States: 1997*.

Disabilities present a significant challenge to fire safety. In the elderly population, hearing and vision loss are the most frequently reported disabilities, but many older adults experience loss of mobility to varying degrees.

Over half of all wheelchair users are over the age of 65, as indicated in Table 4. Mobility deficits in the elderly are most commonly associated with degenerative illnesses, such as Parkinson's Disease and osteoporosis. These illnesses can hinder an afflicted individual's ability to escape fire in a timely manner.

Table 4. Reported Disability Type by Age

Age	Percent of Disability Group	
	Mobility Impaired (Uses Wheelchair)	Vision Impaired
0-64	45	41
65-79	29	34
Over 80	26	25

Source: Vital and Health Statistics, National Center for Health Statistics, Centers for Disease Control and Prevention, *Current Estimates From the National Health Interview Survey*, Series 10, No. 192, 1994.

Hearing impairments are one of the most commonly reported disabilities among older adults, affecting 40 percent of the elderly population (Reference 18). People 65 years and older are eight times more likely to have a hearing impairment than people aged 18 to 32 (Reference 18). The elderly deaf and hard of hearing often lack an appropriate smoke alarm or other specialized devices to help them compensate for their impairments, possibly due to the expense of installing such alarms, lack of awareness of their availability, or denial of the impairment (Reference 19).

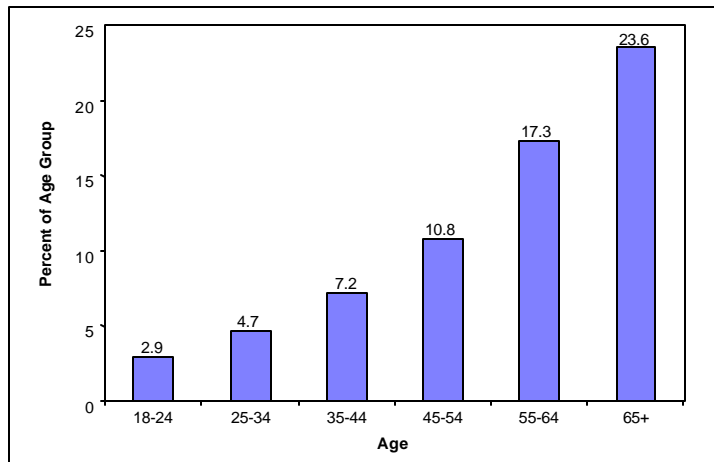
Blindness and other visual disturbances commonly associated with aging are a result of a variety of degenerative diseases and conditions (see *Fire Risk for the Blind or Visually Impaired*). Nearly two-thirds of the blind and visually impaired population in this country are over the age of 65 (Reference 20). Vision loss significantly reduces an individual's ability to interact with the environment. Progressive degeneration of sight requires the individual to readjust to once-familiar and now-foreign surroundings. Those who suffer from these conditions must restructure their home environments to reduce the risk of accidents. Older adults with deteriorating vision or complete vision loss may be at an increased risk for sustaining burn injuries. The fire hazards associated with cooking are increased when the burner or flames are not visible. Similarly, a sight-impaired person could easily start a fire with smoking materials by unintentionally knocking an ashtray off a table.

Medications and Alcohol Use

Patients over the age of 65 receive 35 percent of the prescribed medications in this country (Reference 21). Additionally, elderly patients may be taking several prescribed medications simultaneously. Taken together or individually, medications may cause drowsiness or impaired judgment. These effects increase the chance of unintentionally starting a fire and decrease the possibility of detecting and escaping a fire. Medications prescribed for ailments commonly seen in

older adults may also interfere with the homeostatic healing mechanisms of the body, further complicating and prolonging the healing process from a burn injury.

In a recent nationwide survey of alcohol use in the United States, almost one-quarter of the respondents over the age of 65 claimed to drink at least one alcoholic beverage nearly every day (from 21 to 31 days per month), as shown in Figure 7 (Reference 22). Since most older adults take medication daily, it is likely that many of those respondents are also taking prescription drugs in conjunction with alcohol. Because the use of alcohol along with prescription drugs reduces a person's cognitive and physical abilities, especially in older adults, the risk of starting a fire is increased and the ability to escape is impaired.



Source: Behavioral Risk Factor Surveillance System, Online Prevalence Data, 1995

Figure 7. Alcohol Consumption (One or More Drinks 21 to 31 Days per Month) by Age

Poverty

Approximately 20 percent of the older adult population lives at or below the poverty line, compared with 10 percent of the population aged 18 to 64 (References 23 and 24). Poverty has long been associated with an increase in fire risk. Individuals living below the poverty line are less likely to receive and comply with fire safety messages for a variety of reasons. Low household income significantly limits the extent to which a home is equipped with fire protective measures. Housing available to low-income tenants is less likely to have adequate smoke alarms, and even when these devices are provided, they are less likely to be properly maintained. Lower income individuals are also less likely to be able to afford to install and maintain safe heating systems or to replace or repair malfunctioning equipment. As a result, many indigent persons rely on dangerous alternative sources of heat such as space heaters or even open flame. In addition, electrical wiring and other systems in low-income households may be unsafe or fall short of code standards (References 23 and 24).

Living Arrangements

More than two-thirds of older adults live in their own homes. Of these, nearly half live alone (Reference 4). In addition to being at risk for sustaining accidental injuries due to the gradual decline of physical, mental, and social abilities, the elderly are also prone to ignore common household fire hazards. They are less likely to reduce potentially flammable clutter and replace unsafe electrical appliances.

Older adults who live alone tend to fashion their daily lives into systematic, repetitive routines. They often overlook such fire safety measures as changing the batteries in the smoke alarm or cleaning the chimney. Some elderly individuals who live alone have a support system consisting of family, friends, or neighbors who can clean and maintain smoke alarms, reduce flammable clutter, clear electric cords from walkways, and rectify other fire hazards. Unfortunately, many other older adults have no such safety nets and either neglect or are unable to perform such fire safety measures.

Approximately 1.5 million Americans live in a group home setting, such as a nursing home or assisted-living facility. Ninety percent of these individuals are over the age of 65, and more than 35 percent are over the age of 85; once an individual reaches 75, the likelihood of living in one's own home decreases, and by age 85, nearly one in four people live in a nursing home (Reference 25). Older adults receiving care in nursing homes often suffer from debilitating illnesses or other conditions that necessitate constant assistance or supervision. As a result, the majority of these facilities are staffed with medical personnel, with the residents typically outnumbering the staff (Reference 26).

A fire emergency places the residents of group living facilities at significant risk for a variety of reasons. First, the ratio of residents to staff often increases at night since, as a rule, fewer staff are on duty during this shift (Reference 26). Bedridden or incapacitated residents are totally dependent on the staff to help them evacuate in the event of a fire. As a result, those with less severe disabilities are often unattended during an emergency as staff assistance is directed toward those with more pressing needs.

Another risk factor is the type of construction used in nursing and other group living homes. These facilities are often designed with large, open-air living spaces that facilitate the passage of smoke and toxic gases upward through several stories (Reference 27). In a study of fires occurring in nursing home facilities, most of the injuries and deaths were attributed to relatively small fires that produced toxic fumes before being detected or activating suppression devices (Reference 28). Many older retirement homes were built with limited means for egress, combustible interior finishes, and a lack of automatic sprinkler systems (Reference 28).

Still another risk factor for nursing homes is the presence of fire hazards. These include pressurized oxygen, flammable liquids and gases, electrical equipment, and carelessly used smoking materials.

Home Health Care

An increasing number of elderly Americans are choosing to live in their own homes with regular medical assistance. The rapid growth in home health care and advances in medical technology have permitted many older adults to postpone, perhaps permanently, costly institutional health care. From 1992 to 1995, the number of home health care patients over the age of 65 jumped by nearly 30 percent, and as of 1995, nearly 73 percent of all home health care patients were over 65 (Reference 29).

Medical equipment and services once restricted to the hospital are now in the hands of family members, visiting nurses, and other home health care providers. One such example is home oxygen therapy. Fires caused or exacerbated by smoking in the presence of oxygen can be swift in nature and are often fatal. In addition to oxygen, various types of electronic monitoring equipment may be situated in the home, potentially overloading electrical circuits.

One benefit that has accompanied the increase in home health care is the conversion of ground floor rooms into sleeping areas. The impetus behind this movement is usually to avoid using the stairs. However, relocating the bedroom to the ground floor also improves the individual's chance of escaping or being rescued from a fire.

FIRE SAFETY FOR SPECIAL-NEEDS POPULATION: TIPS FOR FIRE SERVICE PROFESSIONALS

You have been asked to provide advice on the fire safety needs of older adults. Where do you begin? There are the “generic” fire safety tips routinely given out to all who ask, but how do you tailor your recommendations to those with special needs? The first thing to remember is that the generic fire safety tips still apply. Individuals with physical impairments or disabilities are people first and foremost, and will benefit from the years of conventional wisdom that created existing fire safety programs.

Recommendations for Assisting Older Adults in an Evaluation of Their Fire Safety Needs

Focus groups found that being identified as “special” or “needy” was a concern for individuals with mobility impairments (Reference 30). This mirrors the findings of a 1981 fire safety report from the National Center for a Barrier Free Environment. That study concluded that impaired individuals often feel that official concern for fire safety can restrict their freedom of choice—for example, denying an impaired student a bedroom on the upper floor of a college dormitory (Reference 31). These opinions also reflect those expressed at the Solution 2000 Conference, held by the U.S. Fire Administration and the North American Coalition for Fire and Life Safety Education in April of 1999. In addition, individuals in the focus groups also worried about falling victim to crime if their home was marked for fire department recognition of their needs. The key to dealing with individuals with a mobility impairment is to acknowledge their ability to help themselves, while guiding them to recognize their limitations in an emergency situation without drawing undue attention to them as impaired individuals.

The importance of exit drills should be stressed to assist older individuals in recognizing their physical limitations in crisis settings. If the individual lives on an upper floor or requires other special assistance, it is important for the fire service to be involved in these drills, if at all possible. Older adults may have an unrealistic view of the capabilities of the fire department. There may be unforeseen obstacles or barriers to exit or rescue. These should be identified and addressed before a fire occurs.

The use of smoke alarms must be *strongly* advocated. The U.S. Fire Administration considers smoke alarms to be the single most important piece of fire safety technology employed today. The importance of early recognition of a fire cannot be stressed enough in populations where physical limitations may increase the time needed to safely exit a burning building.

If you are called upon to assess the needs of an older adult, the Center for Fire Research at the National Institute of Standards and Technology (formerly the National Bureau of Standards) recommends assessment of the following seven risk factors (Reference 32):

- *The risk that the individual will resist leaving the structure.* For example, is the individual fearful of leaving with a stranger; unwilling to leave pets, belongings, and cherished items; or exhibiting confusion or other symptoms consistent with possible mental impairments?
- *The individual's response to fire drills.* For example, does the individual's escape plan work during drills?
- *The individual's response to instructions.* For example, are there language or other communication barriers?
- *The individual's mobility impairments (and the resources necessary to overcome them).* For example, is the individual capable of reasonably safe self-rescue from a burning structure? How much can the person assist his or her rescuers?
- *The need for extra help.* This may be related to the actual egress or the period immediately following. For example, a ventilator-dependent quadriplegic may require medical resources once outside the structure involved.
- *The individual's waking response to alarms.* Will there be a difference between the daytime and nighttime fire safety needs of the individual concerned?
- *The probability that the individual will lose consciousness in an emergency.* For example, is the individual dependent on specific equipment for life support? Is there adequate backup to provide for emergency situations?

Note the emphasis on performance-based assessment. The risk assessment cannot be based on an individual's impairment, but rather must be based on his or her demonstrated abilities to evacuate a structure in an emergency.

Building Design and Codes

The following recommendations are based on *Design for Accessibility*, a guide for architects on designing barrier-free environments (Reference 33). They should provide some insight into the role of building design in the fire safety needs of elderly residents.

- Provide exit signs set to flash (less than 5 hertz) when a fire alarm sounds. These signs should be connected to the emergency power system.
- Provide audible fire alarms that exceed the average ambient sound level by a minimum of 15 decibels (15 phones). These alarms should exceed a noise of 30 seconds' or less duration by a minimum of 5 decibels (5 phones). The maximum audible emergency signal should not exceed 120 decibels (120 phones).
- Provide visual/light alarm signals in all areas occupied by individuals who are deaf or hard of hearing.
- Provide under-pillow vibrating alarm signals in bedrooms for deaf or hard-of-hearing individuals.

- Provide a minimum of two accessible exits or horizontal exits for all accessible areas of all buildings.
- Where there is only one accessible exit, provide a minimum of one fireproof refuge area (fire-rated enclosed elevator lobby preferred, or enlarged landing area in a fire-rated stair enclosure). The fire refuge area should be a minimum of 16 square feet (1.5 square meters) outside of exit circulation paths. Provide an occupancy/call system from refuge areas to fire department enunciator location or entrance vestibules.
- Cover open fireplaces with tempered glass doors and guard them by a 9- to 18-inch (23- to 46-cm) raised hearth.
- Provide fire detectors, especially in institutions, in accordance with the recommendations presented in the table below:

Recommended Smoke Alarms

Area of Residence in Which To Install Alarm	Type of Smoke Alarm			
	Rate of Temperature Rise	Fixed Temperature, Adjustable	Fixed Temperature, Permanent Setting 175° to 240°F (79° to 116°C)	Smoke/Products of Combustion
Kitchen	Preferred			
Basement	Preferred	Acceptable		
Storage	Preferred	Acceptable		
Trash	Preferred	Acceptable		
Garage		Preferred		
Accessible Attic			Preferred	
Sleeping Area				Preferred
Hallways	Acceptable			Preferred

Source: Based on Robert James Sorensen, *Design for Accessibility* (New York: McGraw-Hill Book Company), 1979.

Instructional Materials

In addition to the reproduction-ready fire safety materials provided in the appendix at the end of this report, other materials, such as “Emergency Procedures for Employees With Disabilities in Office Occupancies,” is available from the U.S. Fire Administration Publications Office or on its web site at <http://www.usfa.fema.gov>.

CONCLUSIONS

Older adults are the fastest growing segment of the American population and are also one of the groups at highest risk for fire deaths. The risk of dying in a fire rises significantly once an individual reaches the age of 65 and even more so for those over the age of 80. Characteristically, elderly fire casualties are in close contact with the source of the fire that kills them, and they often have physical impairments that impede their escape. In many cases, the elderly person's clothing or bedding catches fire, which significantly reduces his or her ability to extinguish or escape the fire. Moreover, physical impairment or incapacitation often prevents older adults from performing life-saving actions such as stop, drop, and roll.

Conditions associated with the aging process place older adults at increased risk for fire injury and death. Chronic illness, disabilities, and impairments limit mobility and cognitive functions and increase the potential for accidentally igniting a fire. Aging bodies have decreased healing mechanisms. As a result, older adults tend to die from smaller burns, have longer hospital stays, and require more time to recuperate from burn injuries. Furthermore, many medications prescribed to treat ailments of the elderly can cause confusion, lethargy, and stupor—conditions that can be multiplied greatly with the consumption of alcohol.

Sociological issues play a role in the potential risks of fire incidence and casualties among older adults. Poverty, a well-documented fire risk factor, affects nearly 20 percent of the elderly population. A fixed income forces many older adults to retain unsafe appliances, use high-risk alternative heat sources, and forgo the purchase of smoke alarms and batteries. The home environment that older adults inhabit and the degree of support they receive from family, friends, and neighbors also affect their fire risks. Group assisted-living homes can increase risk because the residents who require assistance generally outnumber the staff available. Construction elements and design as well as hazardous medical supplies and equipment may create additional dangers in the event of a fire.

Individuals living alone and without social support are more susceptible to unduly high fire risks. They are also less likely to engage in basic fire prevention practices due to physical limitations. Outside assistance may be necessary to install and maintain smoke alarms, clean grease buildup from the stove, or replace worn or frayed electrical wiring.

By practicing a few simple fire safety tips, older adults can reduce their chances of experiencing a fire and subsequent injury or death. While self-empowerment is an important component, the general population must also engage in activities that reduce the risk that fires pose to the elderly. Caregivers, family members, and friends of the elderly must contribute actively to maintaining fire safety measures for their aging parents, patients, and friends. As the Nation's elderly population grows, the fire safety community must address the needs of older adults or be faced with the potential for a massive public health problem.

APPENDIX: FIRE SAFETY TIPS FOR OLDER ADULTS

The following fire safety tips are organized in three sections: before the fire, during the fire, and fire prevention. While these tips represent many fire safety approaches, the use of smoke alarms and exit planning should be considered the most crucial. The U.S. Fire Administration considers smoke alarms to be the single most important piece of fire safety equipment available today. Exit planning is also extremely important, especially for individuals who may have difficulty exiting a burning building.

These fire safety tips are reproduction ready. They may be used as education material by fire service, life safety, or health educators. Permission to reproduce them for that purpose is granted. Proper credit should be given to the U.S. Fire Administration and the Federal Emergency Management Agency. These tips are printed in large font to enable people with vision impairments to read them more easily.

Before the Fire

Identify the Nearest Emergency Exit. Whether you are at home or elsewhere, you should always know the location of the nearest exit. This could save your life in an emergency.

Heed Fire Safety and Design Guidelines. Walkways and doorways should accommodate any mobility impairment the individual may have. For example, doorways should accommodate a wheelchair's width, and flooring material should accommodate artificial limbs, walkers, or canes.

Install Smoke Alarms. The single most important step you can take to save your life during a fire is to install a smoke alarm that suits your needs. A working smoke alarm can make a vital difference in the event of a fire and may reduce the risk of dying in a fire by as much as 60 percent. A properly functioning alarm can alert you to the presence of deadly smoke while there is still time to escape. Place alarms next to each sleeping area and on every floor of your home. Keep smoke alarms clean by vacuuming or having them vacuumed regularly. Test batteries monthly, and replace them annually. Ask friends, family members, building managers, or someone from the fire department to install and test the batteries of a smoke alarm if it is hard to reach. If your smoke alarms are hardwired (connected to the electric circuitry of your residence), make sure they are also equipped with battery backups.

To accommodate wheelchair users in public buildings, manual alarm pull stations should be mounted no higher than 48 inches from the floor. If manual alarms are mounted higher than 48 inches, these devices should be retrofitted with attachments that make them accessible to a wheelchair user.

Have a Fire Extinguisher—and Learn How To Use It. If you are confined to a wheelchair, consider mounting (or having someone mount) a small “personal use” fire extinguisher in an accessible place on your wheelchair and become familiar with its use. Then, if you can-

not “stop, drop, and roll” during a fire, you should “pull, aim, squeeze, and sweep.”

Live Near an Exit. If you live in an apartment building, try to get an apartment on the ground floor. If this is not possible, know where the exit stairwell is and plan to wait there for help if you cannot take the stairs in the event of a fire.

If you live in a multistory house, try to sleep on the ground floor. Make sure a phone (or a TTY/TDD if you use one) is next to your bed, within arm’s reach. Keep emergency telephone numbers and hearing aids (if necessary) handy as well. If necessary, construct an exit ramp for emergency exits. It is recommended that ramps be at least 36 inches wide. Guardrails and handrails should be 44 to 48 inches high and 34 to 38 inches wide.

Plan and Practice Escape Plans. Knowing your escape plan is one of the most important steps you can take to save your life in a fire. Plan your escape around your capabilities. Know at least two exits from every room. Make sure you can unlock all your doors and windows. Be sure you know how to open your windows. If security devices, such as bars, are installed across the windows, ensure that they release from the inside. Make any necessary accommodations (such as installation of exit ramps) to facilitate escape.

Involve the Fire Department. Ask the fire department to help you plan an escape route, and inform them of your special needs. Ask the fire department to help identify any fire hazards in your home and explain how to correct them. Any areas you plan to use as a rescue area must be identified and agreed upon by you and officials from the fire department. Learn the fire department’s limitations, and make fire officials aware of yours.

During the Fire

Get Out and Stay Out. Leave your home as soon as possible. Do not try to gather personal possessions or attempt to extinguish a fire. Do not use the elevator. Once out, **do not go back inside.**

Test the Doors Before Opening Them. Using the back of your hand, reach up high and touch the door, the doorknob, and the space between the door and the frame. If anything feels hot, keep the door shut and use your second exit. If everything feels cool, open the door slowly and exit as low to the ground as possible if smoke is present.

Stay Low and Go. Crawl low and keep under the smoke, if you are physically able. If not, try to cover your mouth and nose to avoid breathing toxic fumes, and make your way to safety as quickly as possible.

What To Do If You Are Trapped. Close all the doors between you and the fire. Fill cracks in doors and cover all vents with a damp cloth to keep smoke out. If possible, call the fire department and tell them where you are located. Signal rescuers from a window with a light-colored cloth.

Stop, Drop, and Roll. If any part of you catches fire, do not run and do not try to extinguish the flames with your hands. Cover your face with your hands. Drop to the ground, rolling over and over. If you have a disability that prevents your taking these actions, try to keep a flame-resistant blanket or rug nearby to smother any flames.

Fire Prevention

Cooking. Never leave the stove unattended while cooking. If you need to step away from the stove, turn it off. Wear tight-fitting clothing when cooking over an open flame, and keep towels and potholders away from the flame. If food or grease catches fire, smother the flames by sliding a lid over the pan and turning off the heat. Do not try to use water to extinguish a grease fire. When deep-frying, never fill the pan more than one-third full of oil or fat. Never put foil or other metals in

the microwave. Make sure the stove is kept clean and free of grease buildup. Turn pot handles away from the front of the stove so they cannot be knocked off or pulled down.

Electrical Safety. Electric blankets should conform to the appropriate standards and have overheating protection. Do not wash blankets repeatedly as this can damage their electrical circuitry. If an appliance begins to smell suspicious or emit smoke, unplug it immediately. Replace all frayed or broken electrical cords. Never use an appliance with exposed wires. Never overload extension cords, and keep them out of traffic areas. Use only tested and UL-listed electrical appliances.

Smoking. Never smoke in bed. Make sure that you are alert when you smoke. If a gas stove or oxygen source is nearby, do not smoke. Place signs stating that oxygen is in use and warning visitors to refrain from smoking. Do not smoke while under the influence of alcohol or if you are taking prescription drugs that can cause drowsiness or confusion. Never leave smoking materials unattended, and collect them in large, deep ashtrays. Check around furniture, especially upholstered furniture, for any discarded or smoldering smoking materials. Soak the ashes in the ashtray before discarding them.

Space Heaters. Give space heaters space. Keep heaters at least 3 feet from any combustible material, including people. Follow the manufacturers' directions regarding operation, fueling, and maintenance of your space heater. Do not use heaters or other heating devices to dry clothing.

Heating. Have your heating systems and chimneys checked and cleaned annually by a professional. Never store fuel for heating equipment in the home. Keep fuel outside or in a detached storage area or shed.

Fireplaces. Open fireplaces can be hazardous; they should be covered with tempered glass doors and guarded by a raised hearth 9 to 18 inches high.

For more information, contact:
The United States Fire Administration
Office of Fire Management Programs
16825 South Seton Avenue
Emmitsburg, MD 21727

Or visit the USFA website:
www.usfa.fema.gov

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