Innovations to Address Preventable Falls

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History

Falls used to be considered:

– *normal* consequence of aging
– *random* event
– *unavoidable* *accident*

Today falls are considered:

– predictable
– preventable
Risk factors for falls

• Age > 80
• Low weight
• History of fall in previous year
• Dependency in ADLs
• Medication
• Polypharmacy
• Confusion & cognitive impairment
• Depression
• Disturbed vision

• Disturbed balance or co-ordination
• Gait disorders
• Urinary incontinence
• Inappropriate footwear
• Environmental factors including home hazards
• Muscle weakness
• Diabetes
• Alcohol abuse
Despite various approaches to fall intervention and advances in technology...

...patient fall rates have not decreased significantly
HOW TO PREVENT A FALL

SENIOR SAFETY TIPS

Staying safe around the house is important for everyone, but especially for seniors, who may be facing health problems and limited mobility. And as the American population continues to age, in-home safety will continue to be of vital importance. About one-third of older Americans (those 65 and up) will suffer a fall this year; the sooner the person is found, the greater the chance of survival.

### Time Incapacitated vs. Percentage Found Alive

<table>
<thead>
<tr>
<th>Time Incapacitated</th>
<th>Percentage Found Alive</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 hour</td>
<td>92%</td>
</tr>
<tr>
<td>1-3 hours</td>
<td>47%</td>
</tr>
<tr>
<td>3-6 hours</td>
<td>25%</td>
</tr>
<tr>
<td>6-12 hours</td>
<td>22%</td>
</tr>
<tr>
<td>12-24 hours</td>
<td>33%</td>
</tr>
<tr>
<td>24-48 hours</td>
<td>14%</td>
</tr>
<tr>
<td>48-72 hours</td>
<td>12%</td>
</tr>
<tr>
<td>72 hours-plus</td>
<td>13%</td>
</tr>
</tbody>
</table>

Fifty percent of people who fall need assistance to get up. Medical alert systems can provide peace of mind for seniors and their families.

People over the age of 80 die in fires at a rate three times higher than the rest of the population.

About 30% of older Americans who aren’t institutionalized live alone. 1 of every 2 women, 75 and older, live alone.

1 out of 3 older adults falls each year. In 2008, more than 19,700 older Americans died from unintentional fall injuries.

### Exercise regularly. Gentle movement is best for older people, so consider Tai Chi or similar programs.

### TIPS

1. Handrails on both sides of stairs.
2. Make sure the home doesn’t have extension cords or long cables in walking paths.
3. Keep walkways as clear as possible, and be sure pets are not frequently underfoot.
4. Improve the lighting in your home.
5. Install and maintain at least one smoke detector on each floor of the home.
6. Use slip-resistant carpets and rugs.
7. Keep ash trays, lighters and other fire sources (heaters, hot plates, teapots) away from beds and bedding.
8. Cooking-related accidents are the leading cause of fire injuries for older Americans. Long sleeves are more likely to catch fire.
9. Have at least one phone where it would be accessible in the event of an accident. Consider a cordless phone, but make sure you keep it charged and keep it with you.
10. Place grab bars and non-slip mats in bathtub.
11. Turn water heater temperature to 120 degrees to help prevent scalding.
12. Heating equipment is blamed for many fires in the homes of elderly people. Exercise caution when using space heaters or wood stoves.

### Have your eyes checked at least once a year and update your eyeglass prescription. Consider single-vision distance lenses for some activities, such as outdoor walking.

### SOURCES:

- U.S. Administration on Aging - World Bank - Centers for Disease Control and Prevention

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Aging Resiliency Center on Aging Retreat 2017
Our focus on prevention versus protection begs an important question.

Should institutions be primarily concerned about fall rate or injury rate?
Patient Room Design
Reconfiguring the Patient Room

Standard Room

Reconfigured Room
Compliant Flooring=Possible Solution?

- SmartCell Flooring

Balance Test

Typical Experimental Evaluation

Dr. Steven Robinovitch Experimental Schematic
Finite Element Simulation Using Explicit Dynamics

New composite floor tile reduces impact force by 40%
Fall Detection and Monitoring
Fall Detection and Monitoring – Mobile Robots

Advanced Situational Awareness

Health Care Info.

Decision Making Algorithm

Stay put & Monitor

Take Action

PAM

Notify Caregiver
Move Mobility Aid
Call Emergency
Modify Environment
Summary

• Innovative interventions to address preventable falls can:
  – Reduce patient fall rates
  – Improve patient monitoring
  – Develop more comprehensive fall models
  – Monitor patients 24/7 and detect subtle changes in function/status
  – Give immediate assistance when needed
  – Provide companionship
  – Save lives
Thank you!

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