



Health and Wellness Study

(IRB Project # 200910)

Health and Wellness Sensor Systems

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Customized Health Messages Using In-Home and Wearable Sensors

Who We Are

The Center for Eldercare and Rehabilitation Technology is an interdisciplinary research group comprised of faculty, staff, and students at the University of Missouri, College of Engineering. We are focused on investigating, developing, and evaluating technology to serve the needs of older adults and others with physical and cognitive challenges. We develop new healthcare technologies, driven by actual clinical needs, and evaluate them in realistic settings. Our mission is to create technology for proactive healthcare that helps older adults and people of all ages and needs to lead healthier, more independent lives.

What We Do

In previous work, we developed a health message system that captures and analyzes data from sensors embedded in the home, and flags possible health changes. In a pilot study, we showed significant differences in health outcomes with health messages from motion and bed sensor data (restlessness and pulse). In our current study, we are extending this work by incorporating additional, more finely grained in-home sensing technology, exploring the use of wearable health and fitness health sensors, and studying new methods that integrate *changes in* health status and medication use for customized messages that recognize health changes very early. With the information displayed on the website, we hope to empower older adults and family members to better self-manage chronic health conditions while addressing their privacy concerns.

Current Work

The purpose of the proposed work is to refine a health alert system by developing new algorithms *using data from sensors and an electronic health record (EHR)*, that provide alerts of very early changes in health status and that are customized to the individual consumer. A consumer-appropriate interface will also be developed to help consumers better manage their own health, *and we will explore their opinions on how the system could be used.*

Specific Aims

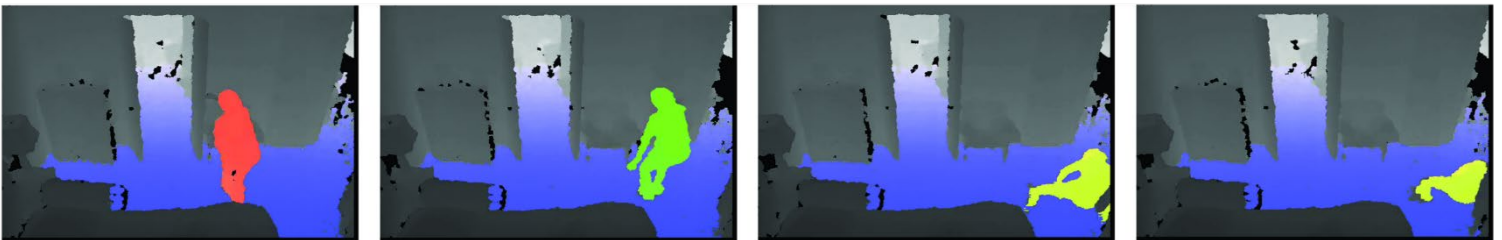
In this project, we *move towards more automation and customization of health alerts for the individual, to support use by active seniors living independently. We will investigate how seniors could use the system to self-manage chronic health conditions, whether alone or with family or clinician support.* We aim to *advance* embedded health assessment by incorporating new sensor features and more sensitive algorithms, developing customization algorithms based on an individual's change in health status and medications (integrating data from an EHR), capturing consumer input about the health alert system, and developing a consumer-centered interface that supports seniors and their families—including distant family—for self-management. We will also investigate wrist-worn sensors for older adult use and their potential for detecting health changes.

Depth Sensor: Fall and Gait Detection

Depth Sensor (Below): Device mounted on ceiling in living room. Detects walking speed, gait, and potential falls in the home.



Infrared Image (Below): Image produced by Depth Sensor. Produces only shadows as shown below to maintain anonymity.



Motion Sensor: Movement within your Home

Motion Sensor (Below): Placed in various areas of the home (above front door, kitchen, bathroom, and bedroom). These strictly detect motion, they DO NOT detect images. These devices detect movement throughout the home, detects entering and exiting of rooms, and how much time is spent in a particular room.



Bed Mat & Bed Computer: Restlessness, Heart Rate, Respiration Rate

Bed Mat (Below): This mat is placed underneath the mattress. It can detect amount of time in bed, restlessness, heart rate, and respiration rate.



Bed Computer (Below): This device is mounted behind or next to the bed. It plugs into the bed mat and collects information from the bed mat and the motion sensors.



Wearable Device: Activity Levels

Wearable Device (Below): Worn on the wrist to detect pulse and activity levels. This information will be part of the Health and Wellness System.



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Non-Payroll Direct Deposit (Accounts Payable) - Financial Institution Request

Payee Name	Business Federal I.D. Number/last 4 digits of SSN
Payee Signature	VEND ID #/EMPLID #/Student ID #
Email address - Required for all Payees <i>(Please PRINT CLEARLY and it is recommended to have <u>two</u> or more email addresses)</i>	Date
Financial Institution Name <i>(US BANKS <u>ONLY!</u>)</i>	Financial Institution Routing #
Financial Institution Address <i>(Street, City, State, Zip)</i>	Account Number
Type of Account <i>(Check One Only)</i> <input type="checkbox"/> Checking <input type="checkbox"/> Savings	Contact Person for any questions relating to this form Contact Person's Phone Number

IF YOU ARE A UNIVERSITY DEPARTMENT REQUESTING A NEW SUPPLIER or CHANGING AN EXISTING ONE, YOU MUST:

1. Complete the Supplier Registration Form with PeopleSoft,
2. Within the Supplier Registration Form, click the "Attachment" link and upload this Direct Deposit Form,
3. Upload a Blank/Voided Checking/Saving Account Deposit Slip from a **United States** bank account.

For Supplier Registration Form Training, click [HERE](#)

Amazon Echo Show Device:

A. Opening the Health and Wellness Interface

1. In order to view your Health and Wellness Interface, please activate the device by saying *"Alexa, Open Health Assistant"*.
 - a. Wait for the device to open the program.

B. Asking Questions about your Health

2. Ask health-related question(s). If the blue light is blinking at the bottom, you do not need to say "Alexa" before asking questions about your health. If the blue light is NOT blinking, you must say "Alexa" before asking questions about your health.
 - a. You may ask for recent health information (Last 24-48 hours)

*****Please see the next page for specific questions to ask about your health*****

C. Closing the Health and Wellness Interface


3. In order to exit the Health and Wellness Interface, please say *"Alexa, Exit"*.
 - a. The device will close the program and will default to the home screen.



Query	
Pulse rate	Sleep
Recent night time pulse rate	recent time in bed at night
what is my recent night time pulse rate	what is my recent time in bed at night
what is my most recent night time pulse rate	what is my most recent time in bed at night
Recent pulse rate	recent restless time at night
what is my recent pulse rate	what is my recent restless time at night
what is my most recent pulse rate	what is my most recent restless time at night
Recent day time pulse rate	recent time in bed at day time
what is my recent day time pulse rate	what is my recent time in bed at day time
what is my most recent day time pulse rate	what is my most recent time in bed at day time
Change in pulse rate	recent restless time in day
what is the change in pulse rate in the last few days	what is my recent restless time in day
show the change in pulse rate over the past few days	what is my most recent restless time in day
Normal pulse rate	recent sleep data
what is a normal pulse rate	what is my most recent sleep data
Respiration rate	what is my recent sleep data
Recent respiration rate	How did I sleep
what is my recent respiration rate	how is the sleep quality measured
what is my most recent respiration rate	how is the sleep quality estimated
Recent night time respiration rate	how is the sleep quality calculated
what is my recent night time respiration rate	display sleep quality graph
what is my most recent night time respiration rate	show the sleep quality graph
Recent day time respiration rate	Fall
what is my recent day time respiration rate	recent fall risk data
what is my most recent day time respiration rate	what is my recent fall risk data
Change in respiration rate	what is my most recent fall risk data
what is the change in respiration rate in the last few days	what is my recent fall risk
show the change in respiration rate over the past few days	what is my risk of falling
Normal respiration rate	recent walking speed
what is a normal respiration rate	what is my recent walking speed
Health Message	stride length
what is my recent health message	what is my stride length
what is my most recent health message	stride time
Help	what is my stride time
help	how is the walking speed measured
give me an example	how is the walking speed captured
	change in fall risk over the past few days
	show me the change in fall risk over the past few days
	what is the change in fall risk over the past few days
	walking speed graph
	show my walking speed trend for the last few days

Amazon Echo Show Device:

D. Technical Issues

- *Unresponsive Device/Not Working*
 - Check the power supply to be sure it is plugged in. If plugged in, unplug for 30 seconds and plug in again.
 - Check the wi-fi connectivity. If wi-fi works on other devices, please contact Amanda Hill, Programmer Analyst, at aeht24@missouri.edu. If you continue to experience wi-fi connectivity issues, please contact your internet provider.
- *The Health and Wellness System Will Not Open*
 - Please contact Amanda Hill, Programmer Analyst, at aeht24@missouri.edu. Please allow 24-48 hours for a response.
- *Turning Off the Device*
 - You can mute the device by pushing the button with this symbol: 
 - You can turn off the screen by saying "Alexa, Turn Off Screen". You can wake it by saying "Alexa".
- *Volume Control*
 - Increase or decrease the volume, press the plus "+" or minus "-" buttons to adjust the volume.
- *Talking Speed*
 - To slow down or speed up the devices talking speed, say either "Alexa, speak slower" or "Alexa, speak faster".
- *General Concerns*
 - For technical issues outside of the Health and Wellness Portal (e.g. playing music, shopping online, etc.), please contact Amazon Device Support or check out their FAQ page at:
<https://www.amazon.com/gp/help/customer/display.html?nodeId=201602230>.
 - For Usability Features, check out Amazon's website:
<https://www.amazon.com/gp/help/customer/display.html?nodeId=202158200>

How to Respond/React

- **Health Messages**

- Health messages are non-urgent messages regarding changes in your health.
- You may share these messages with family, friends, caregivers, or healthcare providers.

- **Fall Alerts**

- Fall alert messages can be sent to individuals designated by the older participant in this study, such as a family member and/or friend.
 - These messages can be sent via text message or email, as preferred by the individual receiving the message.
- Fall alert messages will be sent immediately following a fall and will include a 10-second video of the fall.
- Please do not panic and try to view this video as soon as possible.
 - **IMPORTANT**: We are still working on refining this system, therefore some fall alerts will be false alarms.
- It is important to have a response plan in place so that you and family members know what to do in an event of a fall. Please see Section 3D for the Fall Action Plan.

Interpreting Health Messages

The health messages will begin to generate about 2 weeks after installation. The computer needs to have some time to learn your patterns. Not every health message is concerning. Some health messages are positive! It is important to understand that receiving a health message is **not** an urgent problem.

Step 1

Read the health message and view the data on the interface.

Step 2

Look for trends and patterns (see next page for more information)

Step 3

Do you have questions? You can contact Dr. Kari Lane at laneka@missouri.edu or 573-882-0285. Dr. Lane can help you understand what the health message means.

Step 4

If you decide you need to see a physician because of the health message print off the screen shot of the health message and the data trend to take with you to the physician's office.

Meaningful Message vs. Meaningless Message

You may receive some health messages that have little or no value to your proactive approach to your health. The following pages are flow charts that will help you interpret the validity and context of the health messages.

At any time you feel you should report your symptoms to your health care provider, you should do so. **This is not a diagnosis. Only your health care provider can provide a diagnosis.**

If you have any questions, concerns, or issues interpreting your health message, please contact Dr. Kari Lane at (573) 882-0285 or laneka@missouri.edu.

As a reminder...

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Clinical Decision Making - *Activity*

Bedroom

Increased Bedroom Activity-Daytime or Nighttime

Review

Using the In-Depth tab, review the bedroom activity using the hourly view, making sure to note activity in other areas during the same time period.

Ask?

Do you have company that could be causing this alert?
Are you already aware of an existing health concern?

Yes

Continue to review future alerts and assess as needed.

No

Assess

Have you had medication changes that may affect activity or sleep patterns?

Are you feeling ill?

Are recent vital signs abnormal?

Do you seem confused or disoriented?

Have you felt down or depressed?

Yes

Act

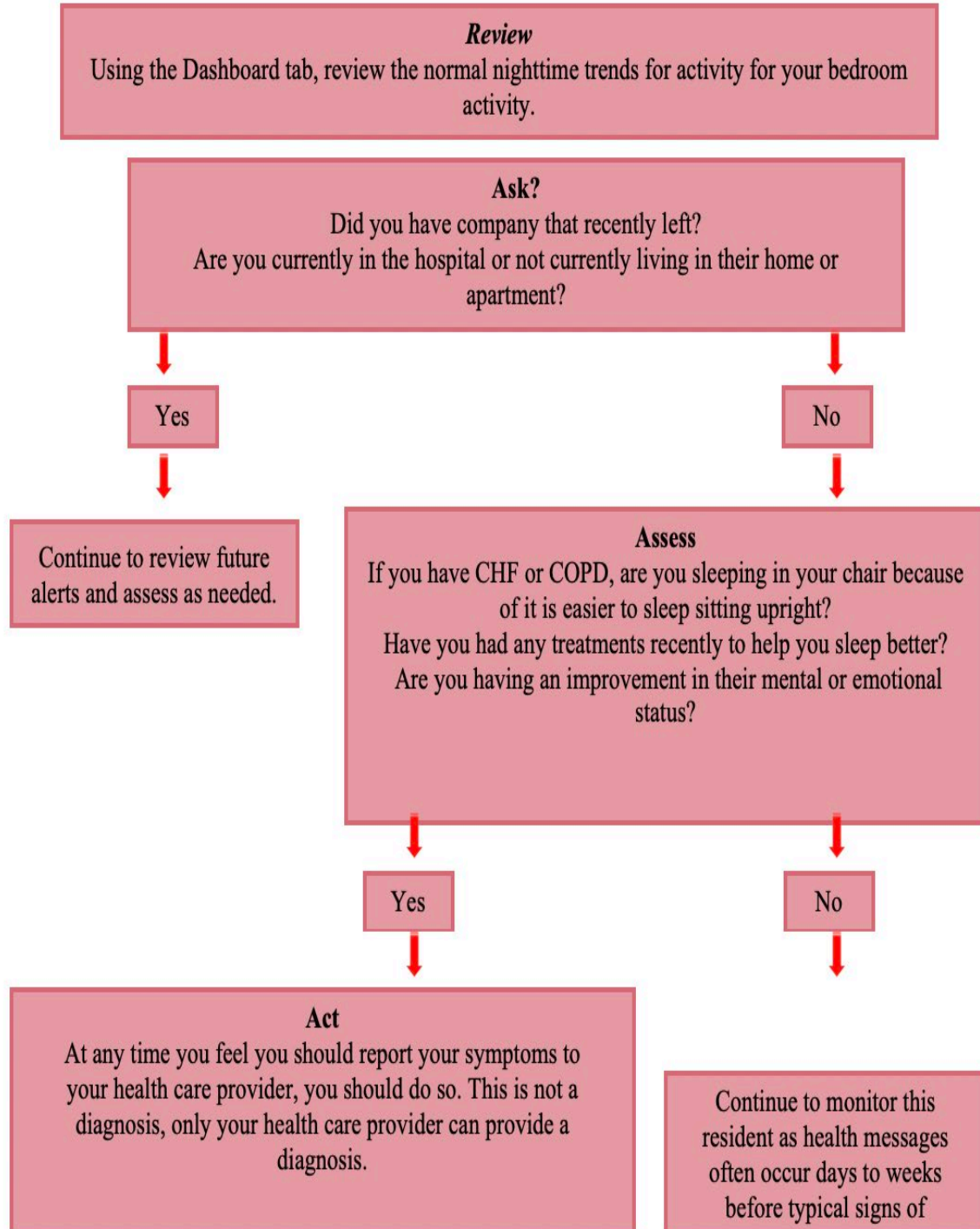
At any time you feel you should report your symptoms to your health care provider, you should do so. This is not a diagnosis, only your health care provider can provide a diagnosis.

No

Continue to monitor your health messages – it can be days to weeks before signs of typical illness appear.

Bedroom

Decreased Bedroom Activity - Nighttime



Bathroom

Increased Bathroom Activity - Daytime

Review

Using the In-Depth tab, review the bathroom activity using the **hourly view**, making sure to note activity in other areas during the same time period.

Ask?

Do you have company that could be causing this alert?
Are you already aware of an existing health concern?
Have you recently started receiving assistance with ADL's including showering?

Yes

Continue to review future alerts and assess as needed.

No

Assess

Are you feeling unwell?
Are recent vital signs abnormal?
Could you have a urinary tract infection (often signs of a urinary tract infection are mild and go unnoticed, burning on urination, having to go frequently)?
Are you having diarrhea or nausea?

Yes

Act

At any time you feel you should report your symptoms to your health care provider, you should do so. This is not a diagnosis, only your health care provider can provide a diagnosis.

No

Continue to monitor this resident as health alerts often occur days to weeks before typical signs of illness.

Action Plan for Falls

- ***How Will You Respond?***

- Plan:

- ***Who Will You Call?***

- ***Call Emergency 911 for help ASAP.***
- **Contact #1:** _____
- **Contact #2:** _____
- **Contact #3:** _____
- **Contact #4:** _____

- ***What Will You Do Until People Arrive?***

- Plan:

- ***What Plans Will You Have To Make If There Is A Hospital Visit?***

- Plan:

- ***What Alternatives Do You Have When People Are Out Of Town Or Unavailable?***

- Plan:

- **If you are near when the fall happens:**

- Immediately call 911 for help.
- Look at your loved one. Are they injured? Are they bleeding?
 - Hold pressure on any bleeding areas for five full minutes with a clean dry cloth/paper towel.
- Can they move their arms and legs without pain?
- Remove any obstruction that may have caused the fall.

Post-Fall

- Be sure to take care of yourself. Seek counseling if needed.
- Enlist additional supports to assist you in providing care to your family member or friend.
- Assess the home for any additional fall risks, including, but not limited to:
 - Area Rugs
 - Uneven Surfaces
 - Poor Lighting
 - Clutter
 - Please see <https://www.nia.nih.gov/health/fall-proofing-your-home> for additional suggestions and resources.
- Talk with your family member or friend about fall risk.

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When to Involve your Doctor

- No matter how 'small' the fall, we recommend that you are evaluated by your physician or other healthcare provider after a fall.
- They may assess you for unseen bodily injuries such as, but not limited to:
 - Concussion
 - Internal Bleeding
 - Broken Bones
- Remember, the depth computer is located only in the living room and even then has a limited view of the area. Regardless of where you fall, please contact 911.

Resources

- The following pages are recommendations and resources from the Center for Disease Control (CDC) for older adult fall prevention. You may find more information at <https://www.cdc.gov/steady/index.html>

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RECOMMENDED EXERCISE

Chair Rise Exercise

What it does: Strengthens the muscles in your thighs and buttocks.

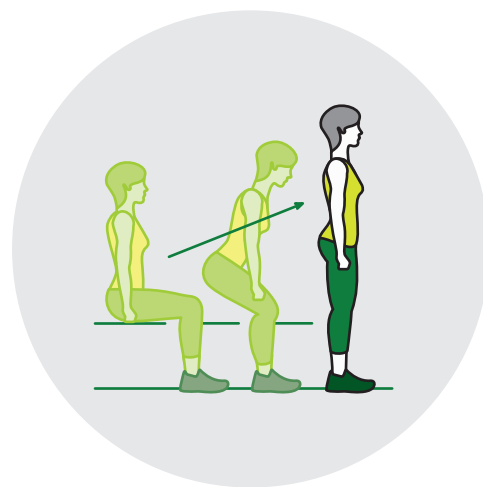
Goal: To do this exercise without using your hands as you become stronger.

How to do it:

1. Sit toward the front of a sturdy chair with your knees bent and feet flat on the floor, shoulder-width apart.
2. Rest your hands lightly on the seat on either side of you, keeping your back and neck straight, and chest slightly forward.
3. Breathe in slowly. Lean forward and feel your weight on the front of your feet.
4. Breathe out, and slowly stand up, using your hands as little as possible.
5. Pause for a full breath in and out.
6. Breathe in as you slowly sit down. Do not let yourself collapse back down into the chair. Rather, control your lowering as much as possible.
7. Breathe out.

Repeat 10-15 times. If this number is too hard for you when you first start practicing this exercise, begin with fewer and work up to this number.

Rest for a minute, then do a final set of 10-15.



Check for Safety

A Home Fall Prevention Checklist for Older Adults



Contact your local community or senior center for information on exercise, fall prevention programs, or options for improving home safety.

For additional information on fall prevention, visit go.usa.gov/xN9XA



**Centers for Disease
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National Center for Injury
Prevention and Control

STEADI

Stopping Elderly Accidents,
Deaths & Injuries

Use this checklist to find and fix hazards in your home.

STAIRS & STEPS (INDOORS & OUTDOORS)

Are there papers, shoes, books, or other objects on the stairs?

- ☐ Always keep objects off the stairs.

Are some steps broken or uneven?

- ☐ Fix loose or uneven steps.

Is there a light and light switch at the top and bottom of the stairs?

- ☐ Have an electrician put in an overhead light and light switch at the top and bottom of the stairs. You can get light switches that glow.

Has a stairway light bulb burned out?

- ☐ Have a friend or family member change the light bulb.

Is the carpet on the steps loose or torn?

- ☐ Make sure the carpet is firmly attached to every step, or remove the carpet and attach non-slip rubber treads to the stairs.

Are the handrails loose or broken? Is there a handrail on only one side of the stairs?

- ☐ Fix loose handrails, or put in new ones. Make sure handrails are on both sides of the stairs, and are as long as the stairs.

FLOORS

When you walk through a room, do you have to walk around furniture?

- ☐ Ask someone to move the furniture so your path is clear.

Do you have throw rugs on the floor?

- ☐ Remove the rugs, or use double-sided tape or a non-slip backing so the rugs won't slip.

Are there papers, shoes, books, or other objects on the floor?

- ☐ Pick up things that are on the floor. Always keep objects off the floor.

Do you have to walk over or around wires or cords (like lamp, telephone, or extension cords)?

- ☐ Coil or tape cords and wires next to the wall so you can't trip over them. If needed, have an electrician put in another outlet.

KITCHEN

Are the things you use often on high shelves?

- ☐ Keep things you use often on the lower shelves (about waist high).

Is your step stool sturdy?

- ☐ If you must use a step stool, get one with a bar to hold on to. Never use a chair as a step stool.

BEDROOMS

Is the light near the bed hard to reach?

- ☐ Place a lamp close to the bed where it's easy to reach.

Is the path from your bed to the bathroom dark?

- ☐ Put in a nightlight so you can see where you're walking. Some nightlights go on by themselves after dark.

BATHROOMS

Is the tub or shower floor slippery?

- ☐ Put a non-slip rubber mat or self-stick strips on the floor of the tub or shower.

Do you need some support when you get in and out of the tub, or up from the toilet?

- ☐ Have grab bars put in next to and inside the tub, and next to the toilet.





Postural hypotension—or orthostatic hypotension—is when your blood pressure drops when you go from lying down to sitting up, or from sitting to standing.

When your blood pressure drops, less blood can go to your organs and muscles. This can make you more likely to fall.



For information about fall prevention, visit go.usa.gov/xN9XA

For more information about hypotension, visit www.mayoclinic.com
www.webmd.com



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2017

Postural Hypotension

What it is & How to Manage it



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Deaths & Injuries

What are the symptoms?

Although many people with postural hypotension have no symptoms, others do.

These symptoms can differ from person to person, and may include:

- Dizziness or lightheadedness
- Feeling about to faint, passing out, or falling
- Headaches, blurry or tunnel vision
- Feeling vague or muddled
- Feeling pressure across the back of your shoulders or neck
- Feeling nauseous, or hot and clammy
- Weakness or fatigue



When might symptoms happen?

- When standing or sitting up suddenly
- In the morning when blood pressure is naturally lower
- After a large meal or alcohol
- During exercise
- When straining on the toilet
- When you are ill
- If you become anxious or panicky

What causes postural hypotension?

Postural hypotension can be caused by or linked to:

- High blood pressure
- Diabetes, heart failure, atherosclerosis, or hardening of the arteries
- Taking some diuretics, antidepressants, or medicines to lower blood pressure
- Neurological conditions like Parkinson's disease and some types of dementia
- Dehydration
- Vitamin B12 deficiency or anemia
- Alcoholism
- Prolonged bed rest

What can I do to manage my postural hypotension?

- Tell your healthcare provider about any symptoms.
- Ask if any of your medicines should be reduced or stopped.
- Get out of bed slowly. First sit up, sit on the side of the bed, then stand up.
- Take your time when changing position, such as when getting up from a chair.
- Try to sit down when washing, showering, dressing, or working in the kitchen.
- Exercise gently before getting up (move your feet up and down and clench and unclench your hands) or after standing (march in place).
- Make sure you have something to hold on to when you stand up.
- Do not walk if you feel dizzy.
- Drink 6-8 glasses of water or low-calorie drinks each day—unless you have been told to limit your fluid intake.
- Avoid taking very hot baths or showers.
- Try sleeping with extra pillows to raise your head.

Four Things You Can Do to Prevent Falls:

① **Speak up.**

Talk openly with your healthcare provider about fall risks and prevention. Ask your doctor or pharmacist to review your medicines.

② **Keep moving.**

Begin an exercise program to improve your leg strength and balance.

③ **Get an annual eye exam.**

Replace eyeglasses as needed.

④ **Make your home safer.**

Remove clutter and tripping hazards.

Learn More

Contact your local community or senior center for information on exercise, fall prevention programs, and options for improving home safety, or visit:

- go.usa.gov/xN9XA
- www.stopfalls.org



1 in 4 people 65 and older falls each year.

Falls can lead to a loss of independence, but they are preventable.

Stay Independent

Learn more about fall prevention.



For more information, visit www.cdc.gov/steady

This brochure was produced in collaboration with the following organizations: VA Greater Los Angeles Healthcare System, Geriatric Research Education & Clinical Center (GRECC), and the Fall Prevention Center of Excellence



Centers for Disease Control and Prevention
National Center for Injury Prevention and Control

STEADY

Stopping Elderly Accidents, Deaths & Injuries

Check Your Risk for Falling





Circle “Yes” or “No” for each statement below			Why it matters
Yes (2)	No (0)	I have fallen in the past year.	People who have fallen once are likely to fall again.
Yes (2)	No (0)	I use or have been advised to use a cane or walker to get around safely.	People who have been advised to use a cane or walker may already be more likely to fall.
Yes (1)	No (0)	Sometimes I feel unsteady when I am walking.	Unsteadiness or needing support while walking are signs of poor balance.
Yes (1)	No (0)	I steady myself by holding onto furniture when walking at home.	This is also a sign of poor balance.
Yes (1)	No (0)	I am worried about falling.	People who are worried about falling are more likely to fall.
Yes (1)	No (0)	I need to push with my hands to stand up from a chair.	This is a sign of weak leg muscles, a major reason for falling.
Yes (1)	No (0)	I have some trouble stepping up onto a curb.	This is also a sign of weak leg muscles.
Yes (1)	No (0)	I often have to rush to the toilet.	Rushing to the bathroom, especially at night, increases your chance of falling.
Yes (1)	No (0)	I have lost some feeling in my feet.	Numbness in your feet can cause stumbles and lead to falls.
Yes (1)	No (0)	I take medicine that sometimes makes me feel light-headed or more tired than usual.	Side effects from medicines can sometimes increase your chance of falling.
Yes (1)	No (0)	I take medicine to help me sleep or improve my mood.	These medicines can sometimes increase your chance of falling.
Yes (1)	No (0)	I often feel sad or depressed.	Symptoms of depression, such as not feeling well or feeling slowed down, are linked to falls.
Total _____		Add up the number of points for each “yes” answer. If you scored 4 points or more, you may be at risk for falling. Discuss this brochure with your doctor.	

This checklist was developed by the Greater Los Angeles VA Geriatric Research Education Clinical Center and affiliates and is a validated fall risk self-assessment tool (Rubenstein et al. J Safety Res; 2011; 42(6)493-499). Adapted with permission of the authors.

Many falls can be prevented.

By making some changes, you can lower your chances of falling.

Four things YOU can do to prevent falls:

-  Have your healthcare provider review your medicines.
-  Exercise to improve your balance and strength.
-  Have your eyes and feet checked.
-  Make your home safer.

For more information, contact Centers for Disease Control and Prevention 1-(800)-CDC-INFO (232-4636) or visit www.cdc.gov/steady

For information about fall prevention, visit go.usa.gov/xN9XA

For more information about hypotension, visit www.mayoclinic.com
www.webmd.com



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What YOU Can Do to Prevent Falls



STEADI

Stopping Elderly Accidents,
Deaths & Injuries

Four things YOU can do to prevent falls:

① Talk openly with your healthcare provider about fall risks & prevention.

Tell a provider right away if you fall, worry about falling, or feel unsteady. Have your doctor or pharmacist review all the medicines you take, even over-the-counter medicines. As you get older, the way medicines work in your body can change. Some medicines, or combinations of medicines, can make you sleepy or dizzy and can cause you to fall. Ask your provider about taking vitamin D supplements to improve bone, muscle, and nerve health.

② Exercise to improve your balance and strength.

Exercises that improve balance and make your legs stronger, lower your chances of falling. It also helps you feel better and more confident. An example of this kind of exercise is Tai Chi.

Lack of exercise leads to weakness and increases your chances of falling.


Ask your doctor or healthcare provider about the best type of exercise program for you.

③ Have your eyes and feet checked.

Once a year, check with your eye doctor, and update your eyeglasses, if needed. You may have a condition like glaucoma or cataracts that limits your vision. Poor vision can increase your chances of falling. Also, have your healthcare provider check your feet once a year. Discuss proper footwear, and ask whether seeing a foot specialist is advised.

④ Make your home safer.

- Remove things you can trip over (like papers, books, clothes, and shoes) from stairs and places where you walk.
- Remove small throw rugs or use double-sided tape to keep the rugs from slipping.
- Keep items you use often in cabinets you can reach easily without using a step stool.
- Have grab bars put in next to and inside the tub, and next to the toilet.
- Use non-slip mats in the bathtub and on shower floors.
- Improve the lighting in your home. As you get older, you need brighter lights to see well. Hang light-weight curtains or shades to reduce glare.
- Have handrails and lights installed on all staircases.
- Wear well-fitting shoes with good support inside and outside the house.



Talk to your doctor
about fall prevention.



Family Caregivers:

Protect Your Loved
Ones from Falling



Learn More

For information about fall risks and prevention:

cdc.gov/homeandrecreationalafety/falls/adultfalls.html

Find STEADI brochures for older adults at cdc.gov/steady/patient.html

- Stay Independent
- What YOU Can Do to Prevent Falls
- Check for Safety: A Fall Prevention Checklist for Older Adults
- Postural Hypotension: What It Is and How to Manage It

For help creating a list of your loved one's medications,
visit AARP.org and print a "Personal Medication Record."

For information on local fall prevention programs, visit the
National Council on Aging at NCOA.org



**Centers for Disease
Control and Prevention**
National Center for Injury
Prevention and Control

STEADI

Stopping Elderly Accidents,
Deaths & Injuries

Take Action



**Every second
of every day, an
older adult falls.**

Many of these falls cause injuries, loss of independence, and in some cases, death. Falls can be prevented. As a family caregiver, you can help.

Speak Up

Talk openly with your loved one and their healthcare provider about fall risks and prevention.

- Tell a healthcare provider right away if your loved one has fallen, or if they are worried about falling, or seem unsteady.
- Keep an updated list of your loved one's medications. Show a healthcare provider or pharmacist all of their medications, including over-the-counter medications, and supplements. Discuss any side effects, like feeling dizzy or sleepy.
- Ask their healthcare provider about taking vitamin D supplements to improve bone, muscle, and nerve health.

Keep Moving

Activities that improve balance and strengthen legs (like Tai Chi) can prevent falls.

- Exercise and movement can also help your loved one feel better and more confident.
- Check with their healthcare provider about the best type of exercise program for them.

Have Eyes and Feet Checked

Being able to see and walk comfortably can prevent falls.

- Have their eyes checked by an eye doctor at least once a year.
- Replace eyeglasses as needed.
- Have their healthcare provider check their feet once a year.
- Discuss proper footwear, and ask whether seeing a foot specialist is advised.

Make the Home Safe

Most falls happen at home.

- Keep floors clutter-free.
- Remove small throw rugs, or use double-sided tape to keep the rugs from slipping.
- Add grab bars in the bathroom—next to and inside the tub, and next to the toilet.
- Have handrails and lights installed on all staircases.
- Make sure the home has lots of light.



Frequently Asked Questions: Interface

concert.missouri.edu

- **How to create an account**
 - Accounts will be created by the website administrator.
- **How to login**
 - Enter your username and password. If you have forgotten your password select the 'Forgot Password' button on the homepage and your password will be reset. Check your email inbox for instructions on how to reset your password and get back into the account.

ElderTech Visualization Interface

USERNAME

username

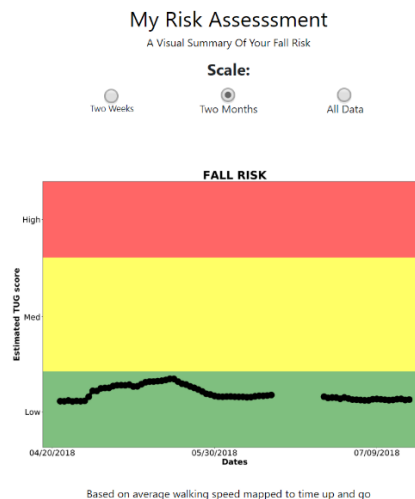
PASSWORD

Log In

Forgot Password

Trouble logging in?
Contact [Amanda Hill](#).

- If you have forgotten the email associated with your account please contact the website administrator.
- **How to view your data**
 - After logging in, you will be redirected to the Home page, here you will see a representation of your data.
 - This graph shows your fall risk, change the scale in order to see how your risk has changed over time.



- **How to view your health messages**

- Select the messages tab on the navigation bar at the top of the webpage.
- On this page you will be able to print out messages, you can print out all of your messages or simply select the ones that are important to you.

[Home](#)
[About](#)
[Contact](#)
[Messages](#)
[Account](#)
[Calendar](#)
[Login](#)

My Health Messages

08/17/2019	<input checked="" type="checkbox"/>	<p>Daytime (6 AM - 10 PM) Bathroom INCREASE resident id 3089 had 531 motion hits in the Bathroom during the Daytime (6 AM - 10 PM). This is an increase of 4.18 times the standard deviation of the previous 14 days, which had an average of 325.50 motion hits with a standard deviation of 49.19.</p>
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- **Report Absences**

- Select the Calendar tab from the navigation bar. Here you can input the time you will be away from your apartment. This will prevent unnecessary alerts from being generated.

[Home](#)
[About](#)
[Contact](#)
[Messages](#)
[Account](#)
[Calendar](#)
[Login](#)

Extended Absence

If you will be gone for several days, let us know so we can adjust your data collection.

When I will leave:

When I will return:

- **Additional help**

- For additional help please use the 'Contact Page' to reach us.

[Home](#)
[About](#)
[Contact](#)
[Messages](#)
[Account](#)
[Calendar](#)
[Login](#)

Contact

Use this for NON-emergency situations or questions. If this is an emergency, dial 911.

☒ I would like help with the website or need something changed on my account.

☒ I would like more information about my health messages.

Message:

Please type your message here.

Frequently Asked Questions: Voice-Assisted Technology (Amazon Echo Show)

- **What does Voice-Assisted Technology do?**
 - *It answers to your health-related questions in the form of audio and visual response.*
- **How does it work?**
 - *First, activate the device by saying the wake word "Alexa" followed by opening the skill by saying "Open health assistant"*
 - **E.g., "Alexa, Open Health Assistant"**
 - Wait for the device to open the skill
 - *Then ask your health-related question.*
 - **E.g., "Alexa, What is my risk of falling"**
 - Wait for the device to respond
 - *You can ask more questions.*
 - **E.g., "Alexa, How did I sleep"**
 - Wait for the device to respond
 - *You can exit at any time by saying "Exit"*
 - **E.g., "Alexa, Exit"**
 - The device should exit from the skill.
- **Which health-related questions can it answer?**
 - *Fall Risk*
 - *Sleep & Sleep Quality*
 - *Pulse rate*
 - *Respiration rate*
 - *Health messages*
- **What else can the Amazon Echo Show do?**
 - *"Alexa, play my video Flash Briefing."*
 - *"Alexa, play some music."*
 - *"Alexa, set an alarm for 7 a.m."*
 - *"Alexa, set a pizza timer for 20 minutes."*
 - *"Alexa, what's the weather like?"*
 - *"Alexa, how do you make chocolate chip cookies?"*
 - *"Alexa, when is [holiday]?"*
 - *"Alexa, sing a Christmas carol."*
 - *"Alexa, what was the score of the [team] game?"*

Frequently Asked Questions: Health Sensors

- **Depth Sensor**

- *Does the depth sensor watch me all of the time? Will my family be able to watch me 24/7?*
 - The depth sensor records movement, but video will only be available in the event of a fall. Under the circumstances of a fall, a 10-second video clip will be sent to your designated family members. They will NOT be able to watch videos of you 24/7.
- *Do I have to be fully dressed in my apartment now that I have the depth sensor installed?*
 - No. The depth sensor detects infrared images that are shown as colored shadows. You cannot tell if you are clothed or not and there are no recognizable features. Your privacy is our utmost concern.

- **Motion Sensor**

- *Does the motion sensor video record me?*
 - No. The motion sensors strictly detect movement, they do not capture videos. We cannot tell what you are doing, only that you have moved in a specific room for a certain amount of time.

- **Bed Mat & Bed Sensor**

- *Can I feel the bed mat?*
 - No. It is placed under your mattress so you cannot feel it.
- *What does the bed sensor do?*
 - The bed sensor collects data from the bed mat and the motion sensors. This information is sent to the database accessible via the interface for you and your designated family member(s) to view at your convenience.

- **Wearable Device**

- *I already have a wearable device. Do I need to wear two?*
 - No. If you already have a wearable device, you can continue to wear yours. If you consent, we will use the information from your personal wearable device and integrate it into the Health and Wellness System.
- *Do I have to wear a device?*
 - No. The wearable device is completely optional.

Frequently Asked Questions: Wrist-Worn Device

- *Do I have to wear the wrist-worn device?*
 - No. The wrist-worn device is optional.
- *What if I already have a smart watch?*
 - You do not have to wear the watch provided by the study. You may wear your own device.
- *Do I have to wear it to bed?*
 - No. You do not have to wear the wrist-worn device to bed.
- *How often do I have to charge the wrist-worn device?*
 - It depends on how often you use it and what features you use. If you only wear it to check the time or count steps, it will not have to be charged frequently. If you use the features often, then you will have to charge it frequently. Depending on use, you may expect anywhere from 3-10 days of usage.
- *Do I have to download an app or upload my data?*
 - No. We will link the wrist-worn device to your bed computer. When in your apartment, the data will be automatically sent to the bed computer to the interface.

Frequently Asked Questions: General Questions

- *Do I get to keep the equipment after the study?*
 - No. The equipment will be uninstalled and removed from your home at the conclusion of the study.
- *I want to turn off one or all of the sensors. How can I do this?*
 - Please do not unplug or remove the sensors. If you want sensors turned off, removed, or wish to withdraw from the study, please contact the Project Manager, Brianna Markway, at 573-882-1859 or markwayb@missouri.edu
- *The sensors make me feel anxious. How can I alleviate this feeling?*
 - Please remember that you are not being constantly video recorded and never audio recorded. All devices and data associated with your sensors is de-identified and confidential. If you are still feeling anxious or nervous with the equipment, please contact Brianna Markway, Project Manager, at 573-882-1859 or markwayb@missouri.edu.
- *Is there a cost to participate in this study?*
 - No. There is no cost to participate in this study.
- *I no longer wish to participate in this study. How can I withdraw?*
 - Please contact Brianna Markway, Project Manager, at 573-882-1859 or markwayb@missouri.edu. She will schedule a time to uninstall the equipment and remove the voice-assisted technology and the wrist-worn device.
- *Am I required to inform my family members of my participation in this study?*
 - Family member involvement is voluntary and up to you to share this information with them. You may involve whomever you wish or no one at all. However, if a family member has Durable Power of Attorney (DPOA), a family member will have already signed the consent form and will be aware of your participation in the study.
- *I do not understand my health messages. Whom do I contact for explanation?*
 - Please contact Kari Lane, PhD, RN at laneka@missouri.edu to assist with your health messages. Please allow 48-72 hours for a response. Please see 'Section 3B: Health Messages & Fall Risk-Interpreting Health Messages' for more details.
- *I forgot how to react to the fall alerts. Whom do I contact for help?*
 - Please contact Erin Robinson, PhD, MSW, MPH at robinsonel@missouri.edu to assist with fall alerts. Please allow 48-72 hours for a response. Please see 'Section 3A: Health Messages & Fall Risk-How to Respond/React' for more details.
- *My Amazon Alexa Show is not working. What should I do?*
 - Please see 'Section 2D: Amazon Echo Show Device-Technical Issues'. For issues that do not involve the Health & Wellness Portal please refer to <https://www.amazon.com/gp/help/customer/display.html?nodeId=201602230> (FAQ) or <https://www.amazon.com/gp/help/customer/display.html?nodeId=202158200> (usability features)

Contact Information

- *IT Technical Support*
 - Need assistance with the Interface or the Amazon Echo Show?
 - Please contact:
 - Amanda Hill
 - aeht24@missouri.edu
- *Clinician to Assist with Health Messages*
 - Need assistance with interpreting the health messages?
 - Please contact:
 - Kari Lane, PhD, RN
 - Office Number: (573) 882-0285
 - laneka@missouri.edu
- *Social Worker to Assist with Fall Alerts*
 - Need help coping with fall alerts?
 - Please contact:
 - Erin Robinson, PhD, MSW, MPH
 - Office Number: (573) 884-3907
 - robinsonel@missouri.edu
- *Project Coordinator to Assist with General Questions or Concerns*
 - Questions or concerns about the study or equipment?
 - Please contact:
 - Brianna Markway, MHA
 - markwayb@missouri.edu
 - 573-882-1859 (Office)
- *My Family Contact Information*
 - Designated Family Member: _____
 - Email Address: _____
 - Phone Number: _____