

**Yoga for Elder Fall Prevention: Pilot Study of a 10-Week
Program for Older Adults in the Salt River Pima-Maricopa
Indian Community**

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2019-2020 Indian Health Service Epidemiology Fellowship

September 2020

ABSTRACT

The purpose of this project was to determine whether fear of falling (FoF) and balance improved after a 10-week pilot yoga intervention for older adults. Participants included adults (N=18) ages 55 years and older in a small-sized tribal reservation in rural Phoenix, Arizona, who either expressed concerns about the FoF or who had experienced a fall in the last year. Participants completed the bi-weekly yoga intervention with at least 80% participation rate. Every yoga session included both physical postures and breathing exercises that were completed either sitting or standing depending on individual comfort with the exercise posture. Fear of Falling (FoF) was measured using the modified CDC Fall Risk Factors Survey and balance, strength and endurance was measured with the CDC STEADI Toolkit physical/functional. FoF displayed decreases of 81% and 39% in response to questions about falling. Balance displayed improvements in mobility using the Timed Up and Go (TUG) test. Strength/endurance improvements were found with statistically significant changes identified with the 30 Second Chair Stand Test. The results for Yoga for Fall Prevention indicate that exercise intervention focused on the slow, purposeful movements displayed in Yoga practice might be a promising intervention to manage the FoF and improve balance for clients 55 years and older who are concerned about their physical health. Senior living communities, or programs tasked with creating exercise programs for older adults, may wish to explore yoga as a modality for fall prevention, however future research is necessary.

Key Words: Fear of Falling; Postural Balance; Yoga; Exercise Program; Rehabilitation.

BACKGROUND

Community dwelling older adults can be defined as individuals, 65 years of age and older, who live self-reliantly within a community. In the United States, unintentional falls are the most common cause of nonfatal injuries for people older than 65 years (CDC WISQARS, 2019). About 28 percent of those 65 years and older experience at least one reported fall per year (Brown, 2014). The definition of fall may have varying degrees of explanation, and they can be caused either by intrinsic or extrinsic factors. An intrinsic factor is one that has a physiological origin while an extrinsic factor is one that advances from environmental issues or other hazardous influences (Tinetti, et al., 1994). How one categorizes a “fall” will determine the methodology or intervention approach to prevention. For this research, the definition of falls in the non-hospitalized geriatric population is “an event which results in a person coming to rest unintentionally on the ground or lower level, not as a result of a major intrinsic event (such as stroke) or overwhelming hazard” (Tinetti et al, 1988).

The event of falling for an older adult can cause serious injury, and even death in some instances. Even those adults who recover from fall injuries could experience lifelong physical functional issues (Tinetti et al, 1990). One of the more debilitating concerns exists with the mental trauma that occurs during a fall, which creates an ongoing battle connected to the fear of falling (FoF) (Lachman et al., 1998). The FoF, common amongst community-dwelling older adults, is defined as a disabling symptom of impaired mobility among older people, many who may be frail or infirm (Maki, Holliday & Topper, 1991). Issues of depression, functional limitations, gait impairments, and loss of freedom have been associated with the FoF. This issue has been identified as one of the greatest fears experienced by older adults, occurring with 40 to 73 percent of those with prior falls and 20 to 46 percent of clients without a recent fall report (Walker & Howland, 1991). The FoF is a “vicious cycle” for elderly clients. Falling is a

traumatic experience, leading to a general fear of falling again. This leads to inactivity due to fears associated with exercise, social gatherings, and general activities of daily living, which leads to decreased flexibility, gait immobility, and poor balance. All of these contributing factors could lead to another debilitating fall (Davies & Scully, 2008).

Falling and injury for elder populations is a major public health concern facing American Indian communities. Among American Indian/Alaska Natives who reported a fall in the last year, 15.2 percent reported a fall-related injury, compared to 10.2 percent of White Americans (CDC WISQARS, 2019). Among American Indians/Alaskan Natives in the U.S from 1999-2018, falls accounted for 25 percent of the unintentional injury death rate among older adults (CDC WISQARS, 2019). The elder population at the Salt River Pima-Maricopa Indian Community (SRPMIC) in Arizona is estimated near 1,130 members, many of whom actively participate in traditional practices, cultural groups, and senior designated programs. Within the SRPMIC, there were a total of 1,240 falls from 2008-2011, with a mean age of 58 years of age, with 74 percent occurring among females (SRPMIC, 2020).

Evidence based interventions like *Tai Chi for Arthritis, A Matter of Balance*™, and *Stepping On* have displayed success in decreasing the FoF for elders who maintain sustained participation with activity during a structured class session that combines an assortment of exercises focused on core stability, mobility, balance, muscle strength, and flexibility (Boros, Csala, & Szillagyi, 2018).

The elders in the Salt River Pima-Maricopa Indian Community voiced interest in the development of a yoga program. A systematic review of yoga programs did not identify any articles regarding evaluation of yoga for fall prevention in AI/AN communities. However, five articles were identified detailing the effects of yoga interventions through pilot studies conducted

on participant's ages 55 years and older. Those five articles detailed improvements in balance and FoF but all recommended additional research to examine the effects more closely (Gothe et al., 2014; Hart & Tracy, 2008; Kelley et al., 2014; Lan et al., 1998; Nick et al., 2016.)

Yoga focuses primarily on physical movement postures, controlled breathing exercise, and meditation. Hatha Yoga, an Eastern form of exercise medicine often considered the foundation of all yoga practices, is a very general term that can encompass a wide range of yoga practices (Prado, 2014). In contemporary yoga descriptions, Hatha has come to mean a slow-paced and gentle way of practicing. It is often considered one of the better therapeutic programs for senior adults to participate in specifically because of the connection between the body and the mind (Nick et al., 2016). Yoga, with its deliberate movements and focus on breathing control, has shown benefits for decreasing the risk of falling for independent living elders (Davies & Scully, 2008). This emphasis with focusing on mindful intention, where a participant would focus on the dynamics of movement before attempting the movement, and the physical intent, where the participant would become aware of the position of their body in space, helps with increasing awareness and proprioception (Ziljstra et al., 2007). Yoga, emphasized with the contemporary description of Hatha training, can be a good place to begin a yoga practice because it provides an introduction to the basic yoga poses in a low key, safety influenced setting (Close, 2009). Yoga has been associated with increased stretch potential in major muscle groups, increased strength within muscular structures associated with transitions from sitting to standing and gait control, and increased confidence that reduces FoF (Kelley et al., 2014).

The purpose of this Epidemiology Fellowship project was to determine whether the fear of falling (FoF) and balance improved after a 10-week yoga intervention for older adults.

METHODS

Intervention

Yoga for Fall Prevention is a 60-minute yoga intervention lead by a registered, 200-hour certified, hatha yoga instructor. The class meets twice per week for a total of 10 weeks. The intervention was taught with the intent of becoming more challenging over the course of 10 weeks. The class started with intervention primarily focused on chair-based exercise for the first 2 weeks, and the remainder of the class was done standing for at least 40-minutes of the overall 60-minute class. Participants always had the option of utilizing the chair for standing support or could remain seated if they felt unsure of their ability to complete the standing tasks. The yoga instruction team consisted of two instructors for every class. One instructor would serve as the primary instructor while the other would help with one-on-one intervention with clients. All clients received individual class equipment (mats, blocks, support straps, and tennis balls) that would be used during class instruction.

Yoga class learning modules were structured for modification for either standing or sitting participation. Each of the 20 learning modules, over the 10-week program time period, was established and unaltered to maintain efficacy of instruction. At the beginning and end of every class, for a minimum of 5 minutes total time each, the instructor would open the class to question and answer sessions to discuss complications or issues with class instruction or to discuss concerns about falling.

All study participants were older Salt River Pima-Maricopa Indian Community adults, ages 55 years and older, who lived independently within the Community. The intervention received support from the tribal community government and direct access to clients associated with the Senior Services Department within the Community. Flyers were distributed at

Community sponsored events, informational booths were arranged at Community events, and in-person presentations were conducted at the Senior Services monthly Senior Breakfast event were an estimated 32% of the elder/senior population attends regularly.

To be eligible for participation in Yoga for Fall Prevention, participants must have reported a fall, in any form, within the past year or have expressed concerns about the fear of falling. Inclusion criteria were older than 55 years of age, the age was decreased from the standard senior citizen age of 65 years old due to lower life expectancy within the Salt River Pima-Maricopa Indian Community, and willingness to give written informed consent.

Clients participating in Senior Services activities were required to have a health screening by their primary care physician. The screening ensured the client was physically capable of participating in Senior Services sponsored events and exercise programs. Clients who signed up or displayed interest in Yoga for Fall Prevention were enrolled if they were given clearance based on their health screening. Research instructors were provided a confidential list of preexisting conditions for each client selected for the intervention, along with emergency contact phone numbers and a list of daily medications provided for health conditions.

Data Collection

Yoga for fall prevention class participants completed pre and post fall risk measurements specific to monitoring physical/functional testing standards established by the Center for Disease Control Stopping Elderly Accidents, Deaths, and Injuries (STEADI) clinical tool for balance and leg strength, endurance, balance, and the fear of falling (FoF). All assessments were conducted by a licensed physical therapist.

The timed up and go (TUG) test, conducted by the same licensed physical therapist for every client pre and post intervention, provided an understanding of dynamic balance for each

participant while transferring from sitting to standing and maneuvering turns while walking. This test displays changes in mobility, specific to the gait pattern demonstrated by the participant during walking. Observations in postural stability, gait, stride length, and sway were taken into account (Jeter et al., 2014); the physical therapist checked for slow tentative pace, loss of balance, short stride length, little or no arm swing, steadying self on walls, shuffling, turning, not using assistive device properly. Changes in any of these factors may signify neurological problems that require further evaluation (Appendix A).

The 30-second chair stand test is looking specifically at leg strength and endurance. The same physical therapist conducted this test pre and post assessment for every client. This test demonstrates changes in strength and endurance over the course of the class, assisting in identifying increased ability to effectively and efficiently repeat a movement without losing strength and endurance. Testing is scored according to age and gender (Appendix B).

The 4-stage balance test provided an understanding of the participant's basic static balance when standing still on either two feet or one foot in different standing patterns that is meant to challenge the balance of the participant. The tandem balance test, specifically of the four tests conducted for this assessment, is the identifying test for fall risk. Due to testing discrepancies specific to how testing was conducted and who monitored the test, the testing guidelines from pre to post assessment identified by the STEADI Toolkit were not identically followed for each subject and therefore make this testing measure unusable (Appendix C).

The fear of falling was assessed using the CDC "Fall Risk Factor Checklist" questions specific to falling and the associated fears. There were two questions pertaining to the FoF, "Any falls in the past year?" and "Worries about falling or feels unsteady while standing or walking?" (Appendix D).

Table 1 summarizes the assessment method, measures recorded when assessment administered, and how fall risk was assessed.

Table 1. Summary of Yoga for Fall Prevention Pilot Study Assessments.

Assessment	Measures	Administered ¹	Fall Risk
Timed Up and Go (TUG) Test	Testing mobility by having participant stand up from a seated position, walk a distance of 10 feet away from the starting position, turning around and walking back, and sitting down.	Test completed pre and post intervention by physical therapist.	An older adult who takes ≥ 12 seconds to complete the TUG is at risk for falling.
30-Second Chair Stand Test	Testing leg strength and endurance by having participant complete as many sitting to standing activities from a 17" chair for a total of 30 seconds.	Test completed pre and post intervention by physical therapist.	Risk of falling is assessed based on age range and gender standards. A below average score indicates a risk for falls.
4-Stage Balance Test²	Testing static balance by having participant complete a series of four standing positions (feet side by side, instep tandem, tandem stance full, and single leg balance), with a goal of holding each standing position without error for 10 seconds.	Test completed pre and post intervention by physical therapist.	An older adult who cannot hold the tandem standing test (i.e., one foot in front of the other, heel touching toe) for at least 10 seconds is at increased risk for falling.
Fall Risk Factors Checklist	A "Yes or No" survey that details falls history, medical conditions, medications, gait, strength & balance, vision, and postural hypotension.	Test completed pre and post intervention by physical therapist or yoga instructor.	Fear of Falling targeted with two checklist questions: <ul style="list-style-type: none"> • "Any falls in the past year?" • "Worries about falling or feels unsteady while standing or walking?"

Table 1b. 30-Second Chair Stand Test Scoring

Age	M	F
60-64	< 14	< 12
65-69	< 12	< 11
70-74	< 12	< 10
75-79	< 11	< 10
80-84	< 10	< 9
85-89	< 8	< 8
90-94	< 7	< 4

¹ Information was collected for each study participant at baseline, including age, sex, and Community member status

² Assessment results were not used in final analysis due to test administration concerns.

Data Analysis

All participants were designated a physical paper chart where all patient information was stored, including testing scores that were collected pre and post assessment. This information was stored in an Excel spreadsheet and then imported for statistical analysis into Epi Info. Statistical analysis was conducted to study changes between the two FoF questions designated in the Fall Risk Factor Checklist, the Timed Up and Go (TUG) test, and the 30-Second Chair Stand test, using paired sample *t*-tests. The paired sample *t*-test is a statistical procedure used to determine whether the mean difference between two sets of observations is zero (Statistics Solutions, 2020). In a paired sample *t*-test, each subject or entity is measured twice, resulting in *pairs* of observations. For the two FoF questions asked for each participant, pre and post assessments were compared in response to “yes” or “no” questions and a proportion was created to calculate a percentage change. For the physical assessments, Timed Up and Go (TUG) and 30-Second Chair Stand, pre and post assessments were taken for each client and mean scores and standard deviations were calculated. These mean scores for the two physical performance tests demonstrate changes in both time and repetition pre and post assessment time period.

RESULTS

Program Participation

We planned a maximum class size of 20 participants for this pilot study. This was established by the controlled practice space and criteria established by Senior Services in regards to safe building capacity. Recruitment for Yoga for Fall Prevention yielded 23 persons who initially signed up to participate in class, three of whom did not receive medical clearance due to pre-existing conditions or were recommended in-home therapeutic exercise before attempting the

class. Two participants received medical clearance but could not commit due to issues of finding consistent transportation to and from class.

A total of 18 participants completed Yoga for Fall Prevention with pre and post assessments collected, representing a $\geq 80\%$ completion rate (Table 2). The age range of the participants averaged 66 years old, with the youngest client being 55 years old and the oldest being 81 years old. Three men and fifteen women composed the 18 participant gender demographic. Of the 18 people who completed the class, 14 had expressed experiencing a fall in the last year.

Table 2. Study Participant Characteristics, n=18

Characteristics	AVG / n (%)
Age, y	65.83 \pm 6.56
Race, American Indian	18 (100%)
Education, any college	8 (44%)
Falls accounted in the last year	14 (78%)
Self - Rated Health, good or better	10 (56%)
Use an assistive device for ambulation	5 (28%)

At the end of the sixth week, two participants (a married couple) were unable to complete intervention due to a health concern that required treatment outside of Arizona. The two participants completed 60% of the class sessions thus their data measurements have been excluded from the pilot study data set because their completion rate was below the set 80% target. One client had a drop in blood sugar during the eighth week of class, requiring a precautionary health check-up at the conclusion of the class period. Two clients complained of feeling lightheaded during prolonged standing exercises, however they were both able to complete class during that time.

Assessments

Concerning the FoF survey, there was an 81% improvement (change in response from “Yes” to “No”) in reply to the question “Are you worried about falling?” from pre to post intervention, and a 39% improvement (change in response from “Yes” to “No”) to the question “Do you feel unsteady when standing or walking?”, from pre to post intervention (Table 3). A paired *t*-test was conducted to study the significance of changes from pre to post assessment findings for the 2 specific questions from the fall risk checklist. The change was statistically significant for both ($P = 0.00001$ and $P = 0.0043$).

Table 3: Proportion of FoF Variables Pre and Post (N=18)

Variable	Pre-Intervention Percentage “Yes”	Post-Intervention Percentage “Yes”	P	% Change
FoF – “Are you worried about falling?”	89%	17%	0.00001	↓ 81%
FoF – “Worries about falling or feel unsteady when standing or walking?”	100%	61%	0.0043	↓ 39%

Abbreviations: ↓ Decrease

Concerning strength, mobility, and balance, the Timed Up and Go (TUG) and 30 Second Chair Stand tests both displayed significant change from baseline to 10 weeks (Table 4). The Timed Up and Go (TUG) test displayed a decrease in *reported time for completion* of the activity for clients after participation in the intervention (9.6 seconds \pm 3.6 vs. 8.5 seconds \pm 3.2, $P = 0.00153$). At the post-test, one additional participant obtained a passing score on the TUG test (i.e., <12 seconds). The 30 Second Chair Stand test displayed an increase in *repetitions achieved* during the testing time limit of the activity for the clients participating in the

intervention (10.6 repetitions \pm 4.6 vs. 12.5 repetitions \pm 4.4, $P = 0.00022$). At post-test, two additional people obtained a passing score on the 30-second chair stand test).

Table 4: Comparison of Physical / Functional Assessment (Pre and Post), n=18.

Variable	Pre-intervention	Post-intervention	P	% Pass Score (Pre / Post)	% Change (Pre / Post Pass Score)
Timed Up and Go Test (TUG)	9.58 seconds \pm 3.59	8.47 seconds \pm 3.21	0.00153	83% / 88%	6%
30 Second Chair Stand Test	10.56 reps \pm 4.57	12.50 reps \pm 4.38	0.00022	44% / 55%	25%

Values are Mean \pm SD unless otherwise noted

DISCUSSION

We found improvements from the yoga for fall prevention intervention among Salt River Pima-Maricopa Indian Community tribal residents ages 55 years and older who had experienced a fall in the past year and/or who had a fear of falling. Post intervention improvements with endurance and strength, along with positive answers to the two FoF checklist question results, identified statistically significant changes for the Timed Up and Go, 30-Second Chair Stand, and the two FoF questions.

The costs associated with the program included a contract with Community Conscious Yoga, a local yoga training program that offers yoga instructors to guide program development and also course guidance for yoga teacher training for students who want to advance to guiding their own classes. The yoga teacher training program is a 200-hour minimum certification process, one that studies different yoga class compositions (including fall prevention for elders and chair based classes for clients with physical special needs) and internships with yoga programs. This program can be done over 16-weeks, 3 classes at 3 hours per week, and includes a cost of \$250 for the entire teacher training. This teacher component was utilized in Salt River to help build a foundation of yoga instructors to help connect with Community members.

General satisfaction surveys were collected from participants at the conclusion of class. One of the most common responses to the question, “what did you like most about class”, detailed the valuable step of delivering the yoga intervention with instructors familiar to participants to guide participants through new material because it made them feel “comfortable” and “less nervous” during class sessions.

The yoga for fall prevention pilot test showed that yoga was helpful for some participants, displaying positive changes from pre to post assessment for FoF and physical/functional assessments. Given the varying degrees of activity levels present among the class participants (i.e., some clients had no prior exercise experience and some had significant exercise experience), the class could have been tailored to advance more experienced participants. All movements in the course curriculum offer degrees of variance that could use both less strenuous and more strenuous movements and positions. For clients who display greater physical functional strength or confidence with standing movement, the curriculum would benefit from instruction tailored to challenge those who are accomplishing movements efficiently and effectively. For instance, during chair-based instruction, those clients needing challenging modifications could transition to standing positions for these movements, or increase time/repetition of movement to accommodate a more challenging practice for their individual needs.

A more comprehensive use of the pre-test data would have identified general physical capacity of participants. Participants would have benefited from a fall intervention that was more specific to their personal activity level, which for this group would have been activities that were more challenging due to their stronger physical functions. This determination of “weak, moderate, or strong” participants could be established during the initial pre-assessment process, specifically with the 4-Stage Balance Assessment which designates balance scores based on

increasingly more challenging standing positions. Those who could not perform the general balance position would be designated as “weak”, those who could perform/attempt the two tandem balance positions would be designated as “moderate”, and those who could initiate the single leg balance test would be designated as “strong” due to the difficulty associated with this test. With this information before the start of class, it would allow instructors to split classes into two sessions, one for beginners and one for advanced participants. These classes would be near identical in forms being performed, the only difference would be the time each form is held and whether we utilize support props for balance instability.

There were a few limitations to this study. While the paired t-test may determine that significance is prevalent within the data measurements monitored during the Timed Up and Go (TUG) and 30 Second Chair Stand test, a larger sample size, and a comparison site, would strengthen the findings. Future research could also compare yoga to other interventions to prevent falls in a randomized controlled trial focused on elder people ages 55 years and older.

Future opportunities to expand this research include standardizing the administration of the 4-Stage Balance test. During the classes used for this project, the 4-Stage Balance Assessment was compromised due to testing parameters not being followed identically from pre to post assessment. During the pre-assessment process, participants were tested with their dominant leg position and only conducted one test per assessment measure. During the post-assessment process, participants were tested bilaterally, utilizing left and right foot parameters for standing positions and tested twice within both assessment measures. Three clients described feeling increasingly fatigued between tests during the post-assessment process, a comment not made during the pre-assessment process. Because this measure was not conducted with efficacy from pre to post assessment, the data could not be utilized. The physical therapist, during consultations with new patients, measures bilateral range of motion and manual muscle testing as

comparison for changes that occur once manual stretching, therapeutic exercise, and functional conditioning begins during the rehabilitation process. Because variations in testing can be different for each physical therapist, or instructor conducting the test, it is important that exact procedures and instrumentation be utilized to provide the greatest likelihood of replication for research study reporting (Conable & Rosner, 2011). The 4-Stage Balance assessment has potential to display changes in regards to proprioception and balance stability, two important factors related to fall risk (Patel et al., 2012).

Yoga for Fall Prevention is recommended as a modality for IHS rehabilitation therapists (e.g., diabetes prevention educators, cardio-pulmonary therapists, physical and occupational therapists) to explore for its ease of administration specifically for elder tribal members who have a FoF or balance concerns. The 10-week pilot study of yoga for the purposes of reducing fall risk indicates that the exercise intervention of yoga, which is focused on the slow, purposeful movements, may be a promising intervention to manage FoF and improve balance for clients 55 years and older.

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Appendix A

ASSESSMENT

Timed Up & Go (TUG)

Purpose: To assess mobility

Equipment: A stopwatch

Directions: Patients wear their regular footwear and can use a walking aid, if needed. Begin by having the patient sit back in a standard arm chair and identify a line 3 meters, or 10 feet away, on the floor.

① Instruct the patient:

When I say “Go,” I want you to:

1. Stand up from the chair.
2. Walk to the line on the floor at your normal pace.
3. Turn.
4. Walk back to the chair at your normal pace.
5. Sit down again.

NOTE:

Always stay by the patient for safety.

② On the word “Go,” begin timing.

③ Stop timing after patient sits back down.

④ Record time.

Time in Seconds: _____

An older adult who takes ≥ 12 seconds to complete the TUG is at risk for falling.

CDC’s STEADI tools and resources can help you screen, assess, and intervene to reduce your patient’s fall risk. For more information, visit www.cdc.gov/steadi

Patient _____

Date _____

Time _____ AM PM

OBSERVATIONS

Observe the patient’s postural stability, gait, stride length, and sway.

Check all that apply:

- Slow tentative pace
- Loss of balance
- Short strides
- Little or no arm swing
- Steadying self on walls
- Shuffling
- En bloc turning
- Not using assistive device properly

These changes may signify neurological problems that require further evaluation.



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Appendix B

ASSESSMENT

30-Second Chair Stand

Purpose: To test leg strength and endurance

Equipment: A chair with a straight back without arm rests (seat 17” high), and a stopwatch.

① **Instruct the patient:**

1. Sit in the middle of the chair.
2. Place your hands on the opposite shoulder crossed, at the wrists.
3. Keep your feet flat on the floor.
4. Keep your back straight, and keep your arms against your chest.
5. On “Go,” rise to a full standing position, then sit back down again.
6. Repeat this for 30 seconds.

NOTE:
Stand next to the patient for safety.



② **On the word “Go,” begin timing.**

If the patient must use his/her arms to stand, stop the test. Record “0” for the number and score.

③ **Count the number of times the patient comes to a full standing position in 30 seconds.**

If the patient is over halfway to a standing position when 30 seconds have elapsed, count it as a stand.

④ **Record the number of times the patient stands in 30 seconds.**

Number: _____ Score: _____

CDC’s STEADI tools and resources can help you screen, assess, and intervene to reduce your patient’s fall risk. For more information, visit www.cdc.gov/steadi

Patient _____

Date _____

Time _____ AM PM

SCORING

Chair Stand Below Average Scores

AGE	MEN	WOMEN
60-64	< 14	< 12
65-69	< 12	< 11
70-74	< 12	< 10
75-79	< 11	< 10
80-84	< 10	< 9
85-89	< 8	< 8
90-94	< 7	< 4

A below average score indicates a risk for falls.



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Appendix C

ASSESSMENT

The 4-Stage Balance Test

Purpose: To assess static balance

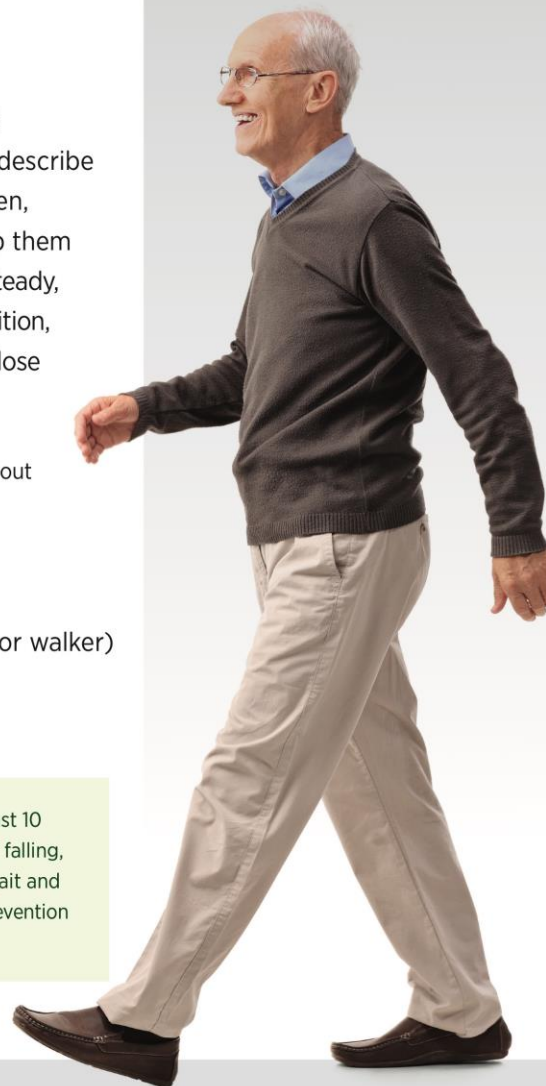
Equipment: A stopwatch

Directions: There are four standing positions that get progressively harder to maintain. You should describe and demonstrate each position to the patient. Then, stand next to the patient, hold their arm, and help them assume the correct position. When the patient is steady, let go, and time how long they can maintain the position, but remain ready to assist the patient if they should lose their balance.

- ▶ If the patient can hold a position for 10 seconds without moving their feet or needing support, go on to the next position.
- ▶ If not, **STOP** the test.

Patients should not use an assistive device (cane or walker) and they should keep their eyes open.

An older adult who cannot hold the tandem stand for at least 10 seconds is at increased risk of falling. To reduce their risk of falling, you might consider referring them to physical therapy for gait and balance exercises, or refer them to an evidence-based fall prevention program, such as Tai Chi.



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ASSESSMENT CONTINUED

The 4-Stage Balance Test





Patient _____

Date _____

Time _____ AM PM

Instructions to the patient:

- I'm going to show you four positions.
- Try to stand in each position for 10 seconds.
- You can hold your arms out, or move your body to help keep your balance, but don't move your feet.
- For each position I will say, "Ready, begin." Then, I will start timing. After 10 seconds, I will say, "Stop."

	① Stand with your feet side-by-side.	Time: _____ seconds
	② Place the instep of one foot so it is touching the big toe of the other foot.	Time: _____ seconds
	③ Tandem stand: Place one foot in front of the other, heel touching toe.	Time: _____ seconds
	④ Stand on one foot.	Time: _____ seconds

Notes:

CDC's STEADI tools and resources can help you screen, assess, and intervene to reduce your patient's fall risk.
 For more information, visit www.cdc.gov/steady



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Appendix D

CHECKLIST

Fall Risk Factors

Patient _____

Date _____

Time _____ AM PM

Fall Risk Factor Identified	Present?		Notes
FALLS HISTORY			
Any falls in past year?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Worries about falling or feels unsteady when standing or walking?	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
MEDICAL CONDITIONS			
Problems with heart rate and/or arrhythmia	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Cognitive impairment	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Incontinence	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Depression	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Foot problems	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Other medical problems	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
MEDICATIONS (PRESCRIPTIONS, OTCs, SUPPLEMENTS)			
Psychoactive medications	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Opioids	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Medications that can cause sedation or confusion	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
Medications that can cause hypotension	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
GAIT, STRENGTH & BALANCE			
Timed Up and Go (TUG) Test ≥ 12 seconds	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
30-Second Chair Stand Test: Below average score based on age and gender	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
4-Stage Balance Test: Full tandem stance < 10 seconds	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
VISION			
Acuity $< 20/40$ OR no eye exam in > 1 year	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
POSTURAL HYPOTENSION			
A decrease in systolic BP ≥ 20 mm Hg, or a diastolic BP of ≥ 10 mm Hg, or lightheadedness, or dizziness from lying to standing	<input type="checkbox"/> Yes	<input type="checkbox"/> No	
OTHER RISK FACTORS (SPECIFY BELOW)			
	<input type="checkbox"/> Yes	<input type="checkbox"/> No	



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