Exercise Interventions to Improve Balance and Reduce the Risk of Falls: “Beyond the Norm”

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Introduction: Brief, Short, Related (Education, Clinical Experience, Publication/Presentation)

- APTA CSM Conference Las Vegas, NV Harris, M., Holden, M., Cahalin, L., Fitzpatrick, D., Lowe, P., Canavan, P. “Clinical Examination and Evidence-Based Interventions to Improve Gait in Older Adults”. APTA Annual Combined Sections, Las Vegas, NV, 2009
- 20 yrs + Clinical Experience working with many patients over 65 yrs
- KeyNote Speaker ITOPO Istanbul, Turkey 2007 (2 presentations including one on Fall Prevention strategies)
Outline
1) Statement and Scope of the Problem
2) Describe what are common “normal” interventions to help decrease Falls in the Older Person
3) Evidence and Experience/outcome based “beyond the norm” interventions to help prevent Falls

Statement of the Problem
- Falls in the Older Person continue to be a significant problem in the U.S.A. and the World
- The physical, emotional and economic direct and indirect costs are substantial
- There is a continued need and importance of dissemination of information related to interventions that could help to decrease the incidence of falls in the older person

Fall-Related Injuries in the Hospital
- 30-50% of hospital patient falls result in physical injury, with 4-6% being a Serious injury. (11,000 deaths per year)
- 700,000-1,000,000 falls in hospital per year. Most occur in patient rooms and not witnessed. Most bed to chair transfer or related to need to utilize the bathroom. Ganz D.A., Agency for HealthCare Research & Quality, 2013
Population > 65 yrs of age in USA expected to climb to **92 million** by 2060; IMPORTANT

- 2012: 43 million estimate
- 2020: 56 million estimate
- Costs associated with Falls expected to exceed $30 billion dollars a year in 2012 and by 2020 over $60 billion.

Indirect/Direct Effects related to Patients who Fall

- Patient
- Family
- Health Care Professionals
- Manager
- Administration (Epic reports)

- 2014 Updated VA Toolkit Risk Assessment and Interventions

Estimating the health care costs of older adult fall-related injuries

In 2003, economists at the Research Triangle Institute in North Carolina worked with CDC to estimate the direct medical costs of falls among adults age 65 years and older in the United States. The study found that in 2000, direct medical costs associated with fatal falls and nonfatal falls were $19 billion for nonfatal fall-related injuries.

Of the nonfatal injury costs, 63% ($12 billion) were for hospitalizations, 21% ($4 billion) were for emergency department visits, and 16% ($3 billion) were for treatment in outpatient settings.

- Resulting publications:
Estimating the health care costs of older adult fall-related injuries

- Medical expenditures for women who made up 58% of the older adult population in 2000, were two to three times higher than for men for all medical treatment settings. Fractures accounted for just 25% of nonfatal injuries but 41% of costs.

- Fall-related injuries among older adults, especially among older women are associated with substantial economic costs. The magnitude of this economic burden underscores the critical need to implement cost-effective fall interventions.


Direct Costs

- Direct costs are what patients and insurance companies pay for the treatment of fall-related injuries. These costs include fees for hospital and nursing home care, doctors and other professional services, rehabilitation, community-based services, use of medical equipment, prescription drugs, changes made to the home, and insurance processing. (Englander et al. 1996)

2013 Direct Medical Costs for Falls

- In 2013, 2.5 million nonfatal falls among older adults were treated in emergency departments and more than 734,000 of these patients were hospitalized.

- In 2013, the direct medical costs of falls, adjusted for inflation, were $34 billion. Centers for Disease Control and Prevention, National Center for Injury Prevention and Control.
Aging Population

- In 2003, 1.5 million people 65 and older lived in nursing homes (National Center for Health Statistics 2005).
- If the rate of the aging population continues, by 2030 the number of older people living in nursing homes will rise to about 3 million (Schum et al. 2002).

Fatal Falls: Men vs Women

- Men are more likely than women to die from a fall. After taking age into account, the fall death rate is approximately 40% higher for men than for women.

Age Adjusted Fatal Fall Injury Rates* Among Men Aged 65 Years and Older, United States, 2000-2003

Age Adjusted Fatal Fall Injury Rates* Among Women Aged 65 Years and Older, United States, 2000–2003

- Falls in the Older Person: Multiple Factors
  - Although some falls are from a single cause, the majority of falls are a result of interactions from many predisposing factors.

- What has been done?
  - National Resource Center for Safe Aging
    - In 1998, CDC funded the San Diego State University – in a joint effort between the University Center on Aging and the American Society on Aging, San Francisco – to develop the National Resource Center for Safe Aging (NRCSA). The mission of the NRCSA is to gather and share the best information and resources on senior safety, including fall prevention.
What has been done?

No More Falls!

In 2001, CDC funded the California Department of Health Services for three years to evaluate a multifaceted fall prevention intervention that was integrated into a public health program targeting fall risk in the community. Study participants were 552 seniors attending Preventive Health Care for the Aging (PHCA) clinics in urban San Diego county and rural Humboldt county.

The intervention included four elements:
1) Education about fall risk factors
2) Referrals to community exercise programs to increase strength and balance
3) Medication review
4) Home modifications to reduce fall hazards

Evaluating dissemination of a fall prevention program for older adults

The 11,500 senior centers throughout the United States serve as gathering places for older adults and offer both information and support for their clientele. As such, they are potential powerful mechanisms for delivering injury control interventions to community-dwelling older adults.

This project, begun in October 2005 by the Injury Control Research Center at the University of North Carolina, will assess the perceived needs for, and barriers to, adopting and implementing Safe Steps, a fall prevention program in senior centers. Older adult adoption and implementation of Safe Steps identify organizational-level factors that predict increased adoption and implementation of Safe Steps by senior centers and identify individual level factors that predict increased adoption and implementation of Safe Steps.

What does the CDC tell us on How to prevent Falls in Older Adults?

“The Norm”

• Exercise regularly. It is important that the exercises focus on increasing leg strength and improving balance, and that they get more challenging over time. Tai Chi programs are especially good.

• Ask their doctor or pharmacist to review their medicines— both prescription and over-the-counter—to identify medicines that may cause side effects or interactions such as dizziness or drowsiness.

• Have their eyes checked by an eye doctor at least once a year and update their eyeglasses to maximize their vision. Consider getting a pair with single vision distance lenses for some activities such as walking outside.

http://www.cdc.gov/HomeandRecreationalSafety/Falls/adultfalls.html
Accessed August 29, 2015 (Page updated July 1, 2015)
What does the CDC tell us on How to prevent Falls “The Norm”

- Make their homes safer by reducing tripping hazards, adding grab bars inside and outside the tub or shower and next to the toilet, adding railings on both sides of stairways, and improving the lighting in their homes.
- To lower their hip fracture risk, older adults can:
  - Get adequate calcium and vitamin D—from food and/or from supplements.
  - Do weight-bearing exercise.
  - Get screened and, if needed, treated for osteoporosis.

http://www.cdc.gov/HomeandRecreationalSafety/Falls/adultfalls.html
Accessed August 29, 2015 (Page updated July 1, 2015)

Statement of the Problem

- Many readmissions to Hospitals due to subsequent Falls
- Need for an improved paradigm for interventions with collaboration/integration of Physical and Occupational Therapists with Test and Re-Testing

What is the common Question asked?

Have you ever Fallen?
What are some common, beyond the “norm” questions?

• Are you afraid to Fall?
  – When?
  – Where?
  – Why?

Listen and Individualize

Breathing, Back Pain and Balance

• Inter-condition comparison showed that in slow and fast breathing relatively to quiet breathing, the mean displacement of the center of pressure along the antero-posterior axis was significantly increased only for the low back pain group.

Clinical Biomechanics; August 2002 Volume 17, Issue 7, Pages 548–550;
Does respiration perturb body balance more in chronic low back pain subjects than in healthy subjects.

Medication Class Types related to Falls

• Meta-analysis of the impact of 9 Medication Classes on Falls in Elderly Persons.
  • John C. Woolcott, MA, Kathryn J. Richardson, MSc, Matthew G. Wem, BSc, Pharm, PharmD, Bhavini Patel, MPharm, Judith M. Marin, BPharm, PharmD, Karim M. Khan, MD, PhD; Carlo A. Manna, BSc, Pharm, PharmD, PhD

• Of 11,118 identified articles, 22 met the inclusion criteria.
The use of sedatives and hypnotics, antidepressants, and benzodiazepines demonstrated a significant association with falls in elderly individuals.
What are “Beyond the Norm Interventions” and what is the evidence for them?

- Shoe Wear
- Medication Changes
- Examples of Therapeutic Exercise and Balance Exercise
- Factors related to balance and need for concentration on the neuromuscular, musculoskeletal system
- Intensity of Exercise
- Balance and Gait Impairments
- Psychological Factors
- Low Back Pain

**Effect of medication changes on the short-term risk of falls in long-term care**

In October 2004, researchers at Johns Hopkins University were funded to study the effects of medication changes on the risk of falls among residents of three nursing homes who fell during 2002–2003. The study used a case-crossover design to capture medication changes that occurred 1 to 9 days before the fall. The measure of effect was the odds ratio of falling after a start, stop, or dose change in medication in the case-time period versus the control time period.

The results indicated that the short-term risk of single and recurring falls may triple within two days after a medication change (odds ratio = 3.0, 95% CI = 1.1–25.9). Study outcomes may be used to develop similar fall risk studies in other clinical settings, develop interventions for high-risk medication changes, and to develop intensive, short-term interventions for vulnerable residents after medication changes.

**Balance and Gait**

- **Balance & Gait Impairments** in older people increase the risk of falls which are the leading cause of accidental death and injury related visits to the emergency room.

Benjuya, 2004
Evaluation: Etiological factors

1) Arch height: Non weight bearing & Weight Bearing

2) Balance

3) Shoe wear

4) Lower Extremity Strength/ Fatigue/ ROM

5) Dynamic Testing (gait, toes, heels, squat, etc.)

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Hallux Valgus and Toe Flexor Strength and Falls?

- 312 Men and Women aged 60-90 yrs of age were followed prospectively for 12 months.
- Hallux Valgus and Toe Flexor Strength is associated with increased risk of falls in older people. ISB Award Winning paper

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3 Sensory Systems that Mediate Balance Ability

1) Visual
   - eyes open - eyes closed
   - Recommendations

2) Vestibular
   - Otoliths (head acceleration/position)
   - Semicircular Canals
   - Recommendations

3) “Somatosensory”
   - (Proprioception, etc)
   - Recommendations
MUSCULO-SKELETAL
• e.g. ROM, STRENGTH, ENDURANCE, Time to peak force development (sway velocity), etc.

PSYCHOLOGICAL
• Self efficacy, Fear, Type of Rehab.
• Closed Skill, Open Skill, Closed Environment, Open Environment
• (Closed Loop/Open Loop)

Therapeutic Exercise Goals with continued PRACTICE

• OPEN LOOP
  – Goal: To improve reflexive motor programs

• CLOSED LOOP
Latencies of 15–20 msec ($M_1$) and 40–55 msec ($M_2$),

- *Experimental Brain Research*
- Modulation of the functional stretch reflex by the segmental reflex pathway

Assessment and Exercise
Toes Up & Toes Down

Firm vs. Unstable Surface

SAFETY:
- Parallel Bars
- Gait Belt
- Gradual Progression
- Dense Foam→
- Air Ex
- Weight shift, Marching, single leg

Toes Up and Toes Down Rotations
Wobble Board (Proximal to Distal)
Progression of Exercises

Forward/Backward Translations

Perturbations: Decrease Reaction Time & Decrease Movement Time

Motor Program Activity
Motor Learning

• How movement patterns are Learned and Integrated
• Defined in terms of a lasting effect of practice
• 4 Factors:
  – Stages of Learning
  – Type of Task
  – Practice
  – Feedback

Environment also must be addressed

Gilmore, 2001 Motor Control & Motor Learning: Implications for treatment of individuals post stroke

One Legged Balance

• One legged balance ability is a predictor to injurious falls in the older person. 482 subjects 60 yr. or older 3 yr. follow up.

Albuquerque Falls Study (JAGS Vellas et al., 1997)

One legged Stance Time Test

• Maximal Ankle dorsiflexion range of motion may be important for one-legged standing balance of older women.
• Age & Passive Ankle Dorsiflexion angle accounted for 71% of the variance in time.

Gilchrist, Perceptual Motor Skills, 2000

(Calf Stretches followed by Toe Raises)
• Exercise program in older women was shown to increase coordinated stability tests and were associated with improvements in ankle dorsiflexion, hip extension and hip flexion strength

Leed, 1996

Patients having difficulty with active dorsiflexion: Electrical Stimulation

• Electrostimulation of the Ankle Dorsiflexors improved Static Balance measures in the Elderly.
  
  Postural Sway
  
  (max. range & std. Dev. of Center of Pressure displacement)


Ankle Dorsi & Plantar Flexion Fatigue Protocols

• Ankle Dorsiflexion & Plantar flexion fatigue increased postural sway with bilateral stance. During unilateral stance, the center of balance shifted anterior and there was an increase of medial/lateral sway

(Ladin, 1993)

Caution: Do not cause excessive fatigue during rehabilitation
**Videos**

- Calf Stretch
- Half foam roll

**Forward Lunge & Lateral Lunges**

*Neurocom® International*

- **Forward Lunge** targets Hip Extensors
- **Lateral Lunge** targets Ankle Plantar Flexors and produces greater ankle dorsiflexion values

> Flanagan, J Strength Cond Res, 2004

- “Mirror Drill”
- Improve Reaction/Confidence

**Maximal Step Length**

- **CONCLUSION:** MSL is as good a predictor of mobility performance, frequent falls, self-reported function, and balance confidence as standard tests such as US MSL. Simplified to one direction may be a useful clinical indicator of mobility, balance, and fall risk in older adults.
- One hundred sixty-seven mildly balance-impaired older adults recruited for a balance-training and fall-reduction program (mean age 78, range 65–90).
- Measures of Maximal and Rapid Stepping Maximal Step Length While keeping their arms across their chest, subjects stepped out maximally with one leg, maintaining the stance leg in the initial position, and then returned to their initial stance position in one step.
- MSL was defined as the average step length over a series of five trials in each leg-direction (five trials for each of six leg-directions, making a total of 30 trials).

Exercises for the Older Person

- Safety #1 priority
- Quick reactions one on one supervision needed
- STRETCH Ankle Plantar Flexors
- Strengthen Ankle Dorsiflexors & Plantar Flexors, Ankle Inverters/Evertors, Knee Extensors, Hip Flexor & Extensors
- Lunges
- Change surfaces
- Change shoe wear or no shoes
- Anticipation vs Reflexive Exercises

Psychological: Self Efficacy & Falls

- Strong association between self-efficacy and function. Goals of rehabilitation is to improve physical skills and confidence
  (Tinetti, J Geronol, 1994)

- Goals for gradual criteria based progression in the clinic (no eyes open then eyes closed). Improve Self Efficacy

Physiological & Psychological Aspects

- Walking speed is influenced by lower limb strength, balance, reaction time and psychological measures
  (Tiedemman, Gerontology, 2005)
Intrinsic & Extrinsic Factors

- Muscle strength
- Muscular fatigue
- Joint ROM
- Muscular Power
- Reaction ability
- Reflexes
- Leg Length
- Motor Control & Coordination

- Footwear
- Terrain/Surface
- Exercise

- Arch Height
- Posterior Tibialis Weakness (Insufficiency)/Fatigue
- Balance
- Anterior Tibialis Weakness/Fatigue, Gluteus Medius/ Quadratus Lumborum/ Hip Flexion & Extension Strength
- Shoe wear
- Worn Outsole or Heel Counter
- Dynamic Testing: Fatigue/ROM/Strength (Accurate)/Symmetry

Falls & Footwear

- 95 older people (mean = 78 years) who fell and fractured their hip were wearing...
  - 22% Slippers
  - 7% Sandals (Shoe-Surface Interface)

- The majority of those who were wearing shoes (75%), had at least one suboptimal feature
  - Excessively flexible soles, heel counter, or absence of fixation to the feet

(Sherrington, 2003)
Falls and Athletic Shoes

- 1,371 adults over 65 years of age were followed for 2 yrs.
  - (327 fell, matched with 327 non-fallers)
- The use of athletic shoes were associated with low risk fall

Low Back Pain

Recent evidence indicates that study participants with LBP have impaired trunk muscle control, which may compromise the control of trunk and hip movement during postural adjustments

Chronic Low Back Pain and Postural Control

- Individuals with Chronic Low Back Pain demonstrated poor Postural Control with Balance Performance

(Radebold et al., Biomech, 2001)
Low Back Pain

- The inability to control a hip strategy indicates a deficit of postural control and is hypothesized to result from altered muscle control and proprioceptive impairment.

- This may result in an increase chance of Falls.

Back Pain as a Factor for Balance Deficits

- Age was the major determinant of both balance and functional mobility and accounted for 9% and 14% of the variance, respectively. After accounting for age, back pain explained an additional 9% of the variance in balance and 13% of the variance in functional mobility. 93 women.

- The Influence of Back Pain on Balance and Functional Mobility in 65- to 75-Year-Old Women with Osteoporosis
  
Exercise Therapy decreased pain and *improved* function for Adults with Chronic Low-Back Pain

(Hayden et al. Cochrane Database of Systematic Reviews, 2005)

Exercises showed stable *positive results* for moderate utility in prevention of low back pain.

(Literature Review Linton & van Tulder, Spine, 2001)

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**Back Strength and Posture**

- The *stronger the back extensor muscles the smaller the kyphosis* and the larger the lumbar lordosis. Back extensor strength is an important determinant of posture.

(Sinaki et al., Amer J Phys Med Rehabil, 1996)

- The angle of kyphosis increased significantly with age (p<.0001) ranging from 41 deg in females in their 30’s to 60 degrees for females over age 70.

(O’Gorman & Gwendolen, PhysioTher & Practice, 1987)

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**Good Posture**

- Good posture requires sufficient flexibility, strength, power, strength endurance, and good coordination.
  - neuromuscular control & reflexes
LOG passes
- slightly anterior to acromion
- close to greater trochanter
- slightly anterior to knee joint
- anterior to ankle joint

External Moments

Ribs & Head related to Spine Position

Postural Changes
- Body posture in elderly, physically active males
  B. Ostrowska, K. Rojek-Mietz and C. Giemz
- A decrease of the lumbar–sacral spinal-segment inclination and an increase of the upper thoracic spinal-segment inclination were observed in the elderly males.

The Aging Male 2003;6:222-229
Physical Therapy

• Physical Therapy Intervention that is Individualized can help prevent future Back Pain Episodes

• Interventions include: Therapeutic Exercise, Manual Therapy, Home Exercise, Patient Education, Modalities

Breathing, Back Pain and Balance

• Inter-condition comparison showed that in slow and fast breathing relatively to quiet breathing, the mean displacement of the center of pressure along the antero-posterior axis was significantly increased only for the low back pain group.

Clinical Biomechanics; August 2002; Volume 17, Issue 7, Pages 548–550; Does respiration perturb body balance more in chronic low back pain subjects than in healthy subjects? A. Hamaoui

Postural Sway

• Postural stability is currently measured as sway motion between C of G and center of pressure as well as C of G velocity.

• Postural sway becomes more variable with aging.

• Stability more dependent on vision, less on proprioception in aging population.
Therapeutic Exercises

- Pec Stretches
- Scapula retractors
- Upper Trap/Scalene Stretches
- Breathing Exercises
- Lumbar Flexion Stretches
- Trunk Extension Exercises
- Hamstring stretching
- Abdominal Exercises

Reaction to Disturbances

- Reaction to external disturbances, such as slips or falls, requires a process of perturbation detection and control of motion changes. Postural control is a common mechanism to compensate unexpected displacements of the body.

  Practical Applications
  - The ranges and patterns of coupled motion of the thorax appear to be strongly influenced by the posture from which the movement is initiated.

Muscular Activity in Erect Standing

Foot: muscular activity may be changed due to surface one is standing on.
Tibia: Posterior calf muscles are more active than the anterior.
Thigh & Hip: Very little activity:
  - Swaying produces bursts of ab/adductors.
  - Iliopsoas constantly active, preventing hyperextension of the hip joint.
Sarcopenia

• Postgraduate Medicine International
  • January 2014, Volume 25, Issue 1, pp 187-193
  • Operational definitions of sarcopenia and their associations with 5-year changes in falls risk in community-dwelling middle-aged and older adults
  • D. Scott, et al.
  • Methods
  • N = 681 volunteers (48 % female; mean ± SD age 61.4 ± 7.0 years)
  • Men classified with sarcopenia according to anthropometric definitions, and women classified with sarcopenia according to performance-based definitions, had significant increases in falls risk over 5 years (all P < 0.05) compared to individuals without sarcopenia.

Gait Characteristics of Elderly People With a History of Falls: A Dynamic Approach

• Increased variability of walking patterns may be an important gait risk factor in elderly people with a history of falls. Although the fallers showed significantly smaller stride lengths, smaller center-of-mass lateral sway, and smaller ankle plantar flexion and hip extension during pushoff, they showed increased variability of kinematic measures in their coordination of walking compared with the non-fallers.


Physical Therapy

• Physical Therapy Intervention that is Individualized can help prevent future Back Pain Episodes, improve posture and balance, improve gait and may decrease falls in the older person

• Interventions include; Therapeutic Exercise, Gait Training, Manual Therapy, Home Exercise, Patient Education, Modalities
Videos

- Abd Ext Flex
- Ext Flex

Obstacle Avoidance Task/Exercise

- Need for dynamic control
- The Nijmegen Falls Prevention Program was effective in reducing the incidence of falls in otherwise healthy elderly.
- Obstacle avoidance task indicated that subjects improved their performance on dynamic control and fall prevention.
- Carrying a tray of empty cups, sitting up without the use of arms, carrying an umbrella, carrying grocery bags, walk in “crowded” environment, change directions, change speed.
- Practice fall techniques

- 113 individuals with history of falls in Netherlands. 2x/wk for 5 weeks. 6 months following fall.
- A Five-Week Exercise Program Can Reduce Falls and Improve Obstacle Avoidance in the Elderly
  Gerontology 2006;52:131–141 DOI: 10.1159/000091822

Testing

- Timed Up and Go
- Balance Error Scoring System
- Berg Balance
- Tinetti
Age Related Data to Compare for Test Performance

- Age and Gender Related Test Performance in Community-Dwelling Elderly People: Six-Minute Walk Test, Berg Balance Scale, Timed Up & Go Test, and Gait Speeds have age-related data to compare.


Timed Up and Go

- Predicting the Probability for Falls in Community-Dwelling Older Adults Using the Timed Up & Go Test.
- The TUG was found to be a sensitive and specific measure for identifying elderly individuals who are prone to falls.

[Shumway-Cook A, Brauer S, Woollacott M. Predicting the probability for falls in community-dwelling older adults using the Timed Up & Go Test. Phys Ther. 2000;80:896-903.]

Balance Error Scoring System (BESS)

- The reliability of the BESS ranges from moderate (< 0.75) to good (> 0.75) while some studies report reliability coefficients below clinically acceptable levels (< 0.75). A modified version of the BESS has demonstrated good reliability.

Systematic Review of the Balance Error Scoring System

• Balance Error Scoring System

Stratify & score and Morses Falls Scale
• 2 best validated risk assessment tools for the hospitals.
• Morse Fall Scale 1989; Acute Medical, Surgical, Long Term Rehab.
• Stratify 1997; Acute/Rehab. Geriatric population
• However, these Score/Scales do not perform equally well in all settings.

Interventions for Preventing Falls in Older People Living in the Community
• Gillespie et al. Cochrane Collaboration Systematic Review 2009
  – 111 trials (55,303 participants)
• Programs that contained 2 or more components flexibility, strength, balance or endurance reduce rate and number of falls.
• Multifactorial interventions reduce rate of falls in older people living in the community
Exercise to prevent falls in older adults: an updated meta-analysis and best practice recommendations

Sherrington et al., NSW Pub Health, 2011

1) Exercise must provide moderate to high challenge for balance
2) Exercise: Sufficient dose (2 hours/week group, home or individual exercise)
3) Ongoing exercise is necessary
4) Group exercise or individual ex session
5) Brisk walking should be avoided in high risk individuals

Review: Developing an Exercise Program should be based upon each unique individual’s evaluation findings including:

- Range of Motion
- Strength
- Endurance
- Balance
- Gait
- Confidence
- Time (practice/volume)
- Compliance
  - Functional Demands
  - Terrain/surface
  - Shoe wear
  - Comfort (safety)
  - Reaction Ability
  - Psychological
  - Stage of Learning
  - Supervision needs
    - (in and out of clinic)

“Hawthorne Effect” on Outcomes of Fall Prevention Interventions

- Individuals will modify their behavior in response to their awareness of being observed. Hawthorne Works Co. in Illinois increased worker productivity by changing the lights, working hours (shortened the day by ½ hour) and providing break times in response to employees interest and they were monitored for productivity.
  - 1958 by Henry Landsberger.
  - Employees felt that “interest was shown on them”.

Pre and Post Testing is very important. Important to let the participants know that they are being watched and there is interest shown on them.
Multi-factorial intervention vs Single Intervention

- Multifactorial fall prevention interventions are effective for individual patients. However, for community programmes for populations at risk, targeted single interventions are as effective as multifactorial interventions, may be more acceptable and cost effective.

Campbell & Robertson  Age and Aging 2007

The *Four C’s* to Success in Rehabilitation

1) Communication

2) Comfort

3) *Confidence*

4) COMPLIANCE

(Paul Canavan, Rehabilitation in Medicine: a comprehensive guide 1998)

Review

1) Statement and Scope of the Problem

2) Describe what are common “normal” interventions to help decrease Falls in the Older Person

3) Evidence and Experience/outcome based “beyond the norm” interventions to help prevent Falls