Efficacy in Falls Prevention Programs for the Elderly

Eficácia de programa de prevenção de quedas em idosos

Efectividad del programa de prevención de caídas en ancianos

*Carlos Kazuo Taguchi**
*Thassya Fernanda Oliveira Santos**
*Rafael Santos Nascimento**
*Allan Robert Silva**
*Oscar Felipe Falcão Raposo**
*Jacqueline Pitanga Teixeira**

Abstract

Introduction: The aging of systems involved in body balance can cause fall episodes and worsen life quality in the elderly. **Objective:** To verify the efficacy of a fall prevention program in socially active elderly. Method: 60 elderly were submitted to a Performance Oriented Mobility Assessment and to the Falls Efficacy Scale International FES I-Brasil that evaluate, respectively, the tendency and the fear of falling. Those with altered scores participated in an intervention program during eight consecutive weeks and were reevaluated. **Results:** In the oriented balance evaluation, 70.0% of the elderly presented moderate risk, 5.0% high risk and 25.0% for low fall risk, resulting in a significant relationship to age. At the end of the program it was confirmed the relationship between initial outcomes and final tests, noticing there was a total reduction of high risk and an increase of low risk to 68.0%. The reduction of falling fear was confirmed in view of the significant relationship between the initial fall fears and the reevaluation. **Conclusion:** The proposal was effective once the falling fears diminished, improving, consequently, body balance with those who volunteered in the research. It even promoted the reduction of future falling concerns, especially with older seniors.

Keywords: Elderly; Postural Balance; Questionnaires; Accidental Falls.

Resumo

Introdução:O envelhecimento dos sistemas envolvidos no equilíbrio corporal pode causar eventos de quedas e piorar a qualidade de vida de idosos. Objetivo: verificar a eficácia de um programa de prevenção a quedas em idosos socialmente ativos. Método: 60 idosos foram submetidos à Avaliação da

*Universidade Federal de Sergipe – UFS – Aracaju-SE – Brazil

Authors' contributions: *CKT Conception, organization and critical revision of the article. TFOS Organization and execution of the study and critical revision of the article. RSN Organization and execution of the study and critical revision of the article. ARS Design and execution of the statistical analysis. OFFR Design and execution of the statistical analysis. JPT Critical revision and translation of the article*

Correspondence address: *Carlos Kazuo Taguchi - carlostaguchi@hotmail.com*

Received: *24/09/2015* ***Accepted:*** *30/05/2016*

Mobilidade Orientada pelo Desempenho (Performance Oriented Mobility Assessment – POMA) e à Escala de eficácia de quedas – Internacional – Brasil (Falls Efficacy Scale International – FES I-Brasil)l que avaliam, respectivamente, a tendência e o medo de quedas. Aqueles com escores alterados participaram de um programa de intervenção durante oito semanas consecutivas e foram reavaliados. Resultados: Na avaliação do equilíbrio orientado, 70,0% dos idosos apresentaram risco moderado, 5,0 % risco alto e 25,0% risco baixo para queda, ocorrendo associação siginificante e inversamente proporcional com a idade. No término do programa, verificou-se associação entre os resultados iniciais e finais nos testes, visto que ocorreu a redução total do risco alto e elevação do risco baixo para 68,0%. Verificou-se a diminuição com a preocupação com quedas frente à associação significante entre o medo de quedas inicial e a reavaliação. Conclusão: A proposta se mostrou eficaz uma vez que diminuiu o risco de quedas melhorando, consequentemente, o equilíbrio corporal dos voluntários da pesquisa. Promoveu, ainda, a redução com a preocupação de futuras quedas, principalmente nos idosos mais longevos.

Palavras-chave: Idoso; Equilíbrio Postural; Questionários; Acidentes por Quedas.

da saúde.

Resumen

Introducción: El envejecimiento de los sistemas involucrados en el equilibrio del cuerpo, puede provocar episodios de caídas y empeorar la calidad de vida en los ancianos. Objetivo: Verificar la eficacia de un programa de prevención de caídas en ancianos socialmente activos. Métodos: 60 ancianos fueron sometidos a la Evaluación del Desempeño de la Mobilidad y la Eficacia de Caidas en la Escala Internacional. (Performance Oriented Mobility Assessment e Falls Efficacy Scale International), para evaluar, respectivamente, la tendencia y el miedo a caerse. Aquellas personas con puntuación alterada participaron en un programa de intervención durante ocho semanas consecutivas y fueron reevaluados. Resultados: En la evaluación del equilibrio orientado, el 70,0% de los sujetos presentaron riesgo moderado de caerse, 5,0% alto y de un bajo riesgo de 25,0%. En los extremos del programa, hubo una relación entre los resultados de las pruebas iniciales y finales, así como la reducción total de alto riesgo y un bajo riesgo que alcanzó 68,0%. Se confirmó una disminución del miedo de caerse frente a la relación significativa entre el miedo inicial y la revaluación. Conclusión: La propuesta mostró ser eficaz una vez que disminuyó el riesgo de caídas, mejorando, consecuentemente, el equilibrio corporal de los voluntarios en la investigación.También promovió la reducción con la preocupación de futuras caída, sobre todo en los más ancianos.

Palabras clave: Anciano; Equilibrio Postural; Cuestionarios; Accidente por Caídas.

Introduction

Aging is a benign biological process, followed by a decline in capacity and biological reserves, increasing the susceptibility to organic and functional alterations, among which stand out the diminishing of body balance, one of the main factors responsible for falling at this stage in life[1,2].

With aging, sensory systems, essential in the process of keeping body balance, suffer physiological, peripheral and central important alterations that affect the functional capacity, predisposing the elderly to body unbalance and falls [3,4].

A fall can be defined as the unintentional dislocation of the body to a lower plane, with inability to correct within available time to the initial position, determined by multifactor circumstances that affect stability[5].

Falls are a global public health problem, being the second main cause of death by accidental or unintentional lesions[6]. Approximately 30% of people with age above 65 years old fall per year, and for those above 75 years, the rates are higher[7]. In Brazil, fall frequency reaches the same mentioned level and is responsible for 24% of deaths. For those older than 80 the percentage of falls during these years can reach 40.0%[8]. It is worth noting a prevalence of torture complaining, an intrinsic factor in falls, that can reach 90.0% in out of hospital patient clinics and approximately 40% of them have vestibular origin[9].

The search for preventive strategies to maintain the body balance, especially those related to collective practices and that do not prioritize solely one risk factor, are the most efficient, once the fear of falling increases the risk for their occurrences[10].

Preventive measures intended to educate the elderly population about the risk of falls and how to avoid them must be introduced, taking into consideration that 60% of falls occur at home during daily activities[11]. It is worth noting that although some risky fall factors are intrinsic, such as muscular strength reduction and the diminishing of body balance, others are extrinsic and can easily be eliminated or reduced, for instance inadequate lighting and slippery or irregular floors[12].

Considering the possibility of professional help in relation to health for the elderly, especially that which refers to early diagnostic of a tendency to future falls and the possibility of prevention and intervention, the objective of this study is to verify the efficacy of a fall preventive program in social active elderlies.

Methods

This is a cross section study, quantitative and qualitative at the Athletic Association in the city of Itabaiana - State of Sergipe that evaluated 60 volunteers coming from the County Family Health Assistance Nucleolus.

This research protocol was approved by the Ethics and Research Committee at the institution, identified as Number 6231.000.107 and all of the volunteers signed the agreement/release form by their own will and of clear mind.

Through an initial interview, the following were excluded: volunteers with less than 60 years of age, also those that used psychotropic drugs, those that acknowledge degenerative neurological illnesses, those with previous dementia diagnosis, those using wheelchairs, those who used helping equipment to move, and from those with difficulty in verbal or written comprehension and that did not show a 50.0% frequency in the developed intervention activities.

Initially, participants were submitted to a brief anamnesis in which a self-report about stunted fall incidents were considered. Immediately the Performance Oriented Mobility Assessment (POMA) adapted to Brazilian Portuguese[13] was done (POMA-Brasil). This test reproduces the alterations that changes in body position caused in the vestibular system during the performance of daily activities. According to the scores obtained, the individuals were classified as low fall risk (above 35 points), moderate fall risk (less or equal to 35 points) and high fall risk (less or equal to 29 points).

Volunteers were submitted, in addition, to the Falls Efficacy Scale International (FES-I) [14,15] validated and adapted by Camargo et al. (2010) [16] and named FES-I- Brasil. This instrument is centered on the evaluation of the self-perceived degree of efficacy to avoid a fall during basic daily life activities (AVD's). A FES-I-Brasil presents issues and concerns with the possibility of falling when performing 16 activities[16], with varied scores from 1 to 4 and a score of ≤23 points for FES-I-Brasil revealing fewer concerns with falling.

After this initial evaluation, volunteers were classified according to the patterns of each inventory for statistical analysis and everyone was invited to participate in the fall preventive proposal followed by the intervention. The studied proposal was divided in two stages:

A) Primary attention with the waiting room dynamics which was developed through lectures, pamphlets and videos, 30 minutes duration covering subjects related to health, fragility and falls for those in the senescence.

B) Intervention: It was carried out by two graduates in audiology and the physical educator. It was done during 30 minutes based on the Cawthorne e Cooksey exercises[17], a classic protocol of Vestibular Rehabilitation that deals with head movements, neck and eyes, postural controlling exercises in sitting and standing position.

The intervention program, once a week, lasted eight meetings, subject to the availability of physical space and displacement of the researches. The intervention activity was done carefully during 40 minutes, in order to avoid physical risks for the participants. At the end of all the meetings, those who obtained 50.0% frequency in the two stages were again submitted to the initial tests (POMA-Brasil and FES-I-Brasil) to analyze the changes between the initial and final performance for risk and fear of falling.

For statistical analysis, the initial and final scores of inventories were considered dependable variables POMA-Brasil e FES-I-Brasil, and gender, age and fall incidents as undependable variable. The Software R Project: 3.12 was used as well as the summary measurements, simple percentage distribution, Test of Tukey, Pearson Association, ANOVA Test and Wilcoxon Test. A significance value P≤0.05 was adopted and highlighted with an asterisk (*).

Results

Two of the 60 volunteers that participated in the research, 95.0% (n=57), were females with an average age of 76.6 and 5.0% (n=3) males with an average age of 67.3.

In the POMA-Brasil test done at the stage before the intervention, three subjects (5.0%) presented high fall risk, 42 (70.0%) moderate risk and 15 (25.0%) low fall risk (table 1)

Table 1. Percentage and absolute distribution of the results of 60 volunteers in the performance oriented mobility assessment at the pre-intervention

RISK		n	Valid Percentual
	High risk	3	5,0
	Moderate risk	42	70,0
	Low risk	15	25,0
	Total	60	100,0

In the initial stage the Pearson Association Test showed a negative and significant statistically relationship between the age and the scores of participants in the POMA-Brasil, in other words, the subjects that showed lower scores in the test showed a higher average age. It was possible to verify, also, a negative and significant relationship between the numbers of falls related to the scores, therefore, the higher the number of falls told by the elderly the lower the performance of participants in this evaluation as presented in table 2.

Table 2. Correlation between age, number of falls and performance oriented performance mobility assessment (POMA-Brasil) at pre-intervention

		TOTAL	PREVALENCE of FALLS	AGE
TOTAL	Correlation	1	-0,257	-0,461
	P value		0,047*	0,000
	n	60	60	60
PREVALENCE of FALLS	Correlation	-0,257	1	0,084
	P value	0,047*		0,526
	n	60	60	60
AGE	Correlation	-0,461	0,084	1
	P value	0,000	0,526	
	n	60	60	60

*Spearman correlation

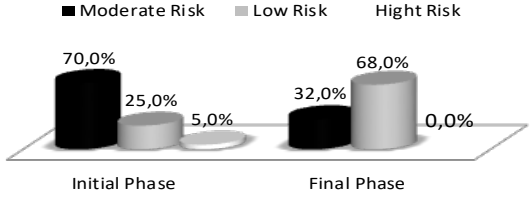
During this same stage, the evaluation for fear of falling was done through the use of FES-I-Brasil. Therefore, in the initial stage, 15.0% of volunteers showed less concern and 85.0% more concern with falling risk (fear). After the intervention, 16.0% showed less concern and 84.0% more concern. (Table 3)

Table 3. Percentage and absolute distribution of the results of 60 volunteers on falls efficacy scale international (FES-I-Brasil in the pre and post-intervention)

CONCERN BEFORE	n	VALID PERCENTUAL	CONCERN AFTER	n	VALID PERCENTUAL
LESS	9	15,0%%	LESS	4	16,0%
BIGGER	51	85,0%%	BIGGER	21	84,0%
Total	60	100%	Total	25	

After the intervention stage the volunteers considered to be eligible, those with assiduity equal or superior to 50.0% in the eight sessions of intervention, were gathered for the POMA-Brasil and FES-I-Brasil. This way, the data of the 25 volunteers was used to analyze the intervention stage. Ninety six per cent (n=24) were females with average age of 66.5 and 4.0% (n=1) males with age 83.0.

After the activities proposed by the intervention program, the moderate risk of falls (70.0%) decreased to 32.0% and the low risk of falls (25.0%) increased to 68.0%. It is worth noting that after the intervention none of the volunteers (0.0%) showed high risk for falls, as illustrated in figure 1.



Legend:POMA = Performance Oriented Mobility Assesment

Figure 1. Percentage distribution of 25 volunteers in the performance oriented mobility assessment (POMA--Brasil) at the initial and final phase of intervention

The analysis of Wilcoxon test showed a significant statistical correlation between the evaluation and the reevaluation of the functional equilibrium (POMA) (p value=0.013). It was not possible to observe the same correlation between the evaluation and the reevaluation of the fear of falling (FES-I-Brasil) (p value= 0.438), meanwhile a migration of subjects appeared from the reoccurring zone to the undefined zone. (Table 4)

Table 4. Association between the results before and after the intervention phase to the falls efficacy scale international tests (FES-I- Brasil) and performance oriented mobility assessment performance (POMA-Brasil)

	FES-I PRE – FES POST INTERVENTION	POMA PRE – POMA POST INTERVENTION
Z	-0,775	-2,496
p-value	0,438	0,013*

*Wilcoxon Test Legend:POMA = Performance Oriented Mobility Assessment FES = Falls Efficacy Scale International

The Wilcoxon test also exhibited that the fear of fall, evaluated before the proposed activity, presented a significant relationship with the reevaluation of the equilibrium after the intervention, in other words, the fear of falling before interfered exactly with the promotional and preventive activity, in the results of the POMA-Brasil test during the stage that the activities took place. (Table 5)

Table 5. The results of the Association between oriented mobility performance assessment (POMA-Brasil) in the final phase of intervention (post) and falls efficacy scale international (FES-I- Brasil) (pre) in the previous phase

	POMA POST-INTERVENTION X FES PRE-INTERVENTION
p value	0,000*

*Wilcoxon test Legend:POMA = Performance Oriented Mobility Assesment FES = Falls Efficacy Scale International

Discussion

The initial results collected from POMA-Brasil with high scores showed imbalance in several individuals. This data agree with the study[18] that referred imbalance in older people had multifactorial underlying base associated with advanced aged and female gender. A similar study presented the same association with the frequency of related falls and lower scores[19].

It was found moderate risk of falls (70.0%) in this sample. About 50.0% of the subjects had reported one fall event last year (average 1,4 falls) which was lower than other studies [7,8] that referred about 30.0%.

The statistical analysis of FES-I-Brasil showed a significant relationship with the previous related falls and aged which disagreed with another study[20].

No relationship was found between fear for falls and fall incidents. A study pointed that fear of falls could be present even in older people who related these falls[21].

The dynamics in waiting room aiding health promotion and prevention of falls were approved by all volunteers. The use of low cost actions based on visual resources and comprehensive language changed behavior in the fear of risks falls. Management of reduction of falling fear includes the development of actions appropriate for elderly, especially for prevention issues[22].

It was verified the decline of postural imbalance, improved by the sequential Cawthorne and Cooksey exercises and this agrees with other studies. The Cawthorne and Cooksey protocol provides renew arrangements of peripheral sensory organ and vestibular pathway stimulation in order to reduce falls risks [22, 23].

On final evaluation it was observed that moderate risk decreased to 32.0%, the low risk level increased to 68.0% and no subject scored points on high risk for falls. On the other hand, a study[24] showed that individuals in the high falling risk do not relate benefits by multifactorial intervention. The reduction of subjects in the high falling risk level agrees with another research[25].

The reduction in future falls demonstrated a positive change in postural control that agrees with another study[26]. The introduction of exercises aiming to decrease the risk factors for falling improves muscle strength and body balance control according to a previous study[27], which reported the effectiveness of intervention programs to reduce falls in older people with or without related risk factors.

Considering the positive results from data analysis, it shows that the fear for falls did not change, which disagrees with another study[28]

A relationship was found concerning the results of fear for falling (FES-I-Brasil) between the pre-intervention stage and the oriented balance evaluation (POMA-Brasil) after the program. It was well recognized the direct relationship between fear for falling and prevalence to future risk of falling. It was impossible to notice the reduction of fear for falling but the risk decrease was found. This data demonstrated the possibility to decrease concerns for a future fall and that development of educational programs could improve the conditions for the risk of falling.[29]

It was verified that the attendance to activities was irregular, which means that less than 50.0% of the sample followed all promotion and intervention activities for statistical purposes including in this study. But, it was noticed that more than 60 subjects were present at each meeting but had not achieved the frequency attendance in all activities. The study has shown that the participation in programs to prevent falls reached at least about one third of the total sample[30]. The results of this study indicated that intervention programs need the cooperation and participation of the majority of subjects in preventing falls or rehabilitating programs[17,23].

There are few studies in Speech Therapy and Audiology field concerning fall issues that are well

known and recognized as multidisciplinary phenomenon. This fact limits the discussion of falling among elderly from this particular perspective, which demands incentives for new research and development of interventional proposals. Despite the limitations presented in this study, it is necessary to highlight that it agrees with education programs, prevention and collective interventions [26].

Conclusion

The proposal was effective once the falling fears diminished, improving, consequently, body balance with those who volunteered in the research. It even promoted the reduction of future falling concerns, especially with older seniors.

References

1. Macedo BG, Pereira LSM, Rocaha FL, Castro ANBV. Association between funcional vision, balance and fear of falling in older adults with cataracts. Rev Bras Geriatr Gerontol. 2012; 15 (2): 265-74.

2. Mirallas NDR, Conti MHS, Vitta A, Laurenti R, Saes SO. Avaliação e reabilitação vestibular no individuo idosos. Rev Bras Geriatr Gerontol. 2011; 14: 687-98.

3. Chandler JM. Equilíbrio e Quedas no Idoso: Questões sobre a Avaliação e o Tratamento. In: Guccione AA. Fisioterapia Geriátrica. Rio de Janeiro: Editora Guanabara Koogan; 2002. p. 265-77.

4. Ricci NA, Gazzola JM, Coimbra IB. Sistemas sensoriais no equilíbrio corporal de idosos. Arq Bras Ciên Saúde. 2009;34(2):94-100.

5. Studenski, S. Quedas in Duthie EH, Katz PR . Geriatria prática. 3ª ed. Rio de Janeiro: Revinter;2002, capítulo 23, p:45-60.

6. Organização Mundial da Saúde 2010 [Internet]. Ageing. [Acesso em 05 Ago 2012] Disponível em: http://www.who.int/topics/ageing/en/.

7. Buksman S, Vilela ALS, Pereira SRM, Lino VS, Santos VH. Quedas em idosos: Prevenção. Projeto diretrizes. Brasília: Associação Médica Brasileira, Conselho Federal de Medicina e Sociedade Brasileira de Geriatria e Gerontologia; 2008.

8. Fukuda Y. Disturbio Vestibular no Idoso In: Ganança MM, Vieira RM, Caovilla HH. Principios de Otoneurologia. São Paulo, Editora Atheneu, 1998.p:68-75.

9. Whitney SL. Tratamento do Idoso com Disfunção Vestibular. In: Herdman SJ. Reabilitação Vestibular. Barueri; Editora Manole,;2002.p.512-3.

10. Todd C, Skelton D. What are the main risk factors for falls among older people and what are the most effective interventions to prevent these falls? Copenhagen: WHO Regional Office for Europe Health Evidence Network report, 2004. Disponível em www.euro.who.int/document/E82552.pdf

11. Gillespie LD, Gillespie WJ, Robertson MC, Lamb SE, Cummign RG, Rowe BH. Intervenciones para laprevención de caídas enlas personas ancianas. Biblioteca Cochrane Plus España. 2008;3.

12. Perracini RM. Prevenção e manejo de quedas no idoso. In: Ramos LR, Toniolo Neto J. Geriatria e gerontologia. Guias de medicina ambulatorial e hospitalar/Unifesp-Escola Paulista de Medicina. São Paulo: Editora Manole; 2005.

13. Gomes GC. Tradução, adaptação transcultural e exame das propriedades de medida da escala "Performanced-Oriented Mobility Assessment" (POMA) para uma amostra de idosos brasileiros institucionalizados. [Dissertação]. Unicamp; 2003.

14. Yardley L, Beyer N, Hauer K, Kempen G, Piot-Ziegler C, Todd C. Development and initial validation of the falls efficacy scale-international (FES-I). Age Ageing. 2005;34(6):614-9.

15. Delbaere,KClose,JCT, Mikolaizak, AS, Sachdey PS, Brodaty H, Lord SR. The Falls Efficacy Scale International (FES-I).A comprehensive longitudinal validation study. Age Ageing. 2010;39(2):210-216

16. Camargo FFO, Dias RC, Dias JMD, Freire MTF. Adaptação transcultural e avaliação das propriedades psicométricas da Falls Efficacy

Scale – International em idosos brasileiros (FES-I-BRASIL). Braz J Phys Ther. 2010;14(3): 237-43.

17. Ribeiro ASB, Pereira JS. Melhora do equilíbrio e redução da possibilidade de queda em idosas após os exercícios de Cawthorne e Cooksey. Braz J Otorhinolaryngol. 2005; 71(1): 38-46.

18. Lojudice DC, Laprega MR, Gardezani PM, Vidal P. Equilíbrio e marcha de idosos residentes em instituições asilares do município de Catanduva, SP. Rev Bras Geriatr Gerontol. 2008;11(2):ISSN 1809-9823.

19. Gai J, Gomes L, Nóbrega OT, Rodrigues MP. Fatores associados a quedas em mulheres idosas residentes na comunidade. Rev Assoc Med Bras. 2010; 56(3):327-32.

20. Friedman SM, Munoz B, West SK, Rubin GS, Fried LP. Falls and fear of falling: Which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. J Am Geriatr Soc, 2002;50(8):1329-35.

21. Batista JS, Pasqualotti A, Marchi ACB, Wibelinger LM. A reabilitação vestibular e o envelhecimento humano. Rev Bras Ciên Saúde. 2011;9(27):57-63.

22. Siqueira FV, Facchini LA, Piccini RX, Tomasi E, Thumé E, Silveira DS et al. Prevalência de quedas em idosos e fatores associados. Rev Saude Publ. 2007; 41(5):749-56.

23. Santos AC, Ferreira CP, Silva KC, Araújo VV, Lima F. Exercícios de Cawthorne e Cooksey em idosas: melhora e equilíbrio. Fisioter Mov. 2008;21(4):129-36.

24. Mantello EB, Moriguti JC, Rodrigues-Júnior AL, Ferrioli E. Efeito da reabilitação vestibular sobre a qualidade de vida de idosos labirintopatas. Braz J Otorhinolaryngol. 2008;74(2):172-80.

25. Vries OJ, Peeters GM, Elders PJ, Muller M, Knol DL, Danner SA et al. Multifactorial Intervention to Reduce Falls in Older People at High Risk of Recurrent Falls. Arch Intern Med. 2010; 170(13):1110-1.

26. Blank WA, Freiberger E, Siegrist M, Landendoerfer P, Linde K, Schuster T. et al. An interdisciplinary intervention to prevent falls in community-dwelling elderly persons: protocol of a cluster-randomized trial [PreFalls]. BMC Geriatr. 2011;11(7):1471-2318.

27. Haastregt JCM, Zijlstra GA, Rossum E, Eijk JT, Witte LP, Kempem GIJM. Feasibility of a cognitive behavioural group intervention to reduce fear of falling and associated avoidance of activity in community-living older people: a process evaluation. BMC Health Serv Res. 2007;7(156):1-9.

28. Halvarsson A, Olsson E, Farén E, Pettersson A, Stahle A. Effects of new, individually adjusted, progressive balance group training for elderly people with fear of falling and tend to fall: a randomized controlled trial. Clin Rehabil. 2011;25(11):1021-31.

29. Haralambous B, Haines TP, Hill K, Moore K, Nitz J, Robinson A. A protocol for an individualized, facilitated and sustainable approach to implementing current evidence in preventing falls in residential aged care facilities. BMC Geriatr. 2010;10(8):1471 – 2318.

30. Nyman SR, Victor CR. Older people's, sustained participation, and adherence to falls prevention interventions in institutional settings: a supplement to the Cochrane systematic review. Age Ageing. 2011; 40:430-6.