

A Preventive Approach to Elderly People Health Problems

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Abstract

Background: To deal with health problems, there is a practical approach, based on “prevention” perspective. This approach, consist of 5 different types of prevention including primordial, primary, secondary, tertiary and quaternary prevention levels. It seems that, using this approach is a proper way to manage the elderly health problems.

Aim: In this study, we are going to introduce an action plan based on “prevention levels” for dealing with elderly problems.

Methods: To obtain information associated to prevention of elderly problems, we have carried out a two stages qualitative study using 26 projects from 52 medical interns (first step) and documentation of them (second step) with reliable scientific resources.

Results: For prevention of elderly problems, a comprehensive evidence based instruction, consist of 85 proposed measurable and operational preventive activities was developed.

Conclusion: We concluded that, to dealing with elderly problems, use of the proposed action plan may be useful.

Keywords: Elderly problems; Prevention; Prevention levels; Elderly co-morbidities

Introduction

Today's population is aging. Usually elderly patients are diagnosed with co-morbid conditions and poly-pharmacy may be a significant outcome in this situation [1]. There are many changes in elderly people body organs that are either physiologic or pathologic. Some of these changes are as follows:

Nervous system changes

Reducing the brain activities– decrease nervous tissues volume–reducing of motor control due to cortical atrophy, reduced cortical excitability and reduced cortical plasticity [2].

Receptors changes

Decreasing the number of serotonin (circulating serotonin has a role in regulating bone mass in humans) [3], acetylcholine (production of serum anti acetylcholine antibodies) [4] and dopamine receptors [5]. As well as, reducing of baroreceptors sensitivity, increasing glucocorticoid receptors and decreasing the mineralocorticoid receptors [6].

Cardiovascular changes

Vessels stricture due to atherosclerosis, rising the arterial blood pressure [7] etc.

Respiratory system changes

Reducing elasticity of the bronchi, decreasing strength of the respiratory muscles, diameter of distal bronchioles reduces and tend to be collapsed, and ineffectiveness of coughing [8] etc.

Stomach and intestines changes

Weakening of swallow, decreasing of stomach acidity, decreasing of gastrointestinal blood flow, decreasing of intestinal movements, and rectal sensory-motor dysfunction [9].

Liver changes

Shrinkage of liver volume, decreasing of liver blood flow, reducing of liver enzymatic activity, reducing of liver oxidation reaction, and reducing of liver metabolism [10,11].

Kidney changes

Reducing the size and volume of the kidneys, diminishing the nephrons, and reducing the kidney blood flow and water, electrolytes and minerals changes [11].

Musculoskeletal system changes

Reducing of muscle mass and muscle atrophy, decreasing bone density, raising the collagen levels and increasing body mass which leads to sarcopenia [12]. Changes of water, electrolytes and minerals which leads to dehydration, hyponatremia (the most common electrolyte disorder in old patients) [13], reducing plasma proteins, decrease of serum albumin concentration [14], decreasing of minerals, and declining of serum ferritin concentrations [15].

Hormonal changes

Decreasing of thyroxin production, ADH, aldosterone and testosterone [16,17] and changes of immunity system including weakening of T cells function which causes loss of immunity [18].

Given the above changes, elderly people are at increased risk of serious health problems [19], which some of these problems are as follows: Cognitive decline, dementia, and Alzheimer (co-morbid factors, such as delirium, depression and poly-pharmacy can contribute to declining of cognition) [20], Parkinsonism [21] etc.

Reduced visual acuity [22], hearing loss [23], oral problems [24], atherosclerosis, hypertension [7], diabetes [25], chronic bronchitis,

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COPD and emphysema [26], cardiac diseases, iron deficiency anemia [15], osteoporosis, importance [17], incontinence, constipation [9], fatty liver [11] and cancers [27,28]. Suffering from multiple chronic diseases and co-morbid conditions [29]. Over-weight and sarcopenic obesity due to malnutrition and physical inactivity [30].

Fall and associated damages

The older people are high risk for falling [31]. Falling risk factors are also as follows:

Intrinsic factors: Muscle weakness, frequent muscle spasms, sarcopenia [32], movements imbalance, dropping reactive power, sleep disturbances, iron deficiency which increased susceptibility to falling and depression [15,31,32].

Extrinsic factors: Home hazards, misuse of assistive devices, inappropriate footwear, poly pharmacy, drug-induced orthostatic hypotension and use of seductive and hypnotic drugs [1,17,29,32].

Behavioral factors: Physical inactivity, hurrying, fear of falling [31,32].

Symptoms: Gait and mobility problems, vertigo, use of assisting devices, history of falling [31,32].

Psychological problems: Aloneness which may cause depression (loneliness included a subjective mood, with empty feeling, depression, and perception of the spirit isolated from the others [33], anxiety, sleep disorder (insomnia, hypersomnia or day time sleepiness, sleep-related to breathing disorders and movement disorders during sleep) [34], cognitive impairment and dementia, psychological disorders, usually after stroke are common.

Socioeconomic problems: Inappropriate life style: lack of mobility, decrease in social activities, inappropriate nutrition (low consumption of fruits, vegetables and dairy products etc.), smoking, use of alcohol and drugs, retirement, unemployment, financial problems [35] and homelessness. Elderly people homelessness leads to many problems. The homeless older people living problems are: financial insecurity (Financial dependency), police suppression, deprivation of social rights, lack of medical services, attacks from the young generations, exposing to risk of elderly abuse, stealing, etc. [35]. In addition, usually they have hearing problems, peptic ulcer before becoming homeless, musculoskeletal problems, injuries, skin diseases, depression etc.

In this study, to address above issues, we propose the use of comprehensive preventive approach. This approach includes all preventive interventions in 5 known (primordial, primary, secondary, tertiary, quaternary) preventive domains and prevention of malpractices [36].

Materials and Methods

This is a two stages qualitative study. In the first stage, we prepared 26 projects to deal with elderly problems. In this step, the following actions were taken: 1) Developing a general template for approach to health problems from the perspective of prevention. 2) Teaching and justifying how to use the template for 52 medical interns participated in the study. 3) Practicing the use of the template for a selective health problem in an educational session. 4) Determining of elderly problem issue and asking from 52 medical interns to present, all the possible solutions in the form of a project. 5) Participated interns in 26 paired groups (in a binary form) presented their ideas in 26 projects.

In the second stage, a qualitative compilation was carried out. In this stage, the data were exactly studied listed, refined, categorized,

assorted, documented with valid literatures published in USA National Library of Medicine (PubMed) and finalized.

Results

Results were categorized in 5 prevention levels (20 primordial activities, 32 primary activities, 20 secondary activities, 6 tertiary activities, 4 quaternary activities, and 3 malpractice preventive activities) as follows:

Primordial prevention domain

These activities are usually special for community administrators. We listed these strategic actions and their proposed executive responsible in Table 1.

Primary prevention domain

Primary prevention measures are those activities to prevent occurrence a disease or disorder. These are usually special for the elderly themselves, their family or care providers.

Elderly themselves related activities: Balance the movements by walking, especially walking in water. Use of Assistive Technology Devices (ATDs). These devices may be divided into five categories, including elimination of environmental barriers (home modification), daily living aids, seating and positioning devices, mobility aids, and sensory aids [37]. Some ATDs are: cane, walker, wheelchair, special toilet, comfortable shoes, anti-slip socks, special seats and the other assistive and protective devices.

Modifying dietary regimen by use of vegetables, fruits, low fat, low salt and low sugar diets and protein intake 0.8 g/kg body weight daily [38].

Self-health monitoring and self-care: Home blood pressure monitoring (HBPM) is one critical activity for elderly people [7]. As well as, blood glucose self-monitoring [39], body weight monitoring, smoking and alcohol consumption self-control etc. are the other examples in this action. Exposure to the sunshine, enough water consumption in the day, improving of sleep and resting patterns, annual eye examination, avoid legs wounding, take mental status by activities such as solving crosswords, etc.

Family and care provider's activities: Some of these activities are: seniors accommodation in lower stairs of the buildings, provide adequate light at home, attention to non-slipping floors and carpets, installing the appropriate handgrips in appropriate places, put the phone near the senior seat and bed, check the blood pressure and blood sugar (glucometry) and monitoring drug use, providing vaccines for them like: Annual flu, hepatitis B, varicella-zoster virus, diphtheria, tetanus each 10 years one complementary dose, and pneumococcal vaccine every 5 years [40], and providing calcium, vitamin D [41], bisphosphonate and aspirin if administered by physician, and elderly education with emphasis on the above topics etc.

Secondary prevention domain

Secondary prevention activities contain timely diagnosis and timely treatment of diseases and prevention of occurrence the complications at individual level. These activities usually are special for physicians or and medical care providers and are including:

Early diagnosis: Obtain medical history with emphasis on, demographic information, co-morbid conditions, drugs information, sleep status, mental status, and safety of the place of residence.

Perform physical examination, including examination of the body

Category	Strategic actions	Proposed responsible/s*
Cultural and educational measures	Conduct promotional and cultural characteristics in society (e.g. promotion of elderly reverence, encourage the benefactors, helpful advertising, book reading habits, encourage of childbearing in appropriate economic conditions etc.).	Cultural organizations
	Reinforcement of public educations in the fields of: risk factors, elderly needs, falling, home safety, appropriate nutrition, self- monitoring and self-care, comorbidity, poly pharmacy, etc.	Mass media
	Training required forces to serve the elderly people such as: geriatric medicine specialists, trained nurses, gerontologists, case managers etc.	Ministry of health, etc.
Socio legal	Supporting the elderly population and monitoring their rights in society	Legislators
Related measures	Strengthening the elderly related NGOs	Ministry of the interior
	Support for retirees, including employing retired people in their previous work or in easier jobs and improvement of retirement facilities.	Different governmental organizations
	Employing the elderly people who have scientific, technical, industrial, literary or artistic backgrounds in advisory positions.	Engineering organization
	Revision of architectural regulations and adapting those to the elderly's life.	
	Providing a special service for seniors in community.	
Welfare and well-being related affairs	Establishing the homes for aged people and monitoring their services.	Welfare organization
	Providing social insurance for the elderly.	Insurance organizations
	Establishing elderly clubs	Welfare organization
	Exportation of facility card for the seniors over 65 years old (welfare organization).	Welfare organization
	Equipping parks and senior homes with appropriate sporting devices.	Municipality
Healthcare related measures	Inclusion of free services for elderly people in the health system	Ministry of health
	Establish the Social Network Analysis (SNA) for examination of large patient data sets to identify poly-pharmacy complications	Organization of cereals, Ministry of health
	Enrichment of foods with calcium and vitamin D	Ministry of health
	Distribution of free supplements in health centers Management of elderly screening programs	Ministry of health

*Note: The main responsible for managing of social and environmental activities is different in each country.

Table 1: Strategic actions for elderly support in community and proposed responsible in primordial domain.

systems with emphasis on eyes, ears, oral cavity, heart, blood pressure, lung, muscle and joints, nerves, fluency, etc. Request laboratory tests such as: CBC diff. Fasting blood sugar and two hours after meal, hemoglobin A1C, lipid profiles, liver and kidney function tests urine analysis and urine culture, etc.

Performing necessary imaging measures such as echography, angiography, bone densitometry, etc. Perform procedural activities such as colonoscopy, Pap smear etc.

Screening of elderly population in community such as measure the blood pressure, assessment of musculoskeletal, colorectal cancer screening, stool examination for occult blood, immune fecal occult blood test (iFOBT), Methylated Septin-9 (MS-9) DNA blood test [42] breast, cervix, prostate, and memory problems.

Early treatment: Early treatment is required or given in the following ways:

Pharmaceutical treatment of co-morbid conditions: Hypertension (administration of Thiazides-Beta Blockers-etc.) Diabetes (insulin if needed, metformin, Thiazolidinedione etc.). Hyperlipidemia (statins, nicotinic acids, fibrates etc.) Cardiovascular diseases (nitrates, digoxin etc.). Osteoporosis and osteomalacia (Calcium, Vitamin D, Bisphosphonate etc.). Arthritis and osteoarthritis (anti inflamaturies), anemia (folic acid - Vitamin B etc). Dementia and Alzheimer's disease (rivastigmine, galantamine, memantine). Anxiety (anti-anxiety drugs). Depression (antidepressants). Prescribing supplements (vitamins B, E and D, calcium, omega 3 etc.). Administration of Short Physical Performance Battery (SPPB) for estimate the mobility [43].

Non-pharmacological treatments: Exercise (Sarcopenia leads to decrease of muscle strength, and because of that, impaired mobility will be happened, and consequently, the risk of falling and eventually increased risk of mortality will rises. A part of the underlying mechanisms for these events is physical inactivity. Therefore, encourage the patient to physical activity can leads to reverse or modify this condition) [44].

Quit smoking and alcohol and rehabilitation treatments such as use of assistance services.

Applying doubly labeled water (DLW) method (this method is preferred for determining energy requirements of populations. It has been applied to determine energy expenditure and physical activity in weight control. This water is made by Oxygen-18 (18O) that is a natural and environmental isotope of oxygen. There have been characterized 3 stable isotopes and 14 radioisotopes for oxygen. DLW is useful for measuring average of metabolic rate. There is lack of international consensus for DLW use [45].

Use of Short Physical Performance Battery (SPPB) for estimate the mobility of the elderly people [43] and use of remote monitoring service [46] and monitoring of patients by GPS system [47].

Tertiary prevention domain

These are measures to prevent disabilities and they are usually special for physicians, rehabilitators, or the other medical care providers. Some of proposed activities are including:

Prescribing and fit rehab devices such as, glasses, magnifier, hearing aids, etc., Physiotherapy, occupational therapy, speech therapy, visualization etc., Laser therapy in diabetic retinopathies, Stents insertion in closed heart vessels, special rehabilitation after strokes, psychological counseling.

Quaternary prevention domain

These activities are avoidance of unnecessary medical measures such as unnecessary "check-ups", routine screening for prostate cancer, routine use of antibiotics for upper respiratory tract infections, routine application of rehabilitation techniques in non-specific low back pains, etc.

Possible malpractices prevention

Some of malpractices that occur for the elderly people, include

irrational administration of drugs (E.g. over-administration of corticosteroids for osteoarthritis, hypnotics, hypoglycemic drugs, etc.), emotional and psychological negligence, etc. Such errors can be prevented by rational administration of medications, psychological and psychiatric counseling, nutritional counseling, etc.

Discussion

We listed 85 practical activities in 5 prevention levels (20 primordial activities, 32 primary activities, 20 secondary activities, 6 tertiary activities, 4 quaternary activities, and 3 malpractice preventive activities) in this study.

In primordial domain, the correction of social and environmental problems should be considered [36] and the main responsible for dealing with these problems usually are policymakers and social administrators. There were listed near to 15 main responsible organisms for dealing these problems in this study. The most preventive measures listed were related to primary prevention domain. This suggests that we should emphasize on the training of elderly people for self-monitoring and self-care and education of health care providers and family members.

In this domain, many devices are used which most required one listed as follows:

Blood pressure measurement kit for blood pressure self-monitoring, glucometer for diabetes self-monitoring, pedometer, medication box with or without alarm, magnifying nail clipper special for elderly, special magnifier, cane, walker, shopping trolley, back seat, medical belts, neck brace, preventing pelvic fracture pads, anti-bedsore pads, carpet brakes, non-slippery bathroom flooring, bathroom chair, bathroom handholds, bed handhold, hearing aids (acoustic), special pen and spoon for people with parkinson's disease, Short Physical Performance Battery (SPPB) [43].

In primary and secondary domains, special issues which should be emphasized on those are multiple diseases involvement, hypertension, diabetes, sarcopenia, special obesity, falling, poly pharmacy, vitamin D status, nutritional care and supplementation and home hazards [29].

For blood pressure, home blood pressure monitoring (HBPM) predicts cardiovascular events better than clinical BP [7] and this is possible with self-care. This may create some stress for the patients. As well as, it is recommended that diabetic patients monitor their blood glucose levels at home [39-50]. Of course, the accuracy of the devices is different with each other.

Sonmez et al. in their study conducted on 59 subjects, have evaluated 5 different types of Home Glucose Meters (HGMs), and stated that, all these devices may not be accurate enough to identify hypoglycemia. They recommended that, caregivers should give more credit to the clinical findings of hypoglycemia than the values obtained by HGMs and they have stated that, the revision of HGMs standards is essential [39].

Another major problem which should be emphasized, is sarcopenia. Sarcopenia defined as presence of low muscle mass, low muscular strength, low physical performance and presence of a high fat mass in elderly body [46] and has the worst prognosis. Prevention and treatment should be based on the correction of malnutrition and physical activity [30]. The prevalence of obesity in elderly population is increasing. The rate of this problem in elderly women is somewhat higher than in elderly men. Obesity in elderly people is related to cardio metabolic risk, occurrence of degenerative diseases of joints and impaired physical functions. Type of obesity among elderly population

usually is sarcopenic obesity [30]. Calculating of body mass index is not useful in the elderly people [48].

One other main problem of the elderly people is falling and its consequences. This dilemma in elderly population is a major source of injury, which causes disability and hospitalization. It has a significant impact on loss of quality of life, increasing the senior home admissions and healthcare costs [29].

Poly pharmacy is another important problem in elderly people. Establish the Social Network Analysis (SNA) for examination of large patient data sets to identify poly-pharmacy complications [1]. It may be effective in reducing the volume of the problem.

Substitution of vitamin D is also recommended only in people who are suffering from vitamin D deficiency [29].

Among the dangerous situations at home, the bathroom is the most common place for environmental hazards [49]. We recommend using anti-slipppers, special chairs, and safety handholds for bathrooms.

Conclusion

We have proposed an action plan for prevention and control of elderly problems to elderly health managers.

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References

1. Franchini M, Pieroni S, Fortunato L, Molinaro S, Liebman M (2015) Poly-pharmacy among the elderly: Analyzing the co-morbidity of hypertension and diabetes. *Curr Pharm Des* 21: 791-805.
2. Clark BC, Taylor JL (2011) Age-related changes in motor cortical properties and voluntary activation of skeletal muscle. *Curr Aging Sci* 4: 192-199.
3. Mödder UI, Achenbach SJ, Amin S, Riggs BL, Khosla S, et al. (2010) Relation of serum serotonin levels to bone density and structural parameters in women. *J Bone Miner Res* 25: 415-422.
4. Robb SA, Vincent A, McGregor MA, McGregor AM, Newsom-Davis JM (1985) Acetylcholine receptor antibodies in the elderly and in Down's syndrome. *J Neuroimmunol* 9: 139-146.
5. Lyzohub VH, Dolylna OV, Zaval'ska TV (2012) Age-related features of neurohumoral effects of dopamine activity on the cardiovascular system in elderly people. *Lik Sprava* 8: 13-21.
6. Butenko GM, Mahdych LV, Ena LM, Tokar AV (1992) Age-related changes in glucocorticoid and mineralocorticoid receptors in lymphocytes of healthy persons and patients with hypertension. *Fiziol Zh* 38: 49-53.
7. Reddy AK, Jogendra MR, Rosendorff C (2014) Blood pressure measurement in the geriatric population. *Blood Press Monit* 19: 59-63.
8. Ketata W, Rezik WK, Ayadi H, Kammoun S (2012) Aging of the respiratory system: anatomical changes and physiological consequences. *Rev Pneumol Clin* 68: 282-289.
9. De Giorgio R, Ruggeri E, Stanghellini V, Eusebi LH, Bazzoli F, et al. (2015) Chronic constipation in the elderly: A primer for the gastroenterologist. *BMC Gastroenterol* 15: 130.
10. Khoroshinina LP, Tur'eva LV, Radchenko VG, Kochergina TA (2014) Fatty liver in elderly patients with atherosclerotic coronary artery disease (according to autopsy data). *Eksp Klin Gastroenterol* 8: 54-59.
11. Nadai M, Katoh M (2013) Changes in pharmacokinetics in elderly patients. *Nihon Rinsho* 71: 999-1003.
12. Fairchild B, Webb TP, Xiang Q, Tarima S, Brasel KJ (2015) Sarcopenia and frailty in elderly trauma patients. *World J Surg* 39: 373-379.
13. Hanotier P (2015) Hyponatremia in the elderly: Its role in frailty. *Rev Med Brux* 36: 475-484.

14. Fairweather-Tait SJ, Wawer AA, Gillings R, Jennings A, Myint PK (2014) Iron status in the elderly. *Mech Ageing Dev* 136: 22-28.
15. Gérvas J (2012) Quaternary prevention in the elderly. *Rev Esp Geriatr Gerontol* 47: 266-269.
16. Davidson JM, Chen JJ, Crapo L, Gray GD, Greenleaf WJ, et al. (1983) Hormonal changes and sexual function in aging men. *J Clin Endocrinol Metab* 57: 71-77.
17. Retornaz F, Castinetti F, Molines C, Oliver C (2013) Thyroid in the elderly (Part 1). *Rev Med Interne* 34: 623-627.
18. Pera A, Campos C, López N, Hassouneh F, Alonso C, et al. (2015) Immunosenescence: Implications for response to infection and vaccination in older people. *Maturitas* 82: 50-55.
19. Brown LM, Barnett SD, Frahm KA, Schinka JA, Schonfeld L, et al. (2015) Health risk factors and differences in outcomes between younger and older veterans using VA transitional housing. *Psychiatr Serv* 66: 33-40.
20. LoGiudice D, Watson R (2014) Dementia in older people: An update. *Intern Med J* 44: 1066-1073.
21. Inuzuka T (2011) Parkinson's disease in elderly. *Nihon Ronen Igakkai Zasshi* 48: 616-618.
22. Rifaat R, Kivelä SL (1989) Visual acuity and refractive errors in the elderly in nursing homes. *Z Gerontol* 22: 315-320.
23. Hesse G, Eichhorn S, Laubert A (2014) Hearing function and hearing loss in the elderly. *HNO Springer* 62: 630-639.
24. Guiglia R, Musciotto A, Compilato D, Procaccini M, Lo Russo L, et al. (2010) Aging and oral health: Effects in hard and soft tissues. *Curr Pharm Des* 16: 619-630.
25. Scheen AJ, Paquot N, Bauduceau B (2014) Diabetes mellitus in the elderly: from the epidemiological challenge to a personalized approach. *Rev Med Liege* 69: 323-328.
26. Matera MG, Calzetta L, Rogliani P, Cesario A, Cazzola M (2014) New treatments for COPD in the elderly. *Curr Pharm Des* 20: 5968-5982.
27. Caillet P, Mongiat-Artus P, Liuu E, Dutendas S, Paillaud E (2014) Kidney and bladder cancers in the elderly. *Soins Gerontol* 109: 38-42.
28. Malaguarnera G, Giordano M, Cappellani A, Berretta M, Malaguarnera M, et al. (2013) Skin cancers in elderly patients. *Anticancer Agents Med Chem* 13: 1406-1411.
29. Pfortmueller CA, Lindner G, Exadaktylos AK (2014) Reducing fall risk in the elderly: risk factors and fall prevention, a systematic review. *Minerva Med* 105: 275-281.
30. Lechleitner M (2016) Obesity in old age. *Vienna Med Weekly* 166: 143-146.
31. Fairhall N, Sherrington C, Lord SR, Kurrle SE, Langron C, et al. (2014) Effect of a multifactorial, interdisciplinary intervention on risk factors for falls and fall rate in frail older people: A randomized controlled trial. *Age Ageing* 43: 616-622.
32. Boelens C, Hekman EE, Verkerke GJ (2013) Risk factors for falls of older citizens. *Technol Health Care* 21: 521-33.
33. Huang YJ, Wang KY, Chen CM (2010) Loneliness: A concept analysis. *Hu Li Za Zhi* 57: 96-101.
34. Frohnhofen H, Schlitzer J (2014) Sleep and sleep disorders in the elderly: Part 1: Epidemiology and diagnostics. *Z Gerontol Geriatr* 4: 527-537.
35. Viwatpanich K (2015) Homelessness among the elderly in Bangkok Metropolitan. *J Med Assoc Thai* 98 Suppl 2: S11: 8-30.
36. Starfield B, Hyde J, Ge'rvas J, Heath I (2008) The concept of prevention: A good idea gone astray? *J Epidemiol Community Health* 62: 580-583.
37. Chu HT, Chen MH (2006) Assistive technology devices for the elderly at home. *Hu Li Za Zhi* 53: 20-27.
38. Volkert D, Sieber CC (2011) Protein requirements in the elderly. *Int J Vitam Nutr Res* 81: 109-119.
39. Sonmez A, Yilmaz Z, Uckaya G, Kilic S, Tapan S, et al. (2010) The accuracy of home glucose meters in hypoglycemia. *Diabetes Technol Ther* 619-626.
40. Del Giudice G, Weinberger B, Grubeck-Loebenstien B (2011) Vaccines for the elderly. *Gerontology* 61: 203-210.
41. Hill TR, Aspray TJ, Francis RM (2013) Vitamin D and bone health outcomes in older age. *Proc Nutr Soc* 72: 372-380.
42. Chen CH, Yan SL, Yang TH, Chen SF, Yeh YH, et al. (2017) The relationship between the methylated septin-9 DNA blood test and stool occult blood test for diagnosing colorectal cancer in Taiwanese people. *J Clin Lab Anal* 31: e22013.
43. Rubio Castañeda FJ, Tomás Aznar C, Muro Baquero C, Chico Guerra J (2015) Mobility assessment in elderly people. Description of measuring instruments for mobility: A review. *Rev Esp Salud Publica* 89: 545-561.
44. Montero-Fernández N, Serra-Rexach JA (2013) Role of exercise on sarcopenia in the elderly. *Eur J Phys Rehabil Med* 49: 131-143.
45. Schoeller DA (1999) Recent advances from application of doubly labeled water to measurement of human energy expenditure. *J Nutr* 129: 1765-1768.
46. Xiang Y, Tang YP, Ma BQ, Yan HC, Jiang J, et al. (2015) Remote safety monitoring for elderly persons based on omni-vision analysis. *PLoS One* 10: e0124068.
47. Moulton D (2015) Nova scotia sets direction on GPS monitoring of patients. *CMAJ* 187: E232-233.
48. Riobó Serván P, Sierra Poyatos R, Soldo Rodríguez J, Gómez-Candela C, García Luna PP, et al. (2015) Special considerations for nutritional studies in elderly. *Nutr Hosp* 31 Suppl 3: 84-90.
49. Huang TT (2005) Home environmental hazards among community-dwelling elderly persons in Taiwan. *J Nurs Res* 13: 49-57.
50. Francescato MP, Geat M, Stel G, Caucci S (2012) Accuracy of a portable glucose meter and of a continuous glucose monitoring device used at home by patients with type 1 diabetes. *Clin Chim Acta* 413: 312-318.