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 28 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, 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].

- **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,
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 [39]. 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 [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
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 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] screening, stool examination for occult blood, immune fecal occult blood test (iFOBT), Methylated Septin-9 (MS-9) DNA blood test [42]

**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 (nitrites, 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 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].

Quitting 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-slippers, 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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