

Non Communicable Diseases and Medicines Use in Elderly Attending Public Sector Hospitals in Sri Lanka

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ABSTRACT— *World population is aging and it is aging fast. Globally there is a dual burden of increase in the elderly population and prevalence of non communicable diseases. Elderly are a special population concerning drug use and are particularly vulnerable for inappropriate prescribing. Elderly population and the chronic diseases are both increasing in Sri Lanka and this study was conducted to identify the types of diseases for which elderly seek treatment from medical and diabetic clinics, drug categories prescribed and to determine whether prescribing is appropriate.*

Materials and methods - We analysed 1114 prescriptions and clinic records of elderly patients (≥ 60 years) attending medical and diabetic clinics of three selected public hospitals. Data was collected over period of one month from each hospital.

Results - Majority of the elderly patients were females (56.9%). Most were from the 60-69 year age group (58.6%) while the very old (≥ 80 years) accounted for only 6.4%. The most common diseases for which treatment was given from these clinics were hypertension, ischaemic heart disease, diabetes mellitus and bronchial asthma. Five or more drugs were prescribed daily to 68% with antiplatelets, statins and diuretics being the most commonly prescribed. Renal function was not documented in 66% of records within the previous year. Antiplatelets were not prescribed to those with ischaemic heart disease (11.1%), strokes (15%) and diabetes (20.9%) despite absence of contraindications documented.

Conclusions - Cardiovascular diseases and diabetes are the chronic diseases that are most commonly treated from these clinics. Prescribing needs to be improved in keeping with accepted guidelines and doses to ensure the desired benefits and minimize harm.

Keywords— elderly, medicines, appropriateness, Sri Lanka

1. INTRODUCTION

The world population is aging, and it is aging fast. It is estimated that by 2025, a total of about 1.2 billion people will be > 60 years of age. This is expected to rise to 2 billion by 2050 with 80% of them living in the developing world [1]. The older population itself is aging. Although the over 80 age group accounts for only 1% of the world's population at present (and 3% in developed countries), it is the fastest growing segment of the population [1]. A gender difference is seen with women living longer than men.

Most developed countries in the world have accepted the chronological age of 65 years as a definition of 'elderly' or older person, but like many westernized concepts, this does not adapt well to the situation in developing countries. At present there is no United Nations (UN) standard numerical criterion, but the UN agreed cutoff is 60 years to refer to the older population [2]. Sri Lanka too uses 60 years as the cut off to define older people, the age at which most persons retire from public service and begin to receive pension benefits although most remain productive for another decade or so after retirement.

Aging is associated with an increase in non communicable diseases (NCDs) and as treatment of these become more effective, an even greater proportion of elderly will survive with multiple comorbidities. Although a cure cannot be expected appropriate treatment of chronic diseases will control them and improve quality of life.

Globally 52% of all deaths are due to cardiovascular diseases while chronic respiratory disease and diabetes accounting for 7% and 2% respectively [3]. The situation is similar in the South East Asia Region (SEAR) with NCDs becoming the leading cause of death accounting for 55% of all deaths in the region with cardiovascular deaths alone accounting for 25% [4]. The NCD deaths occur at a younger age in the SEAR countries compared to the rest of the world with a massive 76% of all deaths in the 60 - 69 year age group being due to NCDs [4]. There is however solid evidence from clinical trials indicating that appropriate prescribing can substantially reduce the burden of preventable morbidity associated with NCDs such as hypertension, dyslipidaemia, diabetes and ischaemic heart diseases (IHD).

Age is a fundamental cause of disease. It works through many causal pathways to generate multiple risk factors and multiple disease outcomes. Older people bear the greatest burden of illnesses and are also the greatest beneficiaries of medicinal drugs to prevent, control or treat disease conditions.

The elderly are a special population with regards to drug use. They have multiple comorbidities necessitating multiple drugs. Two-thirds of people over the age of 60 are taking regular medication, and over half of those with repeat prescriptions are taking more than four drugs. [5]. Studies conducted in some countries have shown that cardiovascular, endocrine and nervous system drugs are among the most widely used prescription drugs by the elderly [6-8]. They also show that more older females use prescription drugs when compared to males [6, 8].

Inappropriate prescribing (IP) includes both prescribing unnecessary or harmful drugs and not prescribing drugs that may be of benefit. Both these problems are seen globally with drug prescriptions in elderly [9-11]. Simultaneous presence of underuse and inappropriate use has also been observed [10] and polypharmacy has been associated with under prescribing [12]. Potentially inappropriate medicines (PIMS) are associated with poor outcomes in the elderly and many tools have been developed to ascertain the appropriateness of medicines applying explicit criteria. American Geriatrics Society Beer's Criteria [13] is one such tool. The tool is divided into three main categories and identifies 34 PIMs and classes to avoid in older adults, PIMs and classes to avoid in older adults with certain diseases and syndromes that the drugs listed can exacerbate and medications to be used with caution in older adults. Thus the updated criteria help to identify medicines for which the risks of their use in older adults outweigh the benefits. Although developed for an American population Beer's Criteria are easy to use as a screening tool and have been used in other countries for screening for PIMs in elderly [14].

Due to a combination of low fertility and increased survival Sri Lanka too has seen an increase in the elderly population. It is estimated that the percentage of adults over 60 years of age will increase from 9.2% in 2000 to 28.5% in 2050 [15]. In 2012 the old (> 60 years) accounted for 12.3% of the total Sri Lankan population with a male to female ratio of 79:100 [16]. Of the elderly 36.6% were in the 60 – 64 year age group while 25.2%, 16.3% and 11.4% were in 65 – 69, 70 – 74 and 75 -79 year age groups respectively [16]. The very old i.e. > 80 years was 10.6% [16].

The NCD burden is increasing in Sri Lanka [4, 17]. Of the 11 SEAR countries, Sri Lanka ranks third with NCDs accounting for 66% of total deaths [4]. The proportion of deaths due to circulatory diseases in Sri Lanka have increased from 3% to 24% over the last 50 years while hospitalization of selected diseases showed a steady increase in major NCD cases [4].

Hospital based data show an increasing trend in hospitalization for NCDs such as diabetes, hypertensive disease and ischemic heart diseases and mortality reports indicate that leading causes of death in public hospitals are cerebrovascular disease, acute myocardial infarction and heart failure [17, 18]. The trend is similar for both males and females [17].

Health care is free from state institutions in Sri Lanka and as such most people especially those from the low and middle income groups seek treatment from these hospitals. This is even more for chronic diseases where long term treatment is needed. Elderly constitute a significant proportion of the patients seen both state and private sector hospitals and knowledge on diseases prevalent in the elderly and their drug management would help health care providers to deliver appropriate medical care to this increasing but vulnerable population. Studies have been done on drug prescribing patterns of community dwelling elderly in many countries (6-10) but no published data is available from Sri Lanka.

The objectives of this study were to identify the types of diseases prevalent among elderly seeking treatment from general medical and diabetic clinics in Sri Lanka, to identify the drugs used and to determine the appropriateness of prescribing in selected NCDs.

2. MATERIALS AND METHODS

We conducted a descriptive cross sectional study of prescriptions and clinic records of those 60 years and over attending medical and diabetic clinics of three public hospitals, i.e. one Teaching Hospital and two Provincial General Hospitals, under the Ministry of Healthcare and Nutrition, Sri Lanka. Medical and diabetic clinics were selected as those with

multiple medical comorbidities are mostly managed in such clinics and as such would be the best to identify long term medication use for NCDs in community dwelling elderly. Records of all those who were 60 years of age and over and attending the relevant clinics during the study period were included in the study. Data was collected from each hospital over a period of one month. Patients are issued drugs for a period of one month from public hospitals, and this allowed us to include almost all those who regularly attend these clinics in to the study. The age, gender and the diseases for which the patients were on long term treatment were taken as stated in the patients' clinic records. In any prescription, all drugs prescribed for a period of one month were included for the analysis. The last prescription of each patient was included in the study and it was marked in the patients' records to avoid duplication. A total of 1114 patient records were included in the final analysis.

The data was analysed to find the diseases for which long term treatment is sought from these clinics and the drugs prescribed according to the drug classes given in the British National Formulary (BNF) 64. The BNF categories were used as there is no national formulary in Sri Lanka.

Appropriateness was assessed based on Beers Criteria and practice guidelines of American Heart Association for Long Term Management of Stable IHD [19] and Prevention of Stroke in Patients with Stroke or Transient Ischemic Attack [20].

The study was approved by the Ethics Review Committee of the Faculty of Medical Sciences, University of Sri Jayewardenepura.

All statistical analyses were performed using SPSS 19.0. Categorical data was initially summarized into percentages and continuous variables were summarized with either mean and standard deviations or with mode. Chi square test or Chi square for trend was performed to test the association. Significance level was set at 0.05.

3. RESULTS

Data from 1114 prescriptions and clinic records were included in the final analysis. The demographics of the sample population compared with country data are given in table 1.

Majority of patients were in the 60-69 years age category (n=653, 58.6%) while the very elderly i.e. >80 years accounted for only 6.4% (n=71) of the total sample. Females [n=634 (56.9%)] were more than males across all age groups. This was similar to the demography of Sri Lanka as seen with the 2012 census (Sri Lanka Census of Population and Housing, 2012).

Hypertension, ischaemic heart disease (IHD) and diabetes were the most common diseases for which treatment was sought from the selected clinics. Hypertension was the most prevalent disease in all age groups and IHD was the next most common in all age groups except 60-64 year olds. The prevalence of diabetes was higher than that of IHD in this group. . Prevalence of all diseases except IHD was higher in females. The prevalence of most commonly treated diseases for which the elderly seek treatment from medical clinics is given in table 2.

A statistically significant association (p=0.04) was seen between increasing age and the number of diseases. There was no association seen between gender and the number of diseases. Only 37.7% (n=420) of the total sample population were on treatment for a single disease while 37.3% (n= 416) and 17.7% (n = 197) were on treatment for 2 and 3 diseases respectively.

On average an elderly person in the study population would consume 5 drugs daily (Mode =5). Five or more drugs prescribed daily to 68% (n=758). A statistically significant difference was seen between the gender and the number of drugs prescribed and compared to males, females were more likely to be prescribed a greater number of drugs. The analysis of number of drugs prescribed according to age and gender is given in table 3.

3.1 Pharmacological categories of the drugs prescribed

The most used pharmacological group was cardiovascular drugs. Endocrine medicines and central nervous system medicines were the other commonly used drug categories. The drugs prescribed according to their pharmacological category are given in table 4.

The commonest other drugs prescribed were paracetamol (n=52), folic acid (n=49), H2 receptor blockers (n= 39) and digoxin (n=30). Although use of calcium supplements was low (5.39%), the use of vitamins was comparatively higher (14.63%). The most common vitamin prescribed was B complex.

Only 34.1% (37.3% of males and 31.7% of females) had their renal function assessed by means of serum creatinine measurement and recorded in their notes within one year from the time of data collection. None had the glomerular

filtration rate (GFR) calculated or estimated. The mean number of drugs that were given to those in whom the renal function was assessed was 6.00 (SD 2.27) and the number of comorbidities in whom the renal function was assessed was 2.1 (SD 1.06). Both these were statistically significant. Of those with diabetes (n=349), 65.3% (n=228) did not have their renal function assessed within the preceding 1 year and 64.5% (147/228) of these were on metformin, either alone or in combination with other oral antidiabetic medicines with 17.5% (40/228) prescribed metformin in excess of 2g/day.

3.2 Appropriateness of the medicines prescribed

The doses of medicines prescribed were within the maximum recommended dose for healthy adults except with two drugs. Maximum recommended daily dose was exceeded 33.55% of those on oral antidiabetics namely metformin and tolbutamide. The maximum recommended daily dose for both these drugs according to the BNF is 2g and those that exceeded this dose were on 3g/day for either drug.

Twelve out of the 34 PIMs and classes to avoid in older adults as given in Beers Criteria 2012 were noted in our sample. Prazosin as an antihypertensive, short acting dipyrindamole and first generation antihistamines were the most prescribed PIMs but each accounted for <0.1% of the total sample. Among those with a confirmed diagnosis of heart failure 12.5% (11/88) were on medicines such as non steroidal antiinflammatory drugs (NSAIDs) and pioglitazone that had the potential to worsen heart failure.

As IHD and cerebrovascular diseases are among the top 5 causes of hospital deaths [17] and as morbidity and mortality of these diseases can be reduced by appropriate therapy, the appropriateness of medicines prescribed for these two diseases was determined. In the absence of up to date Sri Lankan guidelines, those issued by the American Heart Association were considered as references [19,20]

Of those with IHD (n=415) 11.1% were not prescribed any antiplatelet agent. Statins, beta blockers and angiotensin converting enzyme inhibitors (ACEIs) were not prescribed for 21.1%, 42.9% and 49.6% respectively despite absence of contraindications recorded for these medicines in patient records. Glyceryl trinitrate (GTN) to relieve acute angina pain was not prescribed to 46.1%.

No antiplatelet agent was prescribed to 11.1% of those with IHD, 15% of those with a TIA/stroke and 20.9% of the diabetics with a 10 year cardiovascular risk >10% despite the absence of contraindications documented.

As an increase in hospitalizations and deaths due to bronchial asthma has been observed [17] we analysed the prescriptions of those diagnosed with bronchial asthma (n=181, 16.2%). Of these 47.5% (n=56) were not prescribed any relievers either as inhalers or as oral salbutamol tablets. Of those not on any relievers, 25% (14/56) were on regular inhaled steroids which suggests a diagnosis of chronic persistent asthma.

Of those diagnosed with chronic renal failure (n=35), none had been prescribed drugs that may worsen the condition.

4. DISCUSSION

Our study was conducted in medical and diabetic clinics of three major public hospitals in different provinces. Although this is not a representative sample of the entire country, the sample demographics are similar to the country demographics. Hence it is likely that the situation in other 6 provinces would also be somewhat similar.

Similar to other studies [6, 8] a predominance of females was seen in our sample too. This could be due to the demographics of Sri Lanka which shows a predominance of females in those over 60 years [16]. It could also be due to the fact that males between 61 – 70 years of age could still be gainfully employed and thus not able to attend hospital clinics which are conducted in the mornings.

The results of our study show a significant association between increasing age and the number of NCDs a person would have. This is to be expected as prevalence of NCDs increase with age. Cardiovascular diseases, diabetes and chronic respiratory diseases showed a high prevalence in our study population and this is similar to that seen in the countries of the SEAR [4].

Doses greater than those recommended for adults had been prescribed only for tolbutamide and metformin. The higher dose of metformin could be due to that fact that manufacturer's recommend a dose of up to 3g/day which is different from the BNF recommended maximum of 2g/day.

While the low percentage of PIMs (<1%) is an indication of reasonable prescribing, the underuse of medicines well known to reduce morbidity and mortality of common NCDs is a concern that needs to be addressed. Although country guidelines to manage common NCDs have been developed they are only partially implemented [21]. The medicines that have not been prescribed for the selected NCDs are those in the Sri Lanka Essential Medicines List [22] and included in the Sri Lanka Hospital Formulary List. As such these medicines are generally freely available in public health care

institutions. Appropriate prescribing will reduce morbidity associated with NCDs and will help to reduce the health care burden of this population.

The absence of regular monitoring of renal function is a finding of concern as compared to younger people, elderly are more likely to subclinical renal impairment. In addition most of the drugs prescribed are excreted by the kidneys and dose adjustments may be needed in those with renal impairment. The situation that we observed suggests that renal function assessment has not been considered at regular intervals in these elderly.

4.1 Strengths and limitations

Studies on drug use among community dwelling adults in developing countries and the SEAR are minimal. Results of this study are relevant to Sri Lanka and to the countries in the SEAR as there is dearth of information on the diseases prevalent and of the pharmacotherapy for elderly living in the community in these countries. This study is the first to examine these aspects of community dwelling elderly in Sri Lanka.

Although the study was confined to three public hospitals in Sri Lanka, these hospitals were the major public hospitals of the 3 of the 9 administrative provinces of the country. As all public hospitals in Sri Lanka are graded according to the facilities available, it is likely that the situation in other public hospitals is also similar. The generally poor documentation in clinic records seen in public health care institutions may have led under recording of some diseases and drugs.

Another limitation is the exclusion of patients on long term therapy for psychiatric illnesses and cancers. These drugs are also among those that need special care when used in the elderly and is an aspect that needs to be studied properly in Sri Lanka.

5. CONCLUSION

Despite a considerable increase in the elderly population, Sri Lanka still has very limited infra structure facilities to cater for their needs. The old age dependency ratio which was 10.9% in 2007 [15] has risen to 19.8% in 2012 [13]. Elderly with chronic diseases are managed mainly by their families in the community adding a considerable strain to both economic and social status of such families. Thus preventing morbidity associated with NCDs with appropriate therapy is vital.

Geriatrics is still not a recognised specialty in Sri Lanka and the Post Graduate Institute of Medicine which is the governing body for postgraduate training in the country currently offers only a Diploma programme in Elderly Care. Elderly are managed in General Medical Units and Clinics and the specialised care needed in managing them is thus unavailable.

Lack of health care data pertaining to elderly is an issue that needs to be addressed to improve the services. While our study addresses some of these concerns more research is needed and needed soon as the dual burden of increasing elderly population and NCDs is increasing.

Development of country specific criteria and tools to improve prescribing in elderly should be explored as critical application of such criteria will result in better patient outcomes. Increasing awareness among prescribers of the special aspects of prescribing in geriatrics is essential to improve prescribing, improving outcomes and minimising harm.

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Table 1: Sample description (n=1114), compared with demographics of Sri Lanka

	Sample		% in Sri Lanka - according 2012 census (15)
	n	%	
Gender			
Males	480	43.1	44.13
Females	634	56.9	55.87
Age (years)			
60-64	353	31.7	36.6
65 – 69	300	26.9	25.2
70-74	250	22.4	16.3
75-79	140	12.6	11.4
> 80	71	6.4	10.6

Table 2: Most common diseases as documented in patients' records

Disease condition	n (%)
Hypertension (HT)	727 (65.3%)
Ischemic heart disease (IHD)*	415 (37.3%)
Diabetes mellitus (DM)	349 (31.3%)
Bronchial asthma	181 (16.2%)
Hypercholesterolaemia	95 (8.5%)
Heart failure	88 (7.9%)
Cerebrovascular disease (Stroke/TIA)	80 (7.2%)
Thyroid disorders	44 (4%)
Chronic renal failure (CRF)	35 (3.1%)
Chronic obstructive pulmonary disease (COPD)	26(2.3%)

Table 3: No. of drugs prescribed according to age and gender

Age (years) n (%) within Age)	No. of drugs prescribed			
	< 2	3-5	6-9	≥10
60-64 (n=353)	29 (44.6%)	171 (48.4%)	147 (41.6%)	6 (1.7%)
65-69 (n=300)	20 (6.7%)	123 (41%)	143 (47.7%)	14 (7.7%)
70-74 (n=250)	10 (4%)	108 (43.2%)	118 (47.2%)	14 (5.6%)
75-79 (n=140)	3 (2.1%)	59 (42.1%)	71 (50.7%)	7 (5%)
> 80 (n=71)	3 (4.2%)	24 (33.8%)	37 (52.1%)	7 (9.9%)
Gender (n, % within Gender)				
Male (n=480)	24 (5%)	186 (38.8%)	247 (51.5%)	23 (4.8%)
Female (n=634)	41 (6.5%)	299 (47.2%)	269 (42.4%)	25 (3.9%)
Total (n=1114, % from total sample)	65 (5.8%)	485 (43.5%)	516 (46.3%)	48 (4.3%)

Table 4: Pharmacological categories of drugs prescribed

Drug category	Total	% from total (n=1114)
Antiplatelet agents *	676	60.68
Statins **	641	57.54
Diuretics **	571	51.26
ACEI *	470	42.19
Nitrates **	405	36.36
Adrenoceptor antagonists *	360	32.32
Oral antidiabetics *	310	27.83
Calcium channel blockers	296	26.57
Angiotensin 2 receptor blockers *	272	24.42
Bronchodilators	180	16.16
Vitamins	163	14.63
Corticosteroids	150	13.46
Tricyclic antidepressants	111	9.96
Proton pump inhibitors (PPI)	108	9.69
Ca Supplements	60	5.39
Insulin*	56	5.03
Thyroid drugs	42	3.77
Antiepileptics *	31	2.78
NSAIDs *	22	1.97
Antibiotics	20	1.80
Fixed dose combinations for asthma	15	1.35
Antipsychotics	12	1.08
Anticoagulants	10	0.90
Others	342	30.7

* Most drugs in this group would require caution and/or dose reduction in renal impairment

** Some agents in this group should be used with caution in severe renal impairment
(Cr Clearance < 30 mL/min)