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Epidemiology of Multimorbidity in Older Adults

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Abstract

Health of elderly is a key public health challenge globally, more so in developing countries. Older adults are at greater risk of vulnerability due to their physical, mental and functional health risks. With rapidly rising ageing population and increasing burden of non-communicable diseases older adults in India are at a greater risk for multimorbidity. A high prevalence of multimorbidity indicates high mortality & increased healthcare utilization.

Multimorbidity encompasses all long-term conditions (LTCs) like hypertension, diabetes or an infectious disease of longer duration such as filariasis or a mental health like depression and cognitive decline. This often leads to an increase in healthcare utilization, hospitalization, expenditure along with poorer patient outcomes. It is responsible for deterioration of the health-related quality of life. For the specialist doctors it poses the challenge of managing explicit problem without worsening the other conditions or complications.

Materials & Methods:

This article is based on assessing the prevalence of multimorbidity among acquaintances, relatives, friends and patients, and impact of quality of life in this population. This study is based on i) multimorbidity cases managed by the author and/or referred to specialists or tertiary care institutes, ii) some cases seeking second opinions on telephone out of Bengaluru and iii) a few through discussions in 3 annual re-union meetings of groups the author is associated, about the current practices. Current literature of international recommendations and trials for a health systems approach to multimorbidity management including improving access to care, promoting generalists, & providing a decision support system.

Outcome: Most Indian GPs chose to prioritize their long-term relationships for mutual trust, deeper insight into a patient's unique circumstances, and useable knowledge of everyone's capacity for the work of illness and goals for life. The specialists and corporate hospitals quite often exploit MM with battery of investigations and multidrug prescriptions. However, GPs need better multimorbidity management guidance, policies and models of practice that provide remunerated nurturing trustful therapeutic partnerships.

Keywords: monkey pox; virus; low level laser; LLLT; lasertherapy; redlaser and blue laser

Abbreviations:

MM= Multimorbidity, **GPs= General Practitioners, S=** Specialists**, SS=** Superspecialists**, HT=** Hypertension**,** Diabetes, Asthma, **CKD=** Chronic Kidney Disease, **MI-** Myocardial Infarction**,** Stroke, **CAD=** Cardiac Artery diseases**, CCF=** Congestive Cardiac failure**, COPD=** Chronic Obstructive Pulmonary disease**,** Frailty, Cognitive Health, Depression, **SP** = Senile Pruritus **CBC=** Complete Blood Count**,** X Ray, Scanning**, ESR=** Erythrocyte Sedimentation Rate**, OR=** Odd ratio**, MMMoEIs** = Multimorbidity Management of Elderly Indians**, SDG**= Sustainable development goals,

Introduction:

Health status fluctuations as age advances is a challenge for the individual, family, family doctor, and more so to specialists and for the State or country's public health programming, globally but more so in the developing countries. Elderly adults are at a greater risk of vulnerability due to their physical, mental and functional health risks. With rapidly rising ageing population and increasing burden of non-communicable diseases (NCDs) older adults in India and other developing countries are at a greater risk for multimorbidity's [1]. **Multimorbidity, the co-occurrence of two or more chronic conditions in an individual is becoming a norm in low-and middle-income countries (LMICs).** 1 This can be attributed to the rise in the ageing population along with an increase in non-communicable diseases (NCDs) vis-a-vis prevailing infectious diseases. This often leads to an increase in healthcare utilization, hospitalization, expenditure along with poorer patient outcomes. It is responsible for deterioration of the health-related quality of life (HRQoL) [2]. For the specialist doctors it poses the challenge of managing explicit problem without worsening the other conditions.

India is experiencing a rising burden of chronic disease multimorbidity due to an aging population and epidemiological transition. Older adults residing in urban slums remote rural and Tribal are especially vulnerable due to challenges in managing multimorbidity, deprived living, disappearance of family physicians or general practitioners, proliferation of quacks and

inaccessibility to quality public sector services [3]. MM more common in older adults increases the risk of hospitalization, disability, rehabilitation challenges and mortality, and most importantly leads to a lower quality of life. The MM prevalence increases with age- 50% for under 65 yrs. ,62% for 65-74 yrs. and more than 80% for 85 years and old. It is more common in women than men, and in people who are illiterate or single. It is a public health programming challenge as it challenges of screening, diagnosis, treating and monitoring outcome in older patients and minimizing case fatality rates. [1,3].

Currently cardiovascular (CVD) diseases like, hypertension, Myocardial Infarctions (MI), Heart Attacks, Heart failure, Strokes, Diabetes, Dyslipidemia, Benign enlargement of Prostate, Cancers, Chronic lung disease (Asthma, Chronic Obstructive Pulmonary Disease (COPD), arthritis, Depression, Hormonal Disruption-Thyroid and Parathyroid hormone levels rise with age, which contribute to osteoporosis are common [3]. Balancing problems, Frailty, Fragility, Arthritis, Cataract, Brittle bones, Diabetes, hypertension and Senile Pruritus are the most common chronic conditions causes MM among people aged ≥80 years [5]. Senile pruritus and Cognitive health impacts quality of life of the population over 65 years [6].

Understanding the prevalence of MM among elderly in the country & local levels where one practices is a crucial piece of information for achieving client satisfaction & national /regional Sustainable Development Goal 3.4, which calls for reducing premature death due to NCDs.

This article is an epidemiological review based on current treatment practices of the general practitioners, specialists and super specialists & private / corporate hospitals and the impact on quality of life on a non-representative population across the country, as observed by the author or reported by acquaintances, and recommendation for a health system approach as tired in some developing countries and promotion of General Practitioners system Globally.

Case Reports and Multimorbidity Statistics among known Senior Citizens:

I. Survivors of Multimorbidity (MM):

1. A senior Citizen's Dilemma in an Urban Corporate Hospital:

72 years old, male, retired medical officer went to a private hospital in Bengaluru recently with complaints of exacerbation of chronic cough he had for over 5 years, as the cough disturbed his sleep & never seemed better. He was looking well, and happy, sometimes feeling giddy, constantly making jokes about being 'only 7 years old'. But there's a good reason for his status, he was doing regular exercise for 100-120 minutes a day at least 6 days week. He is always doing physical work, walks every day, and does his push-ups, pull-ups, and many other exercises every day. The exercise included about 35-40 minutes of Yoga, another 30-35 minutes of walking and 30 minutes of Gym, mainly weight bearing exercises to strengthen core muscles other large muscles by rotation which out his both mind and body to challenge every day. He is currently learning 3 new languages (Hindi, Tamil, Malayalam) and relearning his mother tongue -Kannada especially literature, and English for writing scientific articles.

He is medical history recorded Diabetes since 1991, Hypertension since 2001, COPD since 2002, Ankylosing Spondylitis since 2006, Benign Prostate Hypertrophy (BPH) since 2007, Bilateral Cataract surgeries in 2009 and Left ear hearing limitation since 2020, but nobody could notice it. Since his retirement in 2006, has lived by the moto 'mind over matter' maintaining discipline in diet, regular walking, muscles stretching & meditation.

Having relocated to Bengaluru from Delhi in 2018 after retirement this was his first major consultation. A Physician examined him first and ordered for Chest Xray, Abdominal & Pelvis Scanning, ECG, Battery of blood tests and Urine examination, PSA-Prostate Cancer Biomarker. Next 3 days went in consultations with a pulmonologist, a Cardiologist, a Neurologist, a Nephrologist at a cumulative cost of INR 25,000. Finally, multiple diagnosis by each specialist of conditions already known to him. The overall prescriptions read- 3 antibiotics, 2 anti- hypertensives, 3 oral anti-diabetics, 2 anti-inflammatories and cough syrup, Vitamin D and B12. Being an experienced general practitioner, he continued drugs he was already taking just adding one more antibiotic for exacerbated COPD. Imagine if it were a person not in medical profession landing with a long list of drugs. This is the bane of specialists & super specialist practices in Urban India. Each organ or a part of an organ is studied and tried to make it function optimally. The individual is never seen in toto.

2.Dental Extraction and Neglected Oral Cancer, Survivor:

A lady aged 72 years, consulted a dentist for a molar toothache in January 2024, which was extracted under antibiotic cover and local anesthesia. The wound took a long time to heal and after a month they observed discolored oral mucosa around the root of the extracted tooth. Suspecting Oral lichen planus, palliative treatment was tried for another 8 weeks which included i) Aloe vera mouth wash and a topical corticosteroid and other home remedies-turmeric cream rubbing on the gums, Vitamin A supplementation, Carrot juice, and Stress management with drugs were also tried. In early April 2024, the patient consulted an Oro-maxillary surgeon, who after a biopsy confirmed it to be Cancerous. Treated with Tumor resection along with a margin of healthy tissue and cutting a part of left jawbone, followed by 8 sittings of radio therapy. Thus, the Scan in August 2024 has cleared tumor or secondaries, she is living with disfigured face & frailty.

Suffered multimorbidity & Succumbed

II.

III.

3. Diabetes & Hepatorenal Failure:

Mr. S Murthy aged about 67 years, from Challkere in Karnataka, consulted a physician in Belagavi, Karnataka, on one of his visits to his married daughter on 12 February 2024 with the complaints of abdominal discomfort, difficulty in micturition and swelling of feet and poor appetite. A routine general examination revealed pallor, hypertension 156/102 mm hg, slight tenderness in right upper quadrant of the abdomen. A routine urine analysis did not indicate any infection, A complete blood count (CBC) had shown Iron deficiency anemia with 10.5% Hb, Blood urea (24 mg/dl) and Creatinine (1.0 mg/dl), all in normal ranges. A prostate-specific antigen (PSA) test and Liver function test biomarkers did not reveal anything suspicious of either liver or Kidney functions. He was prescribed Dytor 20 mg (a diuretic) half tablet BD, Tab Envas 2.5 mg (antihypertensive), Tab. Urimax 0.4 mg once day (alpha adrenergic antagonist) for BPH one tab every night and Tab Detox (for indigestion) after lunch every day.

In a follow up visit after about 2 months on 8 April 2024, except for the reduction of pedal oedema, there was no improvement in general condition. This time the routine clinical examination revealed BP under control (132/89 mm Hg). Repeat routine urine and blood biomarkers and abdominal and Pelvic Scanning was ordered. Key abnormal findings recorded in the scanning report were i) Liver showed normal size with coarse eco-structure and surface nodularity ii) Gall bladder distended with a few Calculi largest measuring about 3.6mm in diameter with No GB wall thickening and pericholecystic oedema iii)Urinary bladder was also moderately distended and mild thickening of the wall measuring 5.2 mm with internal echoes & 2-3 tandem calculi largest measuring 6.9x3.5mm. iv) Pre-voiding urine volume was 246 ml and post-voiding residual urine of 126 ml. v) Prostate enlarged measuring 4.4x3.8x4.6 cm and a volume of 41.5cc. vi) Blood PSA level was raised to 0.54 (0.00-0.40) vii) Liver function biomarkers were in normal ranges. He was advised to continue the same treatment.

In mid-May 2024 in his hometown of Challakere, he noticed bloating abdomen and swelling of the feet. When the abdominal distension was discomforting, he consulted a local Physician on 26 June 2024 and Liver function tests were repeated. This time showed the reports were indicating abnormal biomarkers (normal range in parenthesis) – i) Serum Creatinine-2.0 (0.6-1.6), Na-122 (136-145) and Chorides-92 (97-111), Serum Bilirubin-3.4 mg/dl (0-1.3), Direct Bilirubin -0.8 mg/dl (0.0-0.3) Indirect Bilirubin -2.6 mg (0.2-1.0), Alkaline Phosphate-145 u/l (41-137) & Gamma GT GGT)-51 u/ l (0-50) a first indication of Liver dysfunction. He was put on a dozen drugs liver, kidney, prostate.

A repeat Biomarkers tests on 21 July 2024 showed a bit improvement in i) Creatintine-1.5, Na-124. However, the abdominal distension had increased

discomforting him, therefore, about 1 Liter abdominal fluid was tapped. There was a temporary relief but soon abdomen starting bulging again.

Another repeat Biomarkers test on 21 August 2024, showed His Hb% - 9.1g/dl and serum Creatinine was 1.6mg/dl. The liver function biomarkers worsened further as T. bilirubin was 5.1, Direct Bilirubin-0.9, Indirect Bilirubin -4.2, SGOT-79, SGPT-52 (all higher than upper limits) and Serum Globulin-1.9 gm/dl (lower than lower limit of 2.3) indicating Liver failure. This time however, 2 Liters of abdominal fluid was tapped again. He was more comfortable this time for almost 2 weeks.

Come September 2024 he started complaining of fatigue to the extent of inability walk in the house itself. On 7 September 2024, he suddenly became disoriented, confused, unable to swallow fluids and retention of urine. local Physician advised admitting him to medical College Hospital (MCH) as he found the patient's condition critical. The same afternoon he was admitted in an ICU of a private Medical College Hospital in Chitradurga. On admission his BP recorded 86/54 mm Hg. At the MCH the biomarkers read Blood Urea 118 mg/dl (10-45), Serum Creatinine-5.4 mg/dl (0.7-1.5), Sodium-134 mmol/l (135-155), Potassium -5.8 mmol/L (3.5-5.5), Chlorides-112 mmol /L (98-107), all elevated. All LFT biomarkers were off the mark too e.g., T Bilirubin-3.1 mg/dl, (0-1.2) D Bilirubin-0.4 (0-0.3), IBilirubin-2.7mg/dl (0-1.5), Total Protein -5.6 gm /dl (6.0-8.3), Albumin-1.9 gm/dl, (3.4-4.5) were reduced, and Globulin 3.7 gm/dl (2.0-3.5) was raised, SGOT-239 u/L (0-46), SGPT-91 U/L (0-49) were more than double, Hb%-8.6 g/l had come down further. The Albumin level in Peritoneal fluid was 2.1 gm/dl. With SAAG working out to be 1.9/2.1= 0.905, a diagnosis of Hepatorenal failure consequent to AKI, was made and led to Hypovolemic shock, and anuria, and the patient died on the early morning of 8th September 2024. It was concluded that the patient went into Uremic encephalopathy, a cerebral dysfunction caused by the accumulation of toxins due to acute or chronic renal failure, as estimated glomerular filtration rate was below 05 mL/min.

4. A case Acute Myeloid Leukemia, Diabetes, and Hypertension:

An elderly friend aged 84 years, a known hypertensive with Mild Heart attack in 2022 reported in February 2024 to a physician in private tertiary care hospital with complaints of Fever, unusual bleeding from the gums, Lethargy and fatigue. A routine complete blood (CBC) examination revealed too many abnormal white blood cells called leukemia (blast) cells that makes the individual difficult to fight infection. A diagnosis of Acute Myeloid Leukemia was made, and he was put on a combination chemotherapy with Enasidenib and Ozogamicin. He showed signs of recovery until the end of July 2024. A respiratory infection compelled him to be admitted in an ICU of the Tertiary Hospital on 15th August, and despite best efforts intensive care he died on 21 August 2024. Lung infections with drug resistant Klebsiella pneumoniae, & Pseudomonas aeruginosa, led to death which are fatal even after treatment with antibiotics and blood products.

5. Senile Pruritus:

Ms. Venkamma, a widow of 82 yrs., in Sindhanur, a town in Karnataka, bedridden for over a year following a fracture femur (left). Since early 2024 she has become more restricted in her mobility and is under stress all the time. She Started complaining of itching in the back in January 2024. Son& Daughter-in-law tried home remedies like applying oil, diet restriction which are traditionally associated with itching like banning {Brinjal (eggplant), sour and salty food, and promoting eating bitter leaves of Nimba (Neem), Haridra (Turmeric)}. Later an Ayurvedic practitioner advised Panchakarma -a) Purgation (Virechana) through herbal medicines, emesis (Vamana) through herbal medicine, Lepa (applying medical plasters on the site of itching), bloodletting (Rakta Mokshana) which the family refused. She was administered Arogya Vardhini Vati and Manjishthadi Kwatha orally. All of them had a combined effect and itching was reduced largely after week but recurred once the treatment was stopped. After the third recurrence, the authors were consulted on 20th March 2024. After digital inspection (over Zoom video) of the sites of itching and noticing absence of any eruptions, A standard approach was taken of i) Oral antihistamines (Allegra 180 mg contains Fexofenadine) in the morning and ii) Chlorpromazine25 mg at night and iii) Topical application of Crotona 10% (Crotamiton 10% lotion) affected area twice a day after bathing. It's just 3 days after following the schedule she improved over a period of 6 weeks but continued to have mild pruritus and she died a week ago.

6. Diffused Elderly Population's Health Status: Contact of the author.

Sl. No	Group Name	Participant Elders by age group				Multimorbidity in 2023-24				Single morbidity	No morbidity
		60-69	**70-79**	**80+**	**Total**	60-69	70-79	80+	Total		
1	**RUCs**	**27**	**56**	**22**	**105**	**19**	**46**	**17**	**82**	**18**	**05**
	Male	21	39	15	75	15	32	13	60	12	3
	Female	6	17	7	30	4	14	4	22	6	2
2	**JWMCB 62**	**0**	**24**	**15**	**39**	0	**19**	**12**	**31**	**8**	**0**
	Male	00	19	12	31	0	16	09	25	5	1
	Female	00	05	03	08	0	03	03	06	0	2
3	**ALHAS**	**17**	**19**	**8**	**44**	**12**	**15**	**7**	**34**	**8**	**2**
	Male	11	12	5	28	9	10	5	21	4	3
	Female	6	7	3	16	3	5	2	10	4	2
4	**Rel. & Fri**	**33**	**28**	**07**	**68**	**26**	**25**	**6**	**57**	**7**	**4**
	Male	20	19	04	43	18	16	04	38	3	2
	Female	13	09	03	25	08	09	02	19	4	2
5	**Other Pts.**	**08**	**04**	**03**	**15**	**06**	**03**	**03**	**12**	**3**	**0**
	Male	5	2	2	09	04	02	01	07	02	0
	Female	3	2	1	06	02	02	01	05	0	01
6	**Gr. Total**	**85**	**131**	**55**	**271**	**63**	**108**	**45**	**216**	**44**	**11**
	Male	57	91	38	186	46	76	33	**155**	**28**	**09**
	Female	28	40	17	085	17	32	12	**061**	**16**	**02**

Table 1: Demographic details of the participants in author's observational study

The basic analysis of the above data infers that two third of Indian population enters the elderly age group of 60yrs with multimorbidity, usually combination of Hypertension, Diabetes, Angina /MI/stroke, Chronic Respiratory disease, IBS, BPH, Cervical or Breast cancer (women). By the time they reach the decade of 70-79, all these conditions continue and the risk of getting Cancers of Prostate, Oral, increase, taking the proportion of MM affecting 82% of this age cohorts. Among the few surviving beyond 80 years Frailty, Depression, Balancing problems and Blood cancers get added to take the cumulative illness proportions to 90%.

Cause of Death among those who died in last 20 months (Jan 2023 to Aug 2024) **(N=07):**

a) Two of the UNIEF colleagues died one each due to Cardiac failure and MI
b) KMC 62 batch male colleague died of Cardiac arrest after prolonged COPD and second due to female secondary to Breast Cancer secondaries
c) One of the ALHS friends succumbed to Myeloid Leukemia and another lady by suicide due to poisoning.
d) One of the relative died of Hepato- renal failure

Discussions:

Health status fluctuations as age advances is a challenge for the individual, family, family doctor, and more so to specialists and for the State or country's public health programming, globally but more so in the developing countries. Elderly adults are at a greater risk of vulnerability due to their physical, mental and functional health risks. With rapidly rising ageing population and increasing burden of non-communicable diseases (NCDs) older adults in India and other developing countries are at a greater risk for multimorbidity's [1]. The Global Burden of Disease Study (GBD) 2021, expects a rise of life expectancy by 4.9 years for men and 4.2 years for women by 2050, despite multiple global health and pandemic threats. This longevity of life will lead people to spend more years in poor health, suffering from CVDs, Diabetes, COPD, Cataract, Deafness, Depression, Cancer, & Poor Cognitive health. Ischemic heart diseases will lead the cause of mortality, followed by strokes, COPD, Cardio-Respiratory, Cardio -Renal failure.

Multimorbidity is increasing in various population groups due to population aging, lifestyle changes, improved socioeconomic conditions, and improved diagnostic capabilities by health services and management capacities [2]. The regional differences of pooled MM by gender indicate that among females South America leads with 50.1% followed by Europe (F=43.4%), North America (F=39.4%), Asia (35.6% & Africa (33.3%) Among Men MM is led by Europe (37.4%), South America (36.7%), North America (36.6%), Asia (31% and Africa (25.9%). The low prevalence in Africa suggests that there may be many undiagnosed chronic illness patients in Africa. MM among men and women in the same region, analysis indicates that South America shows a big difference of 13.4%, Africa 7.4% and Europe 6%, Asia 4.6% and the least in North America 2.8% [2]. Similar gender differences in MM are observed in Indian studies [4,5,6, 7,8,9,10]. The MM trend in the last two decades is suggestive of the global burden of multimorbidity continuing at the same pace. A high prevalence of multimorbidity among European, North and South American elderly is drawing attention of all countries for immediate effective and integrative interventions for older adults across the world, discouraging the trends of vertical specialization practices at the cost of general practice. There needs to be a good referral mechanism by general practioners seeking and coordinating the requisite specialist care [2,18,19,20,21].

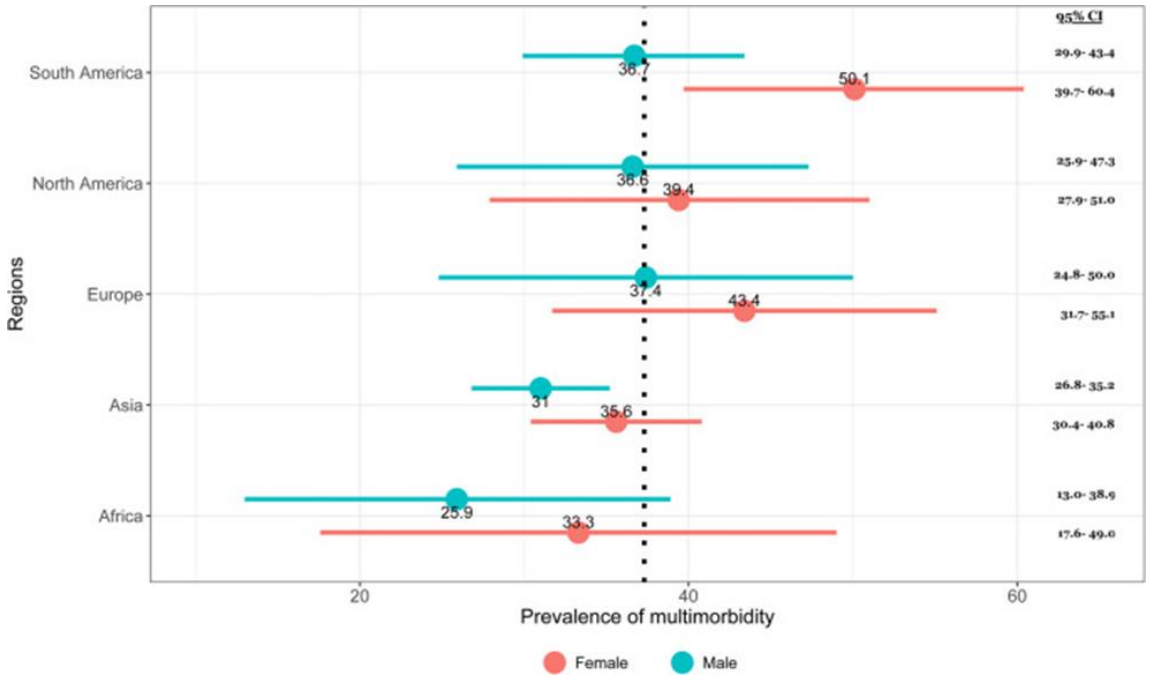


Figure 1: Regional differences of pooled prevalence of multimorbidity by gender.

Source- Global & regional prevalence of multimorbidity in the adult population in community settings [2]

Burden of Multimorbidity in India: Being aware of the common health problems of our seniors facing helps health system not only plan for the prevention and stay prepared for any impending health emergency. A National Council for Older Persons (NCOP) under the chairperson of the Minister of State for Social Justice and Empowerment was set up in 1999 to operationalize the National Policy on Older Persons. According to the NCOP India close to 92% of elderly have at least one chronic disease, and 77% have at least two. Consequent to the popularization of a single health checkup by most laboratories in India which offers 33 health parameters, more and more hidden conditions like Dyslipidemia, Diabetes, Arthritis, hypertension, etc. are being diagnosed in the last decade. Based on such studies in the recent years "Metropolis" a group of nationwide lab services lists 6 most common health conditions in elderly [5] and ways to manage them as:

1. heart disease: This is a chronic condition causes close to two-third of all deaths among the aged. The symptoms of heart disease are not always apparent and are highly likely to get ignored. i) Keeping check and restricting the intake of bad fats (trans fats and saturated fats), Motivating to cut down on alcohol (or remove it altogether) and quit smoking, iii) Exercising at least 20-30 minutes every day and iv) Limiting daily salt intake to reduce sodium consumption are the key measures to be followed by the individuals and the

primary responsibility of their family physician to monitor the same [4]. A recent report from another a diagnostics firm "Healthians found that 31% of Indians have high cholesterol, with the 35-54 age groups being the most affected, accounting for 34.5% of the cases. The report, based on three years of health tests, identified Kerala as having the highest prevalence of Dyslipidemia at 63%, followed by Karnataka (31.9%), Telangana (27.4%), Maharashtra (27.3%), and Punjab (24.5%). India is experiencing a significant rise in lifestyle-related health issues driven by stress, poor dietary habits, and inactive lifestyles. The report also highlighted that high cholesterol affects men and women equally, with 31% of men and 30% of women affected [5]. According to a study by Healthians, 6 in 10 Indians have abnormal levels of cholesterol. The study analyzed blood test data from 2.66 million people in over 250 cities in India recently. The findings include: 63% of Indians have high LDL cholesterol. 69% of people aged 31–40 have abnormal LDL levels, 36% of Indians have abnormal levels of HDL cholesterol, Dyslipidemia is a major risk factor for atherosclerosis. In India, the most common types of dyslipidemia are: Low HDL cholesterol, High triglycerides, and Borderline high LDL cholesterol. The factors that contribute to the prevalence of dyslipidemia in India are- Unhealthy diet, Smoking and tobacco use, low Physical inactivity, Alcohol consumption, Reheating oils for deep frying and eating large quantities of sweets during celebrations. Low awareness of dyslipidemia, low treatment seeking rates, high cost of treatment, and Lack of periodic health checks add to the problem.

2. Diabetes: This is chiefly a lifestyle-related condition that results in an inability to process sugar by our body. High blood sugar can have serious long-term effects on the health and can also lead to kidney disease, heart diseases, etc. The risk of getting diabetes increases as one ages. In fact, adults aging 65 or older are at a greater risk of becoming diabetic. Avoiding a sedentary lifestyle and keeping active in day-to-day routine, reducing carb and unhealthy fats in the diet, testing for blood sugar levels periodically and taking medicines as advised by doctors are the ways to manage the problem

3. Dehydration: This means that our body lacks enough levels of fluids. Inadequate body fluids have an adverse impact on elderly people health, leading to urinary tract infections, electrolyte imbalance, etc. Elderly people must drink at least 3 liters of water every day. People with heart failure need to be watchful of excess water intake. One must also Limit the intake of fluid-depleting drinks like alcohol and caffeinated beverages. It would better to consume more of fruits, herbal teas, etc.

4. Chronic constipation: Not able to defecate properly and feeling full is a fairly common problem in elderly. Though not of any immediate serious implication, if it becomes frequent and severe, it can lead to bloating, indigestion, nausea, and stomach pain. The major cause of constipation are a lack of physical activity and fiber in diet. Consuming more fruits and green leafy vegetables in the diet for more roughage, keeping well-hydrated, exercising regularly to maintain healthy bowel movements and seeking help if these do not help.

5. Conditions related to mental health: Around 15% of people aging 60 and above are affected with at least one mental health conditions. like Alzheimer's disease, depression, and anxiety. Staying connected with neighbors, family, and friends. Virtual connection if in person is not possible during the pandemics or any other reasons. If you can't be around your loved ones adopting a pet, picking up a new hobby like gardening, knitting, pottery, etc. and keeping a check on feelings and emotions are way to address most mental health issue.

6. Bone and joint related disorders: Conditions like osteoarthritis, rheumatoid arthritis, and muscle aches are common in elderly. Arthritis affects almost half of all people of age 65 and older. Bone and joint related disorders can have a massive impact on the quality of life as they affect your participation in daily activities. Participating in physical activities within our range of movements, taking enough of calcium and vitamin D rich foods to never fall short of these nutrients, ensuring to get enough sun and using various anti-inflammatory foods in the daily diet such as nuts, seeds, fatty fishes like salmon, etc., Getting tested for arthritis and related conditions, having fall support in bathrooms to avoid any accidental fall can add year and happiness to elderly life. The family physicians must manage health conditions in elderly, make sure to shower our love and care in every possible way! that's indispensable.

Over 30 million Americans have some measure of osteoarthritis. Even today, science is not sure why cartilage in our joints deteriorates, osteoarthritis' causes also remain clouded; and it is not even clear as to what can be done to halt arthritis. Arthritis doesn't have a cure, but it can be curbed it or at least can control it. People can live well with osteoarthritis. Today we have most effective tools, safest medications, and newest techniques to stop pain, protect your joints, reduce discomfort, and improve mobility.

Prevalence of single morbidity was 30.3%, and multimorbidity was 32.1% among older people in India. Multimorbidity was higher among females and in urban areas and increased with age and among those living alone [3]. The prevalence of multimorbidity was 45.26% among the urban poor. Hypertension and oral morbidities were the most observed dyad. Poorer individual [AOR: 1.27 (1.06–1.51)] have higher chances of having multimorbidity than the poorest. People with a health insurance [AOR: 1.40 (1.14–1.70)] had a higher risk of having multimorbidity, as they sought care, while those with no Health Insurance didn't seek care for minor ailments. In-patient admission was significantly higher among participants having multimorbidity. Out of pocket expenditure increased while self-rated health deteriorated with each additional morbid condition [4,5]. In India, the burden of COPD is expected to rise significantly, due to air pollution, high tobacco consumption, ischemic heart disease, and poor childhood lung development. Increasing burden of Dyslipidemia will lead to Obstructive blockages and sudden blood clots paving way for heart attacks. Metabolic non-communicable disease health report of India by the ICMR-INDIAB nationwide cross-sectional epidemiological study (ICMR-INDIAB-17)12 on 113043 individuals (Rural= 79506 and Urban 33537) showed the prevalence of dyslipidemia to be 81.2 %. In 2024 [8] Therefore, the public health experts and Cardiologist stress the importance of preventive measures, like healthy eating, regular exercise, good sleep and managing hypertension, diabetes, and cholesterol, to improve overall well-being [9].

Most common health problems in Urban population are i) Osteoporosis, causing bones to become weak and break easily, ii) Arthritis that causes joint pain, stiffness, and reduced range of motion, iii) Chronic obstructive pulmonary disease (COPD), a lung disease that causes breathing difficulty, excessive coughing, chest tightness, and wheezing, iv) Alzheimer's disease with complex pathogenesis and challenging treatment options, v) Poor cognitive health, depression associated with decreased life expectancy, vi) Dementia if moderate to severe to is called geriatric syndrome vii) Incontinence- inability to hold urination viii) Falls-that occur at least three times a month or cause a fear of falling to be considered a geriatric syndrome, ix) sleep disorders, x) anxiety, xi) psychosis, xii) hearing loss, xiii) cataracts, xiv) refractive errors, xv) back and neck pain, xvi) Hypertension and xvii) diabetes xviii) Vit D and Vit B12 deficiency [7]

Differences in health problems among the elderly in rural & urban India:

The national cross-sectional data of 67,489 individuals (≥45 years) in 2017–2018 from 35 states and union territories of India reported that Urban areas have a higher prevalence of non-communicable diseases (NCDs) like coronary heart disease and diabetes, due to a combination of lifestyle and environmental factors. The study population represented by majority (70.4 %) living in rural areas, 10.3 % urban migrants & 19.3 % urban slum dwellers.

A multivariable logistic regression analysis indicated urban migrants, and urban dwellers had a higher self-rated health status, cognitive functioning, physical inactivity, overweight or obesity and abdominal obesity than rural dwellers, while urban migrants and/or urban dwellers had lower functional disability, insomnia symptoms, current smokeless tobacco use, current smoking, heavy episodic drinking and underweight than rural dwellers. Urban migrants and/or urban dwellers had higher odds of diabetes, hypertension, heart disease, cancer, high cholesterol than rural dwellers, while urban migrants and/or urban dwellers had lower odds of persistent

headaches, major injury, recurrent fall, physical pain, periodontal disease, vision impairment, and gastrointestinal problems than rural dwellers [5,6,7].

Among 30 health indicators assessed, 16 had an urban migrant and/or urban dweller advantage, 8 had urban migrant and/or urban dweller penalty, and 6 did not differ between rural-urban groups. Public health promotion and health care must address differing health care needs of rural and urban older adults.

Gender & Multimorbidity Combinations in India:

a) Common illnesses of Elderly Women in India: Elderly women's multimorbidity causes include- i)Heart disease: A chronic condition Atherosclerosis- fat deposition in blood vessels resulting in weight gain and high blood pressure, ii) Arthritis: joint pain, muscular stiffness, and inflammation iii) Diabetes, that damages the eyes, kidneys and heart over time iv) Cancer: The risk of Breast, Cervical cancer etc. increases as women age v) Cognitive Health- Depression, Dementia, Alzheimer's disease vi) Mental Health -15% affected by 60 yrs., which increase as the age advances vii) Bladder Control & Constipation viii) Eyesight (Cataract) & Hearing problems ix) Frailty x) Edentulism- when one or more teeth are missing, or need removing due to injury or disease is called Edentulism. The leading causes of tooth loss include untreated cavities (tooth decay), periodontitis (gum disease with associated bone loss), and smoking. Most women with chronic conditions have untreated dental conditions, more often and lead to Malnutrition, xi) Chronic back pain, Senile Pruritic, and elder abuse xi) Postmenopausal Syndromes: Menopausal symptoms like hot flashes & vaginal discomfort, may continue after age of 60 years also among some women, with potential long-term health risks for women. Latest good news is that contrary to earlier concerns, HT, containing oestrogen and progesterone, is safe and beneficial, for women aged 65 & above.

a) Common illnesses of Elderly Men in India:

Elderly men in India suffer multimorbidity due to combination of causes i) Diabetes associated with irreversible vision loss ii) Hypertension, often unrecognized and leads to various health issues if untreated for long time, iii) Osteoporosis weakens bones, making susceptible to fractures in a fall iv) Arthritis - Pain due to inflammation and swelling around joints, v) heart disease- lesions or blockage in the heart vessels due to deposits of fat, cholesterol, calcium, and platelets. vi) Cancers- Oral, Lung, Prostate, Primary liver cancers, Blood and Colo-rectal cancers are common, and the risk increases with age viii) Chronic Obstructive Pulmonary Disease (COPD) -Smokers are most likely to suffer from COPD, and men exposed to pollution, irritating gases, or particulate matter for a long time as an occupational hazard, ix) Asthma.

c) Gender Differences in Multimorbidity in India:

Prevalence rates of chronic heart diseases (5.8% vs. 4.6%), chronic lung diseases (9% vs. 8%), and diabetes (14.6% vs. 13.9%) were higher among the male older adults than in the female older adults. In contrast, the prevalence of hypertension was higher among the female older adults (37.1% vs. 28%) than in the male older adults. The odds of diabetes were lower among the older adults living with spouse and/or others [OR=0.54] than living alone. The odds of chronic lung diseases (OR=0.62) & chronic heart diseases (OR=0.72) were lower among females than in males [8]. In the multimorbidity criteria scale, heart failure, autoimmune diseases, dementia, & osteoarticular diseases are more in women, while ischemic heart disease, chronic respiratory diseases, & neoplasms predominate in men.

Culture & Multimorbidity: Cultural health beliefs can affect how people think about health, seek care, and respond to treatment recommendations. These beliefs impact multimorbidity patterns and care seeking behaviors in older adults in India: i) Sociodemographic factors- Multimorbidity is more common in females than males, in urban areas than rural areas, and in higher wealth quintiles. It's also more common in certain regions of India, such as the south and northeast, ii) Family- Multimorbidity is prevalent within families, including between spouses, siblings, and across generations iii) Age- MM prevalence increases with age, but slightly decreases in people over 80 iv) Education- Multimorbidity increases with education, basically due to awareness and improved care seeking behavior but decreases in people with higher education who take well informed judgment to consult and manage in early stages vi) Religion- People from Hindu and other religions have less multimorbidity than those from the Muslim religion viii) Caste- People from the Scheduled Caste (SC) category have less multimorbidity than those from the Other Backward Class (OBC) and others category basically as they mostly are hardworking labor class and also care seeking behavior as they don't rush to seek care for minor illnesses ix) Living arrangements- People living alone have higher multimorbidity than those living with others, but people living with children have higher multimorbidity than those living with others.

The culture of living with children in old age is preferred and socially recognized in Indian society which has two-way benefits. Elderly parents' health and daily needs are taken care of by the children, and in return, parents provide childcare for young grandchildren, which echoed the non-financial aspects of co-residence in a joint living arrangement. The living arrangement of the older adults, coupled with socioeconomic conditions, has a strong association with multiple chronic diseases, especially non-communicable diseases as the disease burden of the older adults requires financial security, which determines comfort of the life of the older adults. Existing studies have revealed that older adults living in close families in low and middle-income countries like India, have a low short-term illness and lesser disease burden on the family. A study that assessed 2 weeks period prevalence of MM reported that 60% elderly in rural India had MM during that period. The study has identified vulnerable groups to guide policy makers in developing holistic care packages for MM [5].

Impact of Multimorbidity on Long-Term Outcomes after Emergency General Surgery

A study on the impact of multimorbidity on long-term outcomes for older emergency general surgery patients among Medicare beneficiaries aged 65 and older who underwent operative management of an emergency general surgery condition, compared multimorbid patients (a specific combination of comorbid conditions known to be associated with increased risk of in-hospital case fatality) with those without multimorbidity. The study also calculated Risk-adjusted outcomes through 180 days after discharge from hospitalization. It included 174,891 patients and identification of 45.5% as multimorbid and observed case fatality rates during index hospitalization and through 6 months after discharge. It reported higher rates of readmission at one month and six months after discharge, lower rates of discharge to home, higher rates of discharge to rehabilitation/nursing facility, greater than double the use of home oxygen, walker, wheelchair, bedside commode, hospital bed, a longer hospital stay and higher costs through 6 months among MM patients [11].

General Medical Practice today:

Approach to a patient depends upon the qualification of the service provider. In India medical education for basic degrees in Allopathy- MBBS, Indian System of Medicines (ISM) like Ayurveda (BAMS), Homeopathy (BHMS), Unani, Siddhi system train the students to approach a patient, while giving due to considerations to presenting symptoms and make a provisional diagnosis with possible differential diagnosis if not sue of the sole condition. However, in the last 2 decades we see, with the advent of specialization and superspecialist more and more biochemical markers and Imaging techniques are being used that tends to identify the pathology either anatomical or function and try to rectify them and leads to compromising the practice of looking at the patient comprehensively, knowing well that the biomarkers or Imaging of all individuals are rarely normal always. This is recognized by these specialties (Imaging/Clinical Labs) and therefore, a note in small letters is seen at the bottom of each investigation reports that reads" Corroborate laboratory values with clinical findings"

GPs: Primary health care providers or general practitioners deal with multimorbidity patients based on one's own experience in the community they serve, but with scarce, relevant evidence-based interventions. In most urban India, the family doctor (Physician) concept is waning. 70% of our 271 elderly colleagues residing in all state capitals report that there are hardly any

general practitioner clinics these days. If there are any, they are in urban poor or slum localities & run by quacks.

Specialists & super-specialists: Approaching Specialists in the last 3 decades and SS in the last decade is the trend to seek care for all educated and Urban people. While a specialist knows and practices his/her practicing system (surgeon, physician, Obstetrician & Gynecologist, Pediatrician, Otorhinolaryngologist, Ophthalmologist etc.), a "super specialist learns, knows and does almost everything about almost nothing" we say. The patient is not seen as an individual but only a small part of him /her is made to function to the full potential, sometime at the cost of something else.

The single disease approach is better suited for acute illnesses, while the multimorbidity approach is better suited for chronic conditions that affect multiple systems in the body. The management of people with multiple chronic conditions challenges general practitioners and health-care systems designed around single conditions. Knowledge about MMM over time is required to inform the development of effective interventions.

Magnitude of MMs and outcomes of Patient Centered Management of MM in Elderly:

A systematic review on multimorbidity in primary care demonstrated a high prevalence ranging from 30% in all adults to 60% among those aged 65–74 years. However, the majority of these were western studies. Recently high levels of multimorbidity have been shown in low- and middle-income countries as well [2].

There is international consensus that care for multimorbidity should be patient-centered, focus on quality of life, and promote self-management towards agreed goals. Five multimorbidity prospective cohort studies in primary care settings- three studies in the US and two in The Netherlands form the basis of current recommendations, even though these findings cannot be generalized as none of the studies was representative of any community, province or a country. All of them studied with a focus on the i) healthcare utilization and/or costs (n = 3); ii) patients' physical functioning (n = 1); and iii) risk factors for developing multimorbidity (n = 1) for a duration of 1–4 years. The findings of these studies showed that multimorbidity increased healthcare costs, hospitalization rate, case fatality rates, and service use, and reduced physical functioning. No study so far has focused on prevalence, treatment use, patient safety, service models, cultural or socioeconomic factors, and patient experience. No study collected qualitative data so far.

However, what we need is the patient-centered, 3D approach based on dimensions of health, depression, and drugs for patients with multimorbidity that would improve their health-related quality of life. The effective elements in patient centered and multimorbidity care approaches, are promoting self or family members management support interventions and developing training for healthcare providers for the most frequent categories of interventions with the potential to result in providing relief from presenting or exacerbated symptoms and long-term positive impact for patients with chronic diseases.

Managing multimorbidity in elderly people include a regular comprehensive review of patients' problems according to their individual circumstances, a focus on quality of life and function as well as disease control, tailoring treatment recommendations to everyone's priorities and situation, balancing risks and benefits of treatment.

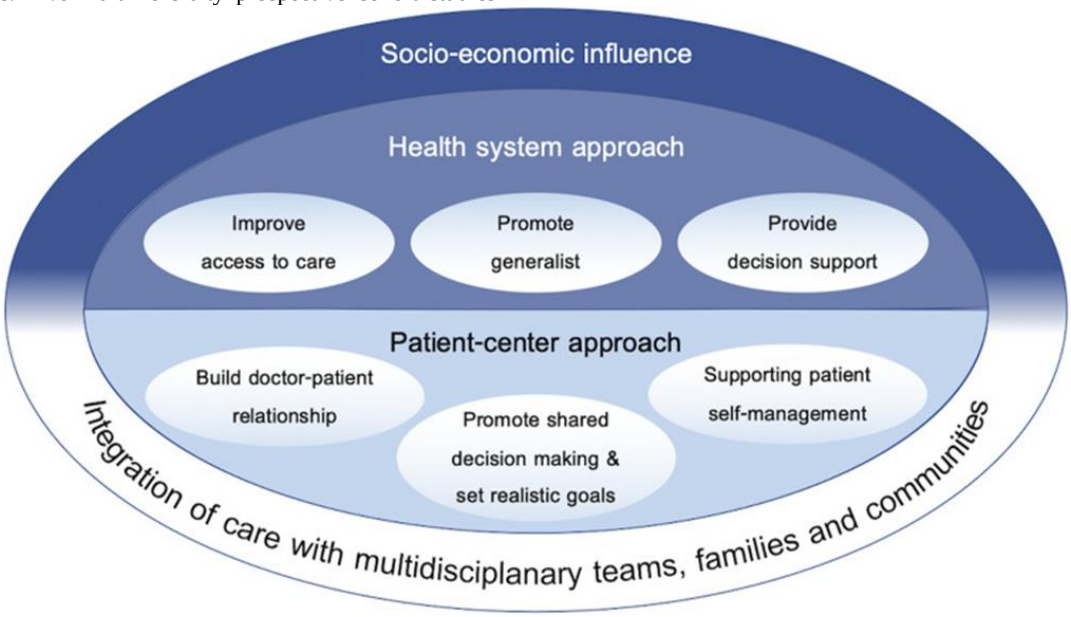


Figure 2 - Integration of Care with Multidisciplinary Teams, families and Communities (ref-2)

Communicating with older patients is a skill and challenge for the practitioners. One must, i) Speak to the patient as a fellow adult, ii) make older patients comfortable, iii) Avoid hurrying iv) Speak plainly, use simple words, avoid medical abbreviations or words like MI, BPH, Kochs BD, TDS etc. v) address the patient face-to-face, vi) write down or print out takeaway points for the patent and the attendants to follow vii) Get ensured that the instructions are understood with relevant feedback regarding the drug names, dose each time, how many times to take, before or after meals etc. viii) recognize that people from different backgrounds have different expectations & try to meet as many as possible for each patient.

Disappearance of General Practice an hinderance for Multimorbidity Management (MMM) Multimorbidity is the coexistence of several chronic conditions in a patient, which represents a great challenge for healthcare practitioners, systems and society. In India medical education for basic degrees in Allopathy- MBBS, Indian System of Medicines (ISM) like Ayurveda (BAMS), Homeopathy (BHMS), Unani, Siddhi system train the students to approach a patient, while giving due to considerations to presenting symptoms and make a provisional diagnosis with possible differential diagnosis if not sue of the sole condition. However, in the last 2 decades we see, with the advent of specialization and superspecialist more and more biochemical markers and Imaging techniques are being used that tends to identify the pathology either anatomical or function and try to rectify them and leads to compromising the practice of looking at the patient comprehensively, knowing well that the biomarkers or Imaging of all individuals are rarely normal always. This is recognized by these specialties and therefore a note in small letters at the bottom of each investigation reports reads" Corroborate laboratory values with clinical findings"

Globally The Integrated Multimorbidity Care Model (IMCM) was recently designed within the Joint Action on chronic diseases and promoting healthy ageing across the life cycle (CHRODIS) to ensure the continuity of care for patients with multimorbidity.

The effect of European pilot interventions was assessed using the Assessment of Chronic Illness Care (ACIC) measure, and by 226 patients with the Patient Assessment of Care for Chronic Conditions (PACIC+) survey. The ACIC total score significantly increased (5.23 to 6.71, $p = 0.022$) after the intervention, with differences across sites. A significant increase in the PACIC+ summary score was found ranging from 3.25 at baseline to 4.03 after the intervention ($p < 0.001$), and 58% of the sample perceived an improvement in care. Higher PACIC+ scores after the intervention were associated to lower baseline values in the respective PACIC+ dimension and to greater changes in ACIC delivery system organization. The IMCM implementation can help improve the quality of care for patients with multimorbidity [11].

Researchers tracked 10 million elderly women from 2007 to 2020 and found that prolonged estrogen use after age 65 reduced mortality and cancers, including breast, lung, colorectal, and heart-related conditions. Combining oestrogen with progestogen therapy increased breast cancer risk but could be mitigated with low doses. The study confirmed the safety and potential benefits of long-term hormone therapy (HT) use, especially for women using oestrogen alone. It provides insights into HT nuances, dosages, administration routes, and formulations, enabling personalized treatment. Progestin usage reduces risks in endometrial, ovarian, ischemic, congestive, and venous thromboembolism, emphasizing the need for customized treatment [13].

National Efforts to Address Multimorbidity among elderly in India:

Ayushman Bharat, a flagship scheme of Government of India, was launched as envisaged in the National Health Policy 2017, to achieve the vision of Universal Health Coverage (UHC), without "leaving no one behind." Ayushman Bharat is an attempt to move from sectoral and segmented approach of health service delivery to a comprehensive need-based health care service, is planning to undertake path breaking interventions to holistically address the healthcare system (covering prevention, promotion and ambulatory care) at the primary, secondary and tertiary level, adopting a continuum of care approach.

PM-JAY is the world's largest health insurance/ assurance scheme fully financed by the government. It provides a cover of Rs. 5 lakhs per family per year for secondary and tertiary care hospitalization across public and private empaneled hospitals in India. An estimated over 120 million poor and vulnerable entitled families and approximately 550 million (One third of the country's population) beneficiaries are eligible for these benefits. PM-JAY provides cashless access to health care services for the beneficiary at the point of service. It covers up to 3 days of pre-hospitalization and 15 days post-hospitalization expenses such as diagnostics and medicines covering all pre–existing conditions from day one. There is no restriction on the family size, age or gender, religion and caste. Benefits of the scheme are portable across the country, meaning a beneficiary can visit any empaneled public or private hospital in India to avail cashless treatment. Services include approximately 2000 procedures covering all the costs related to treatment, including but not limited to drugs, supplies, diagnostic services, physician's fees, room charges, surgeon charges, OT and ICU charges etc. Public hospitals are reimbursed for the healthcare services at par with the private hospitals. PM-JAY envisions to help mitigate catastrophic expenditure on medical treatment which pushes nearly 6 crore Indians into poverty each year. National Health authority, implementing Ayushman Bharat-Pradhan Mantri Jan Arogya (AB-PMJAY) is working on adding 25 health packages that will cater to old age-related ailments, with the Government of India recently committing to expand the coverage to all senior citizens aged 70 years and above irrespective of their income group.

The expanded scheme with cover all expenses related to medical examination, treatment and consultation, Pre-hospitalization Medicine and medical consumables, non-intensive and intensive care services, Diagnostic and laboratory investigations, medical implantation services (where necessary), hospital bed benefits, food services, complications arising during treatment and post-hospitalization follow-up care up to 15 days

Some Common MM Dyads & Triads in India:

The most common combinations of chronic conditions among elderly men in India are i) Hypertension and HDS (10.3%), ii) Hypertension and diabetes (9.7%), iii) Hypertension and arthritis (8.3%), and iv) Arthritis and HDS (6.7%). Other common chronic conditions among the elderly are chronic lung diseases (COPD, Asthma, Bronchitis), chronic heart diseases (CCF, Atrial Fibrillation), stroke, Cataract, Deafness and cancer.

Similarly, some common chronic conditions among elderly women in India include- i) Hypertension (38%) & diabetes (31%) , ii) Chronic Heart disease-CCF, Atrial Fibrillation iii) Acute upper respiratory tract disease or exacerbation of chronic LRI conditions, iv) Asthma, v) Stroke, Arthritis, Cataract, deafness and cancers.

Regional variations are also observed int he prevalence of chronic diseases such as- Southern region has the highest prevalence of chronic diseases, and central region has the lowest prevalence of chronic diseases. Rural areas have a lower prevalence of chronic diseases compared to urban areas, except for Kerala and Tamil Nadu. The lower prevalence may be due to access to services particularly diagnostic facilities.

The older people in the state of Kerala have a high prevalence of multimorbidity (59.2%), probably due to literacy, care seeking behaviors and access to health services

A community-based cross-sectional study in rural Andhra Pradesh using multistage cluster sampling technique studied 2419 adult participants from 40 clusters in 2018. There were only 216 (9.5%) elderly people in the study. Multimorbidity was assessed using Multimorbidity Assessment Questionnaire for Primary Care (MAQ-PC) tool, collecting information on 13 chronic diseases. Patient Health Questionnaire (PHQ-12) was used to screen for depression. The results indicated that Mean age (standard deviation) of participants was 48.1 (13.1 +/- SD) years. The overall prevalence of multimorbidity was 58.5%; with 30.7%, reporting two illnesses, 15.6%, three, and 12.2% four chronic conditions, respectively. Acid peptic disease-musculoskeletal disease (44%) and acid peptic disease-musculoskeletal disease-hypertension (14.9%) were the most common dyad and triad. Among metabolic diseases, diabetes-hypertension (28.3%) and diabetes-hypertension-chronic kidney disease (7.6%) were the most common dyad and triad, respectively. Advancing age, female gender, and being obese were the strongest determinates of the presence of multimorbidity. Depression was highly prevalent among the study population, and participants with higher PHQ-12 score had 3.7 greater odds of having multimorbidity.

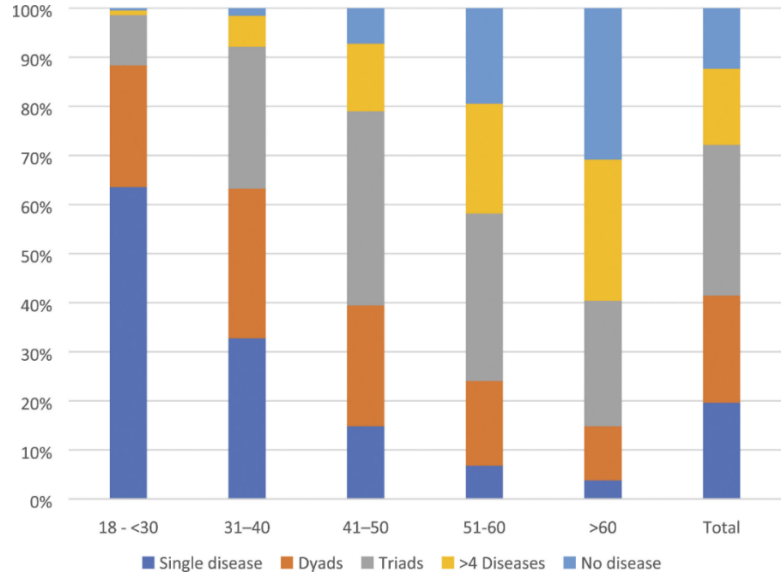


Figure 3: Disease distribution among a community Based Study in AP, India

The above graph indicates that Singe disease (62%) was dominant among 18-30 years, with less than 2% being normal. In the elderly population nearly 30% had Triads, followed by 22% having dyads, another 18% single disease, 18% had 4 diseases and nearly 13% were devoid of any disease.

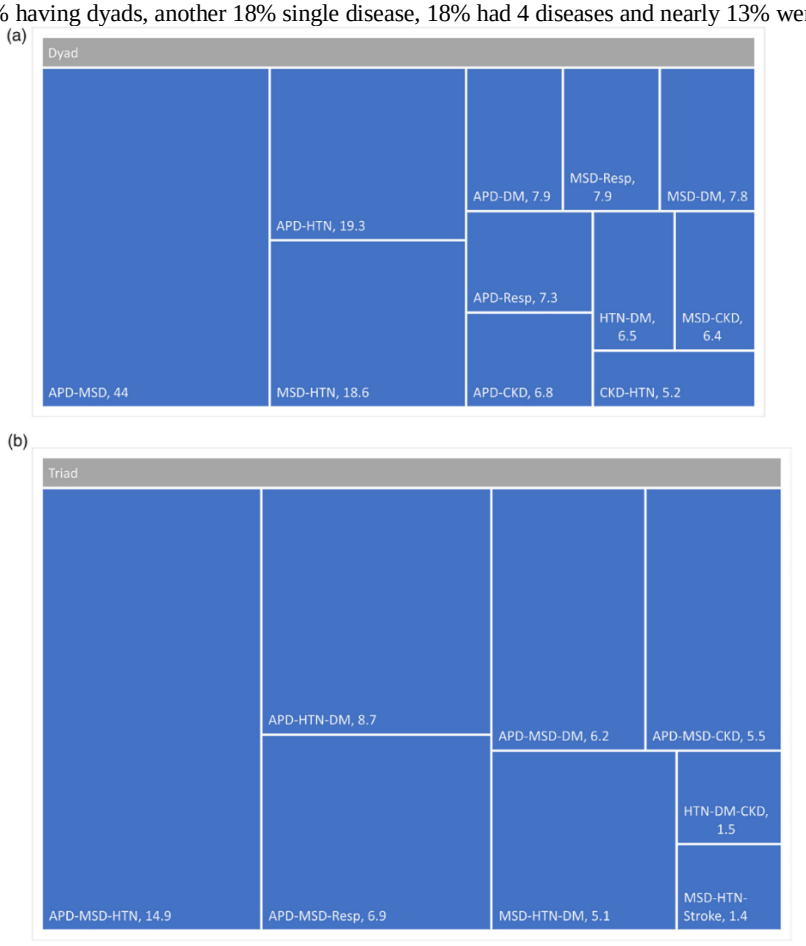
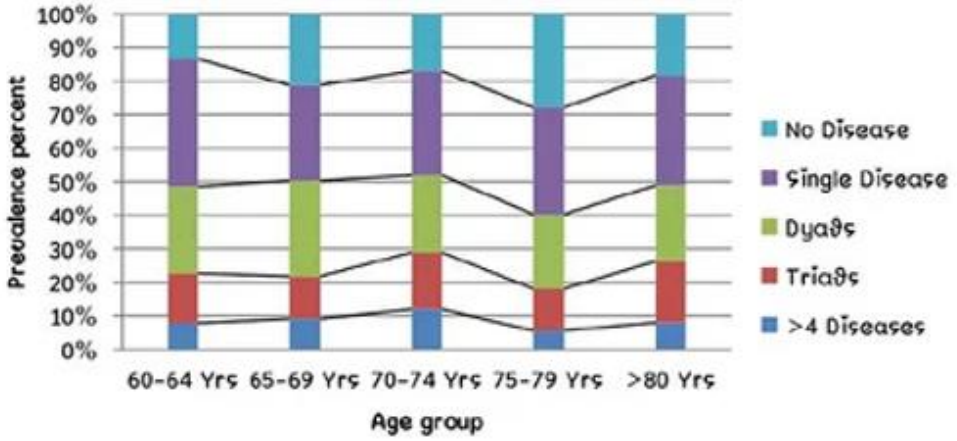


Figure 4. (a): Tree map depicting burden of morbidity combinations among common dyads. (b): Tree map depicting burden of morbidity combinations among common triads.

Note: APD= Acid Peptic disease, **MSD**= Musculoskeletal diseases, **HTN**= Hypertension, **CKD**= Chronic Kidney Disease, **DM**= Diabetes Mellitus, **Resp**= respiratory diseases. Stroke



Another study in rural Odisha, included a total of 725 rural older adults female -47.9% (n = 347) and the rest male. The mean age was 70.24 years (SD = 8.37 years) and ranged between 60 and 106 years. The overall prevalence of multimorbidity was 48.8% (CI = 45.1–52.5%; n = 354) and among them dyads were most common = 25% (CI: 21.8–28.2%) followed by triads =15.2%; (CI: 12.6–17.9%). Four or more chronic diseases were seen in 63 persons = 8.7%; (CI: 6.7–10.9%). Among the study participants, 18.2% (n = 132; CI: 15.4–21.2%) had no chronic disease and 33.0% (n = 239; CI: 29.5–36.5%) had a single chronic disease.

Figure 5: Disease distribution among a community Based Study Odisha India

The overall prevalence of current smoking was 11.7% (n = 85) and consumption of alcohol (at least once a week) was 5% (n = 36). However, 72.1% (n = 523) used any one form of smokeless tobacco daily. While family history of diabetes was reported in 64% and Hypertension in 60%.

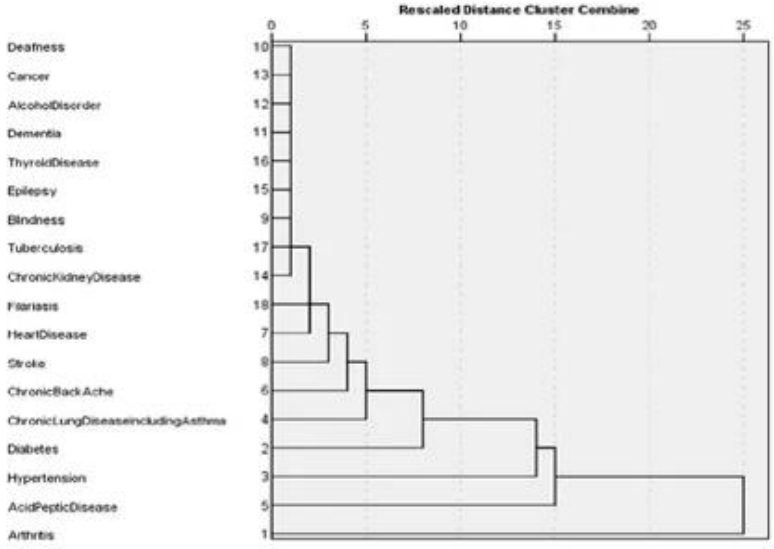
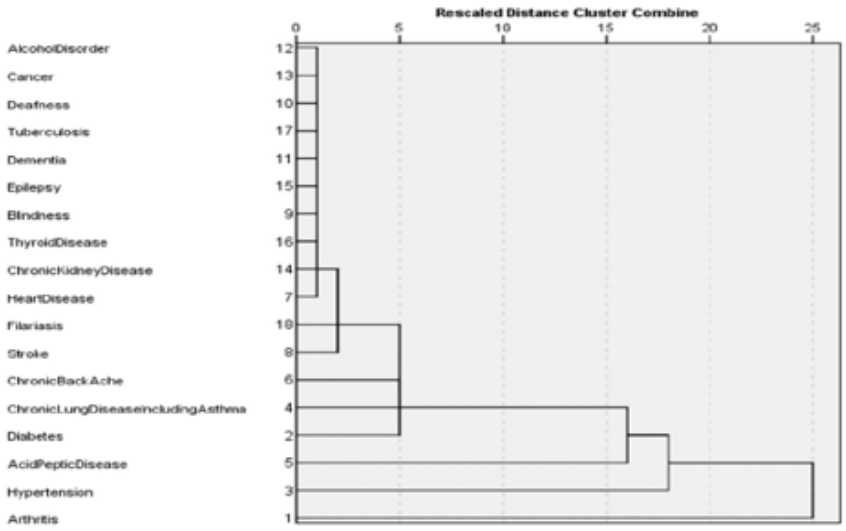


Figure 6. Cluster dendrogram for multimorbidity (CDfMM) in

a) CDfMM in<<males.
b) >>CDfMM) in Females



c)

A study with an objective of estimating the proportion of older adults with non-communicable disease (NCD) multimorbidity, its correlates and implications in selected Indian states, in which data of 9852 older adults (≥60 years) (men 47%, mean age 68 years) collected by the United Nations Population Fund in 2011 from seven selected Indian states.

Indian states based on proportion of elderly aged 60 years and above (in Parenthesis) and regional representation: Kerala (10.5%) and Tamil Nadu (8.8%) from the south, Punjab (9.0%) and Himachal Pradesh (9.0%) from the north, Maharashtra (8.7%) from the west and Orissa (8.3%) and West Bengal (7.1%) from the east. From each state 1280 households with older adults were selected. The primary sampling units (PSUs) were villages or urban wards. More than half (52%) were rural residents. Nearly half (49.0%) of the older adults were formally educated. Ever use of tobacco was 45.5% and ever use of alcohol was also 45.5%. Nearly one-fourth (24.2%) of the sample were in the lowest, 61.0% were in the middle and 14.8% were in the highest wealth index group. Sixty-three per cent of the older adults suffered from at least one NCD. Multimorbidity was seen among 30.7% of older adults. Of those with NCDs, 49% had multimorbidity. Among the elderly with multimorbidity, the most common clusters of conditions were arthritis and high-blood pressure (7.5%), arthritis and cataract (5.3%) and diabetes and high-blood pressure (4.7%).

Multiple logistic regression analysis results of NCD MM were reported by 30.7% (95% CI 29.8 to 31.7). Those in the highest wealth group, aged ≥70 years, alcohol users, women and tobacco users were more likely to report more MM than those without any & single NCD [8].

Chronic disease	**%** reported	% with comorbidity	Comorbidities (Mean±SD)
Arthritis (Rheumatism, osteoarthritis & osteoporosis)	30.6	15.7	1.8±0.9
High-blood pressure	21.0	14.0	2.1±1.0
Cataract	12.9	9.2	2.2±1.1
Diabetes	10.1	7.4	2.3±1.1
Lung disease (Asthma, COPD, Bronchitis)	9.1 5.	9 2.	2±1.2
Heart disease	5.8	4.3	2.4±1.2
Paralysis	1.8	1.1	2.1±1.1
Depression	1.5	1.3	2.9±1.5
Alzheimer's disease	1.4	1.1	2.8±1.5
Stroke (Cerebral embolism or thrombosis)	1.0	0.8	2.7±1.3
Dementia	0.9	0.8	3.1±1.5
Cancer	0.4	0.3	2.4±1.4

Table 2. Chronic NCD morbidity pattern in the sample population (N=9852)

Another study, taking data from Longitudinal Ageing Study in India (LASI) Wave 1- 2017–18. LASI is a multidisciplinary, internationally harmonized panel study of 72,250 older adults aged 45 and above, including their spouses less than 45 years, representative to India and all its states and union territories (excluding Sikkim). It is a baseline data of India's first longitudinal ageing study that provides a comprehensive scientific evidence base on demographics, household economic status, chronic health conditions, symptom-based health conditions, functional health, mental health (cognition and depression), biomarkers, health insurance, and healthcare utilization, family and social networks, social welfare programs, work and employment, retirement, satisfaction, and life expectations. The break-up study population based on the age was:

Age at last birthday	Number	%
≥ 45 Years	9168	12.69
46–60 Years	33,115	45.83
61–75 Years	24,002	33.22
Above 75 Years	5965	8.26

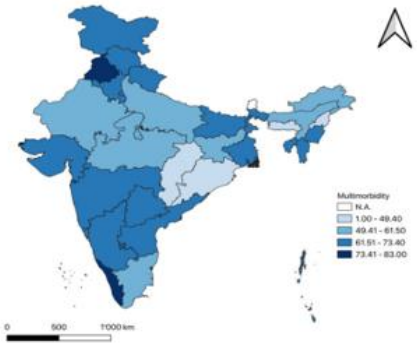
Table 3. Study population distribution according to age

The elderly population consisted of 41.48%, roughly 20% represented five sections of MPCE quintiles, a categorization of households based on their Monthly Per-capita Consumer Expenditure (MPCE).

Poorest	14,956	20.7
Poorer	15328	21.22
Middle	14,790	20.47
Richer	14,151	19.59
Richest	13,025	18.03

Table 4. Study population distribution according to MPCE quintile

The prevalence of multimorbidity was the highest in Punjab (83%), Chandigarh (78.7%), Kerala (78%), West Bengal (73.4%), & Goa (72.5%), while the lowest was found in Nagaland with 42.6%, followed by Chhattisgarh (44.6%), Meghalaya (48.8%), Odisha (49.4%) & Jharkhand (51.5%). Sothern states of Karnataka, Telangana, Andhra Pradesh, Maharashtra and Gujarat reported between 61.5-73.4% MM and reported less than 61.5%



Multimorbidity prevalence among the older adults in India at state level using LASI Wave-1 data

Approaches to common MM by Family Physicians:

A general practitioner must approach patients with multimorbidity by taking a person-centered approach that considers their individual needs, preferences, and social context. The strategy must include:

i) Discuss the patient's goals, values, & priorities in addressing current morbidities
ii) Review the patient's medications and other treatments.
iii) Discuss how the patient's health problems and treatments affect their daily life.
iv) Consider the patient's mental health and pain, common in people with long-term MM conditions.
v) Tailor treatment to the patient's individual priorities & situation.
vi) Promote self & Family members -management and share decisions with them.
vii) Agree on an individualized care plan giving priority too felt needs.
viii) Improving communication- Indian GPs or MOs have a rapport with the patient, if it is the first time a Patient has come, explain your role and their &family's role.
ix) Prioritize long-term relationships with patients to gain mutual trust and insight into their circumstances.
x) Promote generalist to see the patient as a whole and provide broad and holistic health care.

Caring for patients with multimorbidity in general practice is increasing in complexity. To integrate care for patients with multimorbidity and to support general practitioners (GPs), or PHCs and H&WCs GOI and State Governments established Community Health Centers / First Referral Units (FRUs) the Elderly Clinic for Multimorbidity (ECM) but they are not well supported with requisite HR, equipment, finance, management support. etc.

A CM established in 2012 at Silkeborg Regional Hospital, Denmark. It is an outpatient clinic that offers a comprehensive one-day assessment of the patient's complete health status and medication. GPs can refer patients with complex multimorbidity (≥2 chronic conditions). It involves collaboration across medical specialties and healthcare professions. The assessment is completed with a multidisciplinary conference and recommendation. In all, 141 patients were referred to the CM between May 2012 and November 2017. The median age was 70 years, 80% had more than five diagnoses, and in median patients had a usage of 11 drugs (IQI, 7–15). Physical and mental health was reported low (SF-12 score: 26 and 42). In median four specialties were involved and 4 examinations (IQI, 3–5) conducted.

The ECM offers innovative care by bridging & exceeding conventional boundaries of disciplines, professions, organizations, and primary and specialized care. The patients represented a very complex group, requiring many examinations & several specialists.

Challenging senile chronic Conditions for General Physicians in India:

Senile Pruritus: Of late senile pruritus- itching in any part of the body without a primary rash, in the absence of xerosis or other recognizable causes is called Senile Pruritus. Though Pruritus is a common symptom everybody experiences at any point in their life, in individuals over 65 years old impacts quality of life among elderly population. Dry skin is a common problem in Indian population and a cause for pruritus, xerosis must be ruled out first. Seborrheic dermatitis (SD) is associated with localized itch, and skin manifestation are characterized by overlying adherent, greasy scales. SD predominantly affects oily areas of the body, such as the scalp, periauricular area, nasolabial folds, cheeks, sternal area and interscapular areas and may also affect other body folds. Then comes the Psychogenic pruritus, somatoform disorders, dissociative disorders, schizophrenia, hallucinations, delusional Parasitosis. Nummular eczema (NE) is an extremely pruritic, inflammatory skin disease found in elderly patients and is considered as a late onset form of atopic dermatitis.

Cognitive Health:

Cognitive health is the ability to think, learn, and remember clearly. It's a key part of brain health and is important for performing everyday tasks. Factors that impact cognitive health include: i) Genetics: Genetic factors can't be controlled, ii) Lifestyle: Diet, exercise, and other lifestyle choices can impact cognitive health, which can be modified iii) Environmental factors like air and noise pollution, temperature rises impact cognitive health iv) Aging: It's common to experience some decline in cognitive function as we get older, v) Chronic health issues like Hypertension, diabetes, Asthma, IBD and Arthritis too impact cognitive health vii) Some medication used for chronic diseases also impact cognitive health as side effect. Stimulant drugs, like nicotine and amphetamine, improve cognitive function at lower doses but impair memory performance at higher doses. Depressant drugs, like alcohol, can cause long-term effects on prefrontal cortex function, disrupting cognitive abilities, viii) Emerging diseases like vascular cognitive impairment (VCI) and dementia in India contribute nearly 40% of the estimated 5.3 million dementia patients [13], ix) Traumatic Brain injuries (TBI): Moderate and severe TBI can cause personality changes including impulsivity, severe irritability, affective instability, and apathy. Mild TBI is associated with a range of affective symptoms, such as suicidality, posttraumatic stress disorder and major depressive disorder. Repetitive head impacts, often in athletic contexts, are associated with emotional and behavioral sequelae. Getting physically active by walking, Tai Chi, gardening, or housekeeping, doing task never done before can help ameliorating such problems [13,23]

The most common clusters of multimorbidity in India are arthritis and hypertension, arthritis and cataract, and diabetes and hypertension, Frailty and deafness, Balancing problems and Cognitive Health. India has three times higher mortality, and more than two times higher disability-adjusted life years (DALYs) compared to the global proportion of asthma burden, Arthritis, Depression, Diabetes, Heart Disease, Hypertension, Alzheimer's disease, Cancer.

A peer review of 126 studies covering 15.4 million people (32.1% were male) with a weighted mean age of 56.94 years (standard deviation of 10.84 years) from 54 countries around the world, indicated an overall global prevalence of multimorbidity was 37.2%, and among females -39.4% and Males 32.8% respectively. South America topped with 45.7%, followed by North America -43.1%, Europe -39.2%, and Asia -35%. More than half of the adult population worldwide above 60 years of age had multimorbid conditions (51.0%). It has been increasing in the last two decades, in developing countries and remained stable in the recent decade among adults developed countries [2]. Multimorbidity among aged ≥80 years [AOR: 4.08] than the younger age groups, and among the most affluent group [AOR: 2.64] than the most deprived class reported across the country in Indian studies [4].

A rural community study of 2419 participants of whom, 2289 completed the MAQ-PC tool. Mean age (standard deviation) of participants was 48.1 (13.1) years. In this rural Andhra Pradesh community based study researchers assessed Multimorbidity using Multimorbidity Assessment Questionnaire for Primary Care (MAQ-PC) tool, collecting information on thirteen chronic diseases. Researchers used Patient Health Questionnaire (PHQ-12) to screen for depression. The overall prevalence of multimorbidity was 58.5% (95% CI 56.5-60.6); with 30.7%, 15.6%, and 12.2% reporting two, three, and four chronic conditions, respectively. Acid peptic disease-musculoskeletal disease (44%) and acid peptic disease-musculoskeletal disease-hypertension (14.9%) were the most common dyad and triad. Among metabolic diseases, diabetes-hypertension (28.3%) and diabetes-hypertension-chronic kidney disease (7.6%) were the most common dyad and triad, respectively. Advancing age, female gender, and being obese were the strongest determinates of the presence of multimorbidity. Depression was highly prevalent among the study population, and participants with higher PHQ-12 score had 3.7 (2.5-5.4) greater odds of having multimorbidity**.**

Study Links Oral Microbiome to Cognitive Function in Older Adults: A recent study published in The Journal of Nutrition, Health, and Aging has found a significant association between the oral microbiome and cognitive function among older adults in the United States. The research focused on individuals aged 60 to 69, analyzing data from the 2011–2012 National Health and Nutrition Examination Survey (NHANES) [15]. The research suggested that oral microbial dysbiosis especially due to Campylobacter rectus and Porphyromonas gingivalis, contribute to cognitive decline and dementia through systemic inflammation. Periodontal disease, linked to oral microbial imbalance, is associated with increased inflammatory markers. However, extensive periodontal therapy can reduce these systemic inflammatory indicators. This study involved 605 participants aged 60-69, assessed subjective memory changes over the past one year. The findings showed that individuals with higher alpha diversity and Beta diversity in their oral microbiome performed better on the DSST and were less likely to report subjective memory alterations. The study noted lower cognitive scores were more common among older participants who were less physically active, had lower educational attainment, lower family income, pre-existing hypertension and diabetes, and were current smokers.

Hearing Loss & Cognitive Health Decline: Mild or disabling hearing loss in middle-aged and older adults is associated with cognitive impairment, as per a new study. However, there is no cognitive benefit from wearing hearings aids, except in people with depression. All available evidence supports that patients with hearing loss are at higher risk of cognitive impairment, mandating monitoring cognitive function in elderly with hearing loss."

Aging and Focus: Just as we may not run as fast or jump as high as we did as a teenager, our brain's cognitive power—that is, your ability to learn, remember, and solve problems—slows down with age. All will find it harder to summon once familiar facts or divide our attention among two or more activities or sources of information. These changes affect elders' ability to focus, so they find themselves getting more easily distracted than they were when they were younger. Hearing loss that often accompanies aging makes it more difficult to distinguish speech in a noisy environment, as hearing then requires more concentration than earlier, mild loss of the ability to focus affects speech comprehension.

Most people start to notice changes as they enter their 50s and 60s. Although these changes can cause consternation, most age-related memory and thinking problems don't stem from an underlying brain disease such as Alzheimer's disease. Instead, it reflects a slower processing speed & poor encoding and retrieval of new memories because of diminished attention. Even though our brain is slower to learn & recall new information, their ability to make sense of what they know & form reasonable arguments & judgments remains intact.

Many of these limitations are reversible and related to poor sleep, but structural changes that take place in elderlies brain as they age can explain some of these developments. Brain regions involved with memory processing, - the hippocampus and the frontal lobes, undergo anatomical and neurochemical changes over time.

The result is that as we age, it takes longer to absorb, process, & remember new information. The natural loss of receptors and neurons that occurs with aging may also make it harder to concentrate. Therefore, elders not only learn information more slowly, but they also have more trouble recalling it because

they didn't fully learn it in the first place. With slower processing, facts held in working memory may dissipate before they have had a chance to solve a problem. With ageing the ability to perform tasks that involve executive function declines with age. Some people learn to compensate for these changes by relying on habit most of the time and devoting extra effort to focus on new information they are trying to learn. Even the aches and pains of getting older can affect focus. Pain itself is distracting, and some of the medications used to treat it also can affect concentration [17].

VO2 Max: VO2 max, or maximal oxygen consumption, is a measure of our cardiorespiratory fitness. It can help GPs to assess your patient's risk of cardiovascular disease and guide their training. VO2 max has three primary components: i) Lung capacity and heart volume: The more oxygen your lungs can intake and the more oxygenated blood your heart can pump, the higher your VO2 score ii) Capillary delivery: The more oxygenated blood your circulatory system can transport to your muscles, the higher your VO2 score iii) Muscle efficiency: VO2 max is the number of milliliters of oxygen you use per kilogram of body weight in one minute (ml/kg/min), though you often see it stated simply as a single number, sans that unit of measurement. VO2 max typically declines with age, but it's possible to increase it even at an older age. Consistent cardiovascular training can help improve your patient's VO2 max. A good VO2 max depends on your age, gender, and other factors. The more your muscles can extract and use oxygen from your blood, the higher your VO2 score. Here are some:

VO2 Max Values by Age and Gender

Age Group	5th Percentile	10th Percentile	25th Percentile	50th Percentile	75th Percentile	90th Percentile	95th Percentile
Men							
20-29	29.0	32.1	40.1	48.0	55.2	61.8	66.3
30-39	27.2	30.2	35.9	42.4	49.2	56.5	59.8
40-49	24.2	26.8	31.9	37.8	45.0	52.1	55.6
50-59	20.9	22.8	27.1	32.6	39.7	45.6	50.7
60-69	17.4	19.8	23.7	28.2	34.5	40.3	43.0
70-79	16.3	17.1	20.4	24.4	30.4	36.6	39.7
Women							
20-29	21.7	23.9	30.5	37.6	44.7	51.3	56.0
30-39	19.0	20.9	25.3	30.2	36.1	41.4	45.8
40-49	17.0	18.8	22.1	26.7	32.4	38.4	41.7
50-59	16.0	17.3	19.9	23.4	27.6	32.0	35.9
60-69	13.4	14.6	17.2	20.0	23.8	27.0	29.4
70-79	13.1	13.6	15.6	18.3	20.8	23.1	24.1

Source: https://www.rei.com/ how-to-measure-and-improve-your-vo2-max.html

Way forward in General Practice Basic Preventive Approaches:

Discourage Elderly pursuit for Comfort: Today, aging is the aggressive pursuit for comfort, while youth is the aggressive pursuit of experience and novelty. Instead, if we use our body and brain more, they will reward us. Promoting our elderly clients to exercise their mind and body as regularly as they can help in managing multimorbidity better. And if, for some reason, the prospect of doing both is intimidating and GPs and the patient feel that the patient can only manage one, it must be exercise of the body. Exercising our body is the ultimate key to health and fixing our diet where needs be. Promote Cutting out refined sugar, cutting back on any drinking habits one might have, stop smoking, eat more meat and veg and less carbs and sugar, cutting back on any inflammatory foods like dairy and grains. Eat well, exercise, sleep well, and keep learning. If elderly stop pursuing comfort, start pursuing fulfillment, their life will improve. After our 50s it's mostly all downhill. However, there is hope- start- exercising, exposing the brain to new challenges and whatever they do, but DO NOT SEEK COMFORT.

Conclusions:

In developing countries, there is a substantial burden of multimorbidity among aged ≥ 65 years, strongly linked to modifiable risk factors - health literacy & social determinants.

The prevalence of multimorbidity among urbanites is established and among remote rural & tribal groups is rising, that can't be overlooked. Older age & affluent groups within these populations must be the center of lifestyle modifications change communication.

Targeted interventions are essential to alleviate this disproportionate burden on older adults. A patient-centered approach for MM in H&WCs be implemented across the country:

Patients and family members must be empowered to speak up & be advocates for their care.

Care must be adapted to each patient's social, medical, and environmental circumstances.

Elderly Patients must be involved in the decision-making process. Setting realistic goals, supporting self & family-management of chronic conditions, building a good caretaker-patient relationship, Prioritizing health problems, Balancing risks & benefits of any treatment opted and reduction of the burden of treatment cost must be aimed.

Indian Health and wellness centers under NHM are an opportunity to provide egalitarian, accessible, and quality preventive and curative services for the elderly.

Future studies must explore the impact of multimorbidity on healthcare utilization and expenditure of tribal, remote rural, hilly and urban slum people.

A health systems approach to multimorbidity management including improving access to care, promoting generalists, providing a decision support system and fostering a sustainable referral mechanism is the need of the time.

One professional (GPs/ medical Officer of the PHC) must coordinate a multidisciplinary team to deliver services in the community, wherever needed and possible

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