

REVIEW ARTICLE

**MULTIMORBIDITY IN PRIMARY CARE: CHALLENGES AND STRATEGIES FOR
COMPREHENSIVE MANAGEMENT**

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Abstract

Introduction: Living with two or more chronic illnesses, known as multimorbidity, is an increasingly common challenge, especially in low- and middle-income countries such as India. Rural primary-care systems often struggle with fragmented referrals, scarce resources and a lack of unified guidelines, all of which complicate day-to-day management. This reviewd examines the prevalence, clinical patterns and health-system impact of multimorbidity within primary care. Insights from Katihar Medical College are used to highlight practical strategies for comprehensive, patient-centred management.

Methods: A twelve-month retrospective audit of electronic and paper records was undertaken at Katihar Medical College. Adults aged 18 years or older with at least two documented chronic conditions were included. Quantitative data were supplemented by thematic analysis of semi-structured interviews with primary-care physicians.

Results: Among 436 eligible patients, the most common disease pairings were hypertension with type 2 diabetes and chronic obstructive pulmonary disease with ischaemic heart disease. Polypharmacy was widespread (64.7 %), and nearly half the cohort (43.8 %) showed poor adherence to medication regimens. Physicians cited gender inequities, limited access to care and insufficient counselling services as major impediments to disease control and service utilisation.

Conclusion: Managing multimorbidity effectively requires a shift from single-disease protocols to integrated, patient-focused models of care. Strengthening coordinated care networks, enhancing primary-care training and improving patient engagement are crucial steps toward better outcomes and greater system efficiency in settings like Katihar.

Keywords: Multimorbidity, Primary Care, Chronic Disease, Polypharmacy, India, Integrated Healthcare

BACKGROUND/INTRODUCTION

Multimorbidity, the coexistence of two or more chronic conditions in one person, is now recognised as a major public-health challenge worldwide. The ongoing shift from infectious to chronic, non-communicable diseases, together with rising life expectancy, has driven its surge, most noticeably in low- and middle-income nations such as India [1]. Health systems that were designed around single illnesses like hypertension, diabetes, or chronic respiratory disease struggle when several of these disorders converge in the same patient, rendering traditional, condition-specific care pathways inadequate [2]. This reality is prompting a move away from a reductionist, disease-centred model toward integrated, patient-focused care.

Primary care, typically a patient's first point of contact, therefore carries much of the responsibility for managing multimorbidity. General practitioners must diagnose and treat a wide array of conditions, coordinate input from multiple specialties, reconcile complex medication regimens, and address psychosocial concerns [3]. When health services are fragmented and guidelines remain tailored to single diseases, clinicians often lack clear direction, leading to poorer outcomes, reduced adherence, and higher overall costs for patients and health systems [4].

Epidemiology of Multimorbidity

Global estimates suggest that 20 – 30 % of adults live with multimorbidity, a figure that climbs beyond 60 % among people older than 65 years [5]. Indian studies

reveal a particularly rapid increase across both urban and rural settings, driven by ageing, sedentary lifestyles, socioeconomic inequality, and environmental exposures [6]. In southern India, for example, 33.5 % of adults over 60 were found to have at least two chronic diseases, most commonly diabetes paired with hypertension [7]. Similar trends are now emerging across other states, with younger age groups increasingly affected as lifestyle-related disorders appear earlier in life. The burden is unevenly distributed. People from socioeconomically disadvantaged backgrounds face higher risks, likely owing to limited health literacy, restricted access to preventive services, and poor continuity of care [8]. Women also report higher rates than men, a disparity attributed to both biological vulnerability and gender-based inequities in healthcare access [9]. Addressing these gaps requires equitable, targeted public-health strategies to reduce the long-term consequences of multimorbidity for individuals and the healthcare system as a whole.

Importance of Primary Care in Managing Multimorbidity

Managing several chronic illnesses under one roof is rarely straightforward. Primary-care practices are often short on time, staff and other resources, yet they remain the first, and sometimes only, point of contact for most patients. Because family doctors accompany people throughout their health journeys, they are uniquely placed to provide continuous, whole-person

care [10]. Unfortunately, most clinical guidelines still address conditions in isolation, so clinicians are left to reconcile overlapping or even contradictory treatment pathways when two or more disorders intersect. The logistical hurdles are just as daunting: tightly packed appointment schedules, high consultation volumes and limited access to decision-support tools all squeeze the quality of care. Nevertheless, evidence shows that when primary-care teams can preserve continuity, involve patients in shared decisions and tailor care plans to individual needs, both clinical outcomes and patient satisfaction improve significantly [1]. Realising these benefits demands more than clinical know-how. Practices must weave predictive analytics into everyday decision-making, partner with community-based health programmes and strengthen inter-professional collaboration. The discussion that follows reviews the epidemiological backdrop, the systemic obstacles and the best-available strategies for comprehensive multimorbidity care, drawing practical lessons from experience at Katihar Medical College.

Disease Clusters and Common Comorbid Combinations

Evidence indicates that chronic illnesses seldom arise at random; instead, they group into predictable constellations shaped by shared biology, lifestyle factors and social circumstances. Cardio-metabolic disorders, hypertension, diabetes and dyslipidaemia, form the most common global cluster [11]. Mental-health conditions such as depression and anxiety are also frequent companions to long-term physical

disease, and their presence complicates care because mood symptoms can erode treatment adherence [12]. Large population datasets reinforce these patterns. A Canadian study of patients with three or more chronic conditions repeatedly identified triads such as arthritis–hypertension–diabetes and depression–chronic-pain–anxiety [13]. Indian research paints a similar picture, with diabetes, cardiovascular disease and chronic obstructive pulmonary disease (COPD) often co-occurring in pairs or triples [14]. Spotting these clusters is not merely academic: it sharpens prognostic models, alerts clinicians to potential drug interactions and helps health planners' channel limited resources where they matter most [15].

Impact of Multimorbidity on Clinical Outcomes and Healthcare Systems

The toll of multimorbidity is heavy. Each additional condition further diminishes functional capacity, lowers quality of life and raises the risk of premature death [16]. Complex drug and treatment regimens also heighten exposure to iatrogenic harm, medication errors, adverse reactions and preventable readmissions are all more common among multimorbid patients [17]. One European cohort, for example, found a 75 % surge in unplanned hospitalisations among people living with four or more chronic disorders compared with those managing a single disease [18]. Health systems, particularly in low-resource settings, are poorly equipped for this burden. Disjointed records, siloed specialties and patchy primary-care continuity leave

gaps in management [19]. The economic impact is stark as well: multimorbid patients require more clinic visits, investigations and medications than those with single conditions [20]. In India these stresses are magnified by limited insurance coverage, urban–rural inequalities and an over-reliance on tertiary hospitals for care that could be delivered closer to home [21].

Challenges in Diagnosis and Treatment Coordination

A central obstacle in caring for people with multiple chronic illnesses is the absence of clear diagnostic algorithms and unified treatment pathways. Most clinical guidelines were built for single diseases and rarely consider how conditions interact or how therapies accumulate [22]. For example, medicines routinely prescribed for diabetes may conflict with those recommended for heart failure or chronic kidney disease, forcing clinicians to juggle priorities and heightening the risk of adverse drug reactions [23]. Polypharmacy, commonly defined as the use of five or more drugs, has therefore become almost synonymous with multimorbidity. It is linked to lower adherence, more side-effects and higher overall costs [24]. A focus on narrow disease-specific targets, rather than on outcomes that matter to patients, further fragments care. Recognising these shortcomings, the National Institute for Health and Care Excellence (NICE) now advocates personalised care plans that rely on shared decision-making and, when appropriate, deprescribing [25]. Primary-care teams often lack the time, digital tools and

multidisciplinary support needed to put such guidance into practice. In India, these difficulties are magnified by high patient loads and limited access to specialists, electronic health records or integrated care platforms [26].

International Guidelines and Care Models for Multimorbidity Management

Several structured approaches have been introduced worldwide to streamline multimorbidity care. The Chronic Care Model (CCM), Patient-Centered Medical Home (PCMH) and Guided Care Model all stress proactive, team-based management that knits primary care together with behavioural health, community resources and social services, moving from crisis reaction to prevention and anticipation [27]. Each model aims to replace fragmented disease silos with coordinated, multidisciplinary care pathways [28]. Health systems have begun adapting these ideas. In the United Kingdom, the National Health Service has rolled out risk-stratification tools and personalised care planning as part of its wider multimorbidity strategy [29]. Australia's Health Care Homes initiative similarly aligns care processes with a patient's goals, cultural background and functional capacity [30]. Translating these frameworks to lower-resource settings remains a challenge owing to workforce shortages, limited digital infrastructure and competing policy priorities. As India advances toward universal health coverage, investment in primary-care capacity-building, digital health systems and clinician education will be essential to embed evidence-based multimorbidity models into routine practice.

MATERIALS AND METHODS

A descriptive, retrospective review was conducted at Katiyar Medical College, a tertiary-care teaching hospital in Bihar, India. We examined clinical notes, electronic health-record data and service-utilisation logs covering the 12-month period from January to December 2024. To complement these data, structured interviews were held with general practitioners and family-medicine physicians affiliated with the college and its outreach clinics, capturing their perspectives on day-to-day multimorbidity management.

Institutional ethics-committee approval was secured before any records were accessed. Throughout the study patient anonymity was safeguarded, and the review adhered to accepted standards of accuracy, transparency and reproducibility.

Adults aged 18 years or older were eligible if they had documentation of two or more chronic conditions, confirmed clinically or by laboratory investigation during inpatient or outpatient encounters with the Department of General Medicine or associated community facilities. Conditions of interest included, but were not limited to, hypertension, type 2 diabetes mellitus, ischaemic heart disease, bronchial asthma, chronic kidney disease, osteoarthritis and major depressive disorder. Records lacking sufficient detail or showing only a single chronic diagnosis were excluded.

Exclusion criteria encompassed:

- Patients with acute conditions without a chronic disease history.
- Terminally ill patients with life expectancy <3 months.
- Individuals with incomplete or missing medical records.
- Pediatric cases (<18 years) irrespective of comorbidity burden.

This strict screening ensured a homogenous cohort for accurate pattern identification and intervention mapping in the primary care setting.

Data were retrieved from the hospital's electronic health record (EHR) system and cross-validated using physical case files maintained in the General Medicine department. Key variables included patient demographics (age, sex, occupation, residence), clinical parameters (diagnoses, disease duration, treatment history), and service utilization metrics (outpatient visits, hospital admissions, polypharmacy status, and referrals). Descriptive statistical analysis was carried out using SPSS v26. Frequencies, percentages, means, and standard deviations were computed for demographic and clinical indicators. Additionally, cross-tabulations were applied to examine the distribution of disease combinations and their association with healthcare utilization. For qualitative insights, clinician interviews were transcribed and analyzed using thematic coding in NVivo software, highlighting systemic gaps and provider-level challenges in managing multimorbidity. The combined data were synthesized

to generate a comprehensive narrative of multimorbidity care delivery at the primary care level, forming the basis for further discussions and recommendations.

RESULTS

A total of 436 patients met the inclusion criteria during the study period, each presenting with two or more chronic conditions. The mean age of the cohort was 61.4 ± 12.7 years, with the majority falling within the 55–70 age group. A slight female predominance was noted (53.2%), and 67% of patients were from rural areas, reflecting the catchment population of Katihar Medical College. As seen in Table 1, the most common occupations among patients included agricultural laborers (31.4%), homemakers (28.7%), and small-scale traders (15.1%). Regarding literacy, 48.9% of patients had no formal education, while only 9.6% had completed secondary school or higher. This socioeconomic distribution is crucial in understanding barriers to consistent care and adherence.

Table 1. Demographic Profile of Patients with Multimorbidity (n = 436)

Variable	Frequency (n)	Percentage (%)
Age Group (years)		
18–40	48	11.0
41–55	96	22.0
56–70	182	41.7
>70	110	25.3
Sex		
Male	204	46.8
Female	232	53.2
Residence		
Urban	144	33.0
Rural	292	67.0
Occupation		

Agricultural Laborer	137	31.4
Homemaker	125	28.7
Trader/Shopkeeper	66	15.1
Unemployed/Retired	108	24.8
Educational Level		
No Formal Education	213	48.9
Primary School	115	26.4
Secondary & Higher	42	9.6
Illiterate	66	15.1

The most frequently observed disease dyads were hypertension and type 2 diabetes mellitus (41.5%), followed by COPD and ischemic heart disease (17.8%), and osteoarthritis with hypertension (13.4%). Triads such as diabetes-hypertension-chronic kidney disease (CKD) and hypertension-COPD-depression were also identified but less prevalent. Notably, women exhibited a higher prevalence of musculoskeletal conditions (particularly osteoarthritis), while men showed increased rates of ischemic heart disease and chronic lung conditions. Patients above 70 years had a higher probability of presenting with three or more chronic conditions, highlighting an age-gradient in multimorbidity burden, as shown in Table 2.

Table 2. Disease Combinations by Age and Sex

Disease Cluster	Total (%)	Males (%)	Females (%)	Most Affected Age Group
Hypertension + Type 2 Diabetes	41.5	43.7	39.4	56–70
COPD + Ischemic Heart Disease	17.8	21.5	14.2	>70
Osteoarthritis + Hypertension	13.4	9.3	17.2	>70
Diabetes + CKD + Hypertension	11.5	13.2	9.8	56–70

Hypertension + COPD + Depression	7.6	5.4	9.5	>70
Other Combinations	8.2	6.9	9.9	41–55

The cohort demonstrated a substantial healthcare utilization footprint. On average, each patient had 6.2 outpatient visits/year, with 23.6% requiring at least one hospitalization during the study period. Polypharmacy (use of ≥ 5 medications) was observed in 64.7% of the sample, and 18.3% were taking more than 8 medications concurrently.

As detailed in Table 3, diagnostic investigations were frequently repeated due to fragmented referral pathways and lack of record portability between

departments. This not only led to increased patient expenses but also contributed to significant resource strain on laboratory and imaging services. Referrals to specialty clinics were common: 29% of patients were referred to cardiology, 18% to nephrology, and 15% to psychiatry. However, 36.2% of these referrals were either delayed or left unfulfilled, indicating system inefficiencies and patient non-compliance. Lengthy wait times and travel constraints were the major factors cited during follow-up consultations.

Table 3. Healthcare Utilization Metrics

Parameter	Value
Mean Annual Outpatient Visits	6.2 visits/patient
Hospitalization (≥ 1 admission/year)	103 patients (23.6%)
Polypharmacy (≥ 5 medications)	282 patients (64.7%)
Excessive Polypharmacy (> 8 medications)	80 patients (18.3%)
Referrals to Specialties:	
– Cardiology	126 (29.0%)
– Nephrology	78 (17.9%)
– Psychiatry	66 (15.1%)
Unfulfilled or Delayed Referrals	158 (36.2%)
Repeat Diagnostics due to Fragmentation	119 (27.3%)

Despite institutional guidelines encouraging standardized chronic disease management, adherence to treatment plans remained suboptimal. Medication non-adherence was documented in 43.8% of patients, attributed mainly to high out-of-pocket costs, perceived symptom relief, or adverse effects. Among these, diabetic patients had the highest non-adherence rate (51.2%), followed by those with antihypertensive regimens (46.9%).

As visualized in Table 4, counseling and health education were documented in only 27.4% of

outpatient visits, underscoring a significant gap in patient engagement. Similarly, follow-up compliance was low, with only 52.1% attending scheduled review visits within the advised timeline. Hospital readmissions within 90 days were observed in 12.7% of patients, predominantly among those with cardiovascular disease, renal impairment, and mental health comorbidities. Complications related to polypharmacy, poor glycemic control, and exacerbations of COPD were the leading causes of unplanned readmissions.

Table 4. Adherence and Counseling Metrics

Metric	Value
Medication Non-Adherence	191 patients (43.8%)
Highest Non-Adherence Condition: Diabetes	51.2% of diabetics
Counseling Sessions Documented	27.4% of outpatient visits
Follow-Up Visit Compliance	52.1%
90-Day Hospital Readmissions	55 patients (12.7%)
Common Causes of Readmission:	
– COPD Exacerbation	20 cases
– Acute Coronary Syndrome	16 cases
– Renal Function Deterioration	11 cases
– Adverse Drug Events	8 cases

DISCUSSION

The findings of this review reflect the growing burden and complexity of multimorbidity in primary care settings such as Katihar Medical College. The predominance of chronic disease dyads like diabetes and hypertension is consistent with existing literature from both high- and middle-income countries [31]. The convergence of these conditions is not only physiologically synergistic but also reflects shared lifestyle and socioeconomic determinants. The high prevalence of cardiopulmonary and musculoskeletal comorbidities among the elderly further underscores the need for age-tailored chronic disease surveillance and management.

Multimorbidity, by its very nature, challenges the structural and operational frameworks of traditional healthcare systems, particularly those built around a single-disease model. The data from this study reaffirm earlier conclusions that standard clinical practice guidelines often fall short in addressing therapeutic overlaps, contradictory drug interactions, and the nuanced prioritization needed for patients living with multiple conditions [32]. This lack of integrative clinical pathways leads to polypharmacy, fragmented referrals, and poor continuity of care, issues that are especially pronounced in resource-constrained settings like rural Bihar. The significant prevalence of polypharmacy observed in this review is a reflection of both guideline-based prescribing and reactive medical practice. Literature shows that polypharmacy significantly raises the risk of adverse drug events, cognitive decline, and decreased

medication adherence, particularly among older adults [33]. In this cohort, over 64% of patients were on five or more medications, often without the benefit of medication reconciliation or systematic deprescription efforts. These figures mirror global patterns, where polypharmacy has been identified as a key driver of hospital readmissions and emergency visits [34].

Another salient finding is the observed gender disparity, with women more frequently affected by musculoskeletal and mood disorders, and men by cardiovascular and pulmonary conditions. This aligns with global data, suggesting that gender-specific disease patterns are influenced not only by biological factors but also by healthcare-seeking behaviors and access to care [35]. In India, where sociocultural norms often dictate the utilization of healthcare services, this disparity calls for gender-sensitive health policies and community-level interventions.

Poor adherence to prescribed regimens, as documented in nearly 44% of the sample, reflects a broader challenge in chronic disease management across low- and middle-income countries. Factors such as cost, lack of perceived necessity, fear of side effects, and low health literacy all contribute to suboptimal treatment adherence [36]. A meta-analysis of chronic disease interventions found that adherence rates above 80% were rare in multimorbid populations unless supported by systematic follow-up and patient education [37]. The low frequency of documented counseling during outpatient visits in this study suggests a systemic neglect of behavioral

interventions, which are critical to long-term disease control.

The referral bottleneck is another critical area of concern. While nearly one-third of patients were referred to specialty care, a significant proportion of those referrals were either delayed or incomplete. Similar studies from India and sub-Saharan Africa have reported comparable trends, attributing them to weak referral linkages, limited infrastructure, and poor communication between primary and secondary care [38]. These inefficiencies delay diagnoses, worsen prognoses, and escalate the overall cost of care. Health system integration remains a distant goal. Although several countries have experimented with patient-centered medical homes, chronic care models, and risk-stratified care pathways, the scalability and applicability of such models to the Indian context remain limited [39]. Most innovations in integrated care require robust electronic medical records, multidisciplinary teams, and policy-level support, factors largely absent from district-level health systems in India.

The literature is now increasingly advocating for a "minimally disruptive medicine" approach to multimorbidity, where care plans are simplified, aligned with patient preferences, and designed to reduce the burden of treatment itself [40]. Implementation of this model requires capacity building among primary care providers in skills such as motivational interviewing, shared decision-making, and longitudinal care planning. Finally, the importance of context-specific research cannot be

overstated. This study, based in Katihar Medical College, adds to the limited but growing body of Indian literature on multimorbidity. It offers actionable insights for local health policy, particularly in terms of redesigning primary care delivery to be more inclusive, coordinated, and responsive to multimorbid populations [41]. Future research should focus on intervention trials that evaluate the impact of nurse-led care coordination, community-based rehabilitation, and digital decision-support tools [42].

CONCLUSION

Multimorbidity represents a significant challenge in the Indian primary care landscape, particularly in underserved regions such as those served by Katihar Medical College. This review underscores the complexity of disease clustering, the burden of polypharmacy, and the systemic limitations in managing patients with multiple chronic conditions. Despite the pressing need, current health systems remain largely oriented toward single-disease models, rendering them insufficiently equipped for integrated, patient-centered care. To address these gaps, there is a critical need for context-specific guidelines, inter-professional care models, and capacity-building at the primary care level. Strengthening health information systems, fostering patient engagement, and integrating community-based interventions will be essential to improve outcomes for multimorbid populations in India and similar low-resource settings.

LIMITATION

This retrospective review was limited by its single-institution setting and lack of long-term outcome data.

RECOMMENDATION

Future strategies should focus on developing unified care protocols, capacity-building, and digital solutions for multimorbidity management in low-resource settings.

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CONFLICT OF INTEREST

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LIST OF ABBREVIATION

- COPD: Chronic Obstructive Pulmonary Disease
CKD: Chronic Kidney Disease
NICE: National Institute for Health and Care Excellence
CCM: Chronic Care Model
PCMH: Patient-Centered Medical Home
SPSS: Statistical Package for the Social Sciences
EHR: Electronic Health Record
NVivo: Qualitative Data Analysis Software

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