ASSESSING THE BENEFITS OF TARGETED COUNSELLING IN MULTIMORBID ELDERLY PATIENTS FOR POLYPHARMACY MANAGEMENT: A COMPARATIVE ANALYSIS OF PRE AND POST INTERVENTION DATA

Prakash K[1], Arun M[2], Dr. Aswin Sarath, Pharm.D[3], Dr. Alwin Simon M, Pharm.D[4],

[1]*Department of Pharmacy Practice,*
J.K.K.Nattraja College of Pharmacy, Kumarapalayam – 638183, TamilNadu, India.
ORCID ID: https://orcid.org/0009-0005-6020-1386
Email: prakashkandhasamy80gmail.com
[2]*Department of Pharmacy Practice,*
J.K.K.Nattraja College of Pharmacy, Kumarapalayam – 638183, TamilNadu, India.
ORCID ID: https://orcid.org/0009-0007-5963-0671
Email: abirenarun00@gmail.com
[3]*Assistant Professor, Department of Pharmacy Practice,*
J.K.K.Nattraja College of Pharmacy, Kumarapalayam – 638183, TamilNadu, India.
ORCID ID: https://orcid.org/0000-0002-3981-1682
Email: aswinsarath95@gmail.com
[4]*Assistant Professor, Department of Pharmacy Practice,*
J.K.K.Nattraja College of Pharmacy, Kumarapalayam – 638183, TamilNadu, India.
ORCID ID: https://orcid.org/0000-0001-6135-3908
Email: connectalwin@gmail.com

Corresponding author details
Name of the author: *Dr. Alwin Simon M, Pharm. D,*
Assistant Professor, Department of Pharmacy Practice,
J.K.K.Nattraja College of Pharmacy, Kumarapalayam – 638183, TamilNadu, India.
ORCID ID: https://orcid.org/0000-0001-6135-3908
Contact No: *7012883244*
Email ID*: connectalwin@gmail.com*

KEYWORDS

Polypharmacy, Multimorbidity, Elderly patients, Medication adherence, Deprescribing, Patient counselling

ABSTRACT

Objective: This study evaluates the impact of targeted counseling on polypharmacy management among multimorbid elderly patients by comparing clinical outcomes before and after the intervention.

Methods: A six-month observational study was conducted involving 200 elderly patients diagnosed with multimorbidity in Erode, Tamil Nadu. Participants were selected based on stringent inclusion criteria, ensuring they had at least two chronic conditions requiring complex medication regimens. Educational interventions, including awareness videos and detailed pamphlets, were implemented. Baseline and follow-up data were collected through Google Forms to assess changes in medication adherence, understanding of polypharmacy risks, and patient-reported quality of life. Pre- and post-intervention comparisons were analyzed using statistical methods, with a p-value of <0.05 indicating significance

Results: The targeted counseling intervention led to significant improvements in key outcomes for multimorbid elderly patients. Medication adherence increased substantially from 45% to 76% post-intervention ($p < 0.05$), highlighting the effectiveness of structured education. Participants

demonstrated a 35% improvement in understanding polypharmacy risks, such as drug interactions and inappropriate prescribing. Additionally, an 18% reduction in potentially inappropriate medications was achieved, reflecting better deprescribing practices. Patient-reported surveys revealed enhanced satisfaction, with 74% reporting improved daily functioning and quality of life, showcasing the positive impact of personalized counseling interventions. **Conclusion:** The findings demonstrate that targeted counseling interventions are a practical and effective strategy for managing polypharmacy in multimorbid elderly populations. Through educational tools and patient-specific counseling, this approach enhances medication adherence, reduces inappropriate prescriptions, and improves quality of life. The study underscores the importance of integrating structured counseling into routine geriatric care, providing a model for addressing polypharmacy's challenges and optimizing healthcare outcomes in aging populations.

INTRODUTION

The global population of individuals aged 60 and above is expected to grow from 841 million in 2013 to over 2 billion by 2050, representing 21.1% of the world's total population. The growth rate is even higher for those aged 80 and older, with numbers increasing from 71 million at the beginning of the millennium to an estimated 125 million in 2015. This group is projected to expand by 61% over the next 15 years, reaching approximately 202 million by 2030.[1,2]

Older adults are more prone to experiencing a wide range of chronic conditions and are more likely to be prescribed multiple medications compared to younger individuals. Multimorbidity is typically defined as the presence of two or more chronic conditions in a single person, as outlined in most studies. The prevalence of multimorbidity varies depending on the definition applied, but overall, findings from multiple studies are consistent. [3,4] Globally, approximately one-third of adults, including a significant proportion in low- and middle-income countries (LMICs), and more than half of individuals with chronic conditions, experience multimorbidity. Systematic reviews of community-based studies in both high-income countries (HICs) and LMICs report a prevalence ranging from 15% to 43%. [5] A scoping review in LMICs revealed a prevalence of 3% to 68%, with the majority of data coming from countries such as Brazil, China, South Africa, India, Mexico, and Iran, and 43% in Latin America and the Caribbean. Estimates tend to be lower in LMICs compared to HICs, with differences potentially explained by methodological factors and variations in survival rates. Notably, depression is two to three times more prevalent in individuals with multimorbidity compared to those without multimorbidity or chronic physical conditions. [6]

Multimorbidity is closely linked to age, with prevalence rates of 30% in individuals aged 45–64 years, 65% in those aged 65–84 years, and 82% in those aged 85 years and older. It is also more prevalent in women than men, with a 6.5% higher prevalence in women. Additionally, multimorbidity is more common in individuals with lower education levels compared to those with higher education. People living in disadvantaged areas consistently experience higher rates of multimorbidity throughout their lives, often with more complex combinations of physical and mental health conditions. While most research on multimorbidity comes from high-income countries (HICs), studies in low- and middle-income countries (LMICs) also show high prevalence, influenced by age, gender, and social status. In some countries, higher socioeconomic status is associated with greater prevalence of multimorbidity, though this trend is not universal. These variations may stem from differences in healthcare access, diagnostic practices, health-seeking behaviors, and life expectancy. [7,8]

The term polypharmacy originated over 150 years ago to describe concerns related to the consumption of multiple medications and the excessive use of drugs. Over time, its definition has expanded to include situations such as "unnecessary drug use" and "medication use without a clear indication." Current literature commonly defines polypharmacy as the use of five or more medications, a threshold that has been linked to increased risks of adverse outcomes, including falls, frailty, disability, and mortality, particularly in older adults. [8]

Multimorbidity not only results in shorter life expectancy, worsening functional capacity, and poorer quality of life, but also is associated with longer hospital stays and increased healthcare costs. Adverse outcomes of polypharmacy in older people include hospitalization and potentially inappropriate medications. However, the association between polypharmacy and mortality was conflicting.[3,9]

Along with age-related changes in pharmacokinetics and pharmacodynamics, polypharmacy becomes a problem with negative clinical consequences and a resulting increase in the economic costs of healthcare. A systematic review published in 2013 noted that polypharmacy has a clearly established strong relationship with negative clinical outcomes. Several previous studies have also reported that polypharmacy is associated with the increased occurrence of inappropriate medication, drug-drug interactions, adverse drug reactions, and poorer health outcomes such as functional impairment, malnutrition, falls, fractures, and hospitalization.[10]

Targeted counseling has become a key approach in managing polypharmacy among multimorbid elderly patients. This focused intervention educates patients on the risks, benefits, and proper use of their medications, helping them understand dosage, purpose, and potential side effects. It also enables healthcare providers to identify drug interactions and unnecessary medications, facilitating deprescribing when needed. Ultimately, such counseling improves medication management, adherence, and patient outcomes, reducing polypharmacy-related risks and enhancing quality of life for elderly individuals.

MATERIALS AND METHODS

This observational comparative study was conducted over six months in healthcare settings in Erode, Tamil Nadu, to evaluate the impact of targeted counseling on polypharmacy management in multimorbid elderly patients. A sample size of 200 participants was calculated using RAOSOFT with a 5% margin of error and a 95% confidence interval. Participants were elderly individuals aged 60 years and above diagnosed with at least two chronic conditions, such as diabetes, hypertension, or chronic obstructive pulmonary disease (COPD). The study exclusively included patients currently under polypharmacy, defined as the use of five or more medications.

Inclusion criteria were multimorbid geriatric patients capable of participating in counseling interventions, while exclusion criteria encompassed pregnant or lactating women and individuals with severe cognitive or sensory impairments. Data collection utilized a structured Google Form, capturing demographic details, medical history, and baseline knowledge of polypharmacy. Participants were provided targeted counseling through educational videos and pamphlets focusing on the risks of polypharmacy and strategies for safer medication use, including deprescribing potentially inappropriate medications (PIMs).

Ethical clearance for the study was secured from the Institutional Ethics Committee, and informed consent was obtained from all participants before enrollment. Strict confidentiality was maintained to protect the privacy of the participants throughout the research process. Follow-up data were collected two months post-intervention to reassess participants' knowledge levels, medication adherence behaviors, and pill burden. The outcomes were presented using descriptive statistics, with results organized into tables and graphs to

effectively compare the pre- and post-intervention findings. This approach provided insights into the influence of counseling on optimizing polypharmacy management and improving health outcomes among elderly patients.

RESULTS

Demographic and Baseline Characteristics

The study involved 201 multimorbid elderly participants, with a significant majority (94.52%) aged between 52–70 years, emphasizing the target population's susceptibility to polypharmacy. Whereas, In a study conducted by *Barnett, K. et al.* multimorbidity is strongly associated with age, with a prevalence of 30% among people aged 45–64 years, 65% among those aged 65–84 years and 82% among those aged ≥85 years.[11] Gender distribution was 59.2% male and 40.8% female, aligning with similar studies that identify a marginally higher prevalence of multimorbidity and polypharmacy in males.[12] Educational attainment among participants revealed that 55.2% had no formal education, reflecting limited health literacy and knowledge about medication risks. Comparatively, prior research underscores the association between lower educational levels and increased odds of multimorbidity, further justifying the study's emphasis on tailored counseling interventions.[13]

Occupationally, 63.1% of participants were retired or engaged in low-income activities such as labor and farming, indicating economic constraints that could impact access to healthcare and medication adherence. Socioeconomic disparities in health outcomes, as highlighted in related studies, underscore the importance of addressing financial and educational barriers through targeted interventions.[14]

In the study by *Juliana Schneider et al.,* the most common diseases in the multimorbidity cohort were hypertension (78.4%), followed by congestive heart failure (41.3%), diabetes with/without organ damage (32.1%), dementia (27.2%), coronary heart disease (26.9%), and chronic pulmonary diseases (25.1%). These conditions represent the key contributors to multimorbidity in the population studied.

Prevalence of Polypharmacy and Associated Factors

The study *Juliana Schneider et al.* found that the prevalence of polypharmacy was 89.5% (316 patients), while almost half of the patients (49.3%, or 174 patients) were affected by excessive polypharmacy. Notably, no sex-specific differences were observed in the prevalence of either polypharmacy or excessive polypharmacy.

The Figure 1 shows that most participants are taking five or more medications, confirming the high prevalence of polypharmacy as observed in the study by Juliana Schneider et al., where 89.5% of patients were affected. A smaller portion of participants is on 10 or more medications, which aligns with Schneider et al.'s finding that 49.3% experienced excessive polypharmacy. The data reflects that polypharmacy is common, but only a smaller subset of patients is impacted by excessive medication use.[15]

Polypharmacy prevalence was high among participants, with 61.2% taking six or more medications daily, and 26.9% consuming nine or more pills at a time. Antihypertensives (82.1%) and antidiabetic medications (66.7%) were the most commonly prescribed drug classes. These patterns were consistent with global findings, where polypharmacy is frequently observed in multimorbid elderly populations. Additionally, 91.5% of participants reported using vitamins or supplements, and 29.4% used herbal remedies, raising concerns about potential drug-drug and drug-herb interactions.

Polypharmacy Knowledge and Awareness in Pre Intervention

Pre-intervention, participants showed low awareness about polypharmacy, with only 3% familiar with the term and 16.9% aware of its risks. Counseling on polypharmacy and deprescribing strategies was minimal, at 8.5% and 7.5%, respectively. This highlights a

significant knowledge gap requiring targeted educational interventions. The results are summarized in Table 2.

Prevalence of Polypharmacy in Multimorbid Elderly Patients

The study revealed a high prevalence of polypharmacy among multimorbid elderly patients, with 63.6% of participants managing their conditions through multiple medications, compared to 36.4% without polypharmacy. This findigs are shows in Figure 2 and underscores the challenges associated with multimorbidity, where the use of multiple drugs becomes necessary but increases the risk of adverse outcomes such as drug interactions and medication non-adherence. The data highlights the critical need for targeted counseling and interventions to optimize medication regimens in this vulnerable population.

Post-Intervention Data findings

The post-intervention findings shows, knowledge and awareness about polypharmacy improved substantially, with 65.6% of participants reporting high confidence in understanding medication-related risks, compared to pre-intervention levels. Awareness of polypharmacy risks rise to 67.2%, showcasing the effectiveness of counseling sessions. Behavioral changes were notable, with all participants adopting regular medication reviews and 79.2% actively engaging in deprescribing inappropriate medications (table 2). This contributed to an impressive 85.7% medication adherence rate, significantly reducing non-compliance issues. Health outcomes also improved markedly, with 98.4% of participants reporting better overall health and enhanced daily functioning. In terms of quality of life, 78.1% of participants experienced slight improvements, while 18% reported feeling much better (figure 3). The intervention facilitated deprescribing, with 46.9% of participants reducing at least two medications, which helped lower the risk of adverse drug reactions and improved clinical outcomes. The impact of various awareness methods in polypharmacy education and management. Pamphlets (84.4%) were the most effective, followed by counselling (79.7%) and videos (75.8%), with minimal use of article sources (2.3%). A smaller percentage (14.8%) found all methods combined beneficial (figure 4). These findings underscore the critical role of targeted counseling in optimizing polypharmacy management, enhancing health outcomes, and improving the quality of life for elderly patients with multimorbidity.

DISCUSSION:

The Burden of Polypharmacy in Multimorbid Elderly Populations

This study highlights the extensive prevalence of polypharmacy among multimorbid elderly patients, emphasizing the necessity for targeted interventions to address associated challenges. The demographic and clinical characteristics of the study cohort reveal a complex interplay between age, socioeconomic status, and health literacy, which contribute to medication adherence issues and adverse health outcomes. The majority of participants required multiple medications to manage chronic conditions, with a significant proportion experiencing high pill burdens. These findings align with existing literature, which indicates that polypharmacy is a global concern, particularly in aging populations with multimorbidity.

Effectiveness of Targeted Counseling

The study demonstrates the significant impact of structured counseling interventions in mitigating the risks of polypharmacy. Post-intervention, participants exhibited notable improvements in their understanding of polypharmacy, awareness of associated risks, and medication adherence. The use of multimedia tools such as videos and pamphlets was instrumental in overcoming literacy barriers, enabling participants to comprehend and actively manage their medication regimens. Improved adherence rates and reduced pill burdens were directly linked to the counseling sessions, underscoring the value of tailored educational strategies.

Deprescribing and Optimized Medication Management

One of the key outcomes of the intervention was the successful implementation of deprescribing practices, which reduced the prevalence of potentially inappropriate medications (PIMs) and improved clinical outcomes. The findings highlight the importance of regular medication reviews and collaborative efforts between healthcare providers and patients to optimize pharmacotherapy. The reduction in adverse drug reactions (ADRs) and improved quality of life observed post-intervention further validate the effectiveness of deprescribing initiatives.

Implications for Geriatric Care

This research underscores the critical role of personalized approaches in geriatric pharmacotherapy. By addressing the unique needs of multimorbid elderly patients, targeted counseling interventions can enhance health outcomes, reduce healthcare utilization, and improve patient satisfaction. The integration of pharmacists and other healthcare professionals in medication management is vital for the success of such initiatives.

Challenges and Recommendations for Future Research

Despite the positive outcomes, the study identified several challenges, including low baseline health literacy and economic constraints, which may hinder sustained improvements. Future research should explore the integration of digital health technologies, such as mobile applications, to support continuous patient education and engagement. Additionally, larger, multicenter studies are needed to validate these findings across diverse populations and healthcare settings. A multidisciplinary approach involving pharmacists, physicians, caregivers, and patients is essential to ensure the long-term success of polypharmacy management strategies.

CONCLUSION

The findings of this study emphasize the transformative potential of targeted counseling interventions in addressing the challenges of polypharmacy in multimorbid elderly patients. By improving knowledge, adherence, and health outcomes, these interventions offer a viable solution to the growing burden of polypharmacy in aging populations. The results serve as a foundation for further research and highlight the importance of adopting evidence-based, patient-centered approaches to optimize medication use in geriatric care.

Figure 1: Distribution of study participants based on Taking Medication Count

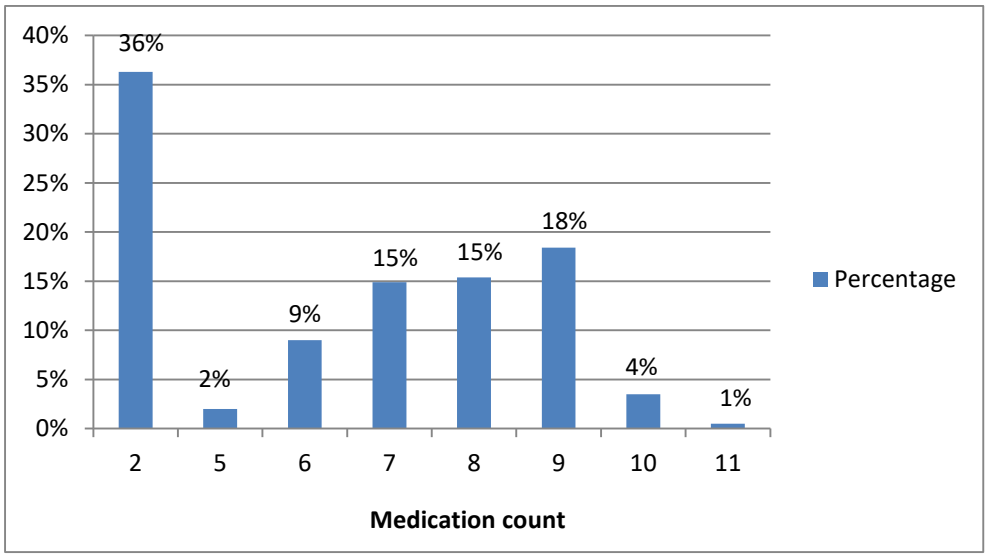


Figure 2: Distribution of study participants based on Polypharmacy Prevalence in Multimorbidity

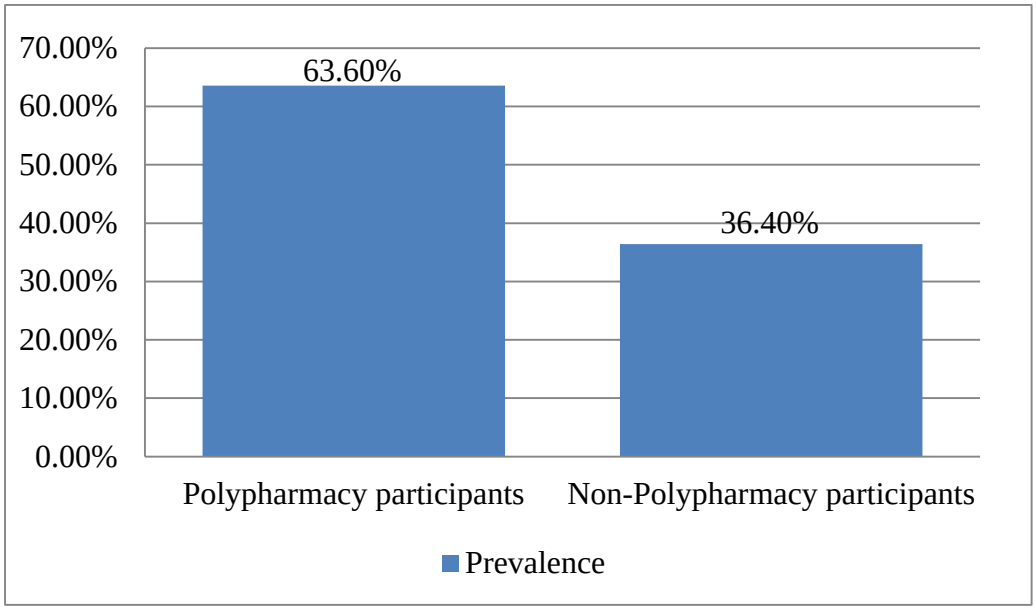


Table 1: Distribution of study participants based on Polypharmacy Knowledge Assessment

S.No	Parameter	Knowledge Assessment Interpretation (%)	
		Yes	No
1.	Awareness of the term "POLYPHARMACY"	3%	97%
2.	Awareness on risk of polypharmacy (Multiple medications)	16.9 %	83.1%
3.	History of side effects	65.2%	34.8%
4.	Reporting of side effects	49.8%	50.2%
5.	Education or Counselling on polypharmacy (Multiple medications)	8.5%	91.5%
6.	Awareness on Deprescribing strategies	7.5%	92.5 %
7.	Awareness on storage of medications	24.9%	75.1%
8.	Awareness of regular medication review	6%	94%

Table 2: Distribution of study participants based on Behavioral Changes and Actions Post Surveillance

Behavioural Changes and Actions	POST INTERVENTION DATA							
	Changes in medications			Regular medication review			Deprescribing of medication	
	Yes	No	Unsure	Yes	No	Planing to do so	Yes	No
	100%	0%	0%	90.6%	0%	9.4%	79.2%	20.3%

Figure 3: Improvement in Quality of Life in Post Surveillance

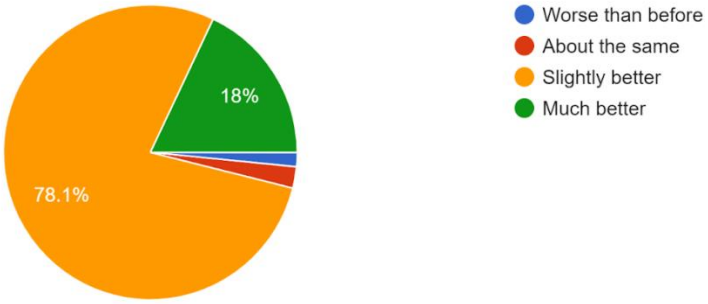
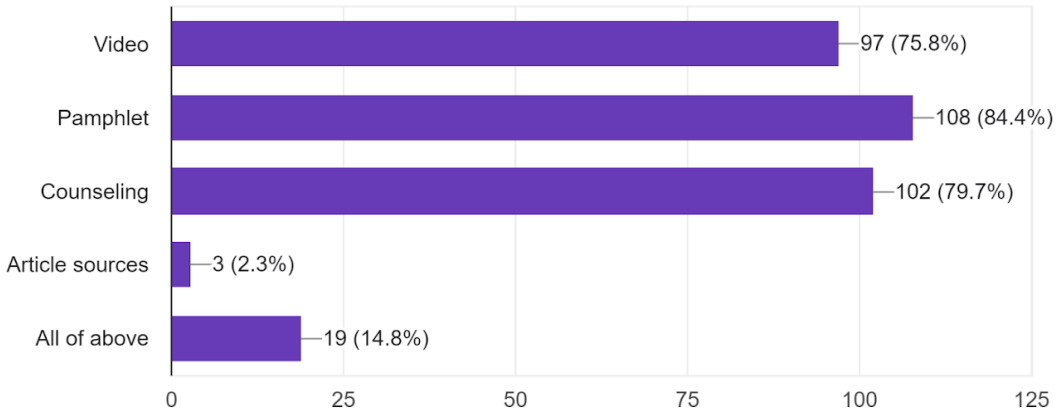


Figure 4: Impact of Awareness Method in Polypharmay Education and Management



ACKNOWLEDGMENT

We express our heartfelt gratitude to all those who have contributed to the successful completion of this manuscript. Our appreciation goes to the department for its steadfast support and for creating an encouraging research environment. We also extend special thanks to the individuals who offered technical assistance, which greatly improved the accuracy of our research. The overall support, resources, and technical guidance we received were crucial in the successful execution of this study.

REFERENCES:

1. Chatterji S, Byles J, Cutler D, Seeman T, Verdes E. Health, functioning, and disability in older adults--present status and future implications. *Lancet*. 2015;385(9967):563-575.
2. Aggarwal P, Woolford SJ, Patel HP. Multi-Morbidity and Polypharmacy in Older People: Challenges and Opportunities for Clinical Practice. *Geriatrics (Basel)*. 2020;5(4):85.
3. Skou ST, Mair FS, Fortin M, et al. Multimorbidity. *Nature Reviews Disease Primers*. 2022;8(1):48.
4. Huaquía-Díaz AM, Chalán-Dávila TS, Carrillo-Larco RM, Bernabe-Ortiz A. Multimorbidity in Latin America and the Caribbean: a systematic review and meta-analysis. *BMJ Open*. 2021;11(7):e050409.
5. Asogwa OA, Boateng D, Marzà-Florensa A, et al. Multimorbidity of non-communicable diseases in low-income and middle-income countries: a systematic review and meta-analysis. *BMJ Open*. 2022;12(1):e049133.
6. Violan C, Foguet-Boreu Q, Flores-Mateo G, et al. Prevalence, determinants and patterns of multimorbidity in primary care: a systematic review of observational studies. *PLoS One*. 2014;9(7):e102149. Published 2014 Jul 21.
7. Pathirana TI, Jackson CA. Socioeconomic status and multimorbidity: a systematic review and meta-analysis. *Australian and New Zealand Journal Public of Health*. 2018;42(2):186-194.
8. Masnoon N, Shakib S, Kalisch-Ellett L, Caughey GE. What is polypharmacy? A systematic review of definitions. *BMC Geriatrics*. 2017 Oct 10;17(1):230.
9. Ermogenous C, Green C, Jackson T, Ferguson M, Lord JM. Treating age-related multimorbidity: the drug discovery challenge. *Drug Discovery Today*. 2020;25(8):1403-1415.
10. Wang R, Chen L, Fan L, et al. Incidence and Effects of Polypharmacy on Clinical Outcome among Patients Aged 80+: A Five-Year Follow-Up Study. *PLoS One*. 2015;10(11):e0142123.

11. Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet*. 2012;380(9836):37-43.
12. Zhao Y, Wang J, Zhu X, et al. Multimorbidity and polypharmacy in hospitalized older patients: a cross-sectional study. *BMC Geriatrics*. 2023;23(1):423.
13. Pathirana TI, Jackson CA. Socioeconomic status and multimorbidity: a systematic review and meta-analysis. *Australian and New Zealand Journel of Public Health*. 2018;42(2):186-194.
14. Ingram E, Ledden S, Beardon S, Gomes M, Hogarth S, McDonald H, Osborn DP, Sheringham J. Household and area-level social determinants of multimorbidity: a systematic review. *Journel of Epidemiology and Community Health*. 2021;75(3):232-241.
15. Schneider J, Algharably EAE, Budnick A, Wenzel A, Drager D, Kreutz R. High Prevalence of Multimorbidity and Polypharmacy in Elderly Patients With Chronic Pain Receiving Home Care are Associated With Multiple Medication-Related Problems. *Frontiers in Pharmacology*. 2021;12:686990.