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The Role of Health Education, Patient Learning and Educational Intervention in Improving Medication Adherence: Educational Deficits and Learning Needs Contributing to Non-Adherence

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Abstract: Pedagogical solutions are crucial for addressing health problems that require significant behavioural changes, self-management of chronic conditions, and general health literacy. Key health problems that are addressed through pedagogical solutions include chronic conditions. To evaluate the role of health education, patient learning, and educational intervention in improving medication adherence in patients on chronic treatment attending a primary healthcare setting in South Africa. A cross-sectional study was used to evaluate educational deficits, learning needs and educational preferences in 80 patients. Results were analysed using SPSS to obtain descriptive statistics, and Pearson chi-square tests were used to assess associations between demographics, chronic conditions, patient-drug-related factors, and non-adherence to chronic treatment. The demographics of the patients obtained revealed more females (56.30%) than males (43.80%). Their ages ranged from 41 to 50 years; most were single, had a secondary level of education, were unemployed, and lived in rural areas. HIV/AIDS was the leading chronic condition. Research highlights the novelty in understanding how educational deficits and learning needs contribute

to non-adherence. The study has shown novelty in quantifying that experiencing side effects ($p = 0.002$) and inadequate knowledge ($p < .001$) significantly increase non-adherence. Inadequate patient education regarding chronic disease management represents a critical gap in health education systems. The pedagogical challenge lies in designing effective educational interventions that translate medical knowledge into sustainable health behaviours.

Keywords: health, education, patient, learning, medication adherence.

Introduction

Pedagogical solutions are crucial for addressing health problems that require significant behavioural changes, self-management of chronic conditions, and general health literacy. As Teutemacher et al. (2024) note, these solutions often focus on prevention, education, and support within school or community settings. Key health problems that are addressed through pedagogical solutions include, according to Juhász et al. (2024), mental health issues, which require educational interventions in schools that can help address stress, anxiety, depression, and chronic conditions that affect patients' well-being and work performance. Programs can teach coping mechanisms, promote help-seeking behaviours, and reduce stigma. In the context of chronic diseases such as diabetes and asthma, pedagogical approaches help individuals, especially the elderly, understand their condition and effectively self-manage their treatment, including medication adherence and lifestyle adjustments.

In their study, Catarino et al. (2021) discusses that pedagogical approaches like therapeutic patient education (TPE) and self-management support are crucial for patients with chronic diseases (diabetes, asthma) to build skills for medication adherence, lifestyle changes, monitoring, and problem-solving, boosting independence, quality of life, and health outcomes, often using cognitive-behavioural strategies, modelling, and family involvement. Grimes et al. (2022) conclude that in obesity and inactivity, health and physical education (PE) classes use pedagogical strategies to counter sedentarism and promote healthy eating and exercise habits from an early age, which is essential for preventing type 2 diabetes and cardiovascular disease.

Patient education is a systematic teaching-learning process that empowers individuals to manage their health and make informed decisions, moving them from passive recipients of information to active partners in their care. In their research, Ricci et al. (2022) reveal that this structured approach involves a continuous, cyclical series of steps, much like the nursing process: assessment, planning, implementation, and evaluation. Tailoring therapeutic education involves adapting the intervention to patients' needs, with the expectation that this individualisation will improve its outcomes. Communication is the basis for any individualisation process.

The primary goal of patient education is to improve health behaviours and outcomes as cited by Rose-Smith et al. (2025): improve patient adherence, healthcare providers must use clear communication (the "what, why, when, how, how long" of meds), simplify regimens (fewer pills, combo meds), use reminders (pillboxes, apps), address barriers (cost, side effects), build trust through empathy, and empower patients with education and support to foster ownership of their treatment plans. Improving Adherence by helping patients understand their treatment plans and medication regimens, leading to better adherence (Aremu et al., 2022).

Patients must be educated on managing chronic conditions (e.g., diabetes, hypertension) to prevent complications. According to Alneami et al. (2024), educating patients on managing chronic conditions such as diabetes and hypertension to prevent complications requires a multifaceted approach that emphasises

self-management education, lifestyle modifications, regular monitoring, and strong support from a healthcare team. Empowering patients with knowledge and skills can significantly improve adherence to treatment plans and overall health outcomes.

Oster et al. (2025) reveal in their studies that promoting self-management for chronic conditions means giving individuals skills (like problem-solving, goal-setting, managing emotions) and knowledge (about their illness) to handle daily life with their condition, reducing reliance on providers, improving quality of life, and achieving better health outcomes through education, peer support, and health coaching. It's a partnership where patients become active participants, managing symptoms, treatments, and lifestyle changes with support from the healthcare system.

In essence, patient education is a powerful tool that transforms patients from passive recipients of care into active, informed participants in their own health journey, leading to sustainable behaviour change and better health outcomes.

The Problem Statement

Authors Kivistik et al. (2025) state that inadequate patient education on chronic disease management represents a critical gap in health education systems, leading to poorer health outcomes, increased hospital readmissions, and a greater burden on healthcare systems. According to Alneami et al. (2024), effective education is crucial for empowering patients to manage complex conditions such as diabetes, hypertension, and asthma.

The following are gaps in health education:

Poor Adherence: Patients often struggle to adhere to treatment plans, medication schedules, and lifestyle changes, lacking an adequate understanding of their condition and the importance of compliance.

Preventable Complications: A lack of knowledge about symptom monitoring and warning signs can delay necessary interventions, resulting in acute flare-ups and long-term complications.

Increased Costs: Ineffective self-management often leads to more frequent emergency room visits and hospitalisations, driving up overall healthcare costs. *Reduced Quality of Life:* Without proper education and support, patients may feel overwhelmed and less confident in their ability to manage their disease, negatively impacting their mental well-being and daily life.

Therefore, addressing this gap requires a multi-faceted approach, which is the following:

Tailored Education: Programs need to be customised to individual patient needs, literacy levels, cultural backgrounds, and learning styles.

Accessible Resources: Utilising a variety of formats, including digital tools, written materials, and in-person counselling, can improve accessibility.

Healthcare Provider Training: Equipping healthcare providers with the skills and time to deliver effective patient education is essential.

Integrated Care Models: Incorporating patient education as a core component of chronic care management rather than an afterthought can ensure better long-term outcomes. As concluded by Veldhuis et al. (2025), prioritising robust patient education can improve patient empowerment, enhance self-management skills, and ultimately lead to healthier communities.

The pedagogical challenge lies in designing effective educational interventions that translate medical knowledge into sustainable health behaviours. This requires a multifaceted, theory-informed approach that addresses not just knowledge, but also capabilities, opportunities, and motivation. Solhi et al. (2020) state that key strategies include using behavioural change models, ensuring interventions are practical and context-specific, and employing a "coach" approach that empowers the individual. The following are the key strategies:

Utilising Behaviour Change Models: According to Timlin et al. (2021), interventions often draw on frameworks such as the COM-B model (Capability, Opportunity, Motivation, Behaviour) to systematically identify and address barriers. This ensures a comprehensive approach that targets all necessary components for change.

Building Capability: Beyond basic knowledge transfer, successful programs focus on developing practical skills and self-efficacy. Bejtac (2023) says this includes offering training in specific health practices, stress management techniques, and navigating healthcare systems.

Enhancing Opportunity: Effective interventions modify the physical and social environments to support healthy choices. Mahmoudi and Zhang (2022) argue that this might involve creating supportive peer networks, improving access to healthy food options, or advocating for policies that make the default choice the healthy choice.

Boosting Motivation: Parker-Drabble (2022) concludes that key psychological theories can enrich our understanding of our ancestors and help improve mental health for present and future generations. Strategies to enhance both reflective (conscious decision-making) and automatic (habitual) motivation are crucial. Techniques can range from goal setting and feedback loops to utilising incentives or leveraging social norms to make healthy behaviours more desirable.

Research aim and research questions.

This study aimed to evaluate the roles of health education, patient learning, and educational interventions in improving medication adherence and to further determine the educational deficits and learning needs contributing to non-adherence among patients on chronic treatment attending a primary healthcare setting in South Africa.

The aim of this study was attained through the following objectives, which were to:

- Establish the prevalence of demographic characteristics of patients.
- Determine the prevalence of adherence and non-adherence of patients.
- Evaluate the associations between demographics and adherence/non-adherence among patients receiving chronic treatment.
- Assess the History of chronic conditions with adherents and non-adherents.
- Identify educational deficits and learning needs contributing to non-adherence in patients with chronic conditions.
- Analyse associations between educational deficits and learning needs contributing to non-adherence.

Literature review

Health education theories

Health education theories provide frameworks to understand, explain, and change health behaviours, focusing on individual, interpersonal, and community levels, with popular models including the Health Belief Model (perceived threats/benefits), Social Cognitive Theory (self-efficacy, environment), Transtheoretical Model (stages of change), Theory of Reasoned Action/Planned Behaviour, and the PRECEDE-PROCEED Model (program planning). These theories guide the development of effective interventions to prevent disease and promote well-being. The key theories and models include:

Health Belief Model (HBM): According to Alyafei and Easton-Carr et al. (2025), the HBM explains behaviour by focusing on perceptions of a health threat (susceptibility, severity), perceived benefits, perceived barriers, and cues to action, plus Self-Efficacy. HBM explains health behaviour by focusing on an individual's perceptions: Perceived Susceptibility (risk of getting sick), Perceived Severity (how bad it would be), Perceived Benefits (positive outcomes of action), Perceived Barriers (obstacles like cost/discomfort), Cues to Action (triggers like symptoms or ads), and Self-Efficacy (belief in ability to act). People are motivated to change behaviour if they feel a serious threat, but believe the benefits outweigh the barriers and that they can succeed, making it a key tool for health promotion.

Social Cognitive Theory (SCT), as Cherry (2025) emphasize reciprocal determinism—the interaction between personal factors (self-efficacy), behaviour, and the social/physical environment. developed Social Cognitive Theory (SCT), highlighting Reciprocal Determinism, where personal factors (like self-efficacy), behaviour, and the environment continuously and mutually influence each other, meaning people aren't just shaped by surroundings but actively shape them too, with self-belief (self-efficacy) and observing others (observational learning) being key drivers of action and change as concluded by developed Social Cognitive Theory (SCT), highlighting Reciprocal Determinism, where personal factors (like self-efficacy), behavior, and the environment continuously and mutually influence each other, meaning people aren't just shaped by surroundings but actively shape them too, with self-belief (self-efficacy) and observing others (observational learning) being key drivers of action and change. developed Social Cognitive Theory (SCT), highlighting Reciprocal Determinism, where personal factors (like self-efficacy), behavior, and the environment continuously and mutually influence each other, meaning people aren't just shaped by surroundings but actively shape them too, with self-belief (self-efficacy) and observing others (observational learning) being key drivers of action and change as concluded by Cherry K (2025).

Transtheoretical Model (TTM) / Stages of Change: Assesses readiness to change, outlining stages like precontemplation, contemplation, preparation, action, and maintenance. As conclude by de Freitas et al. (2020) the Transtheoretical Model (TTM), or Stages of Change Model, assesses readiness for behaviour change, defining it as a cyclical process through Precontemplation (no change planned), Contemplation (thinking about change), Preparation (planning to act soon), Action (actively changing), and Maintenance (sustaining change for >6 months), with a potential for Relapse. As discussed by Chen et al. (2022), the TTM model helps tailor interventions by matching strategies to the individual's current stage, recognising that change is gradual and non-linear, and focusing on processes such as self-efficacy and decisional balance (pros/cons) to facilitate movement between stages.

Adult learning principles in patient education

Palis and Quiros (2014) discuss that adult learning principles (andragogy) in patient education focus on making learning relevant, self-directed, and experience-based, recognising adults as independent

learners who need to know why they're learning, using their existing knowledge, being ready for relevant problems, and preferring practical, goal-oriented, internally motivated education rather than abstract, subject-centred instruction. Applying these means involves patients in goal setting, connecting new information to their lives, using problem-solving, and respecting their experience to boost engagement and understanding.

The key Andragogical Principles for Patients include, as stated by Niksadat et al. (2023):

Need to Know: Explain why the information is important and how it helps their specific health situation (e.g., managing diabetes, post-surgery recovery).

Self-Concept: Treat patients as capable individuals who can direct their own learning; involve them in setting goals and choosing how to learn.

Experience: Value their life experiences as a rich resource; connect new health knowledge to what they already know and have done.

Readiness to Learn: Teach when they are ready, often when facing immediate life events or problems (e.g., a new diagnosis).

Orientation to Learning: Focus on practical, problem-centred learning (e.g., "How do I take this medicine correctly?") rather than just facts.

Motivation: Tap into internal motivators like self-esteem, quality of life, and personal goals, not just external pressures.

The following are the practical applications of adult learning principles in patient education:

Active Involvement: Ask patients what they want to learn, and involve them in care planning.

Relevance: Use real-life scenarios, case studies, and immediate concerns.

Build on Experience: Ask about past successes/failures with health, use storytelling.

Problem-Solving: Frame education around solving their specific health problems.

Support Independence: Provide resources and mentorship for self-management.

"Just-in-Time" Learning: Deliver information when they need it for immediate application.

Health literacy assessment and improvement strategies

Seidel et al. (2023) discusses that health literacy assessment involves using tools like Newest Vital Sign (NVS) and Teach-Back, while improvement focuses on Universal Precautions: plain language, visual aids, limiting key points, using teach-back for confirmation, cultural sensitivity, and leveraging digital health like telemedicine; organizational strategies include training staff, clear processes, and integrating literacy into existing goals for better outcomes.

Health Literacy Assessment Strategies include those discussed by Seidel et al. (2025):

Informal Assessment: Observe patient understanding during conversations, use open-ended questions, and note their ability to use health information.

Formal Tools: Use validated questionnaires like the Newest Vital Sign (NVS) (using a nutrition label) or longer surveys to gauge numeracy and reading comprehension.

Sensitive Approach: Conduct assessments privately to avoid shame and to differentiate low literacy from other issues such as English proficiency or cognitive decline.

Educational interventions for chronic disease self-management

Bahari and Kerari (2024) reveal that educational interventions for chronic disease self-management empower individuals with skills to handle daily health challenges through group workshops (like CDSMP), peer support, and technology, focusing on symptom management (pain, fatigue), healthy lifestyle (diet, exercise), problem-solving, communication with providers, and building self-efficacy for better quality of life and outcomes. Key components include learning about conditions, action planning, decision-making, medication use, and emotional coping, using approaches from traditional settings to digital games and VR.

The Core Components of educational Interventions in chronic disease self-management, according to Lemmon et al. (2025), include:

Symptom Management: Techniques for pain, fatigue, shortness of breath, stress, and sleep issues.

Healthy Lifestyle: Guidance on exercise, nutrition, and weight management.

Problem-Solving & Decision-Making: Developing skills to tackle daily problems and make informed choices.

Communication Skills: Training for effective interaction with healthcare providers.

Medication Management: Understanding and appropriate use of medications.

Action Planning: Creating personal plans to achieve health goals.

Emotional Support: Peer groups to reduce isolation and build confidence.

Common Program Models

Common program models for chronic disease self-management, according to Lawless et al. (2025), focus on empowering patients with skills (problem-solving, goal-setting, communication) through structured, often peer-led, group education like the Stanford Chronic Disease Self-Management Program (CDSMP), supported by broader frameworks like the Chronic Care Model (CCM) and Innovative Care for Chronic Conditions (ICCC) that integrate self-management support into the healthcare system for better outcomes. Key elements include skill-building, addressing emotional challenges, fostering peer support, and linking to clinical care, using formats from six weeks.

Chronic Disease Self-Management Program (CDSMP): An evidence-based, workshop-style program covering broad skills, often taught by lay leaders.

Peer-Led Groups: Provide social support and shared experiences, helping participants realise they are not alone.

Delivery Methods

In-Person Workshops: Interactive group settings.

Digital/Technology-Based: Computer games, educational videos, and even Virtual Reality (VR) for simulated experiences and training.

Tailored Support: Programs specifically adapted to individual needs.

Key Goals & Benefits

Empowerment: Building belief in one's ability to manage the condition (self-efficacy).

Improved Outcomes: Better quality of life, reduced clinical events, and better use of health services.

Action-Oriented: Moving beyond just knowledge to active goal achievement.

Pedagogical approaches in community health education

Pedagogical approaches in community health education focus on empowering people to improve health, moving beyond lectures to methods like Critical Pedagogy, Participatory Learning, Culturally Responsive Teaching, and Inquiry-Based Learning, all emphasizing community voice, context (place), addressing inequities, and fostering critical thinking for sustainable change, using strategies like service-Key Pedagogical Approaches as states Zhang et al. (2025):

Critical Pedagogy: Challenges power structures, focusing on social determinants, health equity, and empowering communities to challenge injustices and enact change.

Participatory/Community-Based: Involves community members as co-creators of knowledge, valuing diverse experiences and shifting focus from teacher-led to shared learning (e.g., Pedagogy of Collegiality).

Culturally Responsive Teaching: Adapts teaching to respect and incorporate diverse student backgrounds, identities, and lived experiences, connecting content to real-world contexts.

Inquiry-Based & Constructivist Approaches: Students actively build knowledge through questioning, exploring problems, and solving real health challenges, often through projects or research.

Contextualised/Pedagogy of Place: Integrates the unique social, physical, and historical context of a specific community into the learning process.

Service-Learning: Blends classroom learning with hands-on community service, applying theoretical knowledge to real-world health needs. learning and co-creation of knowledge.

Patient education effectiveness studies

According to Johnson et al. (2023), patient portals provide patients access to health records, lab results, medication refills, educational materials, secure messaging, appointment scheduling, and telehealth visits, allowing patients to take a more active role in their health care decisions and management.

Health literacy measurement tools

Dijkman et al. (2023) state that health literacy measurement tools assess skills in understanding, appraising, and applying health information, with common examples including the Newest Vital Sign

(NVS), REALM-SF (word recognition), TOFHLA (reading/numeracy), and the comprehensive Health Literacy Questionnaire (HLQ). Tools range from quick clinical screeners like the NVS (nutrition label-based) to broader instruments covering print, oral, digital, and numeracy domains, with resources like the Health Literacy Tool Shed providing databases for selection.

Common Measurement Tools

- *Newest Vital Sign (NVS)*: A 3-minute, bilingual (English/Spanish) screening using a nutrition label to assess numeracy and comprehension, identifying patients needing communication support.
- *Rapid Estimate of Adult Literacy in Medicine (REALM-SF)*: A quick word recognition test (7 items) to gauge medical vocabulary, available in short form.
- *Test of Functional Health Literacy in Adults (TOFHLA)*: Measures reading comprehension and numeracy using real-life healthcare materials (prescription labels, forms).
- *Health Literacy Questionnaire (HLQ)*: A broad 44-item tool covering nine scales like access, understanding, appraisal, and application of health info; can be administered verbally.
- *Health Literacy Skills Instrument (HLSI)*: Assesses print, numeracy, oral literacy, and information-seeking skills.
- *eHealth Literacy Scale (eHEALS)*: A popular tool specifically for measuring digital health literacy.

Community-based participatory education program

Benedict (2025) states that a Community-Based Participatory Education Program (CBE/CBPR) is a collaborative learning model where students, educators, and community members work together to identify and solve real-world local challenges, using experiential learning to connect theory with practice, fostering civic engagement, and creating social change through shared knowledge and action. It moves beyond traditional teaching to empower communities, building skills and generating solutions that are relevant, context-specific, and mutually beneficial for all involved.

Key Characteristics involve:

- *Partnership & Collaboration*: Involves shared power and decision-making between academic institutions and community groups, treating community members as experts.
- *Experiential Learning*: Focuses on hands-on, real-world projects and challenges, often using [Participatory Action Research \(PAR\)](#).
- *Contextual Relevance*: Grounds learning in specific community issues, such as health, social inequality, or local development.
- *Action-Oriented*: Aims to produce tangible solutions and social change, not just academic knowledge.
- *Reflective Practice*: Includes critical reflection on the process and outcomes to deepen learning.

Digital health education platforms

As discussed by Ferretti et al. (2024), digital health education platforms provide online learning for professionals and patients, covering topics from basic digital literacy to specialised skills using tools like video modules (ORCHA, Medbridge), VR/AR for training, and AI-driven patient management (Huma), enhancing access, self-paced learning, and integration of technology (apps, wearables, EHRs) for better health outcomes and workforce readiness. Key platforms include ORCHA Digital Health Academy (for

professionals), Medbridge (CE/patient education), Huma (RPM/chronic care), and general resources like YouTube Health for the public in

For Healthcare Professionals

- *ORCHA Digital Health Academy*: Offers free, CPD-accredited courses on recommending quality digital health tools (apps, wearables) to patients.
- *Medbridge*: Provides continuing education (CE) and patient education resources, including videos and home exercise programs (HEP).
- *E-learning Platforms*: Facilitate self-paced learning on diverse medical topics, crucial for keeping up with dynamic medical advancements.

For Patients & General Public

- *Telemedicine Platforms*: Enable remote consultations, enhancing understanding through direct interaction (e.g., via Zoom, [Teladoc](#)).
- *Mobile Health (mHealth) Apps*: Support self-management of conditions (e.g., diabetes, hypertension) with reminders, tracking, and educational content.
- *YouTube Health*: Provides engaging, expert-vetted video content for public health awareness.
- *VR/AR*: Offers immersive experiences that let patients visualise procedures (e.g., surgery) before they occur, improving comprehension.

Key Technologies & Platforms

- *Remote Patient Monitoring (RPM)*: Devices and apps track vitals for conditions like diabetes (Huma, MyWay Diabetes).
- *AI & Data Analytics*: Generate insights for personalised care (Huma).
- *EHR/EMR Integration*: Platforms connect with existing hospital systems for seamless data flow (Huma, Epic).

Culturally responsive health education approaches

Look et al. (2023) state that culturally responsive health education uses community knowledge, values, and experiences to make health info relevant and effective, focusing on building trust through community-based approaches, active listening, cultural humility, and integrating local traditions (like hula or storytelling) into programs, rather than just translating materials, to foster better engagement and health outcomes for diverse populations. Key strategies include involving community leaders, using storytelling/art, ensuring linguistic access, and tailoring messages to resonate with family structures and beliefs, creating safe, validating spaces for learning.

Key Approaches & Strategies

Community-Based Participatory Research (CBPR): Involving community members as partners in designing and implementing programs, leveraging their expertise and ensuring cultural integrity.

Cultural Humility & Active Listening: Health workers approach sensitive topics with respect, acknowledge their own limitations, and create safe spaces for open dialogue.

Leveraging Cultural Capital: Using culturally relevant examples (foods, practices) and familiar communication styles (e.g., pláticas, porch-sitting) to make learning meaningful.

Storytelling & Arts: Incorporating collaborative art forms like photo voice, filmmaking, music, or traditional dances (like hula) for deeper engagement.

Family & Community Integration: Involving family and community in health decisions and education, recognising collectivist values.

Tailored Materials & Delivery: Adapting messages to specific cultural norms, values, and beliefs, and using community health workers.

Building Trust & Relationships: Prioritising mutual respect, fair treatment, and strong relationships between educators and community members.

Core Principles include: *Value Students' Cultures:* Recognise that every individual has a rich cultural story that should be validated, not ignored.

Build Positive Environments: Create inclusive spaces where all learners feel they belong and can succeed.

Promote Equity: Advance social justice by addressing historical oppression and ensuring all voices are heard.

Examples in Practice

A hypertension program using Hawaiian hula dance, developed with cultural experts, showed strong results by maintaining cultural priorities.

Using intimate storytelling spaces (pláticas) for Latinx women or focusing on family-centred care in dietary guidelines.

By moving beyond simple translation to truly embedding culture into the process and content, health education becomes more accessible, empowering, and effective for diverse communities.

Educational Assessment

Study design

This was a quantitative cross-sectional study using an educational needs assessment to examine knowledge deficits, learning barriers, and educational preferences, conducted through face-to-face interviews with patients with chronic conditions and taking medications from the Gateway clinic. These illnesses are HPT, DM, TB, HIV/AIDS, asthma, epilepsy and CVDs. The design was chosen because quantitative research is an informal, systematic, and objective process used to describe and test relationships and to examine cause-and-effect interactions among variables.

Study setting

The study was conducted at Gateway Clinic in Mthatha, Eastern Cape (EC), South Africa. The clinic serves nearby areas such as Old Payne, Zimbane Valley, and South Ridge. It is open Monday through Sunday, 8:00 am to 16:00 pm. Gateway Clinic is a facility focused on outpatient services, meaning patients can go home after receiving care. It is also a public service centre, so one does not need to make an appointment to go there.

Study population

A population is defined as all the elements (including individuals, events and objects) that meet the sample criteria in a study. The study population consisted of selected patients on chronic treatment attending the healthcare clinic. Patients attending the Gateway clinic with chronic illnesses like HIV/AIDS, TB, HPT, DM, asthma, epilepsy and cardiovascular diseases.

Inclusion criteria

- All patients diagnosed with a chronic condition and who were getting their chronic medication from the Gateway clinic for the period June 2022 to August 2022.
- All patients 18 years and older, irrespective of gender, with chronic conditions were included.

Exclusion criteria

Exclusion criteria are characteristics or factors that disqualify potential participants from a study, even if they meet the inclusion criteria. These criteria are established to ensure the safety and ethical treatment of participants, improve the scientific rigour by reducing confounding variables, and define the specific characteristics of the study population. Therefore, the following patients were excluded from the study:

- All the patients who have or would not be collecting their medications outside the defined period, June to August 2022.
- Patients not willing to take part in the study.
- Patients who were too critically ill to respond to interview questions or did not have a caregiver, and patients who do not have chronic conditions.

Sampling strategy

A random sampling method was used to select patients with the following chronic

diseases: HPT, DM, TB, HIV/AIDS, asthma, epilepsy and CVDs. The selection of patients for this study was unbiased and based on the study's ideal benefits.

Sample size formula calculation determination.

I hereby acknowledge that the sample size of 80 is convenience-based.

Ethical considerations

The protocol was authorised by the Faculty of Medicine & Health Sciences Biosafety Human Research Ethics Committee (HREC) of Walter Sisulu University, and the study was conducted in compliance with the Declaration of Helsinki. The research identification number was 080/2020 and was issued on 25 August 2022. Furthermore, permission was sought from WSU Gatekeepers, Tambo Municipality, and KSD, under whose auspices the clinic functions. Finally, permission was obtained from the clinic manager who oversaw the data collection.

The project team informed participants of the study's goals and advantages using a participant information sheet before data collection. Participants were asked to sign a written consent form, which was optional, to participate in the study. It was made clear to the participants that if at any point they felt they did not want to continue taking part in the study, they were free to withdraw. The researcher and data

collectors guaranteed the participants' anonymity and the confidentiality of their information, as stipulated in the participants' consent form.

According to ethical rules, written consent is a documented agreement in which an individual voluntarily agrees to participate in a study or procedure after fully understanding its nature, purpose, and potential risks and benefits. Furthermore, while written informed consent is the standard and generally required procedure for most human research studies, it is not always mandatory. It can be optional or waived in specific, ethically approved circumstances.

Educational needs assessment examining knowledge deficits, learning barriers and educational preferences

Julie and Timothy (2011) revealed that in the last two decades, evidence-based practices have become increasingly prioritised, yet their adoption and application remain limited. It is important, then, to characterise the contextual factors that facilitate or impede the implementation and sustainment of evidence-based practice. The educational needs assessment examines the following:

Knowledge deficits

As defined by Choi and Park (2024), an educational needs assessment is a systematic process used to identify and address the "gap" between an individual's or group's current knowledge, skills, and performance ("what is") and the desired or required competencies ("what should be"). This process is crucial for designing effective, targeted, and relevant educational programs or curricula.

Learning needs

Chirowamhangu (2024) says that an educational needs assessment that examines learning barriers is a crucial process for identifying and removing obstacles to learning and development, promoting effective and inclusive education for all learners. The goal is to identify specific challenges and determine appropriate supports, shifting the focus from individual deficits to systemic issues.

Educational preferences

According to Levy-Feldman (2025), assessment is an integral core component of the educational process (learning-teaching-assessment), influencing learning and teaching. Its impact extends beyond these core elements, shaping decisions that affect students, teachers, administrators, policymakers, and the wider community. Recognising the critical role and broad impact of assessment on educational practices, we must leverage its power to foster better education that caters to diverse multicultural learners and promotes a more equitable society.

Health literacy assessment tools are used for educational background as a predictor of learning capacity.

Health literacy assessment tools do not directly use an individual's educational background as an input to calculate a score or predict learning capacity. Instead, educational background is widely recognised as a major socio-demographic predictor of health literacy levels, and studies consistently show a strong association between lower education and lower health literacy scores as interpreted by Lorini et al. (2020).

Here are some widely used health literacy assessment tools:

- *Rapid Estimate of Adult Literacy in Medicine (REALM)*: An objective, performance-based tool that assesses the ability to read and pronounce medical words. It is quick to administer and correlates with general vocabulary tests, but it does not use education level in its scoring.
- *Test of Functional Health Literacy in Adults (TOFHLA) / Short TOFHLA (S-TOFHLA)*: This performance-based tool uses medical documents (e.g., prescription labels) to assess reading comprehension and numeracy skills. Like the REALM, the results correlate with educational attainment, but education is not part of the scoring matrix.
- *Newest Vital Sign (NVS)*: This short, performance-based instrument uses a nutrition label and asks six questions related to it to assess print literacy and numeracy. It is considered practical for clinical settings and is superior to demographics alone for identifying individuals with limited health literacy.
- *Health Literacy Questionnaire (HLQ) & European Health Literacy Survey Questionnaire (HLS-EU-Q)*: These are self-reported measures covering a broader range of health literacy domains (e.g., accessing, understanding, appraising, and applying health information, as well as social support and navigating the healthcare system). They typically collect educational background as part of a separate socio-demographic section to analyse associations with results, not to calculate the score itself.

Health literacy assessment tools are used to assess prior health education experiences

Dijkman et al. (2024) note that health literacy assessment tools typically lack a specific, separate section to measure "prior health education experiences" as a distinct score. Instead, this information is often collected as a sociodemographic or background variable (e.g., educational attainment, prior program participation) and used in data analysis to examine its influence on overall health literacy scores or health knowledge.

Health literacy assessment tools are used to evaluate existing patient education materials

To assess patient education materials, key health literacy tools include the PEMAT (Patient Education Materials Assessment Tool) for understandability/actionability, the CDC Clear Communication Index for overall clarity/design, the Suitability Assessment of Materials (SAM), and readability formulas like Flesch-Kincaid, SMOG, or the Newest Vital Sign (NVS) for assessing reading level, often combined with self-report tools like the Health Literacy Questionnaire (HLQ) for broader context. These tools help evaluate clarity, design, and whether materials empower patients to take action, covering print, audiovisual, and digital formats.

Health literacy assessment tools used for learning style preferences

As stated by Dijkman et al. (2024), health literacy assessment tools don't directly measure learning styles, but they identify comprehension levels, which inform communication; tools like the S-TOFHLA, NVS, and BHLS assess literacy, while the VARK™ Inventory and Learning Channel Preference Checklist (LCPC) identify learning preferences (visual, aural, read/write, kinesthetic), with some d Learning Style Assessment Tools (Focus on Preference)

Learning Style Assessment Tools (Focus on Preference)

These tools, as emphasised by Dijkman et al. (2024), identify how individuals prefer to receive and process information (sensory preferences). These are:

- VARK™ Inventory: Assesses preferences for Visual, Aural, Read/Write, or Kinesthetic (hands-on) learning.
- Learning Channel Preference Checklist (LCPC): Categorises responses to identify visual, aural, and kinesthetic learning styles.

Health literacy assessment tools used for educational barriers

According to Faux-Nightingale et al. (2022), several tools are commonly used to assess health literacy and identify educational barriers, with popular choices including the Newest Vital Sign (NVS), the Short Test of Functional Health Literacy for Adults (S-TOFHLA), and the Rapid Estimate of Adult Literacy in Medicine (REALM). These tools are often categorised as either objective tests of ability or self-reported questionnaires.

Educational Needs Assessment

A previously validated standard questionnaire was used as a data tool. A questionnaire is a research tool made of a set of questions designed to gather data. In this study, the patients' demographic characteristics were obtained through face-to-face interviews. The questions encompassed both closed-ended questions with pre-determined responses and open-ended questions that allowed respondents to give comprehensive, unscripted answers. All questionnaires were translated into the local vernacular, "IsiXhosa".

The data were collected from 80 patients at the Gateway clinic, including their socio-demographics such as gender, age, marital status, educational background, employment status, salary earned, form of settlement, means of transport, number of people in the household, and the chronic conditions from which they are suffering.

Medication adherence was measured using a self-report questionnaire, the most commonly used validated tool for assessing adherence to medication, as advised by Chan et al. (2021). To collect self-reports for this study, the selected questionnaire was the Medication Adherence Rating Scale (MARS), a validated tool. The questionnaire was administered to the patients using a normalised introductory statement to make non-adherence seem less stigmatising. The questionnaire included a specific recall period (e.g. 'last week'), and a visual analogue scale (VAS) for a percentage estimate was used.

The Medication Adherence Report Scale (MARS) was used to test the reliability and validity of the data collection tool. Pilot testing was carried out. For the translations, a standard forward-backwards translation process was used, followed by a pilot test with a small group of patients to ensure the wording is understandable, acceptable, and culturally appropriate before a full validation study.

The following self-report questions were used to determine the frequency of non-adherence: "In the last 30 days, on how many days did you miss at least one dose of any of your medications?" and "Over the past 7 days, how many times did you miss a dose of any of your heart medication?" Finally, the responses were analysed using the tool's specific scoring method to determine the patients' adherence rate and identify potential barriers. Reasons given for not adhering to chronic treatment were: No knowledge about the importance of not adhering to treatment, side effects, forgot to take chronic treatment, did not have money to go to the clinic, felt better, in denial, stigma, did not get medication at the clinic, and I was told it was out of stock.

The validity of educational tools assessment

Sullivan (2011) describes how the validity of educational tools' assessments shows how accurately they measure what they claim to measure, ensuring that conclusions drawn from scores are meaningful for their intended purpose (e.g., certification, remediation). It's not just about the tool, but also about the interpretation of its scores, supported by evidence such as content validity (covering the right material), construct validity (measuring abstract traits like critical thinking), and criterion-related validity (predicting future performance). A valid tool is crucial for fair judgments; it must be continually validated with various types of evidence to be credible.

Reliability of the educational tool assessment

Sullivan (2011) states that the reliability of educational tools assesses their consistency in producing similar results under the same conditions, ensuring scores aren't due to chance, while validity ensures the tool measures what it's supposed to. Reliability is assessed using methods such as test-retest (similar scores over time), inter-rater reliability (consistent scores across graders), and internal consistency (e.g., Cronbach's Alpha for consistent items). High reliability is crucial for trustworthy data, allowing educators to depend on results for fair evaluations and informed decisions about student progress.

Data protection and management

Two people kept the information collected; if one person lost it, the other would have it. Only eleven people had access to the data. To protect the data from loss, it was saved on Google Drive, where it could be retrieved whenever needed. To prevent unauthorised access and maintain the confidentiality of the data, it was stored on a computer protected by a password. Physical security measures were put in place, such as storing research copies in locked cabinets.

Data cleaning and entry

The data was entered into SPSS. Data cleaning was done by thoroughly scanning the data for errors and duplications, and by removing all irrelevant and incorrect information. All faulty questions and participant-completed consent forms were disposed of. We verified that all questions were answered and assessed the response rate.

Data analysis

After all the data were collected, variables were checked for completeness and consistency using a mechanistic analysis. The pre-coded data was captured in SPSS. Descriptive statistics were used to narrate patient attributes. Categorical variables were reported using frequencies and/or percentages. The association between participants' attributes, chronic conditions, patient-drug factors, and non-compliance with chronic medications was determined using the Pearson chi-square test. A p-value of less than 0.05 was regarded as statistically significant. The data were presented in tables, followed by a discussion of each graph.

Results

Demographic characteristics of patients

A total of 80 questionnaires were collected, giving a response rate of 100%, meaning that every single person who was invited to participate in the research study completed it. This was possible in this study because of the controlled environment in which the project was carried out and the small number of

participants (80). Females represented 56.25%, and males 43.75% of the participants included in the study. In terms of age groups, participants belonging to the 41–50 years group comprised the highest percentage (31.25%), followed by the 31–40-year-old group and > 50 years group, both accounting for (21.25%) and lastly 16.25% for the 18–30-year-old group. Regarding marital status, single participants were the majority (61.25%). While most participants (63.75%) had received secondary education, others (25.00%) had received only primary education. More than half (60.00%) of the patients were unemployed, and for income status, the majority (72.50%) earned less than R 5000 per month (See Table 1).

Table 1

Demographic characteristics of participants and level of adherence and non-adherence

Gender	Frequency (n)	Percentage (%)	Adherent	Non-adherent	X ²	P value
Male			18		1.376	0.241
Female	35	43.80	29	17		
Total	45	56.30	47	16		
	80	100.00		33		
Marital status					4.083	0.397
Single	49	61.25	27	22		
Married	22	27.50	16	6		
Divorced	4	5.00	2	2		
Widowed	5	6.25	2	3		
Total	80	100.00	47	33		
Educational level					7.136	0.028
Primary	20	25.00	15	5		
Secondary	51	53.70	30	21		
Tertiary	9	11.30	2	7		
Total	80	100.00	47	33		
Age group					7.994	0.046
18-30	13	16.25	8	5		
31-40	21	26.25	7	14		
41-50	25	31.25	18	7		
>50	21	26.25	14	7		
Total	80	100.00	47	33		
Employment status					10.390	0.016
Unemployed	48	60.00	24	24		
Employed	32	40.00	23	9		
Total	80	100.00	47	35		
Income status					12.740	0.002
≥5000	58	72.50	29	29		
5000-1000	20	25.00	18	2		
>1000	2	2.00	0	2		
Total	80	100.00	47	33		
Residential area					0.580	0.446
Urban	42	52.50	23	19		
Rural	38	47.50	24	14		
Total	80	100.00	47	33		

People per household					50.997 <.001
< 5	29	36.25	12	17	
5-10	35	43.75	35	0	
>10	16	20.00	0	16	
Total	80	100.00	47	33	
Chronic conditions					11.156 0.084
HIV/AIDS	38	47.50	18	20	
TB	10	12.50	9	1	
HPT	13	16.25	8	5	
Asthma	10	12.50	4	6	
DM	6	7.50	5	0	
Others	3	3.75	3	1	
Total	80	100.00	47	33	

Prevalence of adherents and non-adherents

Of the 80 patients interviewed for the study, 47 (58.75%) were adherents, while 33 (41.25%) were non-adherents.

History of chronic conditions with adherents and non-adherents

In terms of the history of chronic diseases, 47.50% had HIV/AIDS, followed by 16.25% having HPT, while both TB and asthma accounted for 12.50% each, 7.50% had DM, 2.50% had epilepsy, and 3.75% had other conditions. The majority (60.61%) of non-adherents were those people with HIV/AIDS, followed by 18.18% with asthma, then 15.15% with HPT, 3.03% for both TB and DM. Neither epileptics nor heart diseases had any non-adherent, as shown in Table 2.

Table 2

Determine the prevalence of chronic conditions and the level of adherence.

Chronic Condition	Frequency of Respondents		Adherents		Non-Adherents	
	(n)	(%)	(n)	(%)	(n)	(%)
HIV/AIDS	38	47.50	18	38.30	20	60.61
Hypertension	13	16.25	8	17.02	5	15.15
Tuberculosis	10	12.50	9	19.15	1	3.03
Asthma	10	12.50	4	8.51	6	18.18
Diabetes Mellitus	6	7.50	5	10.64	1	3.03
Epilepsy	2	2.50	2	4.26	0	0.00
Heart disease	1	1.25	1	2.13	0	0.00
Total	80	100.00	47	100.00	33	100.00

4.3. Identify educational deficits and learning needs of patients with chronic conditions.

Patients were interviewed about whether they skipped their chronic treatment. Thirty-three (41.35%) responded yes, and 47 (58.75%) responded no. Then they were asked why they skipped their chronic medications, and they provided responses (See Table 3).

Table 3

Reasons for skipping chronic treatment (n=33)

Reason for skipping chronic treatment		Frequency (n)	Percentage (%)
1.	No knowledge about the importance of taking medication	8	10.00
2.	Side effects	6	7.50
3.	Forgot	5	6.30
4.	Did not have money to go to the clinic	4	5.00
5.	Felt better	3	3.80
6.	In denial	3	3.80
7.	Stigma	2	2.50
8.	Did not get medication at the clinic	2	2.50
9.	Total	33	41.30
10.	Missing	47	58.80
11.	Total	80	100.00

Assess associations between educational deficits and learning needs associated with non-adherence to chronic treatment

Associations between patient-drug-related factors and non-adherence to chronic treatment were determined using chi-square tests. A value of $p \leq 0.05$ was considered statistically significant, as reflected in Table 4. Patient-drug related factors identified to be associated with non-adherence to chronic treatments are patients not knowing the importance of adhering to treatment ($p < .001$, side effects ($p=0.002$), forgetfulness ($p=0.006$), patients feeling better ($p=0.035$), being in denial ($p=0.035$), and patients who did not have money for transport to the clinic.

Table 4

Association between patient-drug related factors and non-adherence to chronic treatment

Patient-drug related factor		Adherence	Non-adherence	Pearson Chi-Square	
		Yes	No	Total	X ² P value
1.	No knowledge of importance medication adherence	47	25	72	12.660 <.001
		0	8	8	
		47	33	80	
2.	Side effects	0	6	6	9.238 0.002
		47	27	74	
		47	33	80	
3.	Forgot to take the medicine	0	5	5	7.695 0.006
		47	8	76	
		47	33	80	

4.	I felt better	0	3	3	4.439	0.035	
		47	30	77			
		47	33	80			
	5. In denial			0	3	3	4.439
	47					30	77
		47	33	80			
6.	Had stigma	0	2	2	2.922	0.087	
		47	31	78			
		47	33	80			
7.	Did not get medication from the clinic	0	2	2	2.922	0.087	
		47	31	78			
		47	33	80			
8.	Did not have money to go to the clinic	0	4	4	5.997	0.014	
		47	33	80			
		47	47	84			

Discussion

This study aimed to assess the role of health education, patient learning and educational intervention in improving medication adherence to chronic medication with the following objectives: Establish the prevalence of demographic characteristics of patients, determine the prevalence of adherence and non-adherence of patients, evaluate the associations between demographics and adherence and non-adherence of patients with chronic treatment, assess the History of chronic conditions with adherents and non-adherents, identify educational deficits and learning needs contributing to non-adherence to patients with chronic conditions and analyse associations between educational deficits and learning needs contributing to non-adherence. Therefore, the discussion is done following the order of the stated objectives.

In this study, although females accounted for 45 (56.30%), males were the most non-adherent group, accounting for 17 (51.51%). This agrees with research conducted by Schutt-Cerdan et al. (2025), who say that being male (OR = 28.3, 95% CI: 5.3–149.7) were significantly associated with a higher likelihood of non-adherence to treatment. It is widely observed in medical literature that males are a majority in non-adherence to chronic treatment. Mokoena et al. (2024) say that studies across various conditions, including diabetes and hypertension, consistently show that men are less likely to follow prescribed treatment plans compared to women.

In terms of age range, 41–50 was the most common, with 25 (31.21%). This age group was also the most non-adherent. However, the 31–40 age group was more non-adherent. This is supported by Stanly et al. (2025). Some studies indicate that younger adults often have higher rates of non-adherence, while others show that adherence peaks by middle age (e.g. 41–69 years), before declining in older adults. According to patient age, the results of the association with non-adherence to chronic treatment show a statistically significant value ($X^2 = 7.994$, $p = 0.046$).

Results of this study revealed that participants had secondary education, with 51 (53.70%) having completed secondary education. At the same time, these participants had the most non-adherents ($X^2 = 7.136$, $p = 0.028$), which is statistically significant. According to Zhu et al. (2023), most non-adherent participants in their study had a secondary level of education, highlighting the complex, multi-factorial nature of medication non-adherence. It indicates that while education is often positively associated with better adherence, other interconnected factors also play a significant role.

Findings from this study revealed that most participants were unemployed 45 (60%). This agrees with Zwide et al. (2025), who say that medication non-adherence was high in re-admitted patients at a psychiatry unit in the Weskoppies Psychiatric Hospital, Pretoria, South Africa. That study revealed that a significant majority of its participants (93.3%) were unemployed, and this difference was statistically significant ($X^2 = 10.390$, $p = 0.016$).

The majority of 58 participants (72.50%) in the study earned R5000 or more, with a significant value of $X^2 = 12.740$ and $p=0.002$. According to Appiah et al. (2023) [45], in a qualitative study on non-adherence to anti-tuberculosis treatment in the Ashanti region of Ghana, only 5% of the non-adherent participants earned more than ZAR 5000.

The number of people per household is significantly associated with non-adherence. This is confirmed by the results of the Pearson chi-square test, with $X^2 = 50.973$ and $p < .001$ for households with more than 5 people. This is supported by the results of a study by Katende-Kyenda (2025), which found that fewer than 5 people per household were a significant factor associated with greater non-adherence to chronic treatment. This implies that individuals in smaller households have less access to social and family support systems, which are crucial for medication adherence.

Results from this study revealed that of the 80 participants, 47 (58.75%) were adherents and 33 (41.25%) were non-adherents. A study conducted by Dunbar-Jacob et al. (2025) reports that for pharmacy-based measures, the overall mean adherence was 60% (median of 60%; range of 11–98%). Electronic monitoring was used in 19 studies (6.1% of 314 papers) to assess adherence, with an overall mean adherence of 70% (median 74%; range 20–97%).

The condition with the greatest number of chronic patients in this study is HIV/AIDS, accounting for 20%. To date, as investigated by Arrieta-Martínez et al. (2022), South Africa has the largest antiretroviral treatment programme in the world, with more than 7 million people currently living with HIV/AIDS, of whom 80% are on ART, and an estimated HIV prevalence five years ago already of 17.3% in the 15 to 49 year age group.

Results from this study on the chronic conditions revealed that HIV/AIDS is currently higher, accounting for 18 (20%). At the same time, this is the condition with the highest number of non-adherents. This affirmation is supported by research by Mashele et al. (2025), which consistently identifies high rates of non-adherence to antiretroviral therapy (ART) due to a complex mix of patient, drug, and systemic factors. This study identified various factors that affect ART adherence among young adults in Limpopo, South Africa. These encompassed medication-related factors, healthcare system factors, healthcare workers' attitudes, economic factors, disclosure, acceptance, mobile phone reminders, and family support.

Educational deficits and learning needs associated with non-adherence to chronic conditions in this study included poor knowledge of the significance of adhering to their chronic medications ($X^2 = 12.660$, $p < .001$), which was statistically significant. As emphasised by Zwide et al. (2025), poor knowledge is a significant barrier, as it directly correlates with a higher likelihood of non-adherence. Lack of knowledge about the condition and the necessity of chronic medication is a major hindrance to adherence. Patients with good medication knowledge are significantly more likely to comply with their medication plans.

Other factors identified in this study include side effects, with statistically significant results ($\chi^2 = 9.239$, $p = 0.002$). According to Tadesse et al. (2025), patients experiencing medication side effects are another significant factor, with patients who have side effects having higher odds of not adhering to their medication. Participants who were experiencing side effects perceived stigma from psychotropic

medication had 2.84 (CI: 2.05, 3.93) and 2.41 (CI: 1.87, 3.10) times more odds of non-adherence, as opposed to participants who did not experience side effects and perceived stigma, respectively. Side effects from treatment are regularly mentioned as a reason for non-adherence, as they can lead to discomfort, raise concerns about long-term health or reduced quality of life.

Forgetting to take their medications was another factor that made participants in this study default on taking their medications ($X^2 = 7.695$, $p=0.006$). According to Andersen et al. (2024), several practitioners indicated that young patients often had an aversion to reduced-quality-of-life treatments, making them more motivated to deprescribe. Besides, some recalled patients who had forgotten to take their treatment and discovered they could sleep without it, resulting in deprescription.

Four patients (5.00%) also reported defaulting on their medications because they did not have money to go to the clinic ($X^2 = 5.997$, $p=0.014$). Patients defaulting on their medication due to a lack of funds for clinic visits is a significant issue, as noted by Paundi et al. (2024), with transportation costs a major barrier. This financial strain can lead to a complete lapse in medication, resulting in negative health outcomes, such as increased costs, drug resistance, and the progression of illness.

Furthermore, key barriers identified were transportation costs: the expense of getting to and from the clinic is a direct barrier that prevents several patients from attending appointments for refills. General financial constraints beyond transportation, such as broader financial instability and the inability to meet basic needs, can make consistent medical care a low priority, even when it is lifesaving. As indicated by Wohl et al. (2017), clinic visit costs may include additional expenses related to the visit itself, even when medication is free, which can be a barrier to consistent care.

Other deficits associated with non-adherence to chronic medication were 3 (3.80%), as some patients reported feeling better ($X^2 = 4.439$, $p=0.035$). Feeling better is a common patient-related factor associated with non-adherence to chronic medication, as the relief of symptoms can lead individuals to assume incorrectly that they are cured or no longer need the treatment. As emphasised by Taderera (2025), feeling better can indeed lead to medication non-adherence and stopping to take their treatment. When individuals are relieved from relief, they may erroneously believe they are healed and no longer need the treatment, resulting in early stopping of treatment.

Taderera (2025) continue to dispute that in the specific case described, 3 out of the total 79 patients (3.80%) who exhibited non-adherence cited feeling better as their reason. This highlights how perceived symptom improvement, while a positive outcome of the medication, can inadvertently become a barrier to maintaining the long-term treatment plan necessary for managing chronic conditions.

Denial is a well-known patient deficit related to non-adherence to chronic medication. This is supported by statistically significant results from this study ($X^2=4.439$, $p=0.035$). Konkor et al. (2025) say that patients in denial may struggle to accept their diagnosis, leading them to minimise the severity of their condition, believe the medication is unnecessary and avoid engaging with treatment plans altogether.

According to Sascha et al. (2021), both physicians and patients believed that patients need to believe in their diagnosis, as denial may prevent them from seeking information, seeking it out themselves, and expressing themselves. One patient (female, with cancer and a high level of education): “So they are in a sort of denial, and if you have this problem, denial, you can’t give an opinion.”

Patients in this study expressed that they defaulted on their chronic medications due to stigma, though results obtained were not statistically significant ($X^2 = 2.922$, $p=0.087$). Stigma is a significant

patient-related factor that contributes to non-adherence to treatment for chronic conditions. This can be due to internalised self-stigma, which leads to feelings of shame and a reluctance to follow medical advice, or external social stigma, which can cause patients to hide their illness or feel shame when taking medication. This is supported by Al-Rajhi and Alqassim (2025) when they say that stigma impacts adherence through internalised stigma: patients may feel a sense of shame, hopelessness, or isolation, which can lead them to believe that their illness is a personal failing. This can decrease their self-efficacy and lead to a reluctance to follow through with treatment plans. Furthermore, a study by Abdisa et al. (2020) concluded that fear of social stigma may lead patients to fear being judged or discriminated against by others if their condition becomes known. This can lead them to avoid taking medication in front of others or to discontinue treatment altogether.

Finally, patient deficits associated with non-adherence to chronic treatment included not receiving medication at the clinic, though results from this study were not statistically significant ($X^2 = 2.922$, $p = 0.087$). Moges et al. (2024) note that the lack of medication at the clinic may result from system-level issues such as long waiting times, limited resources, or supply chain problems. According to Llorca et al. (2021), healthcare system factors include long waiting times. Patients may not be able to get medication due to long waits at the clinic and supply and access issues. Inadequate medication supply or limited resources at the clinic can prevent patients from receiving their treatment.

Recommendations

For a study on health education and medication adherence, recommendations include focusing on patient-centered/individualized education, using simple language with visual aids, incorporating motivational interviewing & self-management training, employing strategies like teach-back, combining education with behavioral/social support, and extending education over 1-3 months with frequent follow-ups, rather than one-off sessions, to improve understanding, self-efficacy, and long-term adherence.

Limitations

Limitations in studies on health education for medication adherence often involve methodological issues (small/heterogeneous samples, short duration, poor reporting), measurement challenges (self-report bias, difficulty measuring adherence accurately), delivery factors (lack of tailored content, limited follow-up), and patient-specific barriers (psychological issues, cost, literacy, cultural factors), leading to inconsistent or weak evidence for purely educational interventions, especially for complex chronic conditions.

Conclusions

Studies conclude that health education, particularly individualised, face-to-face, and nurse-led interventions, significantly improves medication adherence by boosting patient knowledge, self-management, and health literacy, leading to better chronic disease control (like hypertension). While effective, optimal delivery requires frequent follow-ups and tailored approaches (such as mobile health), underscoring the need to integrate these patient-centred strategies into standard care.

Suggestions for Future Research

Future research on the role of health education, patient learning, and educational intervention in improving medication adherence should focus on the following areas:

- *Long-term effectiveness of interventions:* While short-term effects (2-6 months) are evident, more research is needed to evaluate the sustained impact of educational interventions on medication adherence and clinical outcomes over extended periods (e.g., beyond six months).
- *Standardisation of interventions and measurements:* The field needs a standardised taxonomy to describe adherence and a gold standard for measuring it to ensure consistency across studies. Future research should clearly define the components of the educational interventions and use uniform adherence measures to reduce heterogeneity in results.
- *Tailored and personalised approaches:* Investigate the effectiveness of individualised, culturally relevant educational programs that address specific patient-facing barriers, beliefs (e.g., concerns about side effects), and needs, as single, generic interventions are not effective for all populations.
- *Integration of digital health technologies:* Explore the optimal integration of digital tools (e.g., mobile apps, smart pillboxes, SMS reminders) for ongoing support, particularly among diverse patient populations, including the elderly, to understand their effectiveness and cost-effectiveness in clinical practice.

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Conflict of Interest

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