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Adapting Medication Counseling Across Language, Literacy, Cultural, and Digital-Access Barriers: A Scoping Review of Strategies and Evaluation Methods, 2017–2024

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ABSTRACT

Medication counseling can fail when information is linguistically inaccessible, exceeds patients' literacy or information-processing capacity, conflicts with cultural or contextual expectations, or depends on digital resources that patients cannot readily use. Adaptations intended to address these barriers vary substantially in what they modify and in how their value is evaluated. To map strategies used from 2017 through 2024 to adapt medication counseling across language, literacy, cultural, and digital-access barriers and to distinguish the barriers targeted from the evaluation methods and outcomes used to judge those adaptations. A scoping review was conducted using PRISMA-ScR reporting principles. Searches combined concepts related to medication counseling and pharmaceutical care with language concordance, limited English proficiency, health and medication literacy, visual communication, cultural tailoring, telepharmacy, digital literacy, and evaluation outcomes. Records were screened without journal-quartile restrictions. Eighty-three records were identified, 14 duplicates were removed, and 69 records were screened. Thirty-eight reports underwent full-text assessment; 9 were excluded, leaving 29 evidence sources in the scoping synthesis. Evidence was charted separately for barrier context, adaptation strategy, delivery mode, population and setting, and evaluation endpoint. Adaptations included bilingual and language-concordant communication, pictograms and redesigned written instructions, teach-back and other comprehension-verification methods, culturally or population-responsive counseling, and digitally mediated or combined human–digital approaches. Evaluation was uneven. Comprehension, knowledge, preference, acceptability, and feasibility were assessed more frequently than demonstrated medication-use behavior, equitable access, quality of life, or clinical outcomes. Several studies also showed that favorable preference or acceptability did not necessarily correspond to improved task performance or downstream outcomes. Medication-counseling adaptations cannot be interpreted as a single intervention class. Their evidentiary meaning depends on what was adapted, which barrier or context was addressed, how counseling was delivered, and which outcome was measured. Separating these dimensions exposes important gaps between adaptation feasibility, patient experience, comprehension, behavior, equitable reach, and clinical benefit.

Keywords: Medication counseling, Health literacy, Language concordance, Cultural tailoring, Telepharmacy, Digital health literacy

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Introduction

Medication counseling is an interactive clinical activity in which information must be adjusted to the patient, the medicine, the encounter, and the conditions under which medication use will occur. Observational work in hospital

pharmacy has shown that pharmacists modify communication through approximation, interpretability, discourse management, interpersonal control, and other accommodation strategies rather than delivering identical information in every encounter [1]. Adaptation is therefore best treated as an observable modification of counseling content, presentation, interaction, or delivery rather than as a general claim that communication was "patient centred."

Patients' ability to participate also depends on conditions that precede and unfold within the counseling encounter. A systematic review of community-pharmacy counseling identified knowledge, beliefs, expectations, communication skills, environmental conditions, and pharmacists' responses as influences on patient participation [2]. These factors can shape whether an adaptation is usable, yet they are analytically different from the adaptation itself. A patient's limited opportunity to participate, for example, is not equivalent to a pharmacist's strategy for addressing that limitation.

Language discordance illustrates why this distinction matters. A systematic review of patient–physician language concordance found that most included studies reported at least one favorable outcome when patients and physicians shared a non-English language, but null findings and some worse outcomes were also present [3]. Language concordance can therefore facilitate communication without functioning as a universal determinant of quality. An evidence map of patient–provider language concordance similarly found positive and null associations across different outcome categories, populations, and settings [4]. The outcome selected for evaluation is consequently central to interpretation.

Health literacy introduces a different mechanism. It concerns patients' capacity to obtain, process, understand, and use health information rather than whether clinician and patient share a language. Recent evidence links health literacy with medication adherence in chronic disease, although relationships vary according to population, condition, literacy measurement, and adherence assessment [5]. Counseling adaptations designed to reduce information-processing demands should therefore be distinguished from adherence interventions whose primary mechanisms lie elsewhere.

Pharmaceutical-care evidence among migrants and refugees demonstrates how language, literacy, cultural expectations, health-system familiarity, and access conditions may accumulate within the same care episode. A scoping review found substantially more evidence describing barriers to pharmaceutical care than evidence evaluating facilitators or solutions [6]. This asymmetry creates an important interpretive problem: identifying a barrier does not establish that a proposed adaptation has been tested successfully against it.

Digital delivery adds a further distinction between access to counseling and ability to use the medium through which counseling is delivered. Electronic health literacy among older adults has been associated with multiple health-related outcomes, but definitions, instruments, and outcome measures remain heterogeneous [7]. Device availability, connectivity, digital skills, language accessibility, and willingness to use remote care should consequently not be collapsed into a single construct of "digital access."

Tailoring may also target population context rather than one isolated barrier. A scoping review of pharmacist-led health services for minoritized populations identified multiple forms of service tailoring, while showing that acceptability was more commonly described than rigorous effectiveness [8]. The resulting evidence base can therefore appear intervention-rich while remaining outcome-poor.

Against this background, the present scoping review asks: What strategies have been used to adapt medication counseling across language, literacy, cultural, and digital-access barriers, and how have those adaptations been evaluated? The analysis separates four dimensions that are frequently conflated: the barrier or context being addressed, the strategy used to modify counseling, the mode through which counseling is delivered, and the endpoint used to evaluate it. This permits favorable findings in feasibility, preference, or comprehension to remain visible without being interpreted automatically as evidence of behavioral or clinical effectiveness.

Materials and Methods

Review design, eligibility, and unit of inclusion

The review was designed and reported according to PRISMA-ScR principles [9]. The unit of inclusion was a unique peer-reviewed evidence source published from 2017 through 2024 that directly described, evaluated, or systematically synthesized a medication-counseling or medication-information adaptation relevant to language, literacy, cultural or contextual, or digital-access barriers.

Eligible evidence could involve pharmacists, pharmacy services, medication information delivered by another healthcare professional, prescription-label communication, discharge medication counseling, telepharmacy, digital medication education, or related medication-information interventions when the adaptation itself was identifiable. Studies concerned only with general health communication or digital health were not treated as included evidence unless medication counseling or medication-information adaptation was substantively examined. Journal quartile was not used as an eligibility criterion.

Multiple reports arising from the same underlying study or intervention were linked during charting to avoid treating publication multiplicity as independent evidence. Review-level sources and primary studies were retained when they served different analytic functions, but the number of references used in the manuscript was kept separate from the number of evidence sources included in the scoping synthesis.

Search, selection, and evidence charting

Searches combined medication-counseling and pharmaceutical-care concepts with terms covering language concordance, limited English proficiency, interpreters, bilingual communication, health literacy, medication literacy, pictograms, visual aids, teach-back, cultural tailoring, minoritized populations, telepharmacy, online counseling, educational video, mobile applications, digital literacy, and digital access. Searches were undertaken across PubMed-indexed literature and journal or publisher search interfaces and were supplemented by citation chaining from directly relevant reviews and primary studies.

The search identified 83 records. After removal of 14 duplicates, 69 records underwent title and abstract screening. Thirty-one were excluded at that stage, leaving 38 reports for full-text assessment. Nine full-text reports were excluded: three were not sufficiently concerned with medication or pharmaceutical counseling, two described barriers without usable adaptation or evaluation data, two examined digital medication or adherence technologies without a relevant counseling or communication-adaptation component, and two failed peer-review or publication-year eligibility after bibliographic verification. Twenty-nine evidence sources were included in the scoping synthesis.

Charting captured study design, country or region where relevant, population, setting, medication or service context, adaptation strategy, comparator where applicable, focal construct, operationalization, measurement source, proposed mechanism or process, boundary conditions, analytical method, temporal design, reported finding, evidence type, effect or performance direction where reported, limitations, applicability boundaries.

Coding barriers, adaptation strategies, delivery modes, and evaluation endpoints

Four coding dimensions were retained separately. Barrier or context identified the condition that could limit access to, processing of, participation in, or use of medication counseling. Adaptation strategy identified what was deliberately modified in the counseling or information process. Delivery mode identified whether the adapted counseling was delivered face to face, in written or visual form, digitally, remotely, or through a combined approach. Evaluation endpoint identified how the adaptation was judged.

Evaluation endpoints were charted without assuming equivalence among them. Comprehension and knowledge were separated from demonstrated task performance; medication-use behavior was separated from preference and satisfaction; feasibility and acceptability were distinguished from effectiveness; and digital reach or equity was treated independently from clinical outcome. Because populations, interventions, mechanisms, and endpoints were heterogeneous, no quantitative pooling was undertaken for the scoping synthesis.

Results and Discussion

Evidence-source, population, and counseling-context profile

The 29 included evidence sources covered hospital discharge, inpatient and outpatient medication counseling, community pharmacy, prescription-label use, chronic-disease medication support, migrant and refugee pharmaceutical care, services for minoritized populations, telepharmacy, telemedicine, digital education, and medication-adherence technologies. The evidence base included randomized and crossover trials, systematic and scoping reviews, validation studies, qualitative studies, mixed-method investigations, observational cohorts, cross-sectional analyses, and intervention-development or implementation evaluations.

Populations ranged from parents administering pediatric liquid medicines and older adults interpreting prescription labels to patients with chronic diseases, adults with limited English proficiency, migrants and

refugees, racial or ethnic minority populations, and users of remote or digitally mediated care. Some adaptations targeted a defined barrier directly, such as bilingual labeling for language discordance. Others combined several modifications, for example language adaptation with visual presentation or culturally responsive content with digital delivery.

The evidence profile therefore did not support treating "adapted counseling" as a unitary exposure. Strategy, population, setting, language context, delivery technology, and endpoint varied sufficiently that the same intervention label could describe materially different forms of care.

Figure 1 summarizes the reported screening sequence and exclusion categories.

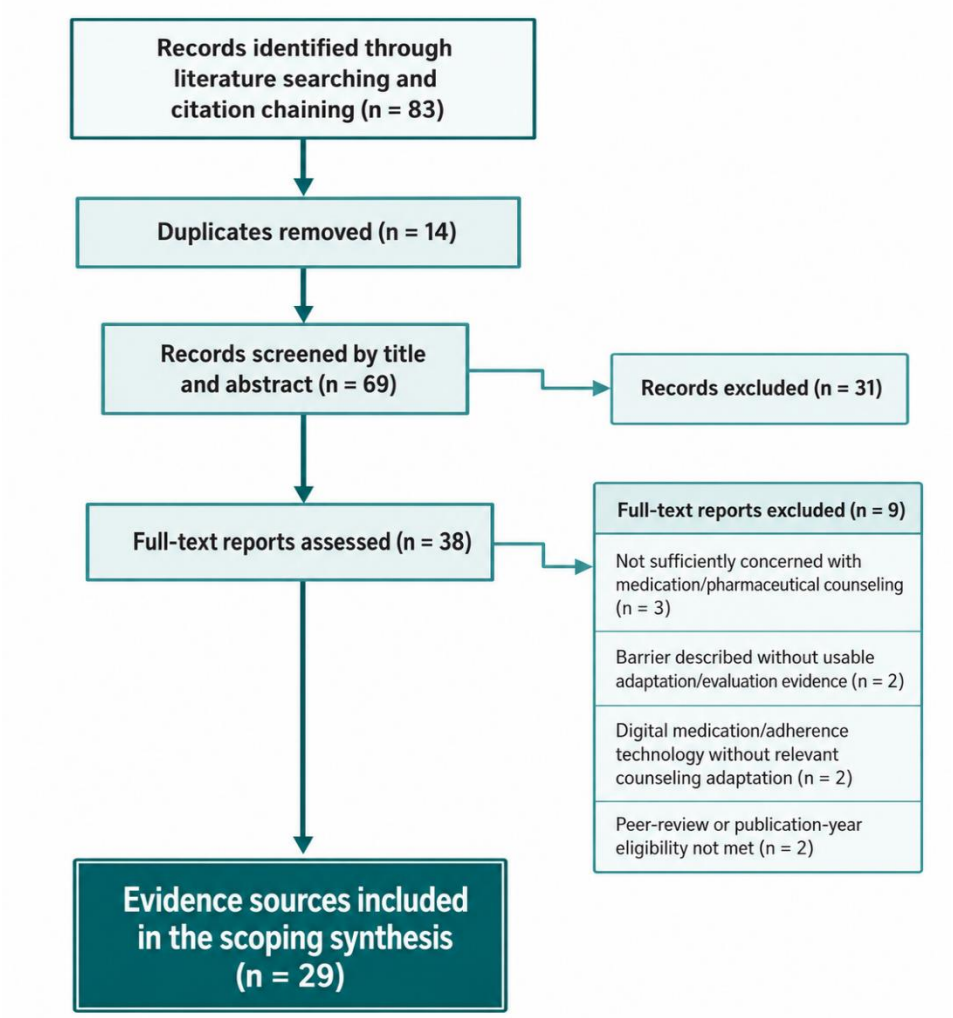

Figure 1. Evidence-source selection for the 2017–2024 medication-counseling adaptation scoping review

The included literature differed not only in population and setting but also in what evidence was capable of establishing. **Table 1** preserves those contextual distinctions before individual adaptation strategies are compared.

Table 1. Evidence configurations represented in the included medication-counseling adaptation literature

Evidence characteristic	Represented configurations	Relevance to interpretation
Study design	Randomized and crossover trials; observational cohorts; cross-sectional studies; qualitative and mixed-method studies; validation studies; implementation evaluations; systematic and scoping reviews	Determines whether findings concern causation, association, experience, feasibility, validity, or synthesized evidence

Counseling environment	Hospital and discharge care; community pharmacy; prescription-label use; chronic-disease management; remote and digitally mediated care	Delivery conditions influence which adaptations are feasible and which outcomes can be observed
Population context	Parents and caregivers; older adults; adults with chronic disease; people with limited English proficiency; migrants and refugees; racial or ethnic minority populations	Population descriptors are contextual variables and do not substitute for measured language, literacy, cultural, or digital barriers
Adaptation target	Language accessibility; information-processing and literacy demands; contextual or cultural fit; comprehension verification; digital delivery or access	Different targets may produce similar proximal outcomes through different mechanisms
Delivery configuration	Spoken counseling; written or bilingual labels; pictorial information; teach-back; digital tools; remote video or telephone contact; combined approaches	Delivery mode is analytically separate from the adaptation mechanism
Evaluation emphasis	Comprehension and knowledge; demonstrated medication-use performance; adherence or dispensing behavior; experience and acceptability; feasibility; access and equity; quality of life or clinical outcomes	Favorable results at one endpoint cannot be transferred automatically to another

Adaptation strategies as a separate analytic dimension

Written and visual medication information formed one of the clearest adaptation families. In pediatric medication use, changes to pictograms, measurement units, and dosing tools altered the risk of dosing errors, demonstrating that seemingly small representational choices can influence medication-use performance [10]. The intervention was multicomponent, however, so its findings do not justify assigning the observed effect to pictograms alone.

Language adaptation could also be embedded directly within written information. In a randomized study among older Singaporeans, bilingual prescription labels improved understanding compared with English-only labels, with further variation according to whether pictograms were also present [11]. The relevant adaptation was therefore not merely "visual communication"; it altered the language in which medicine instructions were available.

Preference for an adapted format did not consistently correspond to better performance. In a randomized crossover pilot examining medication schedules, participants generally viewed pictograms favorably, yet pictograms did not significantly improve pillbox-task performance [12]. This provides a direct example of why preference, comprehension, and demonstrated medication use must remain separate evaluation categories.

Review-level evidence on pictograms was similarly mixed. A systematic review of medication-adherence interventions using pictograms found significant improvement in some studies, while a substantial proportion did not demonstrate significant benefit and all included studies had methodological limitations [13]. Visual adaptation therefore represents a strategy family with context-sensitive performance rather than a uniformly effective intervention.

Broader evidence from low-literacy health education shows that visual aids are most defensible when their development responds to the needs and interpretations of the intended population instead of simply reducing the amount of text [14]. Medication-specific validation supports the same point. Among older adults with limited English proficiency, many standard pharmaceutical pictograms failed prespecified transparency or translucency criteria, indicating that symbol familiarity cannot be assumed across populations [15].

A subsequent systematic review of randomized studies found that pictogram-supported medication information frequently improved textual comprehension but remained heterogeneous in design, population, and measurement [16]. Comprehension benefit is therefore a more defensible conclusion than generalized improvement in clinical outcomes.

A second strategy family verifies understanding rather than altering the initial representation of information. Teach-back asks patients to restate or demonstrate what they have understood so that misunderstandings can be identified and corrected. A systematic review found broadly favorable learning or process outcomes but considerable variation in implementation and methodological quality [17]. In a pharmacist-led hospital-discharge

evaluation, teach-back combined with a medication-change list was feasible and well received by participating pharmacists and patients [18]. That evaluation supports implementation and acceptability; its design does not establish reduced readmissions or other downstream clinical effects.

Some interventions combined several adaptation mechanisms. A computerized medication-management intervention for older Hispanic adults with type 2 diabetes was developed through culturally responsive and Spanish-language adaptation rather than translation alone [19]. Such interventions are best coded as multicomponent because language, content, population context, and digital delivery may all contribute to usability.

Cultural responsiveness itself was inconsistently defined across pharmacy literature. A systematic review of cultural-competence education found substantial heterogeneity in how cultural competence was conceptualized, developed, and assessed [20]. Consequently, an intervention should not be classified as culturally tailored solely because it was delivered to a particular ethnic or linguistic group.

Minority-focused adherence interventions reinforce this distinction. A scoping review of blood-pressure and medication-adherence strategies among racial and ethnic minority populations identified pharmacist or clinician counseling, mobile-health components, and multicomponent quality-improvement approaches [21]. These interventions show the range of strategies used in population-responsive care but do not establish that one strategy family is universally superior.

Language and interpretation contexts in which adaptations were deployed

Language-related evidence included concordant clinician–patient communication, bilingual written information, interpreter-supported care, and services designed for populations with limited English proficiency. These are related but non-equivalent conditions. Language concordance reduces the need for linguistic mediation, while interpreters preserve access when concordance is unavailable; bilingual written instructions modify the informational artifact itself; and culturally adapted interventions may incorporate language alongside other changes.

The review evidence on concordance cautions against treating language matching as a sufficient intervention. Although favorable communication and quality outcomes were common, null and occasionally unfavorable findings remained in the evidence base [3]. The broader evidence map likewise showed that the relationship between concordance and outcomes depended on what was measured [4]. Language therefore functions simultaneously as an access condition, an interactional variable, and a potential target for adaptation.

Pharmaceutical-care evidence among migrants and refugees further indicates that language difficulties may coexist with unfamiliarity with health systems, health-literacy demands, cultural expectations, and practical access constraints [6]. An adaptation aimed solely at translation may therefore address one component of a larger counseling problem.

Bilingual prescription labels provide more direct medication-specific evidence. Their benefit in older Singaporeans demonstrates that medicine instructions can be made more linguistically accessible at the information-design level [11]. Yet the poor contextual validity of many standardized pharmaceutical pictograms among older adults with limited English proficiency shows that adding a visual layer does not automatically overcome language or cultural interpretation problems [15].

The combined language and cultural adaptation used in the computerized medication-management intervention for older Hispanic adults illustrates a different approach: adaptation was embedded during intervention development rather than appended after a generic tool had been completed [19]. The distinction is important because translation, language concordance, cultural tailoring, and visual redesign may all address communication difficulties through different mechanisms.

Literacy-sensitive information design and comprehension verification

Literacy-sensitive medication counseling addresses the demands created by vocabulary, written complexity, numerical instructions, information density, and the need to convert instructions into medication-taking actions. Health literacy is associated with medication adherence in chronic disease, but the relationship is heterogeneous and should not be interpreted as evidence that low literacy alone explains nonadherence [5].

Several adaptation strategies reduce processing demands before the patient is asked to act. Bilingual text and pictograms can alter the accessibility of medication labels [11], while visual aids may help organize or reinforce written information [14]. Their value depends on contextual intelligibility. The pictogram-validation evidence

demonstrates that an image can be technically standardized yet still be misunderstood by the target population [15].

The pediatric dosing trial demonstrates that literacy-sensitive information design also includes units and measurement tools, not simply word choice or reading level [10]. Where a medication instruction must be translated into a physical dosing action, comprehension and performance may diverge. The pictogram crossover trial makes this distinction explicit because participants' positive appraisal of the pictorial format did not produce a significant improvement in task performance [12].

Teach-back addresses a different stage of the communication process. Rather than assuming that simplified or pictorial information has been understood, it makes comprehension observable by asking the patient to explain or demonstrate the intended medication use [17]. The pharmacist-led discharge study indicates that this method can be incorporated into routine medication counseling and accepted by patients and pharmacists [18]. Evidence at this stage remains primarily proximal: successful implementation and reported understanding cannot by themselves establish downstream clinical benefit.

Taken together, the literacy-sensitive evidence supports separating information redesign from comprehension verification. A strategy may reduce the cognitive or textual demands of medication information, verify whether information was understood, or do both. These mechanisms should not be treated as interchangeable merely because both may improve a knowledge score.

Cultural and population-responsive tailoring

Cultural or population-responsive tailoring was less consistently operationalized than language or literacy adaptation. The pharmacist-service literature for minoritized populations describes interventions adjusted for population needs, but rigorous effectiveness evaluation remains limited relative to descriptions of acceptability and service adaptation [8]. Population targeting alone is therefore insufficient evidence that cultural tailoring occurred.

More explicit examples incorporated language, culturally relevant communication, user feedback, and intervention development together. The computerized comprehensive medication-management intervention for older Hispanic adults with type 2 diabetes used Spanish-language and culturally responsive development processes to increase usability and relevance [19]. Its evidentiary contribution lies primarily in demonstrating how several forms of adaptation can be integrated; it does not establish that cultural tailoring independently improves clinical outcomes.

The broader pharmacy-education literature further shows why terminology requires care. Cultural competence has been defined and taught using diverse constructs and approaches, with substantial inconsistency in conceptualization and assessment [20]. Applying the term indiscriminately to patient-facing interventions would obscure whether the actual modification involved language, communication style, beliefs about medicines, family involvement, health-system navigation, or another contextual feature.

Population-responsive medication interventions also frequently combine cultural context with behavioral and technological strategies. Minority-focused hypertension interventions have incorporated counseling, adherence support, mobile-health elements, and broader quality-improvement activities [21]. Their multicomponent nature makes it difficult to attribute observed outcomes to a single cultural mechanism.

Across these sources, cultural tailoring is most defensibly identified when an intervention contains an explicit modification based on population-relevant meanings, communication expectations, priorities, or context. Ethnic or linguistic group membership by itself is not an adaptation strategy. This distinction prevents demographic categories from being mistaken for mechanisms.

The charted strategies can consequently be organized without implying that any strategy is intrinsically effective. **Table 2** separates the modification made to counseling from the barrier or context it was intended to address and from the mode through which it was delivered.

Table 2. Medication-counseling adaptations classified by the component modified, target context, and delivery configuration

Adaptation configuration	Counseling component modified	Principal barrier or context addressed	Typical delivery configuration	Evaluation emphasis represented in the evidence	Interpretation limit

Bilingual or language-adapted medication information	Language of written or spoken medicine information	Language discordance or limited English proficiency	Bilingual labels; language-concordant counseling; interpreter-supported encounters	Comprehension; communication quality; patient experience	Language accessibility does not establish behavioral or clinical benefit
Pictogram-supported instructions	Visual representation of medication directions	Literacy, language-processing, or information-density demands	Printed labels or medication schedules	Comprehension; preference; dosing or pillbox performance; adherence	Pictograms require contextual validation; preference may diverge from performance
Unit and dosing-tool optimization	Numerical representation and translation of instructions into action	Numeracy and medication-administration demands	Medication labels plus dosing devices	Dosing performance and error	Multicomponent effects cannot be assigned automatically to one design element
Teach-back and demonstration	Verification of what the patient understood	Unrecognized misunderstanding or limited processing of counseling	Spoken counseling, often face to face	Understanding; feasibility; acceptability	Successful teach-back implementation does not by itself establish downstream outcomes
Culturally and linguistically adapted medication-management tools	Language, examples, content, interaction and user-interface context	Combined linguistic and population-context needs	Human-guided digital or computerized intervention	Usability; acceptability; comprehension-related outcomes	Cultural adaptation is multicomponent and its independent effect is rarely isolated
Population-responsive pharmacist counseling	Content, service organization, communication approach or support intensity	Context-specific needs in minoritized populations	Pharmacist counseling, sometimes combined with mobile or quality-improvement components	Acceptability; adherence-related outcomes; implementation	Population targeting alone does not prove that the intervention was culturally tailored
Combined visual–linguistic adaptation	Language and visual presentation simultaneously	Overlapping language and literacy demands	Bilingual text plus pictograms	Comprehension and user appraisal	Effects of individual components may not be separable

Digital and hybrid counseling: delivery modality versus access prerequisites

Digital delivery expanded the range of medication-counseling formats but did not remove pre-existing communication barriers. A systematic review of video-based pharmaceutical care found limited evidence for consistent clinical or psychological benefit, although some studies reported improvements in adherence or correct medication use [22]. Communication itself may also change online: analysis using the Roter Interaction Analysis System found differences between online and face-to-face medication counseling, particularly in socio-emotional exchange [23].

Asynchronous educational video provides another delivery option. A systematic review found insufficient robust evidence that medication-education videos reliably produce sustained medication-related behavior change [24]. In contrast, an observational evaluation of health-literacy-conscious medication videos reported lower primary medication nonadherence among exposed prescriptions, but its nonrandomized design limits causal attribution [25]. More broadly, pharmacist counseling can improve adherence and quality-of-life outcomes across randomized trials, yet pooled counseling effects cannot identify which adaptation component produced benefit [26].

Hospital-discharge interventions also illustrate the importance of proximal outcomes. The LiMeTiD study reported improvements in medication literacy following structured discharge support [27], but medication-literacy improvement is distinct from demonstrating later clinical benefit.

Mobile applications may improve adherence among people who can access and use them. A meta-analysis of randomized trials reported an overall adherence advantage for medication-adherence apps, although several individual trials were nonsignificant and measurement methods varied [28]. Digital delivery therefore introduces selection before counseling begins: device access, connectivity, confidence, digital literacy, language compatibility, and prior experience with remote care can determine who reaches the intervention.

Evidence among older adults demonstrates these access constraints. Telemedicine participation among older adults with serious illness remains shaped by digital access [29], while mixed-method evidence shows disparities in digital health-information use associated with socioeconomic and demographic conditions [30]. An electronic medical-record-embedded digital health-literacy tool similarly identified substantial variation in digital capability among diverse older adults [31].

Language can intersect with digital access. Among patients with limited English proficiency, video-visit use varied according to language and previous telemedicine experience [32]. Nationally oriented analyses have also shown lower telemedicine use among adults with limited English proficiency [33]. Qualitative work with Mandarin-speaking patients emphasized communication quality, modality preference, and access to language services rather than simple availability of video technology [34]. California data likewise documented lower telehealth use among people with limited English proficiency [35]. Digital counseling is therefore better interpreted as a delivery modality whose accessibility depends on additional prerequisites.

Evaluation methods and distinct endpoint domains

Evaluation approaches ranged from comprehension tests and medication-use tasks to adherence measures, satisfaction, feasibility, communication coding, access, quality of life, and clinical outcomes. Older-adult hypertension literacy research illustrates how varied these approaches are, including face-to-face education, written materials, electronic tools, counseling, and self-management supports [36]. Patient-experience evidence further shows that receipt of services and quality of communication are not equivalent: adults with limited English proficiency may obtain recommended services while still reporting poorer communication experiences [37].

The evidence therefore supports distinct endpoint domains with different inferential roles. Feasibility establishes whether an adaptation can be delivered. Acceptability or experience measures how it is perceived. Comprehension tests whether information is understood. Demonstrated performance tests whether understanding can be translated into an action. Behavioral outcomes examine medication use over time. Access measures whether intended populations can reach the adapted service. Clinical outcomes assess consequences beyond the communication encounter.

Table 3. Evaluation methods used to judge medication-counseling adaptations

Endpoint domain	Typical measurement approach	What it can establish	What it cannot establish alone
Comprehension or knowledge	Recall questions; interpretation tests; medication-literacy instruments	Whether information was understood	Correct medication use over time
Demonstrated performance	Dosing task; pillbox task; interpretation of directions	Ability to translate instructions into an observable action	Sustained adherence or clinical benefit
Behavior	Refill, dispensing or adherence measures; self-report	Medication-use behavior	Mechanism responsible for the behavior
Experience and acceptability	Satisfaction; preference; qualitative interview	Perceived usability or communication quality	Effectiveness
Feasibility	Recruitment, completion, workflow integration, provider uptake	Whether delivery is practicable	Patient benefit
Equity and access	Modality use; reach; language-specific uptake; digital-access measures	Who can access or use the intervention	Quality of counseling after access

Clinical or quality-of-life outcomes	Symptoms; disease measures; utilization; quality-of-life scales	Downstream patient outcome	Which counseling component caused the outcome

Cross-domain coverage gaps and discordant evidence

The strongest coverage occurred where a clearly defined adaptation could be linked to a proximal endpoint: bilingual labeling with comprehension, pictograms with interpretation or task performance, teach-back with understanding, and digital tools with use or adherence. Evidence became thinner when the question shifted to whether adaptations reached disadvantaged populations equitably or produced sustained clinical benefit.

Discordance was itself informative. Pictograms could be preferred without improving task performance; standardized pictograms could fail contextual validation; telepharmacy could be feasible without improving clinical endpoints; and language-concordant care could show positive, null, or unfavorable associations depending on outcome and setting. These patterns argue against ranking strategies using a single undifferentiated effectiveness label.

Table 4. Cross-domain evidence-gap map for medication-counseling adaptation

Barrier or context	Strategy coverage	Evaluation coverage	Principal gap
Language discordance	Strong representation of concordance, bilingual information and language-support approaches	Communication, comprehension, experience and access represented	Limited isolation of long-term behavioral and clinical effects
Literacy and information-processing demands	Strong representation of pictograms, simplified information, dosing tools and teach-back	Comprehension and performance relatively well represented	Limited linkage to sustained clinical outcomes
Cultural or population context	Multicomponent tailoring and population-responsive counseling represented	Acceptability and implementation more visible than effectiveness	Cultural mechanism often insufficiently specified
Digital-access constraints	Video, telepharmacy, applications and digital education represented	Uptake, adherence, experience and access represented	Intervention efficacy often evaluated among users without fully resolving who was excluded
Overlapping barriers	Some combined language, visual, cultural and digital adaptations	Heterogeneous, usually proximal endpoints	Few designs isolate which component addresses which barrier

Figure 2 converts this synthesis into a noncausal evidence map. Its purpose is to show where barrier domains, adaptation strategies, and evaluation endpoints have been jointly studied, not to imply that movement across the map represents a causal pathway.

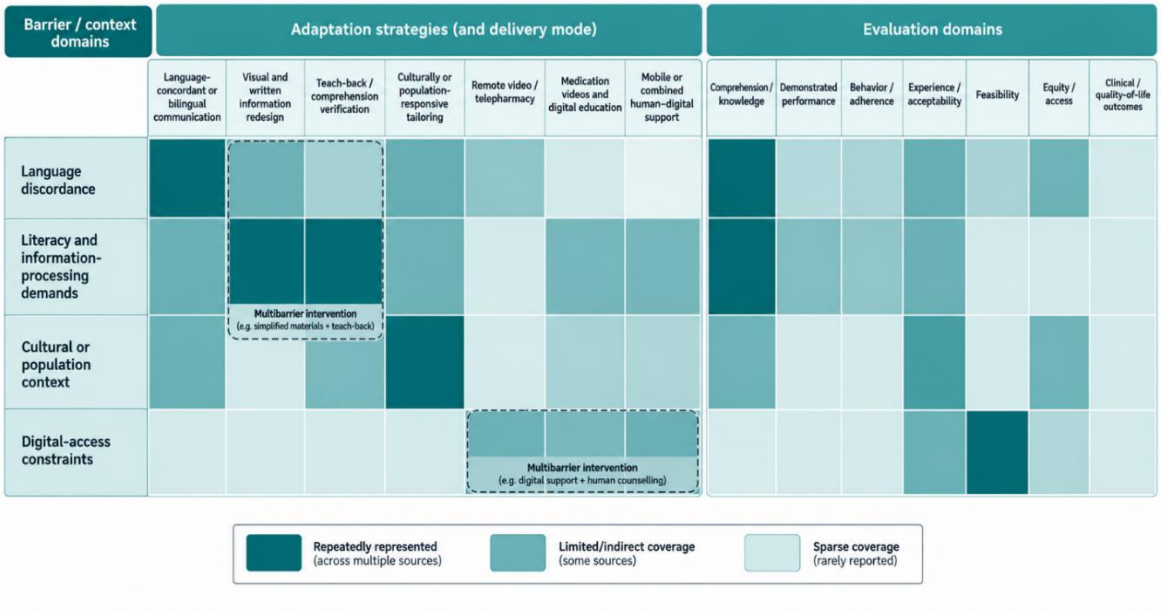

Figure 2. Strategy–barrier–evaluation coverage across medication-counseling adaptation evidence

This review shows that medication-counseling adaptation is not one intervention class. Language accessibility, literacy-sensitive design, cultural responsiveness, comprehension verification, and digital delivery modify different parts of the communication process and therefore require different evaluation logic.

Three implications follow. First, adaptation should be described by mechanism rather than population label. Second, outcome selection should match the claim: feasibility, acceptability, comprehension, behavior, access, and clinical benefit answer different questions. Third, digital delivery should not be treated as equivalent to digital accessibility, because language, skills, devices, connectivity, and modality preference can determine who receives the counseling.

The evidence also identifies useful counterexamples to overly broad effectiveness claims. Favorable attitudes toward pictograms did not always translate into better medication-use performance. Standardized visual symbols were not automatically interpretable across populations. Remote pharmaceutical care could be feasible without producing consistent clinical benefit. Language concordance was commonly favorable but not uniformly so. These findings suggest that future studies should prespecify the barrier being targeted, the mechanism through which adaptation is expected to operate, and at least one endpoint capable of testing that mechanism.

The scoping design has limitations. The evidence was heterogeneous in population, setting, intervention content, and measurement, preventing meaningful quantitative synthesis. Several evidence sources were observational, qualitative, developmental, or implementation-oriented, and review-level evidence sometimes incorporated primary studies with variable risk of bias. The map should therefore be read as a description of where and how adaptation has been studied rather than as a hierarchy of intervention effectiveness. Inclusion of both reviews and primary studies also requires attention to overlapping evidence when interpreting the apparent breadth of support.

Conclusion

Medication counseling has been adapted through language modification, visual and literacy-sensitive information design, comprehension verification, cultural or population-responsive tailoring, and digital or hybrid delivery. The literature is considerably more consistent in demonstrating that such adaptations can change accessibility, comprehension, experience, or feasibility than in establishing sustained behavioral, equity, or clinical effects.

Evaluation should therefore remain matched to the adaptation mechanism and the barrier being addressed. Separating strategy, barrier, delivery mode, and endpoint produces a more discriminating account of the evidence and identifies where future studies need stronger contextual validation, clearer mechanism specification, equitable-access measurement, and downstream outcome assessment.

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