

Interventional Compensation in Elderly-Oriented Medical Translation: Revised Functional Equivalence Theory in English-Chinese Practice

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Abstract: Linguistic precision and cultural appropriateness are crucial in the translation of medical texts, particularly as globalization drives the dissemination of health information across diverse populations. This study investigates the major challenges and strategies involved in Chinese-English medical translation, with a specific focus on terminology, syntax, and the interplay between linguistic and cultural factors. Drawing on a corpus of translated medical texts, the research combines qualitative analysis with comparative translation evaluation to identify recurrent issues and effective solutions. The findings reveal that mistranslations often arise from lexical ambiguity, syntactic divergence, and insufficient cultural contextualization. Moreover, the translator's subject-matter expertise and familiarity with target language conventions significantly impact translation quality. The study proposes a multi-dimensional approach integrating terminology standardization, functional equivalence, and genre-based strategies to enhance accuracy and readability in medical translation. These insights contribute to improving translation training and professional practice in the field of medical discourse. The implications of this study are particularly relevant for translation educators, practitioners, and policy-makers involved in health communication.

Keywords: Patient Information Leaflet Translation, Elderly Patients, Cultural Equivalence, Health Literacy

1. Introduction

The rapid aging of the global population, particularly in China where the population aged 60 and above reached 296.97 million (21.4%) in 2023 and is projected to surpass 35% by 2050[1], has presented significant challenges to healthcare systems and medical communication, making elderly patients' access to comprehensible medical information critical. Medical translation, as a key medium for conveying healthcare instructions, plays a pivotal role in addressing the needs of an aging society.

1.1. Growth of the aging population and increase in solo-living elderly in China

Changes in family structures and increased population mobility have led to a growing number of elderly individuals living alone. With over 30% of elderly people in China living alone in 2021 [2] and this number rising annually, access to comprehensible medical information, beyond complex technical language, becomes crucial as they heavily rely on written materials like drug package inserts

without familial support. However, many of these materials, especially those accompanying imported medications, are translated from their original languages (English, German) into Chinese[3]. The quality of these translations plays a critical role in determining whether elderly users can comprehend the instructions accurately. Unfortunately, the current use of highly technical terminology and vague expressions in translated materials often exceeds their comprehension abilities, leading to low medication adherence and increased risks of errors.

1.2. Primary medication use among the elderly

The elderly are the primary demographic of medication consumers, a group that includes significant utilization of imported drugs. This trend is largely attributable to age-related declines in physical function and the high prevalence of chronic diseases among this population. Statistics reveal that individuals aged 60 and above use an average of more than five different types of medications per year, many of which are imported pharmaceuticals [4]. These imported drugs often come with package inserts translated from their original languages, typically English. However, the technical language used in these translations frequently fails to consider the cognitive limitations and linguistic preferences of elderly patients in China. For instance, terms like “CYP3A4 inhibitors”, while scientifically accurate, are rarely explained in plain language accessible to ordinary patients. The lack of adaptation hinders the elderly’s ability to comprehend medication instructions, which may increase the likelihood of medication errors, potentially leading to serious health consequences. Apparently, the absence of cognitively appropriate translations exacerbates the challenges faced by elderly patients who rely on these imported medications for their daily healthcare needs.

1.3. Absence of patient information leaflets in China

In many Western countries, Patient Information Leaflets (PILs) have become a standard component of drug packaging [5]. These leaflets are specifically designed to provide clear, accessible and patient-friendly information, ensuring that users can understand medication instructions with ease. However, in China, PILs have yet to be widely adopted, with drug inserts serving as the primary source of patient information. These inserts, often written in highly technical language characterized by complex linguistic expressions and specialized terminology, are crucial for scientific accuracy and regulatory compliance but can be difficult for elderly patients to understand. In this context, PILs could serve as a valuable supplement to make information more accessible to elderly users.

PILs are specifically tailored to present information in a way that is both scientifically accurate and accessible to patients, including the elderly. By incorporating age-appropriate language and clear guidance, PILs can serve as a complement to traditional drug package inserts. This study proposed age-appropriate translation strategies that are designed to align with the principles of PILs, ensuring that elderly patients receive clear and actionable information. This approach can enhance the usability of medical information for elderly patients while maintaining the scientific integrity of drug instructions.

This paper aims to develop existing translation theories. It does so by analyzing the specific needs of the elderly, which focus on improving the accessibility of Patient Information Leaflets (PILs). Through this innovative application of translation theory, the proposed mechanism aims to bridge the gap between complex medical terminology and patient understanding, ultimately reducing medication-related risks and fostering improved health outcomes for aging populations.

2. Literature review

The review is structured into three key sections. First, it examines the current state of medical translation research, highlighting the specific difficulties faced by elderly users in comprehending

technical medical texts. Then relevant translation theories have been discussed to identify their potential applications and limitations in addressing the needs of elderly populations. Finally, it reviews studies on aging-related cognitive decline and reading preferences, emphasizing the importance of adapting medical translations to accommodate the unique cognitive and emotional demands of elderly users. By synthesizing these perspectives, this review identifies critical gaps in existing research and lays the groundwork for the proposed four-dimensional compensation model.

2.1. Medical translation and age-appropriate translation: current status

Medical translation plays a pivotal role in ensuring patient safety and medication adherence, as it serves as the primary medium for conveying healthcare information. Hutt et al. have highlighted that drug package inserts are particularly challenging due to their highly technical language and legal constraints [6]. These documents often contain dense terminologies that pose significant barriers to comprehension, especially for vulnerable populations such as the elderly.

Despite growing interest in medical translation, limited attention has been paid to the specific needs of elderly patients in the context of age-appropriate translation. Few studies have systematically examined the challenges posed by translated drug package inserts, particularly those of imported medications, for elderly users. This gap highlights the urgent need for research into age-appropriate translation strategies tailored to this demographic.

2.2. Translation theories: Nida's functional equivalence and Chesterman's norms

Translation theories provide a valuable framework for understanding how source texts can be adapted to meet the expectations of different audiences. Nida's functional equivalence theory emphasizes achieving equivalent meaning between source and target languages to ensure that the translated text fulfills the same function in the target culture [7]. While widely adopted, Nord argues that Nida's functional equivalence may overlook simplification and accessibility for specific audiences [8], neglecting diverse needs, such as elderly users' challenges with cognitive decline and complex terminology.

In contrast, Chesterman's theory of translation norms offers a more flexible framework for addressing the needs of diverse audiences. By reconstructing translation norms for specific user groups, researchers have successfully integrated Nida's functional equivalence with Chesterman's norm-based approach in other domains. For example, Luxin Zhang demonstrated how combining these theories could enhance the accessibility of advertising texts for non-expert users. Their study revealed that simplifying complex terminology while maintaining precision significantly improved comprehension among less experienced readers [9]. Such insights offer valuable lessons for age-appropriate medical translation, suggesting that a similar integration of theoretical frameworks could address the unique challenges faced by elderly users.

2.3. Aging-related cognitive decline and reading needs

Aging is associated with significant declines in cognitive functions such as memory, processing speed, and working memory capacity. Salthouse found a reduced ability in elderly users to decode complex terminology compared to younger individuals [10]. Specifically, Kumar et al. conducted a cross-sectional study demonstrating that GPT-4-based plain language translations of clinical notes significantly improved patient comprehension, particularly among marginalized populations with low health literacy [11].

Elderly users demonstrate specific preferences in reading medical texts. The BABRI team found that the brain's structural connectome's topological efficiency declines with age, significantly mediating declines in attention and executive function among elderly individuals [12]. Their findings

suggest that providing explicit step-by-step instructions can significantly enhance the usability of medical texts for this population. Moreover, for example, cognitive impairment has been identified as a potential risk factor for poor adherence to antihypertensive medication among elderly users with hypertension, even in cases where dementia is not present [13]. As Cho et al. suggest, clinicians in geriatric care should prioritize the close monitoring of patients' cognitive function and medication adherence.

2.4. Research gaps and the significance of this study

While previous research has made significant progress in understanding the challenges faced by elderly users in comprehending medical texts, several gaps remain. First, existing studies have primarily focused on general patient populations, with limited attention to the specific needs of elderly users in the context of translated materials. Second, the integration of translation theories such as Nida's functional equivalence and Chesterman's norms has not been fully explored in the field of age-appropriate medical translation. Finally, there is a lack of systematic strategies for addressing the cognitive decline and emotional sensitivities of elderly users in translated drug package inserts.

This study seeks to address these gaps by developing an age-appropriate expectation model that integrates terminological, cognitive, and emotional considerations. Drawing on insights from Nida's and Chesterman's theories, as well as empirical evidence on aging-related cognitive decline, this research aims to propose a comprehensive framework for enhancing the accessibility of medical translations for elderly users.

3. Problem analysis and methodology construction

The conclusion should elaborate on the key points of the research results, analyze the conclusions drawn from the results, and explain their significance for future research or practice. All sections such as patents, appendices, funding projects, and acknowledgments should be placed after the conclusion and before the references.

To address such issues, this section begins by analyzing specific problems in existing medical translations, focusing on terminological, cognitive, and emotional challenges faced by elderly users. Building on this analysis, the limitations of Nida's functional equivalence theory will be critically evaluated, followed by an exploration of how Chesterman's translation norms can complement and enhance age-appropriate translation practices. Finally, an age-appropriate expectation model will be proposed as a new framework for improving the accessibility of medical translations for elderly users.

3.1. Current challenges in medical translations for elderly users

Imported drug package inserts often retain the linguistic complexity of their source texts (e.g., dense terminology and lengthy syntax), creating barriers for elderly users by neglecting cognitive adaptations like terminology simplification, sentence restructuring, and empathetic phrasing. Research shows that specialized terminology (where proportion in a text reaches or exceeds 2%) and complex sentences challenge elderly comprehension due to reduced working memory and processing speed [14,15]. The absence of simplification standards and emotionally buffered language (e.g., 'prohibited,' 'fatal if misused') further contributes to psychological stress and reduced adherence. These issues underscore the urgent need for age-appropriate adaptations to prevent misunderstanding of critical health information, ensuring elderly users' safety and well-being.

3.2. Choices and adjustments of translation theories to age-appropriate expectation model

Nida's functional equivalence theory, a dominant framework in medical translation for its emphasis on reader comprehension, proves inadequate for elderly-centric adaptations. Despite its historical role in shaping regulatory guidelines [16], the theory's assumption of homogeneous audiences' neglects geriatric-specific barriers—cognitive decline necessitating lexical simplification and working memory constraints requiring sentence segmentation. While alternative models (e.g., Skopos theory) similarly prioritize function over sub-population needs, Nida's enduring influence in pharmaceutical texts makes its limitations a critical entry point for redefining gerontolinguistic translation paradigms.

To adapt Nida's functional equivalence theory for elderly users, this study integrates Chesterman's translation norms, which prioritizes audience-specific adaptation over universal linguistic accuracy. By redefining norms through an age-appropriate expectation model—incorporating terminological expectations, cognitive expectations, emotional expectations, and operational expectations—we propose a framework to reconcile scientific rigor with gerontocentric accessibility in medical translations.

Drawing on Nida's and Chesterman's frameworks, this study puts the age-appropriate expectation model into practice by employing four gerontocentric strategies tailored to the needs and preferences of older adults.

- Terminological normativity: Simplifying jargon (e.g., replacing “antihypertensive” with “blood pressure medication”) while retaining scientific validity;
- Cognitive accessibility: Segmenting complex sentences into digestible units (e.g., bullet points for dosage steps);
- Emotional safety: Mitigating anxiety-inducing phrases (e.g., “may cause death” → “requires close monitoring”);
- Operational guidance: Converting passive warnings into active directives (e.g., “Avoid alcohol” instead of “Alcohol consumption is contraindicated”).

The first dimension, terminological normativity, addresses the tension between preserving source-text accuracy (mandatory for regulatory compliance) and enhancing PILs' comprehensibility for elderly users. Recognizing that unmodified medical jargon (e.g., 'anticoagulant' in original inserts) disproportionately burdens older readers, this model advocates parallel terminology systems:

Source insert texts: Retain scientifically precise terms as usual;

PILs: Introduce lay-accessible equivalents (e.g., 'blood thinner' alongside 'anticoagulant') with contextual definitions (e.g., 'prevents clots in your veins').

This approach ensures fidelity to original inserts while adapting PILs to elderly users' linguistic needs, which permits auxiliary explanations in patient-facing materials.

In addition to terminological considerations, the model prioritizes cognitive accessibility by reducing the cognitive load associated with long and complex sentence structures. Elderly users often struggle to process information presented in dense or convoluted sentences. By breaking down such structures into shorter, clearer alternatives, the model ensures that the information is easier to decode and retain.

Another critical aspect of the model is emotional safety, which addresses the psychological impact of language on elderly users. Negative expressions, such as “禁止[prohibited]” can evoke feelings of stress or resistance, potentially leading to decreased medication adherence. To mitigate this, the model advocates for the use of emotionally buffered language, replacing negative terms with more supportive alternatives. For example, phrases like “请避免[please avoid]” or “建议咨询医生[it is recommended to consult your doctor]” can foster a positive tone, enhancing the overall user experience.

Finally, the model incorporates operational guidance to ensure that instructions are clear and actionable. Abstract information, such as dosage adjustments or usage recommendations, can be difficult for elderly users to translate into concrete actions. By providing step-by-step guidance and practical suggestions—like simplified usage methods—the model helps bridge the gap between abstract information and real-world application. This dimension ensures that elderly users can understand the step they need to make informed decisions about their healthcare.

Together, these four dimensions form a comprehensive framework that addresses some challenges faced by elderly users in medical translations. By systematically addressing barriers related to terminology, cognition, emotion, and action, it hopes to offer a solution to improve the accessibility and usability of translated materials for elderly users.

4. From theory to practice: empirical validation of the age-appropriate expectation model

To evaluate the practical applicability of the proposed framework, this section presents an empirical analysis of three commonly prescribed medications among elderly populations: JANUVIA (Sitagliptin Phosphate Tablets), Plavix (Clopidogrel Bisulfate Tablets), and CELEBREX (Celecoxib Capsules). These medications were selected due to their relevance to prevalent geriatric conditions, including cardiovascular diseases, diabetes, and arthritis, as well as their frequent use in clinical settings [17].

The selection of these PILs was guided by their representation of common issues in medical translations, such as high-density technical terminology, syntactically intricate sentences, and insufficient emotional buffering. By applying the model, this analysis identifies specific deficiencies in the case texts and proposes targeted improvements. Each case is examined through the lens of the four dimensions, ensuring a systematic and comprehensive evaluation of both the original and translated versions of the PILs.

In light of the practical needs of patients and the functional role of PILs, the cases selected for analysis are drawn exclusively from sections that are most frequently consulted by patients, namely **Dosage and Administration, Indications and Usage, Contraindications, and Precautions**. These sections are prioritized because they directly govern medication adherence and safety outcomes, while also representing the content areas most habitually accessed by elderly users.

4.1. Case study 1: JANUVIA (Sitagliptin Phosphate Tablets)

JANUVIA (Sitagliptin Phosphate Tablets), developed by Merck & Co., Inc., is an orally administered dipeptidyl peptidase-4 inhibitor used to manage type 2 diabetes mellitus by enhancing blood sugar regulation. It is commonly prescribed for adult patients, particularly elderly individuals requiring glucose level monitoring, due to its efficacy and safety profile.

Table 1: Sentence 1 from JANUVIA

Original Text	Existing Translation Text (Chinese)
Monotherapy. JANUVIA is a dipeptidyl peptidase-4 (DPP-4) inhibitor indicated as an adjunct to diet and exercise to improve glycemic control in adults with type 2 diabetes mellitus [18].	【适应症】单药治疗。作为二肽基肽酶-4(DPP-4)抑制剂,配合饮食和运动可改善 2 型糖尿病成人的血糖控制[19]。

The original sentence's accessibility for elderly users is hindered by highly technical terminology, such as “二肽基肽酶-4 (DPP-4)抑制剂 [dipeptidyl peptidase-4 (DPP-4) inhibitor]”, and its complex structure, which increases cognitive load.

To address the identified issues, several modifications can be implemented. First, the technical term is deleted. Second, the sentence structure is simplified by breaking down complex ideas into shorter, more digestible statements.

Revised Version for PILs:

Text: 本品可单独使用,配合饮食和运动,帮助控制 2 型糖尿病患者的血糖水平。

(Literal translation: This product can be used alone, combined with diet and exercise, to help control blood sugar levels in patients with type 2 diabetes.)

Table 2: Sentence 2 from JANUVIA

Original Text	Existing Translation Text (Chinese)
Because there is a need for dosage adjustment based upon renal function, assessment of renal function is recommended prior to initiation of JANUVIA and periodically thereafter	由于需要根据患者肾功能调整剂量,因此开始使用本品治疗之前建议对患者肾功能进行评估,之后定期评估。 (Literal translation: The dose of JANUVIA needs to be adjusted based on kidney health. Before starting treatment, check the patient’s kidney health. Regular checks are also recommended.)

The original sentence presents the same challenges that may hinder its accessibility for elderly users. To address the identified issues, several modifications have been implemented in the revised translation. First, technical terms such as “肾功能[renal function]” have been replaced with more accessible language, such as “肾脏健康状况[kidney health]” to enhance comprehension. Second, the sentence structure has been simplified by breaking down the original complex sentence into shorter, more digestible statements. For example, the recommendation to assess “肾功能[renal function]” before treatment initiation and periodically thereafter has been divided into two clear instructions: “Before starting treatment, check the patient’s kidney health (renal function)” and “Regular checks (periodic monitoring) are also recommended.”

Revised for PILs:

Text: 本品的剂量需要根据患者的肾脏健康状况调整。在开始治疗前,建议检查患者的肾脏健康状况。之后应定期复查。

(Literal translation: The dose of JANUVIA needs to be adjusted based on kidney health. Before starting treatment, check the patient’s kidney health. Regular checks are also recommended.)

4.2. Case study 2: Plavix (clopidogrel bisulfate)

Plavix is an antiplatelet medication widely prescribed to reduce the risk of atherothrombotic events in patients with cardiovascular diseases. It is particularly significant for elderly patients, who are at higher risk of such conditions due to age-related comorbidities. Plavix is commonly used by elderly users with a history of recent myocardial infarction, ischemic stroke, or peripheral arterial disease, as well as those diagnosed with acute coronary syndrome. By inhibiting platelet aggregation through its active metabolite, Plavix helps prevent secondary cardiovascular events. Its long-lasting effects and once-daily dosing make it a practical choice for elderly patients, although careful monitoring is required due to increased bleeding risks in this population.

Table 3: Sentence 1 from Plavix

Original Text	Existing Translation Text (Chinese)
Due to the risk of bleeding and undesirable hematological effects, blood cell count determination and/or other appropriate testing should be promptly considered, whenever such suspected clinical symptoms arise during the course of treatment. [20]	在治疗过程中一旦出现出血的临床症状,就应立即考虑进行血细胞计数和/或其它适当的检查。[21] (Literal translation: Once clinical signs of bleeding appear during treatment, a blood cell counts and/or other appropriate tests should be immediately considered.)

The original sentence exhibits structural complexity, incorporating a conditional clause ("一旦...就...") and multiple modifiers ("血细胞计数" and "其它适当的检查"). This complexity may increase the cognitive load for elderly individuals, particularly in quickly comprehending potential symptoms. Additionally, the term "血细胞计数" (blood cell count) are highly technical, potentially causing confusion for non-expert readers.

The revised sentence focuses on clearly identifiable symptoms and avoids specialized terminology. The"皮肤淤青[bruising]" and "牙龈出血[gum bleeding]" are employed in place of medical jargon. Furthermore, the revised version emphasizes the action of "联系医生[immediately contacting a doctor]" providing explicit guidance on the next steps, ensuring they can effectively follow medical advice in a straightforward manner.

Revised for PILs:

Text: 如果在治疗期间出现任何出血症状(如皮肤淤青、牙龈出血),请立即联系医生。

(Literal translation: If you experience any bleeding symptoms during treatment, such as bruising or bleeding gums, please contact your doctor immediately for a checkup.)

Table 4: Sentence 2 from Plavix

Original Text	Existing Translation Text (Chinese)
If a dose is missed: If the usual dosing time is within 12 hours, the patient should take the missed dose immediately and take the next dose at the usual time; if the usual dosing time is more than 12 hours away, the patient should take the standard dose at the next usual dosing time without doubling the dose.	如果漏服:在常规服药时间的 12 小时之内漏服:患者应立即补服一次标准剂量,并按照常规服药时间服用下一次剂量;超过常规服药时间 12 小时之后漏服:患者应在下次常规服药时间服用标准剂量,无需剂量加倍。 (Literal translation: No changes with original text.)

The original instruction is overly complex, incorporating conditional clauses and multiple numbers that may be difficult for elderly patients to comprehend and memorize.

The revised version simplifies the instructions by segmenting them into clear, distinct steps, each articulated with straightforward language. The use of bullet points further enhances readability and emphasizes key actions, this structure provides clearer guidance for patients, thereby reducing cognitive load and minimizing the likelihood of misunderstanding.

Revised for PILs:

Text: 如果您忘记服药,请根据以下建议操作:

如果距离正常服药时间不到 12 小时,请立即补服。下一剂时间照常。

如果已经超过 12 小时,无需补服,按原时间服用下一剂量。不可加倍剂量。

(Literal translation:

If you forget to take your medication, follow these instructions:

If it's less than 12 hours since the missed dose, take it immediately. Next dose as usual.

If it's more than 12 hours, No need to replenish, take the next dose as scheduled. Do not double the dose.)

4.3. Case study 3: CELEBREX (Celecoxib Capsules)

CELEBREX is a selective COX-2 inhibitor widely prescribed for the management of pain and inflammation associated with osteoarthritis, rheumatoid arthritis, and ankylosing spondylitis. It is particularly valued among elderly patients due to its efficacy in alleviating chronic joint pain while minimizing gastrointestinal side effects compared to non-selective NSAIDs. By selectively targeting the COX-2 enzyme, CELEBREX reduces prostaglandin production, thereby mitigating inflammation and pain without significantly impairing gastric mucosal protection. This makes it a preferred option for long-term use in elderly users, who are at higher risk of NSAID-induced gastric complications.

Table 5: Sentence 1 from CELEBREX

Original Text	Existing Translation Text (Chinese)
Gastrointestinal Risk: NSAIDs, including celecoxib, cause an increased risk of serious gastrointestinal events including bleeding, ulceration, and perforation of the stomach or intestines, which can be fatal. These events can occur at any time during use and without warning symptoms. Elderly patients are at greater risk for serious gastrointestinal events.[22]	胃肠道出血、溃疡和穿孔 非甾体类抗炎药会使严重胃肠道不良事件的风险增加,包括胃或肠道的出血、溃疡和穿孔,其风险可能是致命的。这些事件可以在用药期间的任何时间出现,并且可以没有警示症状。老年患者以及有消化性溃疡和/或胃肠出血既往病史的患者发生严重胃肠道事件的风险更大。[23] (Literal translation: Gastrointestinal bleeding, ulcers, and perforations Nonsteroidal anti-inflammatory drugs can increase the risk of serious gastrointestinal adverse events, including bleeding in the stomach or intestines, ulcers, and perforations, which can be fatal. These events can occur at any time during the medication and can be without warning symptoms. Older patients and those with a previous history of peptic ulcers and/or gastrointestinal bleeding are at greater risk for serious gastrointestinal events.)

This case does not conflict with the underlying principles of the emotional safety model. It serves as a valuable complement. Despite the apparent absence of emotional buffering, this warning fulfills a critical function by addressing a high-risk situation. Its inclusion at the beginning of the instruction ensures that patients are immediately made aware of the most significant risks associated with the medication. This approach aligns with regulatory standards for transparency and informed consent, prioritizing the communication of essential safety information over emotional reassurance. Consequently, such high-risk statements must be retained verbatim in PILs.

The primary aim of emotional safety in the model is to prevent elderly patients from developing a resistance to necessary medications due to unwarranted fear. However, in cases where the described risk, such as gastrointestinal bleeding, presents an immediate and severe threat, the need for clear,

direct warnings takes precedence over concerns about inducing temporary anxiety. The rationale behind this approach is that withholding such warnings could be more harmful than beneficial, as patients may remain unaware of critical, life-saving precautions.

5. Conclusion and reflection

This study has developed a comprehensive age-appropriate expectation model for age-appropriate medical translation by integrating theoretical insights with practical validation. The research establishes a coherent framework that addresses the unique linguistic, cognitive, emotional, and operational challenges faced by elderly users. The integration of research findings reveals that technical terminologies, complex sentence structures, and emotionally charged expressions significantly hinder elderly patients' comprehension of medical information. By systematically simplifying terminology, restructuring sentences for clarity, and introducing emotional buffering for negative content.

From social and ethical perspectives, ensuring the accessibility of medical information for elderly patients constitutes a fundamental responsibility in public health communication. The findings highlight the potential benefits of policy reforms that encourage the inclusion of Patient Information Leaflets (PILs) written in age-appropriate language within regulatory standards. By promoting clearer and more accessible communication, such initiatives could significantly enhance medication safety and adherence among elderly users, while also addressing disparities in healthcare access. Furthermore, the study's insights can inform the development of future guidelines and training programs for translators, promoting a more empathetic and user-centered approach that addresses the diverse needs of vulnerable populations.

While the findings of this study provide valuable insights into improving age-appropriate medical translation, several challenges remain to be addressed. The current model lacks empirical validation and quantitative analysis, leaving its practical implementation untested. Future research should evaluate the model's effectiveness in diverse clinical settings with real-world data and refine its adaptability across different patient populations and linguistic contexts to promote more inclusive healthcare communication.

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