Designing for the Communication Needs of International Students in U.S. Healthcare Settings

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ABSTRACT
International students are fluent in English, yet still face communication challenges in U.S. healthcare settings. To explore these barriers, we conducted semi-structured interviews with ten international students, two Cornell Health professionals, and one Cornell Translation-Interpreter Program volunteer. We found that these difficulties stem less from general proficiency and more from unfamiliar medical vocabulary, trouble mapping bodily sensations onto English, reduced lexical retrieval under stress, and cultural or procedural mismatches with U.S. healthcare contexts. Students rarely found general translation tools useful, noting that they already communicated basic information but lacked support for medical concepts. Instead, participants emphasized the need for medical-specific support such as systems that convert provider speech into plain English, multimodal interfaces for describing symptoms through sliders or visual maps, or health-focused conversational AI that prompts for clarification. Overall, support must go beyond translation to address the linguistic, cultural, and procedural complexity of international students' clinical experiences.

INTRODUCTION
Effective communication is essential to equitable healthcare, yet non-native English speakers often encounter unfamiliar terminology, difficulty describing symptoms, and clinical systems designed for native speakers. Existing multilingual tool, such as translation apps [4], multilingual portals [5], and multilingual record interfaces [17], primarily target Limited English Proficient (LEP) patients and rely on general translation. Although accuracy concerns remain, LEP patients and clinicians frequently perceive such tools positively and report reduced anxiety and greater participation.

However, it is unclear whether these tools meet the needs of international students, who are proficient in English yet unfamiliar with medical vocabulary or U.S. clinical norms. Under the psycholinguistic Complementarity Principle, bilinguals develop *domain-specific* competence rather than uniform proficiency across contexts [9]. Because international students mainly use English in academic and social settings, not medical ones, they may lack vocabulary and conceptual mappings for symptoms, sensations, and procedures. Prior studies identify them as a vulnerable population [21] but focus largely on administrative burdens [2], insurance literacy, cost [1], and cultural adjustment [15] with little attention to the *moment-to-moment linguistic and interactional challenges* that arise during clinical encounters.

To address this gap, we conducted a qualitative study using semi-structured interviews with international students, Cornell Health staff, and a volunteer from the Cornell Translator Interpreter Program, analyzing the data through a synthesis based on activity notes to identify recurring communication breakdowns and unmet support needs. We also aim to generate actionable insights for more inclusive clinical communication practices and technological interventions tailored to this population. Our research questions are:
RQ1: What linguistic and interactional challenges do international students encounter in U.S. healthcare, and how do these challenges arise?
RQ2: How do students and providers evaluate existing communication tools and strategies, and what support do they feel is missing?
RQ3: What improvements emerge from the perspectives of students, interpreters, and providers?

Our findings show that, despite high English proficiency, students face challenges distinct from LEP patients. They are more about domain-specific vocabulary gaps, difficulty mapping bodily sensations onto English symptom categories, reduced term retrieval under stress, and cultural or system-level mismatches that translation alone cannot resolve.

Participants emphasized supports beyond literal translation, such as visual symptom mapping, visual glossaries, structured pre-visit preparation, and plain-English conversions of provider speech. These results demonstrate that effective communication support must address the linguistic, cultural, and procedural complexity of international students' clinical experiences rather than assuming that general English proficiency transfers smoothly into medical contexts.

RELATED LITERATURE

Language barriers remain a major obstacle to equitable healthcare. LEP patients frequently struggle with understanding medical information and participating in decision-making, and although interpreter services improve safety and satisfaction, they are inconsistently implemented, especially in digital settings [20]. Telemedicine widened access but also exposed persistent gaps in language support [16], reinforcing frameworks like TECCI (Translation, Education, Concordant Care, Community Outreach, and Interpretation), which argue that translation and cultural mediation must be embedded into digital and institutional design rather than left to individual patients [12]. A growing range of multilingual tools, such as translation apps [4], multilingual portals [5], and multilingual record interfaces [17], attempt to address these needs, but most rely on general machine translation. While convenient and anxiety-reducing, these tools show variable accuracy, perform poorly on specialized terms, and remain rarely evaluated beyond pilot studies [4, 10]. Recent fixed-phrase and culturally informed systems improve comprehension during specific workflows such as vaccination or emergency care [11], yet fully translated portals and broader language-equity frameworks remain uncommon in U.S. healthcare systems [5, 14]. Even as AI-based chatbots expand, concerns about reliability, phrasing, privacy, and long-term usability persist [8, 10, 11], and few evaluations consider cultural responsiveness or equity impact [10, 11, 12].

However, multilingual healthcare technology has mostly focused on LEP users. Meanwhile, international students also face notable barriers navigating U.S. healthcare. Early work identifies them as a vulnerable population with limited support networks, acculturation stress, and difficulty navigating unfamiliar systems [21]. Surveys note sleep problems, self-treatment, low awareness of campus services, and general language barriers [15]. Other studies highlight mismatched conversational norms, unfamiliar symptom-description practices, low provider cultural sensitivity [18], and widespread confusion around insurance concepts such as deductibles and co-pays [1]. Recent qualitative research adds challenges with appointment logistics, transferring records, and expressing emotional states in counseling [13].

Within the HCI/ACM literature, however, only one study directly examines and tries to address international students' healthcare communication needs. Balghare's three-phase qualitative study of twelve F-1 students investigated how universities communicate about U.S. healthcare and how students navigate administrative systems such as orientation materials, insurance websites, and health-plan documents. Students demonstrated low insurance literacy, substantial confusion about U.S. healthcare logistics, and a heavy reliance on peers or online search because orientation programs were too short, too dense, or poorly timed. They struggled to locate insurance cards, interpret benefits, understand jargon (e.g., "deductible," "in-network"), and complete tasks on poorly structured insurance websites. Balghare proposed redesigning university-facing communication, such as clearer orientation content, improved digital messaging, and more usable insurance sites [2].

Despite overlaps with LEP groups, international students' needs differ. No existing technology is designed for mid-to-high-proficiency bilinguals who can converse easily yet lack medical vocabulary or familiarity with U.S. clinical norms. Much of the literature treats "language barriers" as a broad category rather than examining the specific linguistic and interactional processes through which misunderstandings occur. Under the Complementarity Principle, international students are expected to struggle most with medical language precisely because they only use English mainly in academic and social contexts, meaning domain-specific gaps, not general proficiency [9], may shape their experiences and their perceptions of existing tools. Existing research primarily documents administrative burdens and acculturation challenges. The only HCI/ACM study found in this space examines healthcare communication between universities and students rather than clinical encounters, leaving a gap in understanding moment-to-moment communication

challenges in medical contexts. Thus, the micro-level dynamics of clinical encounters are left unexplored.

Our study addresses these gaps by examining the moment-to-moment linguistic, psycholinguistic, and interactional challenges international students face during clinical encounters. Rather than treating language barriers as a single construct, we identify specific breakdowns from the perspectives of students, providers, and interpreters, and assess where existing multilingual technologies fall short. We also surface participants' proposed solutions and the design opportunities they point toward, providing the fine-grained evidence needed to evaluate whether current translation-based tools meaningfully support international students or whether new, tailored approaches are required.

METHODS

To understand how international students navigate healthcare communication in the U.S., we conducted a qualitative interview study grounded in human-centered design. Because this population is understudied in multilingual healthcare research, we used semi-structured interviews to capture narrative accounts of linguistic and interactional challenges that are difficult to measure quantitatively, as well as their unmet needs and recommendations for tools. We interviewed international students, Cornell Health staff, and a volunteer from the Cornell Translator-Interpreter Program (TIP) to compare perspectives across roles.

Participant Recruitment

We recruited ten Cornell international students through convenience and snowball sampling. To ensure the validity of experiences, we excluded medically related majors. Eligible participants were (1) non-native English speakers, (2) age 18+, (3) who arrived in the U.S. at or after beginning university and (4) had at least one healthcare interaction in the U.S. or had communicated directly with healthcare providers through emails, phone calls, or follow-up discussions involving their own health. We also interviewed one TIP volunteer, who interprets for LEP patients and is an international student herself, to contrast LEP-oriented communication breakdowns with those experienced by highly proficient bilinguals. Their experience may also reveal useful strategies that could inform designs. Two Cornell Health staff members with experience supporting international students provided provider-side insight into communication challenges and institutional constraints. These perspectives enabled triangulation across students, interpreters, and clinicians. Tables 1-3 summarize de-identified demographics.

Participant	Country of Origin	Gender	Years in the U.S.	Type of Healthcare Encounter(s)
P1	Afghanistan	Male	4	Stomach-related appointment
P2	China	Female	3	General medical care
P3	Indonesia	Male	3	Stomach-related appointment
P4	Italy	Female	4	Mental health-related appointment
P5	Myanmar	Female	4	Physical therapy; general medical care
P6	Taiwan	Female	5	Dermatology appointment
P7	Tanzania	Female	4	Dental visit
P8	Thailand	Female	4	Back pain-related appointment
P9	Vietnam	Male	2.5	Stomach-related appointment
P10	Vietnam	Female	9	Mental health and general care

Table 1. *International Student Participants (N = 10)*

Participant	Background	Languages	Role
TIP-P1	Korean American, pre-med student	Korean, English	Volunteer medical interpreter for parents

Table 2. *Cornell TIP Participant (N = 1)*

Participant	Role	Languages
CHS-P1	Community liaison therapist	Mandarin, Cantonese, Japanese, English
CHS-P2	Community liaison therapist	Dutch, French, Oshiwambo, English

Table 3. *Cornell Health Staff Participants (N = 2)*

Interview Procedure

We developed a semi-structured interview protocol centered on three stages of the healthcare journey: (1) describing symptoms and emotions, (2) completing intake forms and responding to provider questions, and (3) sharing medical history across national systems. Interviews were conducted in person (~45 minutes), with an optional audio recording. Informants followed the same protocol, with additional questions on translation practices, communication patterns, and informant perspectives. All interviews adhered to HIPAA guidelines, ensured anonymity, and emphasized voluntary participation. They could skip questions and withdraw at any time.

Analysis Approach

Because our project timeline is short and exploratory, we used a lightweight qualitative synthesis method based on industry-standard qualitative synthesis method based on activity notes rather than formal coding. Immediately after each interview, researchers created structured notes capturing key experiences, communication pain points, contextual factors, and illustrative anecdotes. We then collaboratively examined all notes, identified recurring patterns and outliers, and clustered observations. These clusters were consolidated into themes such as expressive difficulty, confusion around medical terminology, mismatches between U.S. and home-country systems, coping strategies, etc. We also divided into subthemes if there are underlying reasons or noticeable patterns for each theme.

FINDINGS

Linguistic and interactional challenges during U.S. healthcare encounters (RQ1)

1. Difficulty expressing symptoms and sensations in English

Across participants, one of the most consistent findings was that describing bodily sensations in English felt imprecise and overly simplified. Students emphasized that they knew exactly how to describe their symptoms in their first language, but struggled to find equivalent expressions in English. Despite being fluent English speakers, they experienced expressive gaps that made symptom descriptions feel incomplete or inaccurate.

First, challenges stemmed from **cross-linguistic differences in describing sensations and emotions**. Several noted that English pain descriptors, such as "sharp," "dull," or "burning," did not match the way they usually categorized pain in their home languages. For example, an Indonesian interviewee explained that such experiences are described more generally, using nouns like *sakit perut* ("stomachache") or *mual* ("nausea"), so assigning his discomfort to a specific English adjective felt unnatural and difficult. He eventually said it was "uncomfortable," which he later felt was too vague to convey his condition accurately.

Second, even when equivalent words existed, participants often **lacked familiarity with English health vocabulary**. A Vietnamese student explained that although he knew how to distinguish between *đầy hơi* ("bloating"), *khó tiêu* ("indigestion"), and *đau co thắt* ("cramps") in Vietnamese, he defaulted to "stomach pain" in English because he did not know the English equivalents for those terms. A Taiwanese participant facing a dermatology issue described a similar experience. She explained that she lacks dermatology terminology in both Mandarin and English, but this gap felt more limiting in English, where she defaulted to very broad descriptors because she didn't know the precise words. In both cases, these expressive gaps led providers to record or interpret symptoms in broader, less accurate categories, which students later felt did not reflect their full experience. Both noted that they rarely encountered medical vocabulary in daily English, so those words never became part of their active speech.

Third, participants described **limited opportunities to use nuanced, health-related language in English**, especially for emotional experiences. They said that because this type of language is rarely actively discussed in their own academic or social lives in the U.S., they felt they had limited practice using these terms spontaneously. For instance, a Vietnamese student in therapy explained that while he could easily express basic feelings like "tired" or "stressed," he struggled to convey subtler emotional experiences. He emphasized that he actually knew the English words for these feelings when reading or hearing them, but they did not come to mind as naturally in conversation. In Vietnamese, he could express such feelings precisely with close friends or family, but in the U.S., those emotionally rich exchanges were less common, leaving him with a narrower expressive range. He felt this gap made his therapy sessions "less personal" and that his provider could not fully grasp the severity of his feelings.

Interviews with the TIP volunteer and the Cornell Health therapists reinforced this broad pattern of difficulty expressing symptoms and sensations in English. The TIP volunteer noted that although she could translate for LEP patients and was comfortable interpreting medical terminology since she is a pre-med, she still struggled, as an international student herself, to describe pain to doctors because it relies on subjective adjectives like "piercing" or "acute." Many sensations lacked direct equivalents in Korean or English, forcing her to approximate or invent expressions rather than produce a precise translation. Her experience echoed international students' challenges with finding the "right" descriptor and conveyed how even fluent bilinguals can feel language

falls short when describing bodily experiences. Cornell Health therapists similarly emphasized that international students often lack the specific language needed to describe emotions and bodily sensations precisely, even when they are fluent in everyday or academic English. Physical cues often signal emotional distress, but students default to broad phrases such as "I'm tired" or "I don't feel good," which can mask anxiety or panic. Stress further exacerbates this difficulty, as emotional strain can block word retrieval and cause hesitations or loss of fluency. Many students mentally translate from their first language before speaking, which one therapist described as "a marathon between translating in my head and finding words." This constant switching divides attention between recalling vocabulary and expressing meaning, disrupting the flow of conversation. As a result, students often feel self-conscious about their English in medical contexts, apologizing before speaking or worrying they "sound wrong," which can lead them to simplify or withhold important information.

2. Confusion about clinical terminology and patient-facing medical information

Although most students could complete pre-visit questionnaires or intake forms (either on paper or through patient portals) and understood their general purpose, many struggled to interpret the phrasing or identify what specific information was being asked for. These difficulties often left them second-guessing their answers or skipping questions altogether.

Challenges in these scenarios mostly stem from **medical terminology and abbreviations**. A student from Tanzania recalled understanding most of her dental visit but becoming uncertain when asked if her "wisdom teeth were impacted." In Swahili and everyday English, impact usually means "effect" or "influence," so she initially thought the dentist meant "infected." Only after he explained that impacted referred to teeth growing at an angle beneath the gums did she understand. Similarly, a student from Taiwan described filling out an online dermatology intake form at Cornell Health and encountering unfamiliar terms such as *rash* and *warts* (Figure 1). Although she tried looking up before the visit, she still forgot what they meant during the visit and felt too shy to check again when the doctor used even more skin-related terms. Also unable to describe her condition precisely, she received a general diagnosis that left her dissatisfied and unsure whether she had been fully understood. She also noted other unfamiliar terms in the form, such as *diarrhea*, *urination*, *UTI*, *genital*, and abbreviations like *CHEP* (Figure 1), while another participant mentioned not knowing *NSAIDs*. These examples show how specialized vocabulary and acronyms can obscure meaning, even for proficient English users.

The interview with the TIP volunteer also showed that while she could identify many medical terms due to pre-med training, she noted that this would be much harder for those without medical backgrounds.

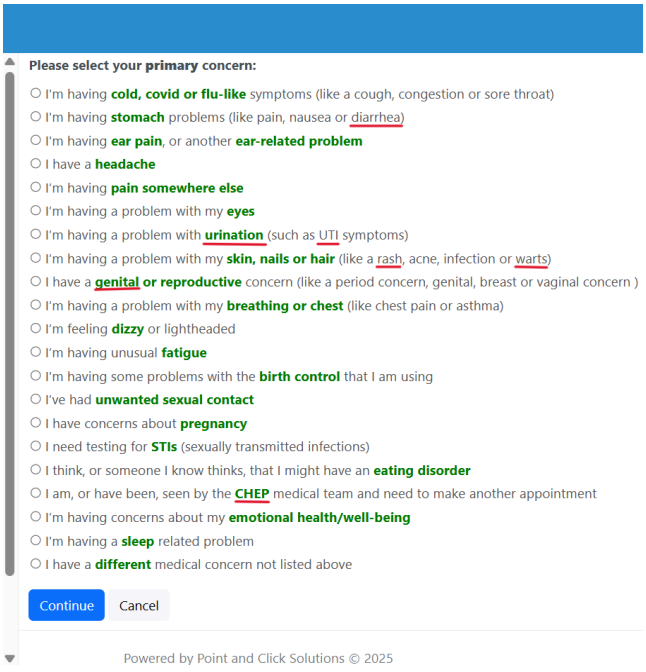

Figure 1*. Cornell Health intake form containing medical terminology that the Taiwanese participant found difficult to understand. She shared this form on her screen during the Zoom interview and highlighted the specific terms she found confusing.*

Confusion also arose from **measurement differences**. A student from Taiwan said providing her height and weight in inches and pounds felt unintuitive because she was used to (centi)meters and kilograms. She had to look up conversions, but was still unsure whether her answer was correct. She also believed this difficulty applied broadly, noting that many of her international friends expressed similar frustration since their home countries use different measurement systems than the U.S.

3. Challenges in transferring medical history and systemic mismatches
Participants also described challenges when sharing medical history or navigating differences between healthcare systems.

First, **transferring and validating medical records across systems** often caused confusion. A student from Vietnam noted that over-the-counter medicines like *Panadol/Paracetamol* back home did not match U.S. brand names. When asked about medications, he told the nurse it was "similar to Tylenol but a bit stronger" and showed photos of the packaging. He also struggled to upload his vaccination record because the system did not recognize the format or English names for certain vaccines. Meanwhile, another Vietnamese student said a U.S. clinic rejected his vaccination proof, forcing him to retake the shots, which cost him a lot of money and made him worry that taking unnecessary extra doses could be harmful. Similarly, a student from Indonesia shared that the measles vaccine used in his country did not align with the *MMR* category in the U.S., requiring extra clarification and verification.

Second, some participants experienced communication gaps around **health topics that were unfamiliar**, either to them culturally or to providers in the U.S. A student from Taiwan said she struggled to understand mental-health terminology and describe her emotions in therapy, as such topics are rarely discussed in her culture. Conversely, a student from Vietnam shared that when he mentioned recovering from dengue fever, a common but dangerous illness caused by mosquitoes in Vietnam, the nurse seemed unfamiliar with it and quickly dismissed it. Although it was not urgent, he worried that the provider's lack of recognition meant his medical history might not be fully considered in future care.

Third, many described **U.S. healthcare as more procedural, segmented, and costly** than what they were used to, which shape their perceived quality of care. Students from Asia said appointments involved multiple stages and detailed paperwork, unlike the shorter, conversational consultations common back home. They were also unfamiliar with the emphasis on written forms, online portals, and pre-visit questionnaires requiring detailed self-descriptions (e.g., "Describe your symptoms in detail"). Another from China found insurance terms like *co-pay* and *out-of-pocket* very confusing for non-Americans.

Both clinicians from Cornell Health also confirmed that unfamiliarity with U.S. healthcare logistics, insurance terms, and appointment systems often leaves international students confused or dependent on peers for help.

Evaluation of existing tools and strategies (RQ2)
Despite the range of communication challenges described earlier, we found that international students rarely used technology or formal language-support tools during healthcare interactions. Most of them said they do not need general translation or interpretation. Although they have access to many technological tools, most participants did not rely on any of these resources. Only one student reported using a translation tool, two prepared brief notes before visits (a strategy not tied to technology), and one used image searching to compare dermatology conditions. Cornell Health staff similarly noted that the use of technological tools in appointments among international students is uncommon.

Students who did attempt to use digital tools encountered mixed or limited benefits. The only participant who used **Google Translate** relied on it exclusively before the appointment in his first year in the U.S., translating Vietnamese phrases/sentences, including symptom descriptions and medical terms, to rehearse what he planned to say. Although this preparation briefly helped him feel organized, he felt the translations sounded unnatural or overly formal. Once in the appointment, he struggled to recall the newly learned vocabulary under stress, especially when bombarded with even more unfamiliar medical terms from the provider. He ultimately felt that Google Translate did not help and discontinued using it, since he could already produce general English sentences on his own, and the tool did not improve his ability to understand medical terminology and describe symptoms accurately. He said the difficulty with illustrating his bodily sensations still remains. Therapists confirmed this pattern: translation apps often generate awkward or inaccurate phrasing for emotional or sensory concepts, and when students bring in translated sentences, clinicians still encounter mismatches or incomplete descriptions that require substantial clarification during the visit.

Some students used the **Notes** app to write short notes before appointments to avoid forgetting key facts, such as timing, triggers, or location of pains. A Vietnamese student who visited for stomach pain

wrote down cues like “after eating,” “tightness,” and “three days,” explaining that simple English bullet points helped him stay organized about what to describe, even if they did not resolve deeper linguistic gaps. Students said these strategies are effective only for non-technical language, as they still struggle when describing sensations or emotions that do not translate neatly into English.

One participant relied on **image searching**. During a phone intake, the Taiwanese participant was asked to describe her condition, but could not do so. The provider then listed several possible conditions in a series of binary yes/no questions. Because she did not know the descriptions of these conditions in Mandarin either, she looked up images online for each one. She noted that this strategy was only possible because her issue was dermatology-related and therefore observable, but she was unsure how it would work for conditions that cannot be visually inspected. However, she also emphasized that the images were not very clear or trustworthy. Pictures for the same condition often looked inconsistent, making it difficult to decide which depiction was accurate. The strategy did help her eliminate several possibilities, allowing her to confidently say “no” to the conditions she knew she did not have, but even after this elimination process, she still could not find any image that clearly matched her situation. Because she was doing this searching while the provider waited on the phone, she also felt guilty about taking too long and worried she was wasting the provider’s time, so she eventually just went with the closest one, although she felt it was not precise. When she later went into the appointment, she remembered which conditions she had eliminated and told the doctor the remaining ones. However, the diagnosis still required her to describe internal bodily sensations, something she struggled to express, so the doctor ultimately offered a general diagnosis, and she left the visit still unsure what her exact condition was.

From our interview with Cornell Health staff, we learned that they offer free **translation and interpretation services**. However, from our interviews, very few international students seem to know about or use them. Therapists attributed this low usage to a general lack of awareness. Even when students are aware, many believe they are already proficient in English and therefore think there is no reason to need additional support. This is understandable, but as our findings show, proficiency in everyday English does not translate into medical literacy or ease in clinical communication. Another barrier reported by therapists is discomfort with having a third person present during sensitive conversations. This hesitation aligns with the TIP volunteer’s account that interpretation can feel invasive or awkward when discussing private medical information.

Recommendations for healthcare communication for international students (RQ3)

Across interviews, participants offered suggestions for tools and design features that could better support international students during healthcare interactions.

1. Tailored translation approaches

Students repeatedly expressed that generic translation is not always sufficient, especially when the underlying concept is unfamiliar in both languages. One student noted that when dealing with a dermatology condition she had never encountered before, translating the English term into Mandarin was not useful because she lacked knowledge of the term in either language. For such cases, she felt English definitions were sometimes more trustworthy than translations. Another participant wished for automatic translation specifically tailored to intake forms, so that phrases, instructions, and questions could be adapted to different language backgrounds instead of relying on literal machine translation. These accounts show a desire for translation tools that adjust their format depending on the type of condition and the user’s existing knowledge, rather than applying a single translation strategy universally.

2. Real-time glossaries for medical terms

Students also highlighted the need for real-time resources to demystify medical vocabulary. One student said that a visual glossary with short explanations and pictures for medical terms would make appointments feel more approachable. Another participant wanted intake forms that automatically detect technical, abbreviated, or U.S.-specific healthcare terms (including insurance terminology) and provide simple explanations or images on hover. Participants felt these resources would lower anxiety during documentation or form-filling and support more confident conversations during the visit.

3. Pre-visit preparation guides

Several students wanted structured guidance before an appointment. Suggestions included a digital pre-visit guide that lists likely questions providers might ask

and offers examples of how symptoms could be described in English. Students felt that having this structure in advance would reduce stress, prevent forgetting important details, and help them enter appointments with clearer, more organized descriptions.

4. Converting provider speech into plain English
Some participants focused on the provider side of communication, wishing for tools that automatically simplify clinical phrasing into everyday language. For example, instead of hearing "lumbar strain due to poor posture," the system might present a clearer version such as "you probably pulled a lower back muscle from sitting too long." Rather than altering medical accuracy, the tool would restate provider language in straightforward terms that match how students naturally speak and interpret health information.

5. Language-support tools for producing symptom descriptions
Students also suggested tools that support the **production** of accurate symptom descriptions. One participant wanted an application where she could describe symptoms in simple English and receive a list of appropriate medical terms along with short definitions so she could rely on them to form her descriptions. Another envisioned a system that accepts descriptions in her first language and produces an English explanation phrased the way providers typically communicate. Students said they would use such tools both before the appointment and during the visit to facilitate clearer expression.

6. Visual-based production aids (pictures, sliders, symptom maps)
Participants consistently described wanting tools that allow them to express symptoms without relying solely on English vocabulary. Many suggested visual or slider-based interfaces where users could indicate where it hurts and how intensely, and the tool would then map those inputs onto appropriate medical terms or clear English descriptions. For example, a slider could help translate a user's selected pain level into terms like "mild discomfort," "sharp pain," or "severe tightness," depending on the intensity. Another participant emphasized that having pictures displayed alongside terminology would make it easier to understand unfamiliar words. One participant also envisioned an app that lets users describe symptoms using images or sliders, which then automatically converts those visual inputs into concise English directly for the doctor, without having to go through patients' descriptions much. They also suggested features like visual symptom maps, where tapping or shading a body region could generate possible descriptions. They said they would use it both before the appointment, so they could organize their thoughts, and during the visit, so they could show the doctor exactly what they meant.

When we asked the TIP volunteer about this idea, she agreed that a visual or slider-based tool would be especially valuable. Even as a fluent bilingual and pre-med student, she explained that both human and machine translators struggle with how subjective sensations are. Pain descriptors like "piercing," "dull," or "radiating" are hard to match precisely, even within one language. With her parents, she relied on closure with them to probe for nuance, something international students may not feel comfortable doing with an interpreter, and something machine systems cannot replicate. She also noted that when switching languages, many sensations have no direct equivalent, and it is also hard for her to translate/interpret, too, as she usually just approximates or invents expressions. Together, these accounts highlight why visual or slider-based tools may fill an important gap: they capture embodied sensations directly, rather than forcing users to retrieve or guess at vocabulary, and they can provide a structured way to generate medically meaningful descriptions from nonverbal inputs.

7. Health-focused conversational AI and LLMs
Some participants imagined an AI system dedicated specifically to health communication. One wanted a tool that prepares users for the structure of the appointment to understand how the visit might unfold, and to practice describing their symptoms. She imagined a chatbot system focused on health topics, where they could enter their symptoms and receive suggestions for clearer wording to communicate to providers. She emphasized the importance of domain-specific training, noting that generic tools like ChatGPT sometimes produce inaccurate explanations. Another participant also saw value in another type of large language model. He explained that during medical visits, if descriptions by patients are not clear enough, providers would just skip asking follow-up questions or prompting for more detail. He imagined an AI agent that could detect when their descriptions were unclear, push them to elaborate, and provide cues for clarification. He believed such a system would

help compensate for time constraints and provider fatigue, giving international students space to fully articulate what they were feeling. He noted that if an AI could guide them to be more specific, it would make their communication with providers more accurate and confident.

8. Cultural mediation and support for cross-cultural contexts

The TIP volunteer emphasized that any support tool should incorporate cultural knowledge and serve as a cultural mediator, not merely a linguistic one. She explained that when providers asked about her parents' diet, Western doctors were unfamiliar with Korean dishes. To bridge the gap, she would describe foods like "soybean soup with vegetables" instead of using the Korean name *Doenjang-jjigae*, yet providers still struggled to understand because they tended to associate meals with Western foods like bread or bacon. She also noted that many Korean medicines are herbal or locally made, meaning that explaining them often requires listing ingredients just so doctors can get a basic sense of what they are. Drawing from these experiences, she suggested that international students face similar cultural mismatches. For example, Asian students living in Collegetown may regularly cook and eat Asian dishes, but providers may not recognize those foods or understand their nutritional profiles. As a result, when students attempt to describe their diets, it becomes difficult for providers to interpret what those meals actually entail. A tool that can, for instance, explain the ingredients, preparation methods, or nutritional values of culturally specific foods could help providers better understand students' everyday routines, health contexts, and concerns. She believed that this kind of cultural mediation would meaningfully improve diagnosis, discussion, and recommendations for international students whose daily practices fall outside what U.S. healthcare providers typically assume.

9. Multilingual Staff

From Cornell Health, we also learned that they employ multilingual community liaison therapists. The two therapists we interviewed collectively speak Mandarin, Cantonese, Japanese, Dutch, French, and Oshiwambo, and both have lived experience as former international students navigating U.S. systems. We only learned about the existence of these services through the interviews themselves, so we do not know how international students perceive or value them. However, from the therapists' observations, communication tends to be easier, and students appear noticeably more comfortable when they can speak directly in their first language. These shared linguistic and cultural backgrounds help students avoid translation-related gaps and allow therapists to empathize with clients' hesitation, normalizing adjustment-related stress without pathologizing it. Both therapists described intentionally slowing their speech, repeating key points, and clarifying cultural assumptions to create psychological safety for students who worry about "sounding wrong." They emphasized that these communication practices make a substantial difference for international students, but they are also much easier to implement in therapy sessions than in medical settings, where providers often operate under tight time constraints.

What our findings reveal

Across interviews, we found four patterns that reveal why international students' experiences are both interesting and different from what existing literature captures. First, **fluency in English does not guarantee fluency in healthcare communication.** Participants consistently reported that while they had little difficulty carrying out general conversations with providers, they struggled when communication required medical-specific language. They could identify basic symptoms or describe general concerns, but explaining sensations, naming conditions, or understanding procedural or diagnostic terms felt imprecise or incomplete. This finding demonstrates that their difficulties do not stem from global language proficiency, as is often assumed in LEP-focused research, but from domain-specific gaps that emerge only in medical contexts.

Second, **students rarely saw value in general translation tools** because they could already communicate basic healthcare information in English. Almost all participants said they did not need translation for general healthcare communication, and the one student who tried Google Translate found that the output sounded unnatural, overly formal, and difficult to retrieve under stress. It did not resolve his main difficulty either: translating medical concepts and describing bodily sensations. Students also said they could complete intake forms on their own, with uncertainty arising only around specific medical terminology or abbreviations. This pattern contrasts with findings from LEP populations, where general translation still yields positive perceptions and measurable improvements, although accuracy issues

remain, and perceived effectiveness could be higher when translation is tailored to medical contexts. For international students, however, general translation was not only unhelpful but sometimes counterproductive as it is inconsistent with how they normally speak, and therefore offered no meaningful communicative advantage. Students emphasized that they do not need assistance with general English. Many suggested that translation would only become useful if tailored to medical contexts and designed around the specific linguistic gaps they encounter.

Third, students consistently **struggled to connect what they physically felt to the specific pain and symptom descriptions expected in English.** This difficulty persisted even with potential translation support because many first languages simply do not encode sensations and emotions using the same fine-grained adjective system, leaving few direct equivalents. Several participants also did not know the medical terms even in their L1, especially for concepts they had never experienced before or lacked familiarity (e.g., the Taiwan participant didn't know the dermatology terminology in Mandarin or mental health concepts since it is rarely discussed in Taiwan). The problem was further compounded by retrieval issues: students often looked up terms before the visit or knew them before already, but could not recall them under pressure because the vocabulary was not well-practiced or grounded in their own conversational use in the U.S. Students also described the limits of image searching: results were inconsistent, medically unreliable, and time-consuming, especially during a live interaction. They emphasized the need for fact-checked visual glossaries embedded into forms or portals, where images and short explanations appear instantly on hover. When discussing preferred solutions, participants repeatedly proposed multimodal tools, such as sliders, visual symptom maps, or image-based interfaces, that let them express sensations nonverbally and automatically map these inputs to appropriate clinical terms or clear English descriptions. These suggestions highlight that the barrier is not translation alone, but a deeper representational mismatch between felt experience, linguistic categories, and real-time recall.

Fourth, international students also identified **limits on the provider side**, since they navigate medical interactions without translators or other support and must communicate directly with clinicians. Many felt that provider explanations were too complicated, jargon-laden, or not sufficiently probing, which heightened the risk of misdiagnosis or incomplete understanding, especially given the students' existing difficulty describing symptoms precisely. Several situations also required cultural mediation, such as explaining diet or past illnesses that are common in their home countries but unfamiliar in the U.S. Interviews with Cornell Health staff confirmed that multilingual providers can partially address these gaps by drawing on cultural knowledge and adjusting communication practices, aligning with findings from Ulrey & Amason about the role of cultural sensitivity [18]. Accordingly, many of the recommendations that students, providers, and the translator/interpreter proposed (e.g., pre-visit preparation guides, tools that convert provider speech into plain English, conversational AI that prompts for clarification, cultural-mediation supports, and access to multilingual staff) all aim to respond to these provider-side challenges.

Together, these patterns address gaps identified in the literature by showing that international students' challenges are not simply broad language barriers, but are linguistic, interactional, conceptual, and cultural mismatches that existing LEP-oriented tools were not designed to address. Prior studies largely focus on administrative burdens or broad difficulties with English, but our findings reveal *how* misunderstandings arise in real clinical encounters and *why* general translation does not solve them. By uncovering domain-specific linguistic gaps, psycholinguistic constraints on expression, provider-side sources of miscommunication, and students' own visions for multimodal and culturally informed tools, our study provides the fine-grained empirical evidence missing from existing work and highlights new design opportunities for more equitable healthcare communication tailored to international students.

DISCUSSION

Taken together, our findings show how linguistic, cultural, and systemic barriers collectively shape international students' sense of alienation in U.S. healthcare. Many participants reported feeling misunderstood or dismissed, dissatisfied with the care relative to the cost, and aware of subtle inequities that made them feel less prioritized. Although none reported overt discrimination, students described

providers assuming familiarity with U.S. norms and terminology, which turned communication breakdowns into wasted time or led them to delay care, self-manage symptoms, or wish they could return home (but this is often impossible due to visa, financial, or travel constraints). These frictions ultimately discouraged consistent healthcare use and shaped perceptions of the system's accessibility.

From an Information and Communication Technology for Development (ICTD) perspective, these challenges arise not from low English proficiency or lack of digital access, but from technologies and communication practices misaligned with international students' linguistic profiles and cultural experiences. Unlike LEP-focused research which frames challenges around low proficiency or socioeconomic barriers, international students struggle because existing tools assume general translation is sufficient and overlook domain-specific gaps, representational mismatches, and interactional pressures. Their experiences underscore a broader ICTD lesson: systems built around translation alone overlook users whose challenges stem from representational and interactional mismatches rather than from insufficient general English knowledge.

Beyond international students themselves, these communication challenges have consequences for providers as well. According to participants, clinicians often did not notice when students were struggling to describe their symptoms or when their answers were vague, culturally unfamiliar, or linguistically difficult to produce. Several students felt that providers did not probe for clarification and instead moved on quickly, unaware that the description was incomplete or imprecise. This dynamic means communication breakdowns affect both sides. Students are left feeling misunderstood or hesitant to seek care, while clinicians may unknowingly base decisions on partial or unclear information simply because they are not aware that students are having difficulty expressing what they mean.

For researchers, these findings highlight the need to support expressive communication, cultural interpretation, and system navigation – areas that existing LEP- and translation-focused literature does not fully address. Current work often emphasizes comprehension barriers or the need for interpreters, but our data show that internationally mobile students face a different problem: they usually understand what providers say, except for medical terminology, but struggle to produce precise, culturally aligned descriptions of what they feel. This expressive gap is compounded by systemic mismatches (e.g., measurement units, unfamiliar paperwork, vaccination categories), all of which shape how effectively care unfolds. Future studies should examine how interactional demands, emotional states, and culturally shaped habits of expression influence communication during clinical encounters. Research in HCI can build on these insights by developing tools that support patients not only as recipients of information but also as contributors whose clarity and precision directly affect the care they receive. These directions can improve diagnostic accuracy, reduce stress for both patients and providers, and create more inclusive clinical encounters for a globally diverse student population.

This study has several limitations that shape how the findings should be interpreted. First, our participant pool consisted primarily of students from Asian countries (see Table 1), which limits the generalizability of the results. Students from other linguistic backgrounds, such as Spanish-speaking regions or European English-speaking regions, may experience different forms of linguistic that change the nature of expressive and comprehension difficulty. For instance, one Italian participant reported very few issues with medical forms because many Italian-English cognates made terminology familiar. Future research should therefore recruit a broader linguistic sample to examine how expressive and comprehension challenges differ across language families and orthographic systems.

Second, our sample reflects the linguistic profile of international students at a highly selective U.S. university, where applicants typically submit TOEFL or IELTS scores within the higher proficiency range (TOEFL $\geq$ 100 or IELTS $\geq$ 7.5) [3, 6, 7]. Our findings may not generalize to institutions that admit students with lower proficiency. Future work should therefore include participants with a broader range of English-learning backgrounds to understand how communication challenges vary across different proficiency levels and educational histories.

Third, some interviews involved language mismatches between the interviewer and interviewee. We did ask participants to provide examples of symptom or emotion terms that were difficult to express or

translate in their first language, and invited them to type these words into the Zoom chat so we could look them up later. However, several participants still found it hard to convey these terms accurately because we did not share a common linguistic background. As a result, we were unable to collect richer L1-specific examples that could have further informed the design of text-based or language-based interventions. Future studies could involve researchers who speak a broader range of languages or use interviewer-interviewee language-matched pairs, allowing participants to articulate L1 examples more precisely.

Fourth, although our findings suggest that tools designed for LEP patients may not generalize to highly proficient international students, we did not experimentally test these tools with our population. Students rarely used such technologies, so the judgments they gave did not include firsthand comparison. Future research should incorporate controlled evaluations in which international students actually use LEP-oriented technologies to assess their perceived usefulness, limitations, and potential adaptations.

Fifth, our qualitative focus emphasizes depth over breadth, which means we cannot estimate the prevalence of the identified challenges among the broader international student population. Future work should pair qualitative methods with larger-scale surveys or mixed-methods designs to assess how widespread these challenges are and which subgroups experience them most strongly.

Finally, our provider perspective was limited to two multilingual community liaison therapists, whose work occurs primarily in mental-health settings rather than time-pressured medical environments. These were the only staff members Cornell Health referred us to, so we were unable to interview monolingual or medically focused clinicians who may face different constraints, communication demands, or levels of cultural familiarity. Future research should include a broader range of providers, such as primary-care physicians, nurses, specialists, and monolingual clinicians, to understand how they interpret vague or incomplete descriptions from international students and to identify opportunities for interventions that support both patients and clinicians during real medical encounters.

Overall, the study shows that communication challenges among international students arise not from low English proficiency, but from the difficulty of understanding and expressing unfamiliar health concepts within systems that implicitly assume shared linguistic and cultural backgrounds. These challenges differ in important ways from those documented in LEP-focused research, which often centers on broad comprehension or production barriers and has motivated translation-oriented technologies. Our findings suggest that such tools alone are unlikely to support mid- to high-proficiency international students, whose difficulties instead stem from domain-specific vocabulary gaps, trouble mapping bodily experiences onto English symptom/pain categories, cultural mismatches, and the real-time expressive demands of clinical conversation. Addressing these challenges will require communication tools and practices that better support real-time expression, acknowledge cultural variation, and reduce the cognitive burden placed on students during medical encounters.

CONTRIBUTION STATEMENT

All team members jointly refined the research topic and scope. Ying prepared the Abstract, and Tran reviewed it, while Ashley drafted the original Problem Statement in Milestone 4 that was later adapted into the Introduction, which Ying, Tran, and Ashley then finalized together.

Ashley and Mahek wrote the literature review on LEP technologies, and Tran completed the literature review on international students.

Ying and Tran developed the Methods section, designed the research plan and interview protocol, conducted outreach, and ran the interviews (Ying with 6 international students; Tran with 4 international students, 2 Cornell Health therapists, and 1 TIP volunteer). Ying created the demographic tables, and both synthesized interview insights and conducted the data analysis.

Ashley and Mahek wrote the Discussion section, and Tran added the limitations.

Ying wrote the contribution statement, and Tran formatted the References, with all members contributing to editing, formatting, and cross-reviewing the final report.

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