Medical student second language abilities and confidence in clinical use: Mandarin pilot

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Abstract

Objectives: Medical students may have conversational skills in non–English languages (NELs) but find it cumbersome to use these languages in a clinical setting. We investigated the demand for resources to enhance medical communication across language barriers and the role for workshops in achieving this purpose.

Methods: Mandarin workshops and a phrasebook with medical terms were created and delivered to medical students, along with the opportunity to practice at a community blood pressure clinic. Surveys of medical students before and after the workshops, and three months following, were collected to determine the impact of different resources. Community members attending the blood pressure clinic were surveyed to gauge their preferences.

Results: Among 58 medical student respondents, 86% spoke NELs, but only 24% were at least "quite a bit" confident in communicating with patients in a NEL. After the Mandarin workshops, 82% of participants reported perceived benefits to their confidence in communicating with patients in Mandarin. The phrasebook and peer coaching in Mandarin were rated as the most useful resources. Mandarin–speaking community members (n = 32) reported they would be more comfortable seeing healthcare providers who had learned basic Mandarin (7.5/10) compared to no Mandarin at all (4.4/10).

Conclusions: Medical students' confidence communicating in Mandarin can be bolstered with resources including workshops and phrasebooks. This approach could be used for other languages to improve communication and contribute to more satisfying, effective, and comfortable care for patients with limited English.

Introduction

Vancouver is a rapidly growing, culturally diverse city. More than 1 in 20 Vancouver residents do not speak English.[1] Additionally, 2016 Canadian Census data shows that 21.1% of the population of Canada speaks an immigrant language at home, a 14.7% increase from 2011.[2] Cantonese, Mandarin, and Punjabi are the three most common non–English languages (NELs) spoken in Vancouver.[2] Health professionals in this city need to work with diverse patient populations with varying language abilities.

Language barriers can contribute to miscommunication and present a barrier to care. Medical students in Vancouver often encounter clinical situations where they struggle to interact meaningfully with patients due to a language barrier. Conceivably, basic knowledge of the patient's language can help medical students begin to overcome language barriers when interpreters are not available, establish better rapport with non–English speaking patients, and respond to patient needs in a timely manner. Many medical students already have conversational knowledge of a NEL, and learning medical vocabulary may allow them to provide more effective patient care and have a more meaningful educational experience during encounters with non–English speaking patients.[3]

Patients with limited English face healthcare disparities. These patients have significantly more tests ordered, increased radiation exposure, and significantly longer time before CT scan orders are placed in the Emergency Department.[4,5] Non–English speaking patients are less likely to receive screening for colorectal cancer.[6] For certain medical and surgical conditions, including acute coronary syndromes and elective hip replacements, patients with limited English proficiency have longer hospital stays.[7] While the use of professional interpretation services increases patient and healthcare worker satisfaction during Emergency Department visits, these resources are often not readily available.[8]

NEL fluency and cultural competence are independently associated with improved primary care.[9] While there is interest in medical language exposure beginning in medical school, there is little research examining the language abilities of healthcare providers and resources available to them.[10,11] It is also unclear whether augmenting healthcare providers' language skills benefits patient care. A past survey of University of British Columbia (UBC) medical students demonstrated that, although they have NEL abilities, they are not comfortable using them clinically.[12] We therefore investigated the following research questions:

1. What is the current ability of medical students to provide care to patients in NELs?

2. Is there a demand among medical students for more learning opportunities to provide care to patients in NELs?

3. Do basic introductory workshops and medical phrasebooks in Mandarin improve medical students' confidence in communicating with Mandarin–speaking patients?

4. Would Mandarin–speaking patients feel more comfortable seeing healthcare providers who have learned basic Mandarin than those who speak none at all?

Materials and Methods

We surveyed the need for language workshops among UBC medical students at four sites across British Columbia (Vancouver, Victoria, Kelowna, and Prince George) and developed a medical Mandarin workshop. We obtained ethics approval from the UBC Behavioural Research Ethics Board in January 2016, and the project was carried out in accordance with the approved ethics application.

This project included multiple components: 1) an initial online needs survey for students in all four years of the UBC medical undergraduate class, which was collected in early January 2016; 2) a two–part medical Mandarin workshop for medical students in Vancouver in late January 2016, with pre–and post–workshop surveys; 3) a blood pressure clinic in which medical students practiced taking blood pressure in Mandarin, with surveys for medical students and Mandarin–speaking community members; and 4) a follow–up online survey sent to the medical undergraduate class in April 2016, three months following the workshops. The process of participant selection and subsequent data analysis therefore differed for each component based on its purposes.

All surveys mentioned herein are reproduced in the Appendix. The surveys were designed with support from a UBC eHealth Strategy Office survey design expert. Surveys for Mandarin–speaking community members were translated into Chinese by a professional translator.

Selection and recruitment of participants

We invited students from all four years of the UBC medical undergraduate class by email to participate in the needs survey, medical Mandarin workshops, and blood pressure clinic. The blood pressure clinic was held at a public library in Richmond, British Columbia, and advertised to community members via posters and library promotional materials. We invited participants at the Mandarin workshops and the blood pressure clinic to complete surveys regarding their experience. Finally, we sent our follow–up survey to students from all four years of the medical undergraduate class three months following the workshops to assess for any longer–term benefit.

Of 1150 eligible participants in the medical undergraduate class, 64 students responded to the class–wide needs survey online, and 41 students responded to the follow–up survey. Responses to the online surveys were included in analysis if they were complete, and, in the case of the follow–up survey, if the respondents had participated in any of the workshops or used

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any of the resources provided. From 48 total participants at all four workshop sessions, we obtained 35 pre–workshop surveys and 28 post–workshop surveys, and all of these were included in analysis. Finally, from the blood pressure clinic, we obtained 7 surveys from medical students and 32 surveys from community members. Responses from community members were included in further analysis if the respondent's self–rated Mandarin ability was higher than their self–rated English ability, to reflect a population that was more comfortable with Mandarin.

Workshops for medical students and blood pressure clinic

The medical Mandarin workshops were delivered in two parts, as summarized in Figure 1. Workshop 1 taught basic Mandarin pronunciation and grammar to students without a background in Mandarin (19 participants), with Mandarin–speaking peer volunteers to help participants practice pronunciation. Workshop 2 taught medical Mandarin phrases to participants of Workshop 1 and students with prior knowledge of Mandarin (29 participants), and participants practiced common scenarios with Mandarin–speaking volunteer patients. Additionally, we created and distributed a medical Mandarin phrasebook at the workshops (online access: http://digem.med.ubc.ca/2016/03/23/a-chinese-english-phrasebook-for-english-speaking-medical-students/). Each part of the workshop lasted two hours and was offered twice, for a total of four workshop sessions. Pre–workshop surveys were offered to participants prior to Workshop 1 or Workshop 2, depending on which part the participants attended first, and post–workshop surveys were offered to all participants at the end of Workshop 2.

Following the workshops, we invited medical students who attended these workshops to participate in the blood pressure clinic. Seven medical students participated to practice taking community members' blood pressures in Mandarin. We prepared materials in English and Chinese regarding blood pressure for community members, and had a Mandarin–speaking physician counsel community members whose blood pressure was elevated. We then invited medical students and community members to complete surveys regarding their experience.

Statistical analysis

We performed data analysis using Microsoft Excel and wrote Python scripts to reorganize spreadsheets and perform basic calculations. We performed statistical testing in Microsoft Excel, using unpaired t–tests for comparisons between two groups and paired t–tests for comparisons of responses to two related questions within groups. We used ANOVA to compare multiple groups together and follow–up t–tests to compare individual pairs of groups. We report 95% confidence intervals throughout.

### Conversion of Likert–type scales

In analyzing responses to questions utilizing Likert–type scales (such as those asking medical students about their confidence in communicating with patients in a particular language), we utilized the scheme shown in Table 1 to convert responses into values, as described by Sullivan & Artino and Bosse et al.[13,14]

We accompanied questions asking medical students about their confidence in communicating with patients in Mandarin or other languages with a follow–up question asking about their confidence in communicating with patients in English. These responses, after conversion into numerical values as described above, were then expressed as a proportion of the respondents' confidence communicating with patients in each language divided by their confidence communicating with patients in English ("confidence relative to English"). Two responses that indicated being "Not at all" confident in communicating with patients in English were excluded from the confidence data.

Results

Current language abilities and needs

Of 64 medical student responses, 58 were complete, and of these respondents, 86% spoke at least one NEL: 41% spoke one NEL, 38% spoke two NELs, and 7% spoke three or more. Respondents reported understanding or speaking 18 different languages to varying levels (Figure 2). The top five most prevalent languages reported were French (57% of respondents), Mandarin (22%), Spanish (17%), Cantonese (16%), and Taiwanese (5%). Twenty-four percent of respondents reported speaking other languages including Russian, Japanese, Hungarian, Vietnamese, Bangla, German, Dutch, Dagbani, Hebrew, Korean, Swedish, Farsi, and Punjabi.
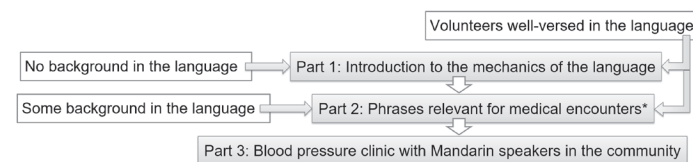
Table 1 | Conversion chart of survey Likert scale ratings to numerical scores for statistical analysis.

Response		Score given
Not at all	Not useful	0
Partly	Partly useful	1
Quite a bit	Quite useful	2
Completely	Extremely useful	3

While 60% of respondents reported being at least "Partly" confident in communicating with patients in a NEL, only 24% reported being "Quite a bit" or "Completely" confident. Increased self–rated speaking ability in a language was associated with increased confidence in communicating with patients in that language (Figure 3). The mean confidence relative to English varied from 0.06 ± 0.07 in those with "Poor" self–rated ability, to 0.72 ± 0.18 in those with "Fluent or Native" self–rated ability, and there was a significant difference between these groups by one–way ANOVA ($F_{3,68} = 39.1$, $p < .0001$) and follow–up t–tests.

In terms of exposure to NELs, 84% of respondents reported clinical encounters in which they felt use of another language would be helpful but was not used. The top five languages reported were Mandarin (53%), Cantonese (36%), Punjabi (24%), Farsi (10%), and Spanish (9%). Forty–one percent of respondents reported having used NELs to communicate with patients. The top three languages were Mandarin (19%), French (14%), and Cantonese (10%), and 12% reported having used other languages.

Seventy–six percent of respondents expressed interest in medical workshops or resources in NELs, including Mandarin (59%), Cantonese (26%), French (26%), Punjabi (26%), Spanish (16%), and others (41%).

Effect of Mandarin workshops on student confidence

In the post–workshop survey, 93% of respondents believed the workshop benefited their ability to speak Mandarin, 71% believed it benefited their ability to understand Mandarin, and 82% of respondents believed it benefited their confidence communicating with patients in Mandarin.

Consistent with this, there was a statistically significant increase in respondents' confidence in Mandarin relative to English from the pre–
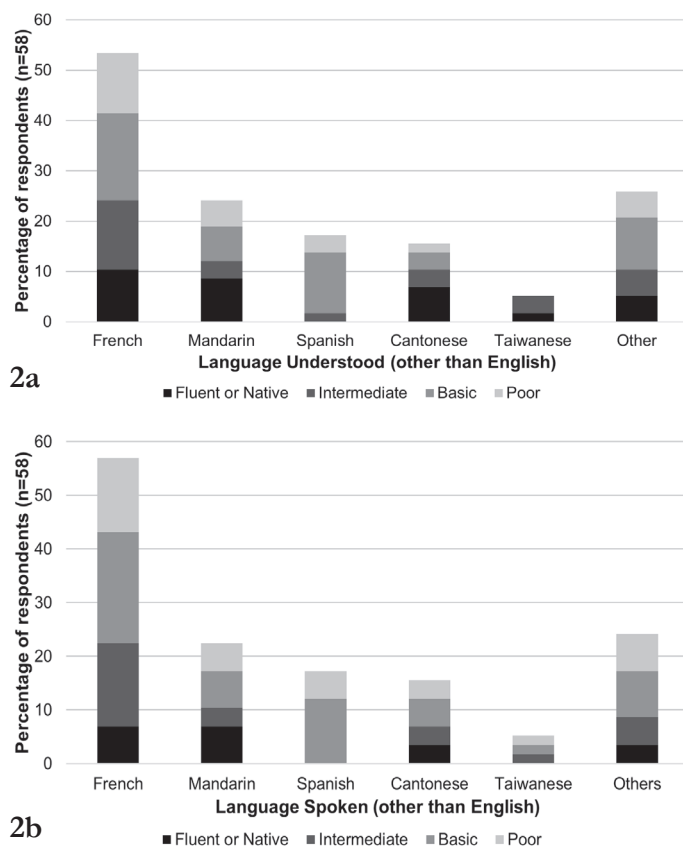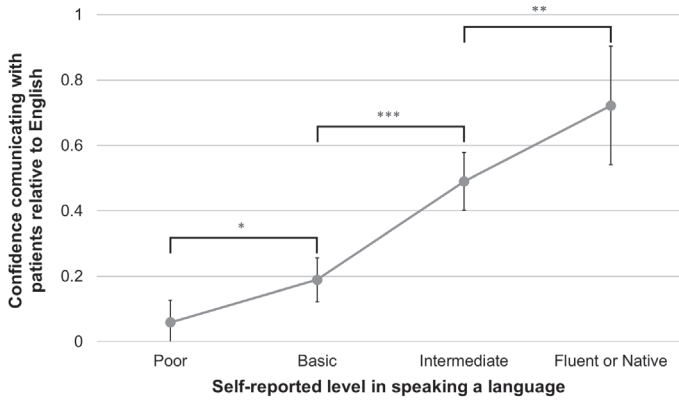
2a

2b

Figure 2 | Percentage of respondents who (a) understood or (b) spoke non–English languages. Respondents (n = 58) were asked to rank their understanding and speaking abilities from poor, basic, intermediate, to fluent or native.

*A phrasebook containing medically relevant phrases was distributed at Part 2

Figure 1 | Structure of medical Mandarin workshops and blood pressure clinic.

Figure 3 | Effect of level of ability in a non–English language on confidence in communicating with patients in that language. Confidence was calculated relative to English by converting responses to questions about confidence in communicating with patients on a Likert scale to numbers (i.e. from Not at all = 0 to Completely = 3), and then dividing the respondent's confidence in communicating in each non–English language by their confidence in communicating in English. * indicates p< 0.05, ** indicates p< 0.01, and *** indicates p < 0.005. Error bars represent 95% confidence interval.

Figure 4 | Effect of medical Mandarin workshops on confidence in communicating with patients in Mandarin. Medical students participating in a medical Mandarin workshop completed a pre–workshop (n = 35) and post–workshop survey (n = 28), in which they were to rate their ability in speaking in Mandarin and their confidence in communicating with patients in Mandarin or English. Confidence was calculated relative to English by converting responses into numbers (i.e. from Not at all = 0 to Completely = 3), and then dividing the respondent's confidence in communicating in Mandarin by their confidence in communicating in English. ** indicates p< 0.01. Error bars represent 95% confidence interval.

workshop to post–workshop surveys (p< 0.05), from an average of 0.21 ± 0.10 prior to the workshops to 0.42 ± 0.14 following the workshops. When we grouped respondents by self–rated Mandarin ability, we found that this was most pronounced among those with "None" to "Basic" Mandarin ability (0.06 ± 0.05 pre–workshop vs. 0.25 ± 0.16 post–workshop, p< 0.01), while "Intermediate" or "Fluent or Native" speakers showed no statistically significant change (0.63 ± 0.19 pre–workshop vs. 0.64 ± 0.18 post–workshop, p = 0.95) (Figure 4).

Respondents to the post–workshop survey had higher average self–rated Mandarin speaking ability (2.2 ± 0.6 out of 4, converted Likert–type scale) compared to respondents to the pre–workshop survey (1.6 ± 0.5 out of 4), but this did not reach statistical significance. More respondents to the post–workshop survey rated their Mandarin ability as "Intermediate" or "Fluent or Native" (43%) than in the pre–workshop survey (25%).
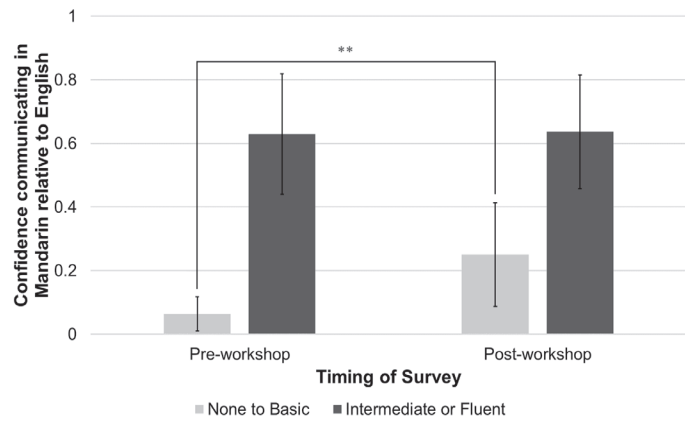
Usefulness of workshop components

We asked respondents to rate the usefulness of various components of the workshop in the post–workshop survey (n = 28) and the follow–up survey (n = 41). Among 41 respondents to the follow–up survey, 14 (34%) had attended the workshops or utilized resources from them. Participants rated the Mandarin phrasebook as the most useful component immediately after Workshop 2, with a rating of 2.7 ± 0.6 out of 3 by 27 respondents, followed by practice with Mandarin–speaking peers in Workshop 1, at 2.3 ± 0.6 out of 3 by 10 respondents (Table 2). Confidence intervals in the follow–up survey were wide, owing to low response rates. The phrasebook's usefulness was rated 2.1 ± 0.6 out of 3 by 10 respondents in the follow–up survey.

Blood pressure clinic

Seven medical students attended the blood pressure clinic, all of whom had attended at least Workshop 2. Of these, 5 rated their Mandarin ability as "Intermediate", while one student each rated their ability as "Basic" or "Fluent or Native", respectively. All reported feeling "Quite a bit" or "Completely" able to gain community members' trust, and most felt "Quite a bit" or "Completely" confident in introducing themselves (apart from one medical student with "Basic" Mandarin ability who felt "Partly" confident introducing themselves). On a 10–point scale, they rated their satisfaction with their ability to provide care as 7.4 ± 1.4 out of 10, and their overall experience as 8.7 ± 0.9 out of 10.

The survey for community members asked about their experiences at the blood pressure clinic, as well as their values regarding language in healthcare. Among 32 community member respondents, 25 rated their Mandarin ability as better than their English ability. Among these, all reported that the medical student gained their trust "Quite a bit" or "Completely", regardless of their ratings of the students' Mandarin ability, which ranged from "Basic" to "Fluent or Native". They rated their satisfaction with the care they received as 9.9 ± 0.1 out of 10, and their overall experience as 9.6 ± 0.3 out of 10. There were no significant differences in their responses based on whether the student's ability in Mandarin was deemed "Basic" (n = 3), "Intermediate" (n = 9), or "Fluent or Native" (n = 13) by the respondent, by one–way ANOVA ($F_{2,22}< 1.75$ for all, p> .19 for all).

In terms of their values about language in healthcare, on a ten–point scale, they rated the importance of having a healthcare provider who could speak to them in their own language as 9.6 ± 0.5 out of 10. Additionally, they expressed significantly greater comfort with the idea of seeing healthcare providers

who had learned basic Mandarin phrases (7.5 ± 0.9 out of 10) compared to a healthcare provider who only spoke English (4.4 ± 1.4 out of 10) (p< 0.001 by paired t–test).

Discussion

Our results demonstrate that many medical students speak NELs but generally do not feel very confident in communicating with patients in these languages. This is consistent with findings from a 2009 study of UBC medical students.[12] Language barriers are a common experience among medical students, and there is demand for medical workshops and resources in NELs, most commonly Mandarin, Cantonese, French, Punjabi, and Spanish among UBC medical students. Our study suggests that language training through medical NEL workshops and phrasebooks can improve medical students' confidence in communicating with patients in NELs, such as Mandarin.

Additionally, our survey of Mandarin-speaking community members suggests that patients who speak Mandarin better than English value receiving care in Mandarin and would feel more comfortable even if healthcare providers can speak their language only to a basic level, compared to speaking English only. Similarly, the community members expressed high satisfaction with the care provided by students in Mandarin, even by those with only basic Mandarin.

The short–term benefit demonstrated by this study is encouraging. Given that increased self–efficacy in working with patients with limited English is a predictor of increased resident satisfaction in caring for patients with limited English, further research should be done on the long–term impact of language resources.[15] These resources should also be translated into other commonly spoken languages, particularly Cantonese, Punjabi and French, which followed Mandarin in terms of demand in our initial survey.

Limitations of the study

There were several limitations to this study. The response rate of the initial

Table 2 | Usefulness of the workshops by component. In a follow–up survey done three months after the workshops, respondents were asked about the usefulness of individual resources and the components that benefited them the most. Responses to these questions were converted into numbers for analysis (ranging from "Not at all useful" = 0 to "Extremely useful" = 3).

Resource	Average usefulness rating (out of 3)	
	After Workshop Part 2	3 Months Following
Workshop Presentation, Part 1	1.8 ± 0.7	2.0 ± 2.3
Mandarin–speaking peer volunteers, Part 1	2.3 ± 0.5	2.7 ± 1.4
Workshop Presentation, Part 2	2.1 ± 0.3	1.7 ± 1.1
Mandarin–speaking volunteer patients, Part 2	2.1 ± 0.3	2.0 ± 1.5
Phrasebook	2.7 ± 0.2	2.1 ± 0.6
Blood Pressure Clinic	--	2.3 ± 2.9

survey was only 6% (64 out of 1150). This could introduce a selection bias for respondents with an interest in the study topic, who might speak a NEL or frequently encounter non–English speaking patients. A more robust method of survey recruitment to boost the response rate would improve the generalizability of the results.

Additionally, subjects were asked to self–rate their abilities in NELs. There is conflicting evidence regarding the accuracy of self–assessment of language abilities. In one study, medical students were reported to be accurate in their self–rated language abilities with correlation to scores on a language exam.[16] Another study demonstrated that physicians may overestimate their abilities, especially if they speak two or more NELs.[17] The Interagency Language Roundtable (ILR) scale, used as the standard grading scale for language proficiency for federal services in the United States, is a more objective language assessment test that could be used in future studies.[17,18] While the formal test might not be feasible for medical students participating extracurricularly, a modified ILR scale has shown promise in self–assessment of physician language abilities when compared with the Clinician Cultural and Linguistic Assessment, a validated oral proficiency interview, at the high and low ends of the scale, although more research is required on the accuracy of intermediate ratings on the scale.[19]

Participants with prior knowledge in Mandarin were given the option to participate in only Workshop 2, and some participants from Workshop 1 did not participate in Workshop 2. This resulted in a demographics shift between Workshop 1 and 2, with more participants having a stronger Mandarin background at Workshop 2, where the post–workshop survey was administered. In order to reduce any possible bias this would introduce, we stratified comparisons of pre–and post–workshop confidence levels by participants' self–rated Mandarin ability. The workshops were most effective in increasing confidence for participants with "None" to "Basic" Mandarin ability. This is likely because the workshops were offered at a more basic level and thus not as effective in increasing the confidence of those with "Intermediate" to "Fluent or Native" Mandarin ability. This was mitigated by the provision of a phrasebook with more advanced terminology including organs, names of screening and imaging tests, and common history–taking questions. In the future, separate workshops for medical students who are advanced speakers of NELs could be developed to better support this group.

There were only seven medical students at the blood pressure clinic, and most rated their Mandarin ability as "Intermediate" or "Fluent or Native". It is therefore difficult to draw conclusions from this study about community members' response to healthcare providers with only basic Mandarin ability. However, in this limited study, there was no significant difference in patient satisfaction with the care received from a student with "Basic" versus "Fluent or Native" Mandarin ability. Additionally, as we did not perform a blood pressure clinic in which medical students spoke only English, we could not determine the degree to which the overall high patient satisfaction with the blood pressure clinic was a result of the students' use of Mandarin, as opposed to satisfaction with the screening intervention. A larger study involving healthcare providers with basic ability in a non–English language, and a control condition with the same intervention in English, could shed more light on this.

Finally, as data collection was anonymized, three–month follow–up data could not be collected directly from all those who had participated in the workshops or previously responded to the initial needs survey. The follow–up survey was sent to the entire school and had a lower response rate than the initial needs survey, at 4%. Among these 4%, only 34% had utilized the resources, including the workshops. Thus, many participants were lost to follow–up.

Future directions

Further research could explore whether the increase in confidence after receiving language resources enhances students' learning experience in clinical settings with a higher proportion of non–English speaking patients. Surveying ongoing cohorts of workshop participants over the course of their medical school education and into residency could investigate any long–lasting benefits from these resources, such as whether access to language resources in medical school expands physicians' eventual scope of practice.

While the resources we developed and studied were extracurricular, other groups have piloted incorporating NEL support into the medical curriculum. In the United States, where some cities have predominantly Spanish–speaking populations, residency programs face the challenge of language training for residents. One program found significant improvement in Spanish competency after first year residents took a 10–day immersion program at a nearby language institute, followed by ongoing one–on–one instruction from a translator during continuity clinics throughout the year.[20] However, this cost $5000 per resident.[20] When considering competency in an official or predominant NEL in a community, it might be possible to justify this cost. In Canadian residencies that are based in predominantly French–speaking communities, proficiency in the French language is a requirement to apply, which avoids extra language training costs. However, for other NELs, more cost–effective methods are

likely necessary if they are to be integrated into the medical curriculum. One feasible method would be to have more extensive training in the use of medical interpreters. For example, the current extent of training at the UBC Faculty of Medicine involves viewing a 20–minute instructional video of a sample history taken with a professional interpreter, as part of the first–year Communication Skills course. This could be furthered by introducing a practical session with feedback from a tutor, where students have the opportunity to practice with volunteer patients and interpreters, as is already done for other sessions in the course. Previous training in interpreter use is associated with increased professional interpreter use in practice, as well as increased provider satisfaction with the medical care provided.[21] However, beyond interpreter use, there is demand for resources in specific languages, which could be satisfied through extracurricular resources. Our data suggest that phrasebooks would be a useful resource, and further research could explore their cost–effectiveness.

Conclusions

In conclusion, there is demand for resources to help medical students better communicate with patients who do not speak English. Language workshops can enhance medical students' confidence in communicating with patients who speak non–English languages. This could also improve patients' experiences in receiving care, and medical schools should consider using this approach not only in Mandarin training but also other languages appropriate to the communities that they serve.

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