

Access to Language Interpretation Services and its Impact on Clinical and Patient Outcomes: A Scoping Review

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Wellesley Institute works in research and policy to improve health and health equity in the GTA through action on the social determinants of health.

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Report

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Statement on Acknowledgement of Traditional Land

We would like to acknowledge this sacred land on which the Wellesley Institute operates. It has been a site of human activity for 15,000 years. This land is the territory of the Huron-Wendat and Petun First Nations, the Seneca, and most recently, the Mississaugas of the Credit River. The territory was the subject of the Dish With One Spoon Wampum Belt Covenant, an agreement between the Iroquois Confederacy and Confederacy of the Ojibwe and allied nations to peaceably share and care for the resources around the Great Lakes.

Today, the meeting place of Toronto is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work in the community, on this territory.

Revised by the Elders Circle (Council of Aboriginal Initiatives) on November 6, 2014

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TABLE OF CONTENTS

Introduction	1
METHODS	2
Search Strategy and Study Selection	2
Data Extraction and Synthesis	3
Terms and Definitions.....	4
RESULTS.....	5
Quality Appraisal	5
Description of Studies	5
Theme 1: Access to and Mode of Interpretation	6
Theme 2: Clinical Outcomes of Interest	8
Theme 3: Patient Outcomes	10
Discussion	11
Interpretation of Findings.....	11
Conclusion	15
Appendices	16
Appendix A.....	16
Appendix B.....	17
Endnotes	31

Introduction

Language barriers are a significant challenge in ensuring equitable access to health care.^{1,2,3,4} Within the Canadian context, language is often cited as an obstacle to health care services for immigrant populations, in particular newcomers.⁵ Patients and families who do not speak an official language face obstacles accessing health services,^{6,7} receiving physician and hospital care, as well as participating in health promotion and prevention programs.⁸ Language barriers can result in inappropriate medical testing,⁹ increase the risk of adverse medication reactions,¹⁰ and pose a significant barrier to medical comprehension.¹⁰ It has also been associated with increased risk of hospital admission,¹¹ medication adherence,^{12,13} less optimal palliative care,¹⁴ and disparities in diagnostic testing.¹⁵ Also language barriers appear to have measurable impacts on patient satisfaction, specifically on communication with health care providers¹⁶ and on the care received.¹⁷ This carries over to health care providers who also experience dissatisfaction in their interactions with patients when there is a language barrier.¹⁸

In Ontario, data suggests that the issue of language barriers may impact more and more residents. Census data from 2016 shows an increasingly diverse linguistic landscape.¹⁹ Nearly half of all Canadians with a mother tongue other than English or French live in Ontario²⁰ and almost 15 percent of Ontarians and 25 percent of Torontonians speak a non-official language at home.²⁰ Furthermore, approximately 80 percent of Ontarians who have no knowledge of English or French are concentrated in Toronto.²¹ This speaks to the growing need for linguistic accommodations in Toronto and Ontario. While Census data²² says that vast majority of Canadians speak one of the official languages, it is not clear exactly how many of Canadians are fully fluent or how many have limited official language proficiency. A 2001 review²³ of the research literature related to language access suggested that 1 in 10 Canadians may need an interpreter in a health care setting. It's not just new immigrants that experience language barriers in health care settings. Some long-term immigrants who have been fluent in English or French for most of their lives are losing their English skills due to the impact of dementia.²⁴ In the era of *Patients First*²⁵, which provides an opportunity to ensure that patients have the right care, in the right place, at the right time, we also need the necessary supports in place so patients can make informed decisions about their health care.

Ontarians who are not proficient in, or unable to speak an official language (English or French), face inequities in health care settings. Health Quality Ontario defines health equity as the ability of all people “to reach their full potential [and] receive quality care that is fair and appropriate for them – regardless of where they live, what their economic and social status, language, culture, gender or religion [is].”²⁶ It is important to consider the health equity impacts of language barriers in health care in the context of an increasingly multicultural, multiracial, and multilingual province such as Ontario.^{27, 28}

Despite the growing body of work on the impact of language barriers on access to health care services, and the growing linguistic diversity in Ontario, there has been limited uptake of formalized language supports across Ontario's health care system. In a review of strategies to increase language accessibility for patients who have limited English proficiency, a number of supports are identified such as bilingual providers, non-professional interpreters such as family members and volunteers, translated written materials, computer-assisted translation, and most common, language interpretation services.²⁹ Some health care institutions in Ontario offer in-person professional language interpretation services to patients, but in practice, many use informal methods such as communicating through bilingual hospital staff or the patients' family members.³⁰

The purpose of this scoping review is to examine the impact of language interpretation services on patients' health and clinical outcomes to better understand its effectiveness as an intervention. We chose language interpretation services compared to other interventions to address language accessibility because of the formalized nature of the intervention as well as to provide relevancy to similar interventions within the Canadian context.³¹

Systematic reviews that have examined the efficacy of language interpretation services have focused on specific settings such as in psychiatric services³², or excluded outcomes of interest, for example relating to the clinical experience of accessing health care services such as length of stay, and re-admission rates.³³ In general, these systematic reviews found that trained interpreters were more effective than untrained interpreters in producing positive patient outcomes when it came to psychiatric assessment and diagnoses, patient understanding of treatment plans, patient satisfaction, and errors of clinical significance. However, many of the studies in these reviews were conducted nearly 10 years ago and do not include more recent research studies. Moreover, there has been limited exploration of the effectiveness of these services across all potential modes of interpretation services such as in-person, phone, video among others.

METHODS

Search Strategy and Study Selection

This scoping review was conducted using the Arksey & O'Malley methodology.³⁴ We focused on peer-reviewed academic literature and followed these steps: 1) identified our research question; 2) selected our databases; 3) developed our search strategy and searched for relevant studies; 4) used inclusion and exclusion criteria to select relevant studies; 5) charted the data; 6) collated and summarized the results.

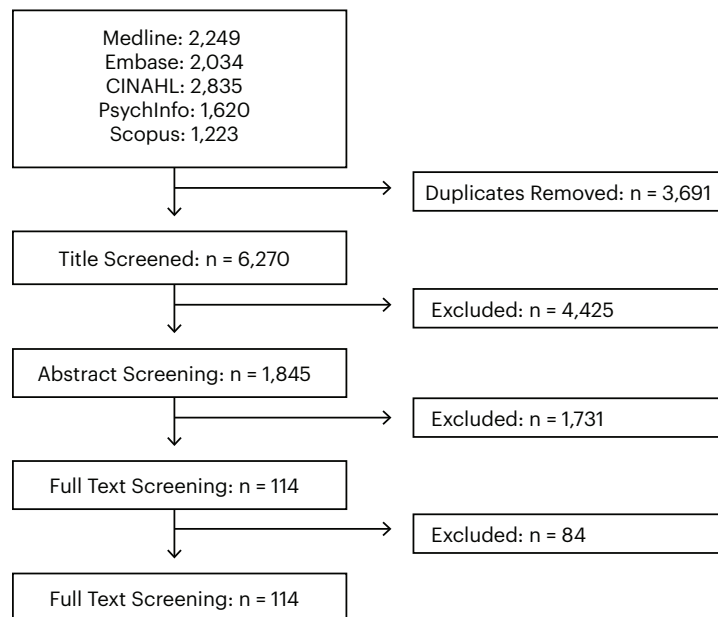
After identifying our research question ("What is the link between access to interpretation services in health care and patient outcomes?"), we developed a search strategy with support

from a librarian at the University of Toronto. We adapted this search strategy to effectively search our five selected scholarly databases (Medline, Scopus, PubMed, PsychInfo, and Embase) (Appendix B). We selected these databases because of their focus on health and social sciences. We selected studies based on the following inclusion criteria: articles had to be peer-reviewed, in English, published in the last 17 years (2000 onwards), focused on the provision of interpretation services in health care settings, and have a patient or clinical outcome. This project focused on the needs of people who had barriers with spoken language as well as the use of formal interpretation. As such, interventions that exclusively focused on informal interpretation or those that did not address spoken language barriers were out of scope for our project. Subsequently, we excluded research that exclusively focused on non-professional or informal interpretation (such as by volunteers, family members or by healthcare providers), and studies that focused on interpretation for American Sign Language, or assessments of aides and tools for addressing communication disorders.

Articles that met the inclusion criteria were extracted and we collated key information on relevant factors including: study design, country/region, type of service provided, how service need was identified, type of interpretation provided, interventions, outcomes of interest, study population, clinical care setting, and key findings.

Data Extraction and Synthesis

Our initial search of the five selected databases yielded 9,961 articles. A total of 3,691 articles were excluded due to duplication. The remaining 6,270 articles were screened by titles, then abstracts, and then full text screening, leaving a total of 30 articles that met all inclusion criteria.



At every stage of the screening process, each article was screened by two of the four researchers and all four researchers resolved conflicts during the screening together. Abstract titles were screened to identify if the study was relevant to language interpretation. We then created a data extraction form to screen abstracts. The screening form identified the following: if language barriers are addressed, if the intervention involved a trained interpreter, and if clinical or patient outcomes are assessed. We used this extraction form again for the full text screening. During this screening process we chose to exclude qualitative studies, as we were primarily interested in measurable health or clinical outcomes. Data extraction was divided amongst all four researchers. Throughout the screening and extraction process, researchers met frequently to ensure consistency was maintained throughout the process. A total of 30 articles were included for review.

Research team members then independently reviewed the results and identified themes based on our outcomes of interest. These included but are not limited to: number of clinically significant errors, admission and readmission rates, length of stay and length of appointment, preventive care, chronic disease management, mental health assessments, quality of care, medical adherence, service utilization and health care usage. The research team then discussed and built consensus on key themes which were summarized and included in the table in Appendix B.

As a point of reference, the table below includes frequently used terminology with an accompanying definition.

Terms and Definitions

Term	Definition
Language Interpretation Services	An intervention that can increase language accessibility of the health care system.
Trained Interpreters	Trained interpreters have received some form of training, whether formal in a classroom or on the job from the health care institution or organization that they are working at.
Untrained Interpreters	Untrained interpreters are a broad term to refer to any person who engages in interpretation who has not been formally trained, whether in a classroom setting or on the job. In this scoping review, we refer to ad-hoc interpreters (individuals who conduct interpretation services without any clear training) as untrained interpreters.
In-person interpreters	In-person interpreters are interpreters who are physically present during the health encounter a patient has with their health care provider.
Remote interpretation	A modality of interpreting that is conducted at a distance, usually by telephone or video. Remote interpretation can either be consecutive or simultaneous.
Consecutive Interpretation	In consecutive interpretation the interpreter listens to a unit of speech in the source language and then conveys that message into the target language. This mode is more often used in health care

Simultaneous Interpretation	Simultaneous interpretation is not necessarily interpreting word to word, it is the mode in which the interpreter interprets the message into the target language at almost the same time as the original message is being said. There are studies included in this review that use “remote simultaneous medical interpretation,” referring to simultaneous interpretation using a telephone or video conferencing.
Language Concordant Providers	Health care providers who are able to speak the same language as their patients.
LEP (Limited English Proficiency)	Patients who do not speak English or are not proficient in English.
ESP (English Speaking Patients)	Patients comfortable speaking English/choose to speak English in health care settings
Length of Stay	Time spent in the hospital or in health care settings from intake to discharge
Length of Appointment	Time spent during an appointment with a health care provider from the beginning to the end of the appointment
Clinical Outcomes	For the purposes of this scoping review, we define clinical outcomes as issues related to institutional level factors impacting a patient’s experience within the health care system such as length of stay or medical errors for example.
Patient Outcomes	For the purposes of this scoping review, we define patient outcomes as issues related to a patient’s uptake of services such as preventive services or the impact of LIS on access and quality of treatment services.

RESULTS

Quality Appraisal

After data extraction was completed, the researchers conducted a quality appraisal of the 30 articles included in the review using the Quality Assessment Tool for Quantitative Studies, developed by the Effective Public Health Practice Project (EPHPP).³⁵ One reviewer completed the quality appraisal per article. There were six strong articles, 16 articles that were of moderate strength, and eight weak articles (Appendix B).

Description of Studies

Thirty articles were included in our scoping review (Appendix B). Of these, the majority of the studies were cohort studies (14) and cross-sectional studies (9). The review included two randomized control trials, one randomized clinical trial, one case control study, and three pre-post observational studies. The majority of the studies (25) were from the United States. There were also studies from Switzerland (1), the United Kingdom (1), and Australia (3).

Through a process of iterative thematic coding, we categorized the outcome data extracted from the finalized list of screened articles into three main themes: Access to and Mode of Interpretation; Clinical Outcomes; and Patient Outcomes.

For the first theme: *Access to and Mode of Interpretation*, we explored the effectiveness of professionally trained interpreters compared to untrained interpreters, such as volunteers and family members. We also considered differences between five different modes of interpretation (in-person, telephone, video, bilingual providers, and remote simultaneous interpretation services) as well as how frequency and consistency of interpretation services affected outcomes.

The second theme focused on *Clinical Outcomes*, which in our scoping review refers to how language interpretation services impacted institutional and organizational level outcomes. This can include various outcomes associated with a health care encounter such as duration of a clinic visit and re-admission rates.

Finally, the last theme focused on the impact of interpretation services on various types of *Patient Outcomes* such as changes in diagnostic, treatment and management outcomes, as well as uptake of preventive services.

Theme 1: Access to and Mode of Interpretation

Comparing Trained Interpreters vs. Untrained or No Interpreters

In our scoping review, 14 studies examined the effectiveness of trained interpreters compared to untrained or no interpreters. Of the 14 articles, six^{36, 37, 38, 39, 40, 41} showed that trained interpreters led to better clinical outcomes, three^{34, 35, 42} showed that trained interpreters led to better patient outcomes, and five^{43, 44, 45, 46, 47} showed a decrease in clinical errors with trained interpreters.

One of the most substantial differences when comparing trained interpreters to untrained or no interpreters was seen in differences in errors of clinical significance. Five studies,^{40, 41, 42, 43, 44} were able to demonstrate that the rates of errors were less frequent and less severe for trained interpreters compared to untrained interpreters or no interpreters. Flores and colleagues found that the proportion of errors was lower for professionally trained interpreters (12%) compared to untrained interpreters (22%) and no interpreters (20%).⁴² There were higher rates of omissions and incorrect interpretation errors for untrained interpreters (46.3%; 31.6%) and no interpreters (54.2%; 35.9%) compared to trained interpreters (41.9%; 13.6%), respectively.⁴² This was also seen by Napoles' research team who found the odds of a moderately or highly clinically significant error was lower for in-person trained interpreters compared to untrained interpreters (OR = 0.25, p = 0.05).⁴⁰ There was also a reduced likelihood of understanding of health issues such as heart disease risk when family and friends were used as interpreters compared to professional interpreters.⁴¹

The evidence from our scoping review indicates that having access to trained interpreters improves clinical and patient outcomes in comparison to ad-hoc, informal, or no interpreters.

Comparing Different Modes of Interpretation

Seven studies^{36, 40, 48, 49, 50, 51, 52} evaluated different modes of interpretation. This included both simultaneous interpretation and interpretation (table 1), delivered in-person, through telephone, and through video conferencing. Some studies also used bilingual providers who provided services in the patient's language. The evidence on which mode was best differed across studies and was dependent on multiple factors including the health care setting context and type of outcome.

In another study,⁴⁷ patients that had in-person interpreters were more likely to be seen faster (65%) than those who had telephone interpreters (52%) or bilingual providers (42%). Patients with in-person interpreters (8%) also had a lower frequency of complex medical administration compared to their counterparts who received alternative support from telephone interpreters (15%) or bilingual providers (15%).⁴⁷

Length of encounter also varied depending on mode of interpretation. For example, one study that looked at errors of clinical significance found that remote simultaneous medical interpretation encounters were on average shorter and non-remote-simultaneous medical encounters (which includes remote consecutive as well as in person simultaneous and consecutive interpretation) were 12 times more likely to result in errors of clinical significance.⁴⁴ Remote simultaneous medical interpretation encounters were also associated with greater rates of detection and treatment of depression, however it was not seen to be statistically significant.⁴⁵ The mode of interpretation may also have implications for patients' understanding of diagnoses. Lion and colleagues found that parents were more likely to correctly identify their child's diagnosis if they were exposed to video interpretation (74.5%) compared to telephone interpretation (59.8%).⁴⁶

Impact of Frequency and Consistency of Interpreter Use

There were four studies^{37,53,56,60} that commented on the impact of increased frequency of interpreter use on clinical and patient outcomes.

One study⁵⁰ found that when a patient had more frequent interpreted health care encounters, there was a significant reduction in hospital admissions due to hyperkalemia, hypertension and fluid overload. Specifically, the greatest reduction was seen for rates of hyperkalemia. When a patient did not have any health care encounters interpreted, there was an average of 10 hospital admissions for hyperkaliemia.⁵⁰ However, when a patient had 5 interpreted health care encounters, the number of hospital admissions for hyperkalemia dropped down to 2.

In a study by Jimenez and colleagues, that measured the association between parental language proficiency, interpreted care, and postsurgical pediatric pain management, it was found that children of families who received less than 2 interpreted visits per day had higher

rates of post-analgesic pain score (1.6 ± 1.4 vs 0.7 ± 1.2 ; $P = .004$) compared to children with more frequent interpretation.⁶⁰

Researchers found that patient stroke rehabilitation patients who had more frequent interpreter use had improved Functional Independence Scores.⁵⁶ There was no evidence of impact on other outcomes such as length of stay or discharge destination. The frequency of interpreter use combined with the mode of interpreter use can also lead to a positive impact. For example, one study found that patients who received 100% of their primary care visits with language concordant providers (also known as bilingual providers) were the least likely to have diabetes related emergency department visits compared to all other types of interpretation which included in-person interpretation, and no interpretation.³⁷

Theme 2: Clinical Outcomes of Interest

The impact of language interpretation services on clinical outcomes was observed in 17 of the reviewed articles.

Length of Stay

For length of stay in hospital, evidence was mixed in hospital settings, and context specific, with some studies finding that length of time increased when trained interpreters were used while others finding it decreased the length of stay. Three studies^{54,55,56} reported that interpretation increased length of stay, one study⁵⁷ reported that interpretation decreased length of stay, and one^{58,59} reported no significant difference in length of stay.

Length of Appointment

Three studies^{36,47,57} provided evidence on the impact of interpretation on the length of an appointment. In a study conducted by Fagan and colleagues, they showed that telephone interpretation was associated with increased time spent with the provider (36.3 min vs. 28.0 min, $P < 0.001$), compared to patients not using an interpreter.³⁶ In another study,⁴⁷ researchers looked specifically at the type of interpretation mode and the impact on provider time and found patients who had in-person interpreters (116 min) had on average significantly shorter throughput time compared to patients who had telephonic interpreters (141 min) and bilingual providers (153 min). Researchers found that for every hour of in-person interpretation (60 minutes), approximately 2 additional minutes were required for an encounter with a bilingual provider and 9 additional minutes would be added for an encounter using telephone interpretation. The third study⁵⁷ found that limited English proficiency (LEP) patients using a trained interpreter had longer appointments, such as patients speaking Spanish (averaging 9.1 additional minutes of physician time) and Russian (averaging 5.6 additional minutes of physician time) compared to English speaking patients who did not use an interpreter.

Service Utilization

Clinical outcomes related to service utilization were also impacted by access to interpretation services, demonstrated in four studies.^{33,35,38,60} Two of these studies^{33,57} found that using professional interpreters led to a significant increase in referrals for primary, specialty, and psychological care, and showed an uptake in the number of office visits. For general medical referrals, access to both untrained interpreters and trained interpreters allowed access to 48 percent and 42 percent of patients respectively, compared to 31 percent for patients who did not use an interpreter.⁵⁷ However, a study conducted by Sarver & Baker, found no significant difference in appointment compliance rates for patients with and without an interpreter.³⁸ One study³⁵ also found that English speaking patients had a significantly greater volume of service use during an emergency department visit compared to patients with limited English proficiency with and without an interpreter.³⁵

Admission and Readmission Rates

In the four studies^{33,54,56,61} that examined admission and readmission rates in hospitals, there was consistent evidence that showed that language interpretation services decreased admission rates and re-admission rates. One⁵ found that upon giving patients access to 24-hour interpretation, 30-day readmission rates decreased by approximately 5% more during the study period, compared to the 18 months before the intervention.⁹ Likewise, Lindholm and colleagues⁵⁶ found that patients who received interpretation at both admission and discharge were less likely to be readmitted 30 days after discharge (14.9%) compared to those only receiving interpretation at admission (16.9%), only at discharge (17.6%), or those who did not receive interpretation at admission nor discharge (24.3%).

Medical Errors

There were three studies^{40,42,44} that evaluated how access to language interpretation services decreased the likelihood of errors of clinical significance. Certain modes of interpretation were less likely to produce errors in general as well as errors of clinical significance. For example, one study⁴⁴ found that remote simultaneous medical interpretation services were less likely to produce errors of clinical significance. Non-remote simultaneous medical interpretation was associated with a 12 times greater chance of potential medical errors of moderate or greater clinical significance compared to remote simultaneous medical interpretation. Non-remote in this case refers to in person simultaneous and consecutive interpretation as well as remote consecutive interpretation. We also see that professional interpreters (12%) are less likely to commit errors compared to ad hoc interpreters (22%) and no interpreters (20%).⁴²

Theme 3: Patient Outcomes

Our scoping review has found 11 studies that show the efficacy of language interpretation services in the diagnosis, treatment, and management of various health conditions, as well as uptake of preventive care.^{33, 34, 35, 37, 39, 41, 49, 55, 57, 59, 60}

Diagnostic, Treatment and Management Outcomes

Four studies indicated the impact of interpretation services had on facilitating the diagnosis, treatment and management of health conditions.^{39,55,57,60}

Eytan and colleagues found that the use of interpreters was helpful in encouraging patients to report traumatic events and psychological symptoms.⁵⁷ The report of adverse events and past exposure to situations like war, the violent death of a relative or a missing relative was more frequently reported when trained interpreters (77%) were present compared to when no interpreters (55%) or untrained interpreters (46%) were present.⁵⁷ The use of trained interpreters was also associated with increased referrals to medical care (42%) compared to no interpreters (31%).⁵⁷

The use of interpretation has also been seen to lead to higher rates of pain control, timely response to patient pain, as well as help from staff compared to patients who did not always receive interpretation.⁶² For stroke rehabilitation patients increased interpretation usage was also associated with greater improvement in Functional Independence Measure efficiency score, which is a significant measure for stroke rehabilitation.⁵⁵ Patients with refugee status who used interpreters (27%) were seen to have greater improvements in mental health outcomes such as for scores on the Impact of Events Scale compared to refugees without interpreters (14%).³⁹

Preventive Health Services

Four studies in our scoping review examined the impact of language interpretation services on the uptake of preventive health services.^{34,35,37,63}

All studies that examined preventive health service use found that language interpretation services increased uptake. Patients who had access to trained interpretation services were more likely to have had rectal exams conducted compared to people that did not have access to interpretation services (0.26 vs. 0.02; $P=0.05$; not shown).³⁴ In another study⁶⁰ it was found that trained in-person medical interpreters increased the likelihood of mammograms (OR = 1.85), clinical breast exams (OR = 3.03), and pap smears (OR = 2.34), compared to patients that did not use any interpreters. Patients who had bilingual providers were also twice as likely to have a clinical breast exam or a pap smear compared to patients who did not have any interpreters.⁶⁰ In another study, it was found that when patients received interpretation

services, they had higher rates of preventive services uptake for rectal exams and fecal occult blood tests compared to their peers who did not receive any interpretation services.³⁵

Discussion

This is the only scoping review to our knowledge that has synthesized evidence on the impact of language interpretation services on both the clinical and patient outcomes across a range of health care settings. There is a significant body of evidence that trained interpreters were consistently effective at producing better clinical and patient outcomes for patients in comparison to patients who had access to only untrained interpreters or no interpreters.^{33,34,40,41,42,49,57} This review also demonstrated that the issue of language accessibility in health care was addressed through many different modes of interpretation.^{40,45,46,47,48}

Interpretation of Findings

Access to and Mode of Interpretation

Overall, the literature reports that trained interpreters are more effective than untrained interpreters or no interpreters. The use of trained interpreters was associated with lower rates of readmissions,⁵⁶ fewer errors of clinical significance,⁴² and produced more favorable outcomes for uptake of preventive services.³⁵

While access to language interpretation appears to be beneficial with respect to clinical outcomes and patient outcomes, it is not possible to definitively conclude which mode of interpretation is most effective. The most effective mode of interpretation varies across contexts and subgroups of patients depending on things such as the type of health problems or acuity. There is no such thing as a one-size-fits-all approach in medical interpreting. Telephone interpretation for example may not be the best approach to patients with dual diagnosis, those who are hard on hearing clients, or children [new endnote]. This is because the studies included in this review did not compare all available modes of interpretation and it is difficult to evaluate the role of varying contexts. It was evident that context played an important role in determining which mode to use, however demonstrating which mode is best for each context is will require further research and exploration.^{44,64}

Previous scoping and systematic reviews have not evaluated the impact of frequency and consistency on language interpretation services. In our scoping review, we found evidence suggesting that the frequency of interpreted health care encounters as well as the consistency of access to language interpretation services seem to be a contributing factor to clinical and patient outcomes.³⁷ More research is required to better establish the relationship between frequency of interpretation services and patient outcomes. However, the available evidence

suggests the value of having consistent access to interpretation services for patients with limited proficiency.

Impact of Language Interpretation Services on Clinical Outcomes of Interest

This review found that the impact of language interpretation services on length of stay in hospitals after length of stay was mixed. Length of stay is often used as a measure of health care system efficiency and some studies suggest that trained interpreters can reduce length of stay of patients by almost a day.^{54,56} While a shorter length of stay is often considered more favorable, there is evidence to suggest more time is needed for appropriate high-quality care.^{65,66,67} Therefore, even though studies showed both an increase and decrease in length of stay with the use of an interpreter, more research is needed to understand whether an increased length of stay is indicative of more appropriate and thorough care in health care settings.

Studies suggest that length of appointment is longer when an interpreter is used, but how much longer depends on the mode of interpretation.^{36,47,53} Increased length of appointment can be due to many factors, such as more information being exchanged or extra time due to the interpretation.³⁶ Telephone interpretation appears to take more time than in-person interpreters. This may be due to challenges when using the phone because there is an inability to communicate through non-verbal means.⁴⁷ In-person interpretation may be more responsive to the needs of patients as there is a greater ability to convey and pick up on verbal cues, body language and other interpersonal cues compared to telephone interpretation.

Additionally, a decrease in health care usage does not necessarily imply more appropriate care.⁵³ As Hampers and colleagues found, health care usage, or service utilization rates as noted in their study, for patients receiving interpretation were similar to that of English speaking patients. This study suggests that access to interpretation services removed a barrier between the physician and the patient and brought patient service utilization closer to that of English speaking patients.⁵³ In many cases patients with language barriers are unable to communicate with their health provider, and are thus are receiving fewer services than English speaking patients.³³ Professional interpreters open a line of communication between patients and health care providers, thus allowing providers to have a more comprehensive understanding of patients' symptoms, pain, queries, and discomforts.⁵⁷ In two studies^{33,57} this led to increased referrals to psychological care and specialists, allowing patients to receive the appropriate care.

Professional interpretation has been consistently shown to decrease hospital admission and readmission rates. Patients with limited English proficiency have higher readmission rates compared to English speaking patients, but one study showed that providing services from trained interpreters significantly decreases the likelihood of being readmitted.⁶⁸ The positive

impacts of interpretation throughout the care continuum contribute to this reduction in admission and readmission rates. With improved health outcomes², better communication with health providers,⁵⁷ and increased referrals to specialists⁵⁷, patients are less likely to experience adverse health implications that require admission and readmission to the hospital.

Finally, the most definitive evidence that examined the impact of language interpretation services on patient outcomes was related to the frequency of errors of clinical significance.^{42,44,45} Trained interpreters were less likely to have clinically significant errors in comparison to untrained interpreters or encounters with no interpreters. This is consistent with previous systematic reviews that also found that patients with limited English proficiency experience worse health care quality with untrained interpreters compared to patients with trained interpreters.^{69,70} These studies also compared a range of interpreter modes and two studies^{44,45} have found that remote simultaneous interpretation services were the best at reducing the rate of medical errors of clinical significance

Impact of Language Interpretation Services on Health Outcomes of Interest

Language interpretation services were found to be effective in improving uptake of preventive services.^{34,35,37,61}

This was found for a range of services including mammograms, clinical breast exams, and rectal exams. This is significant to note because there has been a substantial body of research that has demonstrated disparities in breast and cervical cancer screening rates for racialized, ethnic minority and immigrant women.⁶⁹ Addressing language barriers has been noted to be an important step towards addressing cancer-related inequities for racially and ethnically diverse patients as well as immigrants and newcomers.⁷⁰ Evidence suggesting that language interpretation services can contribute to reducing inequities between LEP patients and English speaking patients (ESP) indicates a potentially effective solution to addressing health inequities.

Finally, the most definitive evidence that examined the impact of language interpretation services on patient outcomes was related to the frequency of errors of clinical significance.^{42,44,45}

Trained interpreters were less likely to have clinically significant errors in comparison to untrained interpreters or encounters with no interpreters. This is consistent with previous systematic reviews that also found that patients with limited English proficiency experience worse health care quality with untrained interpreters compared to patients with trained interpreters.^{71,72} These studies also compared a range of interpreter modes and two studies^{44,45} have found that remote simultaneous interpretation services were the best at reducing the rate of medical errors of clinical significance.

Limitations and Areas of Future Research

According to Grant and Booth⁷³, a scoping review is a “preliminary assessment of potential size and scope of available research literature [and] aims to identify nature and extent of research evidence.” A limitation to this methodology is the comprehensiveness of searching is limited by time and scope. Due to the inclusion and exclusion criteria, this scoping review was not exhaustive and did not include all studies related to language interpretation. Part of the exclusion criteria was that it only included studies from 2000 onwards. This enabled the study to focus on the most recent evidence when considering evaluations of language interpretation services, making them as closely relevant to the current context as possible. It is possible that there are studies prior to 2000 that may have value in understanding language interpretation and its relationship to clinical and patient outcomes.

This scoping review also highlighted gaps in the literature and areas of future research. While this review did include studies from Europe and Australia, a significant proportion of the included studies were conducted in the United States and none of the studies included were from Canada. There are aspects of the Canadian context that this study could not address such as having a publicly financed health care system, the presence of two official languages, and the high degree of linguistic diversity in certain regions such as the Greater Toronto Area (GTA).⁷⁴ The lack of Canadian academic literature on language interpretation points to a need for more research on this topic in a Canadian context.

While we did not exclude research from non-hospital settings, nearly all studies were from hospital settings. From our survey of the research literature, there is a gap in studies investigating the use of language interpretation services in non-hospital settings. Language interpretation services in hospital settings may not be generalizable to settings such as smaller scale family practices which do not have the same level of resources. Family doctors are often the first point of entry into a health care system and reducing language barriers in such a setting would be warranted to ensure that a patient’s complete clinical history is able to be taken and a positive relationship is able to be built.

Additionally, this review found limited data on the financial costs of providing interpretation services. Some studies looked at costs of programs or service use, but none of the studies conducted any sort of cost effectiveness analysis or cost benefit analysis. In the future, as language interpretation services continue to expand, it may be helpful to understand the resources required for implementation, particularly regarding different modes of interpretation. However, this must be compared against arguably the most important variable, clinical and patient outcomes and the ability of patients to achieve their full health potential.

Conclusion

Ensuring equitable access to health care is an important priority that benefits all Ontarians. It improves the health of communities and addresses health disparities. Language barriers have been noted to be a significant issue preventing access to health care services. This is especially pronounced in a province as linguistically diverse as Ontario. Ontario's health care system should be accessible to its diverse communities. Therefore, it is important to better understand the effectiveness of interventions that seek to address language barriers and facilitate greater language accessibility of the health care system.

Access to language interpretation services can enhance the accessibility of Ontario's health care system. As this scoping review suggests, language interpretation services can have a measurable impact on the clinical and patient outcomes. Ontario's linguistic diversity is likely to continue to grow, so it is important that health care institutions and providers across the province consider how language needs in health care settings are addressed and managed.

Language accessibility will also become increasingly relevant to the operations of our health care systems. As such, it is important that resources and energy be directed towards evaluating interventions that aim to address these concerns. Future work should look at further evaluating the impact of language interpretation services and other interventions that improve language accessibility in the health care system within the Canadian context and within Ontario specifically.

This review has demonstrated the value of providing patients with services from trained interpreters. As Ontario becomes increasingly linguistically diverse, language barriers will continue to pose a challenge for health and health equity. Ontarians deserve the opportunity to ensure not only that they have the right care at the right time, but also that they have the necessary supports to make informed decisions about their health care. Investing in interpretation services, and continuing to evaluate best practices, are important steps for Ontario to improve patient care and health equity.

Appendices

Appendix A

Search Strategies

Database	Records	Search Strategy	Limits
Medline	2,249	[exp Patients/ OR (patient or patients).mp.] AND [exp Translating/ OR medical interpret*.mp. OR health interpret*.mp. OR cultural interpret*.mp. OR (translat* adj3 service*).mp. OR (interpret* adj3 service*).mp. OR (language* adj3 service*).mp. OR (interpreter or translator).mp.]	Limit to [English language AND yr="2000 -Current" AND journal article]
Embase	2,034	[exp Patients/ OR (patients or patients).mp.] AND [exp Translating/ OR medical interpret*.mp. OR health interpret*.mp. OR cultural interpret*.mp. OR (translat* adj3 service*).mp. OR (interpret* adj3 service*).mp. OR (language* adj3 service*).mp. OR (interpreter or translator).mp.]	Limit to [English AND 13 to yr="2000 -Current"
CINAHL	2,835	[(MH "Patients") OR (TX patient OR patients)] AND [(MH "Translations") OR (MH "Interpreter Services") OR TX medical interpret* OR (TX health interpret* OR TX cultur* interpret*) OR (TX translat* N3 service*) OR (TX interpret* N3 service*) OR (TX language N3 service*) OR (TX interpreter OR translator)]	Limit to [(Published Date: 20000101-20171231) AND English AND Journal Articles]
PsychInfo	1,620	[exp Patients/ OR (patient or patients).mp.] AND [medical interpret*.mp. OR health interpret*.mp. OR cultural interpret*.mp. OR (translat* adj3 service*).mp. OR (interpret* adj3 service*).mp. OR (language* adj3 service*).mp. OR (interpreter or translator).mp. OR (exp foreign language translation/ or exp foreign languages/ or exp interpreters/)]	Limit to [English language and journal article and yr="2000 -Current"]
Scopus	1,223	TITLE-ABS-KEY("Medical interpret*" OR "health interpret*" OR "language Pre/3 service" OR "translator" OR "interpreter" OR "interpret* Pre/3 service" OR "translat* Pre/3 service" OR "cultural interpret*") AND TITLE-ABS-KEY("Patient" OR "patients") AND TITLE-ABS-KEY("health" OR "health care" OR "health service" OR "healthcare")	Limit (PUBYEAR > 1999)

Appendix B

Summary of Findings Table

Article Identification Number	Article Title	Author and Year	Sample Information	Theme 1: Access to and Modes of Interpretation Comparing Trained Interpreters vs. No Interpreters Frequency of Interpretation Comparing Different Modes of Interpretation	Theme 2: Clinical Outcomes of Interest Length of Stay Admission/Readmission rates Service utilization Medical Errors	Theme 3: Health Outcomes Prevention Diagnostic	Quality Appraisal
1	Detection of Depression with Different Interpreting Methods Among Chinese and Latino Primary Care Patients: A Randomized Controlled Trial	Leng, C.F., Changrani, J., Tseng, C., & Gany F. (2010).	Group 1: General LEP randomized to receive Remote Simultaneous Medical Interpreting (RSMI) Group 2: General LEP randomized to receive usual and customary (U&C) interpreting Group 3: Language concordant patients Setting: New York City, USA Study Design: Randomized Control Trial	<u>Comparing Different Modes of Interpretation</u> RSMI was associated with greater rates of detection and treatment of depression, however, the results were not statistically significant. The apparent superiority of RSMI may have been due to practical issues such as time and efficiency. RSMI is more private and simulates a natural conversation between language discordant participants; non-verbal cues may also be more obvious without a distraction by third person in the room			Strong
2	Effect of Telephone vs Video Interpretation on Parent Comprehension, Communication, and Utilization in the Pediatric Emergency Department A Randomized Clinical Trial	Lion, K. C., et al. (2015).	LEP Youth, LEP with another interpreter mode, Testing the effect of telephone vs. video interpretation on communication during pediatric emergency care. Setting: Seattle, WA, USA Study Design: Randomized Clinical Trial	<u>Comparing Different Modes of Interpretation</u> Among 208 parents who completed the survey, those in the video arm were more likely to name the child's diagnosis correctly than those in the telephone arm (P =0.03) and less likely to report frequent lapses in interpreter use (P = .04). No differences were found between the video and telephone arms in parent-reported quality of communication (P = .43) or interpretation (P = .69). Parent-reported adherence to the assigned modality was higher for the video arm (P = .004). Use of video interpretation shows promise for improving communication and patient care in this population.			Strong

3	Professional Language Interpretation and Inpatient Length of Stay and Readmission Rates	Lindholm, M., Hargraves J. L., Ferguson, W. J., & Reed, G. (2012).	General LEP who receive interpretation at admission/ discharge vs. LEP who did not Setting: Massachusetts, USA Study Design: Retrospective Cohort	Length of Stay Patients who did not receive interpretation during admission + discharge had a longer length of stay (+1.5 days), compared to those who had interpreters during admission + discharge (p<0.001). Interpretation at discharge only was not significantly associated with length of stay, though interpretation at admission was. Readmissions Patients receiving interpretation during both admission AND discharge were less likely to be readmitted within 30 days (14.9%) compared to those receiving it at admission (16.9%), discharge (17.6%) or neither (24.3%) (p<0.001). Patients who got interpretation at admission and/or discharge were still less likely to be readmitted.	Strong
4	Inaccurate Language Interpretation and Its Clinical Significance in the Medical Encounters of Spanish-speaking Latinos	Nápoles, A. M., Santoyo-Olsson, J., Karlner, L.S., Gregorich, S. E., & Perez-Stable, E. J. (2015).	General LEP (n=32; face-to-face=5; video=27, family=5) vs. LEP with other interpreter mode (To compare accuracy of interpretation using in-person, video, or ad-hoc interpreters) Setting: California, USA Study Design: Cross-sectional	<u>Comparing Different Modes of Interpretation</u> The odds of a moderately or highly clinically significant error were lower for face-to-face professional interpreters than for ad-hoc interpreters (OR=0.25, p=0.05).	Strong
5	Knowledge of Heart Disease Risk Among Spanish Speakers with Diabetes: The Role of Interpreters in The Medical Encounter	Wagner, J., Abbott, G., & Lacey, K. (2005).	To investigate heart disease risk knowledge among Spanish speakers with diabetes and examine whether use of ad-hoc interpreters is associated with heart disease knowledge. LEP patients were asked to fill out a survey indicating their heart disease knowledge and whether they use ad-hoc interpretation. General LEP participants used friends/family during appointments Setting: Connecticut, USA Study Design: Cross-sectional	<u>Comparing Trained Interpreters vs. Untrained Interpreters</u> Knowledge of heart disease overall was low. Those who used family or friends had lower scores (p<0.001) than those who did not use family or friends (18.8, SD=4.1, p<0.01). Using friends/family instead of a professional interpreter is associated with lower understanding of heart disease risk.	Strong

6	<p>Comparison of Throughput Times for Limited English Proficiency</p> <p>Patient Visits in the Emergency Department Between Different Interpreter Modalities</p>	<p>Grover, A., Deaklyne, S., Bajaj, L., Roosevelt, G.E., (2012).</p>	<p>Data from 1196 families were analyzed. 1st cohort consisted of LEP families presenting on study reenrollment days that were seen and managed by a verified bilingual provider in the standard course of ED workflow. If they could not be seen by bilingual provider, they were randomized to either in-person or telephonic interpreter.</p> <p>Various modalities used – in-person interpretation, remote telephonic interpretation, and bilingual providers.</p> <p>Setting: USA</p> <p>Study Design: Retrospective Cohort</p>	<p><u>Comparing Different Modes of Interpretation.</u> More patients in the in-person cohort were seen quickly compared to both telephonic and bilingual cohorts.</p> <p>Statistically significant decrease in complex medication administration in the in-person interpreter group as well as a lower admission rate when compared to the telephonic and bilingual interpreter group.</p> <p><u>Comparing Different Modes of Interpretation.</u></p> <p>The in-person cohort (116 min) had a significantly shorter total throughput time than telephonic (141 min) and bilingual provider (153 min) cohorts (P < 0.001).</p> <p>For every hour of in-person interpretation, approximately 2 additional minutes were required for a bilingual visit and 9 additional minutes would be added to a telephonic visit, controlling for admission rate, complex medication administration, fast track status and involvement of trainees.</p>	<p><u>Length of Appointment</u></p> <p>The mode of interpretation impacted the length of the appointment. In-person interpretation had a shorter length of appointment compared to telephonic interpretation and a visit with a bilingual provider.</p>	Strong
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7	<p>Trained Medical Interpreters in the Emergency Department: Effects on Services, Subsequent Charges, and Follow-up</p>	<p>Bernstein, J., Bernstein, E., Dave, A., Hardt, E., James, T., Linden, J., Mitchell, P., Oishi, T., & Safi, C. (2002).</p>	<p>The study was done to investigate the impact of an interpreter. Service on the intensity of Emergency Department services, utilization, and charges. In all 26 573 ED records from July to November 1999, resulted in a data set of 500 patients with similar demographic characteristics, chief complaint, acuity, and admission rate. Three groups – Interpreted Patients (IPs) n = 63; Non-interpreted patients (NIPs) n = 374; and ESPs n = 63) Setting: Massachusetts, USA Study Design: Matched Cohort Study</p>	<p>Comparing Trained Interpreters vs. Untrained Interpreters</p> <p>Non-interpreted (NIPs) patients who did not speak English had the shortest ED stay (length of stay). English speaking patients had the longest length of stay. ESPs stayed in ED an average of 3 hours longer than did NIPs</p> <p>NIPs had lowest subsequent utilization. The three groups differed in the 30-day period following the index visit. IPs received more primary care and specialty clinic referrals than did either NIPs or ESPs. ESPs received a significantly greater intensity and volume of services than did either IPs or NIPs during their index ED visit.</p> <p>Interpreted patients (IPs) had lowest return ED visits. IPs were more likely than NIPs to demonstrate follow up clinic visits and less likely than NIPs to return to the ED.</p> <p>NIPs whose acuity level (intensity of illness) did not differ statistically at baseline from IPs or Asp's, received the fewest tests and procedures, were least likely to have an IV started and received the fewest medications during their ED stay.</p>	<p>Length of Stay</p> <p>Non-interpreted (NIPs) patients who did not speak English had the shortest ED stay (length of stay). English speaking patients had the longest length of stay. ESPs stayed in ED an average of 3 hours longer than did NIPs</p> <p>Service Utilization</p> <p>NIPs had lowest subsequent clinic utilization. The three groups differed in the 30-day period following the index visit. IPs received more primary care and specialty clinic referrals than did either NIPs or ESPs. ESPs received a significantly greater intensity and volume of services than did either IPs or NIPs during their index ED visit.</p> <p>Readmissions</p> <p>Interpreted patients (IPs) had lowest return ED visits. IPs were more likely than NIPs to demonstrate follow up clinic visits and less likely than NIPs to return to the ED.</p>	<p>Diagnostic</p> <p>Non-interpreted (NIPs) patients who did not speak English had the fewest tests, IVs and medications</p> <p>NIPs whose acuity level (intensity of illness) did not differ statistically at baseline from IPs or Asp's, received the fewest tests and procedures, were least likely to have an IV started and received the fewest medications during their ED stay.</p>	Moderate
8	<p>Does Interpreter-Mediated CBT with Traumatized Refugee People Work? A Comparison of Patient Outcomes in East London</p>	<p>D'Ardenne, P.D., Ruaro, L., Cestari, L., Fakhoury, W., & Priebe, S. (2007).</p>	<p>3 groups of patients – refugees who required interpreters, refugees who did not require interpreters, English speaking non-refugees. Patients referred to an East London mental health service specializing in the psychological treatment of post-traumatic stress disorder between 2000 to 2004. 44 refugee patients requiring interpreters, 36 refugee patients not requiring interpreters, and 48 non-refugee patients. Setting: East London, UK Study Design: Retrospective Study</p>	<p>Comparing Trained Interpreters vs. Untrained Interpreters</p> <p>Refugees with interpreters have proportionally more improvement than refugees with interpreters.</p>	<p>Diagnostic</p> <p>All groups showed significant improvement in the Impact of Events Scale (IES) which assessed severity of PTSD symptoms, as well as the Beck Depression Inventory (BDI).</p> <p>Refugees with interpreters have proportionally more improvement than refugees with interpreters.</p>	Moderate	

9	Does English proficiency impact on health outcomes for inpatients undergoing stroke rehabilitation?	Davies, S.E., Dodd, K.J., Tu, A., Zucchi, E., Zen, S., Hill, K.D. (2016).	To determine whether English proficiency and/or frequency of interpreter use impacts on health outcomes for inpatient stroke rehabilitation People admitted for inpatient stroke rehabilitation High English proficiency group of native or near native English proficiency (n=80); and a low English proficiency group comprised people who preferred a language other than English (n=80). Setting: Australia Study Design: Retrospective Case Control Study	Frequency of Interpretation Increased interpreter usage improved Functional Independence Measure (FIM) efficiency score but did not significantly alter other outcomes	Length of Stay No significant differences were found between the groups in length of stay.	Diagnostic The low English proficiency groups showed greater improvement in FIM from admission to discharge Increased interpreter usage improved FIM efficiency but did not significantly alter other outcomes Significant differences were found for FIM efficiency and FIM motor efficiency with lowest interpreter usage resulting in lowest efficiency; however no statistically significant differences were found between the quartiles of the percentage of therapy encounters with an interpreter for FIM and length of stay.	Moderate
10	Impact of Interpreter Services on Delivery of Health Care to Limited-English-proficient Patients	Jacobs, E.A., Lauderdale, D.S., Meltzer, D., Shorey, J.M., Levinson, W., & Thisted, R.A. (2001).	4380 adults continuously enrolled in a staff model HMO for two years of study who either used the comprehensive interpreter services (ISG, N=327) or were randomly selected into a 10% comparison group of all other eligible adults (CG, N = 4053). Majority of patients in the ISG spoke Spanish (n=257) ISG was more female (63% vs. 57%, P <0.05), older (mean age – 46 +/- 14 years, P < 0.01) and lived in a ZIP code with a lower median income compared to CG. Setting: Massachusetts, USA Study Design: Retrospective Cohort Study	Comparing Trained Interpreters vs. Untrained Interpreters vs. No Interpreters Clinical service use increased significantly in the ISG compared to the CG for office visits (1.8 vs. 0.70, P < .01); prescriptions written 1.76 vs. 0.53, P < 0.01), and prescriptions filled (2.33 vs. 0.86; P < 0.01).	Service Utilization Overall there was an increase in clinical service for both groups in all but of the measures, which was urgent care calls. It increased in CG but not in ISG. All others increased for both groups: office visits, phone calls, urgent care visits, prescriptions written, prescriptions filled. For three measures, there was a significant increase for patients in the ISG group compared to the CG group: office visits ISG 1.8 vs. CG 0.7; # of prescriptions written for the ISG was 1.76 vs. 0.53 for CG; prescriptions filled for ISG was 2.33 prescriptions per person per year over the study period compared to 0.86 for CG. This stayed even after adjusting for age, gender, income.	Prevention Overall, there was an increase in both groups for all preventive measures. The increase of rectal exams of 0.26 per man over age 40 was significant. Rectal exams increased significantly more for ISG compared to CG but this was not significant after adjusting for age, gender and median income.	Moderate

11	Overcoming Language Barriers in Health Care: Costs and Benefits of Interpreter Services	Jacobs, E.A., Shepard, D.S., Suaya, J.A., & Stone, E.L. (2004).	They assessed the impact of interpreter services on the cost and utilization of health care services among patients with limited English proficiency. They measured the change in delivery cost of care provided to patients enrolled in a health maintenance organization before and after interpreter services were added. The time period of June 1, 1995 through to May 31, 1997. 380 patients in the interpreter group and 4119 in the comparison group. Setting: Massachusetts, USA Study Design: Retrospective Cohort	Comparing Trained Interpreters vs. Untrained Interpreters vs. No Interpreters Relative to the comparison group, the interpreter service group showed significantly greater increases per person per year in the following services: percentage of the recommended preventive services received (7.3% vs 2.7%; P=0.033), number of office visits made (1.74 vs 0.71; P=0.014), and number of prescriptions written (1.70 vs 0.52; P<0.001) and filled (2.38 vs 0.88; P<0.001). ER visits were same for both groups.	Service Utilization Compared with English speaking patients, patients who used the interpreter services made significantly more office visits.	Prevention (Services, Prescriptions and Primary Care) Compared with English speaking patients, patients who used the interpreter services received significantly more recommended preventive services and had more prescriptions written and filled. Between year 1 and year 2 of the study, preventive services, primary care and total costs increased for both groups. ER costs increased in the comparison group and decreased for the interpretation group.	Moderate
12	Impact of Interpretation Method on Clinic Visit Length	Fagan, M.J., Diaz, J.A., Reinert, S.E., Sciamanna, C.N., & Fagan, D.M. (2003).	613 visits – 72% (n=441) of the visits required no interpreters and 28% (n=172) used some form of interpreter. 15% of all visits used a patient supplied interpreter (n=90); 8% of all visits used a hospital interpreter (n=51), and 5% of all visits used a telephone interpreter (n=31). Setting: Rhode Island, USA Study Design: Cross sectional	Comparing Trained Interpreters vs. Untrained Interpreters vs. No Interpreters Compared to patients not using any interpreters, patients using a telephone interpreter had significantly longer mean provider times (36.3 minutes vs. 28.0 min) and clinic times (99.9 minutes vs. 82.4 minutes) Patients using a patient supplied interpreter had significantly longer mean provider times (34.4 min vs. 28.0) and mean clinic times (92.8 min vs. 82.4 min, P =0.027) when compared to patients not requiring an interpreter. In contrast, patients using a hospital interpreter did not have significantly different mean provider times (26.9 min vs. 28.0 min, P=51) or mean clinic times (91.0 min vs 82.4 min, P=0.16) than patients not requiring an interpreter.	Length of Appointment In the model, use of telephone interpreter was associated with longer mean provider time (8.3 min, 95% CI, 3.94 to 12.7.as was use of a patient supplied interpreter (4.58 min, 95% CI, 1.84 to 7.33). In contrast, hospital interpreter use was not associated with significantly longer mean provider time. When compared to patients not requiring interpreters, patients using some form of interpreter had longer mean provider times (32.4 minutes vs. 28 minutes) and clinic times (93.6 min vs. 82.4 min).	Moderate	

13	<p>Errors of Medical Interpretation and Their Potential Clinical Consequences: A Comparison of Professional Versus Ad Hoc Versus No Interpreters</p>	<p>Flores, G., Abreu, M., Barone, C.P., Bachur, R., & Lin, H. (2012).</p>	<p>57 encounters included with 20 with professional interpreters, 27 with ad hoc interpreters, and 10 with no interpreters.</p> <p>Interpreters were present during these encounters included professional interpreters, 20 (35%); ad hoc interpreters, 27 (47%); and no interpreter, 10 (18%). Setting: Boston, MA, USA Study Design: Cross Sectional</p>	<p>Comparing Trained Interpreters vs. Untrained vs. No Interpreters</p> <p>The proportion of errors was significantly lower for professional interpreters (20%).</p> <p>Compared with professional interpreters, ad hoc interpreters and having no interpreter resulted in significantly higher proportions of omissions and false fluency errors, while professional interpreters had higher errors in the less frequent error categories.</p>	<p>Medical Errors</p> <p>The most common error was omission (47% of all errors) followed by false fluency (26%), addition (10%), editorializing (9%) and substitution (9%).</p> <p>Among professional interpreters, previous hours of interpreter training, but not years of experience were significantly associated with error numbers, types and potential consequences.</p> <p>Those with greater than or equal to 100 hours of training committed significantly lower proportions of errors of potential consequence overall (2% vs. 12%) in every error category</p>	Moderate
14	<p>Exploring the Impact of Language Services on Utilization and Clinical Outcomes for Diabetics</p>	<p>Hacker, K., Choi, Y.S., Trebino, L., Hicks, L.R., Friedman, E., Blanchfield, B., & Gazelle, G.S. (2012).</p>	<p>1425 LEP patients in Cambridge Health Alliance Diabetes Registry.</p> <p>There are 7 sample groups which are based on the amount and the combination of language services (language concordant providers, no formal interpretation, no interpreters) Setting: Cambridge, MA, USA Study Design: Retrospective Cohort Design.</p>	<p>Frequency of Interpretation</p> <p>In unadjusted analyses, patients who received a mixture of language services (Patients with 1-49% of their visits with formal interpreting services and 1-99% of their visits with language-concordant providers and Patients with 50-100% of their visits with formal interpreting services and 1-99% of their visits with language-concordant providers) were more likely to have experienced a hospitalization or ED visit related to diabetes (over 19.5%/23 and 19.2%/10 respectively) compared to other groups in the outcome period.</p>	<p>Prevention</p> <p>Patients who received 100% of their primary care visits with language concordant providers were least likely to have diabetes related emergency department visits compared to other groups in the following 6 months.</p> <p>Patients who received 100% of their visits with language-concordant providers were less likely to have an ED visit related to diabetes or poorly controlled diabetes compared to patients receiving no language services.</p>	Moderate

15	Effect of Language Barriers on Follow-up Appointments After an Emergency Department Visit	Sarver, J. & Baker D. W. (2000).	<p>Three groups. Group 1 - Language concordant - native English and Spanish speakers who communicated without the aid of an interpreter. Group 2 - interpreter was used - native Spanish-speakers who communicated with their provider in Spanish. Group 3 - interpreter needed but not used - native Spanish-speakers who said an interpreter was not used but thought an interpreter should have been used.</p> <p>Setting: Torrance, CA, USA</p> <p>Study Design: Cohort Study</p>	<p>Comparing Trained Interpreters vs. Untrained Interpreters</p> <p>The proportion of patients who received a follow up appointment was 83% for those without language barriers, 75% for those who communicated through an interpreter, and 76% for those who said they should have an interpreter but did not have one (P = 0.05). Appointment compliance rates were similar for patients who communicated through an interpreter, those who said an interpreter should have been used but was not, and those without language barriers (P = 0.78).</p>	<p>Service Utilization</p> <p>The proportion of patients who received a follow up appointment was 83% for those without language barriers, 75% for those who communicated through an interpreter, and 76% for those who said they should have an interpreter but did not have one (P = 0.05). Appointment compliance rates were similar for patients who communicated through an interpreter, those who said an interpreter should have been used but was not, and those without language barriers (P = 0.78).</p>	Moderate
16	Does a Video-Interpreting Network Improve Delivery of Care in the Emergency Department?	Jacobs, E. A., Fu Jr, P. C., & Rathouz, P. J. (2012).	<p>LEP Spanish speaking vs non-LEP.</p> <p>ED of 2 network hospitals in California (Hospital A, in a rural area, and Hospital B, in an urban area in)</p> <p>Setting: California, USA</p> <p>Study Design: Pre-post, Observational study</p>	<p>Length of Stay</p> <p>Mean hospital time in the ED for both language groups at both hospitals went down in the post-video-interpreting network time period compared with the pre-video-interpreting network time period, by 16 minutes for English speakers and 31 minutes for Spanish speakers at Hospital A, and by 34 and 87 minutes for these two groups, respectively, at Hospital B. [Not statistically significant]</p> <p>Admission Rates</p> <p>The percentage of ED patients admitted to the hospital went down in the post-video-network time period for both language groups at Hospital A and was essentially unchanged for both language groups at Hospital B. There was no significant difference in the change in admission rates for English speakers compared with Spanish speakers at either study hospital.</p>	<p>Length of Stay</p> <p>Mean hospital time in the ED for both language groups at both hospitals went down in the post-video-interpreting network time period compared with the pre-video-interpreting network time period, by 16 minutes for English speakers and 31 minutes for Spanish speakers at Hospital A, and by 34 and 87 minutes for these two groups, respectively, at Hospital B. [Not statistically significant]</p> <p>Admission Rates</p> <p>The percentage of ED patients admitted to the hospital went down in the post-video-network time period for both language groups at Hospital A and was essentially unchanged for both language groups at Hospital B. There was no significant difference in the change in admission rates for English speakers compared with Spanish speakers at either study hospital.</p>	Moderate

17	Postoperative Pain Management in Children, Parental English Proficiency, and Access to Interpretation	Jimenez, N., Jackson, D. L., Zhou, C., Ayala, N. C., & Ebel, B. E. (2014).	Children with LEP parents (n=237): Children with EP parents (n=237). Objective was to examine the association between parental language proficiency, interpreted care, and postsurgical pediatric pain management Setting: USA Study Design: Retrospective Matched Cohort	Frequency of Interpretation Within the LEP group, children with ≥2 interpretations per day had lower pain scores after medication administration (P < .05) and were more likely to receive opioids at pain levels similar to those of EP families. Children of families who received less than 2 interpreted visits per day had higher mean post analgesic pain scores (P = 0.04) relative to children with more frequent interpretation.	Moderate
18	Convenient Access to Professional Interpreters in the Hospital Decreases Readmission Rates and Estimated Hospital Expenditures for Patients with Limited English Proficiency	Karlner, L. S., Perez-Stable, E. J., & Gregorich, S. E. (2017).	Patients aged 50+ years receiving the intervention: the dual-handset interpreter telephone at every bedside (bedside interpreter intervention). Setting: USA Study Design: Pre-Post	Readmission Rates Observed 30-day readmission decreased during the intervention period and increased again post intervention. The intervention was programmed to allow 24-hour access to a professional (trained and tested) medical interpreter for more than 100 languages. The effect of the intervention on readmission rates was significantly modified by patient language group; that is, the effect of the study periods on readmission rates significantly differed across the 2 language groups (P = 0.040 for test of interaction). The odds of readmission for the LEP compared with EP group was lower during the intervention period; while it was roughly equivalent during both the pre-intervention and post-intervention periods (Table 4).	Moderate
19	Use of Interpreters by Physicians for Hospitalized Limited English Proficient Patients and Its Impact on Patient Outcomes	Lopez, L., Rodriguez, F., Huerta, D., Soukup, J., & Hicks, L. (2015).	General LEP vs. Non-LEP. Four groups: 1) interpreter used by non-physician (i.e., nurse); 2) interpreter used by a non-Hospitalist physician; 3) interpreter used by Hospitalist; and 4) no interpreter used during hospitalization. Setting: USA Study Design: Retrospective Cohort Analysis	Length of Stay Compared to English speakers, LEP patients with no interpreters had significantly shorter length of stay. LEP patients who had an interpreter and a physician present had the longest length of stay.	Moderate

20	<p>Use of Interpreters by Physicians for Hospitalized Limited English Proficient Patients and Its Impact on Patient Outcomes</p>	<p>Hampers, L.C., & McNulty, J.E. (2002).</p>	<p>LEP children. LEP with professional interpreters vs. LEP with bilingual provider Examined visits of children (ages 2 months to 10 years) with a presenting temperature of 38.5C or higher or a complaint of vomiting or diarrhea. In 170 cases, the treating physician was bilingual. In 239, a professional interpreter was used. In the remaining 141, a professional medical interpreter was unavailable Setting: Chicago, IL, USA Study Design: Prospective Cohort</p>	<p>Comparing Trained Interpreters vs. Untrained Interpreters Decision making was most cautious when non-English-speaking cases were treated in the absence of bilingual physicians or professional interpreters.</p>	<p>Length of Stay Cases with an interpreter had longer length of stay visits (+16 minutes; 95% CI, 6.2-26mins). The barrier cohort (non-English) without a professional interpreter showed no difference in length of visit. When a barrier was present, and a professional interpreter was unavailable, physicians performed more extensive evaluations (more frequent and more expensive diagnostic testing) and treated children more conservatively (more intravenous hydration and more frequent hospital admissions). Service Utilization Compared with the English-speaking cohort, non-English speaking cases with bilingual physicians had similar rates of resource utilization. Cases with an interpreter were least likely to be tested (odds ratio [OR], more likely to be admitted [OR, 1.7; 95% CI, 1.1-2.8], and no more likely to receive intravenous fluids. The barrier cohort (non-English without a professional interpreter) had a higher incidence (OR, 1.5; 95% CI, 1.04-2.2) for testing and was most likely to be admitted (OR, 2.6; 95% CI, 1.4-4.5) and to receive intravenous hydration (OR, 2.3; 95% CI, 1.2-4.3).</p>	Moderate
21	<p>Patient-Reported Quality of Pain Treatment and Use of Interpreters in Spanish-Speaking Patients Hospitalized for Obstetric and Gynecological Care</p>	<p>Jimenez, N., Moreno, G., Leng, M., Buchwald, D., & Morales L. S. (2012).</p>	<p>LEP women with an interpreter vs. LEP without an interpreter Setting: USA Study Design: Cross-Sectional</p>	<p>Frequency of Interpretation Patients who did not always receive interpretation reported significantly lower scores in all 3 survey items: less likely to have their pain controlled (OR=0.4, p<0.05), have a timely response to their pain (OR=0.4, p<0.05), and less helpfulness from staff (OR=0.03, p<0.05).</p>	<p>Diagnostic Patients who did not always receive interpretation reported significantly lower scores in all 3 survey items: less likely to have their pain controlled (OR=0.4, p<0.05), have a timely response to their pain (OR=0.4, p<0.05), and less helpfulness from staff (OR=0.03, p<0.05).</p>	Moderate

22	Interpretation in Consultations with Immigrant Patients With Cancer: How Accurate Is It?	Butow, P. N. et al. (2011).	To compare accuracy of interpretation using professional vs. ad-hoc interpreters. LEP patients with new cancer diagnoses were recorded during their first two oncology consultations after diagnosis, with ad-hoc/family interpreters or professional interpreters. General LEP (n=49 encounters; some of which have multiple interpreters present) VS. LEP with another interpreter mode Setting: Australia Study Design: Cross-sectional	Comparing Trained Interpreters vs. Untrained Interpreters Professional interpreters (phone or face-to-face) were less likely to present non-equivalent interpretation than family members (50% vs. 65%, p=0.05). However, across both groups there was no significant difference in the rate of negative non-equivalent interpretation. No differences between telephone and face-to-face interpretation.		Moderate
23	Comparing In-Person, Video, and Telephonic Medical Interpretation	Locatis, C., et al. (2010).	General LEP (n = 241; face-to-face=80; phone=80; video =81) vs. LEP with another interpreter mode Setting: South Carolina, USA Study Design: Randomized Control Trial	Comparing Interpretation Modes Wait times are significantly longer (2.5 min, p=0.01) for video vs. in-person interpretation. Interview times are significantly longer (7.4 min, p=0.01) for in-person compared to phone, not significantly longer (5.3 min, p=0.1) for in-person compared to video.		Weak
24	Comparing the Use of Physician Time and Health Care Resources Among Patients Speaking English, Spanish, and Russian	Kravitz, R.L., Helms, J.L., Azari, R., Antonius, m D., & Melnikow, J. (2000).	Distinguish between patients using "health system interpreters" (paid interpreters or bilingual physicians) and those using "personal interpreters" (friends or family members) General LEP (18 + years) who speak Spanish and Russian (n=62 Spanish) (n=111 Russia) compared to Non - LEP (18+ years) (n=112 English) Setting: California, USA Study Design: Prospective Observational Study	Length of Appointment Compared with English-speaking patients, Spanish and Russian speakers who used health system interpreters averaged 12.2 and 7.1 additional minutes of physician time, respectively (P = 0.28 for Spanish speakers and P = 0.82 for Russian speakers). For Spanish and Russian speakers using personal interpreters, there was no statistically significant difference between them and English-speaking patients.		Weak

25	No Difference in Emergency Department length of stay for Patients with Limited Proficiency in English	Wallbrecht, J., Hodes-Villamar, L., Weiss, S. J., & Ernst, A. A. (2014).	General LEP (124 LEP patients): Non - LEP (ES); For each ES patient, one LEP patient with the same acuity and similar age was selected. (121 ES patients) Setting: New Mexico, USA Study Design: Prospective Convenience Sampling Cohort Study		Length of Stay The use of interpreters was associated with a significant increase in length of stay (increased length of stay of 237 minutes from the time of arrival to time of discharge or admission request). No difference in length of stay between ES patients and patients with LEP. Only 53% of patients with LEP were reported to have used an interpreter during their ED visit.	Weak
26	The Impact of Medical Interpretation Method on Time and Errors	Gany, F., Kapelusznik, L., Prakash, K., Gonzalez, J., Orta, L.Y., Tseng, C.H., & Changrani, J. (2007).	4 scripted clinical encounters Modes of interpretation: Remote simultaneous, Remote consecutive, Proximate consecutive, Proximate ad hoc Setting: New York, NY, USA Study Design: Cross Sectional	Comparing Modes of Interpretation and Trained vs. Untrained Interpreters Remote simultaneous medical interpreting (RSMI) encounters averaged 12.72 vs. 18.24 minutes for the next fastest mode (proximate ad hoc) (p=0.002). There were 12 times more medical errors of moderate or greater clinical significance among utterance in non-RSMI encounters compared to RSMI encounters (p=0.0002).	Medical Errors RSMI produced fewer errors than the other modes, which had error rates that were clustered at the a significantly higher rate. RSMI had a mean of 1.139 linguistic errors per utterance and 0.019 medical errors of moderate or greater clinical significance per utterance. Non -RSMI interpreting modalities were associated with 12-fold greater rate of potential medical errors (of moderate or greater significance (per utterance compared to RSMI (P=0.0002).	Weak

27	The Role of Medical Interpretation on Breast and Cervical Cancer Screening Among Asian American and Pacific Islander Women	Dang, J., Lee, J., Tran, J.H., Kagawa-Singer, M., Foo, M.A., & Nguyen, T.N. (2010).	1,708 Asian American and Pacific Islander women in Northern and Southern California. Cambodians n = 344, Laotians n = 353, Tongans n = 286. Setting: California, USA Study Design: Cross-sectional	Comparing Trained vs. Untrained vs. No Interpreters People preferred to speak to their doctor or medical provider in a non-English language – bilingual staff (94.3%), medical interpreter (93.6%) and family/friends (88.9%).	Prevention Women who typically used a medical interpreter had a greater odd of having received a mammogram (OR = 1.85; 95% confidence interval = 1.21, 2.83), a clinical breast exam (OR 3.03, 95% CI = 1.82, 5.03) and a Pap Smear (OR = 2.34; 95% CI = 1.38 to 3.97) than those who did not use an interpreter. Patients who had bilingual staff were twice as likely to have a clinical breast exam (2.23 OR) and a pap smear (2.82 OR) compared to patients who did not use any type of interpretation. Those who used bilingual staff members had the highest rate of Pap Smears (85.8%) compared with the other groups (none, 65.1%; family or friends, 77.1%; medical interpreters, 81.8%). Did not find greater odds of receiving breast or cervical cancer screening after accounting for other variables in the model.	Weak
28	Quality of Reproductive Health Services to Limited English Proficient (LEP) Patients	De Bocanegra, H.T.D., Rostovtseva, D., Cetinkaya, M., Runde, C. & Lewis, C. (2011).	Modes of Interpretation – staff interpreters, language discordant (LDI); bilingual clinician, language concordant (LC) 831 clients for 1589 reproductive health visits of female and male LEP clients where their primary language was Spanish and in which the services were provided by a clinician who spoke their language or through a staff interpreter. Setting: California, USA Study Design: Retrospective Cohort (Pre-Post)	Comparing Different Modes of Interpretation LDI visits were significantly less likely than LC visits to contain documentation of the provision of education and counselling services and less likely to have documentation of sexually transmitted infection (STI) risk assessment among new female clients. Female clients in LDI and LC visits were equally likely to be tested for Chlamydia. Among women, LC visits were significantly more likely than LDI visits to have documentation of STI risk assessment. However, female clients in LDI and LC visits were about equally likely to be tested for Chlamydia, both for women under the age of 26 and for women age 26 and older.	Diagnostic Less frequent documentation of education and counselling on any topic when using an interpreter compared to that for clients seen by a language concordant provider. Providers were significantly less likely to document an STI assessment win an LDI visit than in an LC visits – new clients seen in LDI were significantly less likely to have documentation of a STI assessment while there was no difference in risk assessment between LDI and LC visits among established clients.	Weak

29	Screening of mental disorders in asylum-seekers from Kosovo	Eytan, A., Bischoff, A., Ruustemi, I., Durieux, S., Loutan, L., Gilbert, M., & Boiver, P. (2002).	319 structured interviews conducted by nurses with asylum seekers in Kosovo during a systematic medical screening at time of entry, consisting of questions about health conditions, past exposure to traumatic events, and post-traumatic symptoms. Setting: Geneva, Switzerland Study Design: Cross-sectional	Comparing Trained Interpreters vs. Untrained Interpreters Subjective rating of communication was poorest when there was no interpreter present, better when relatives were used and best when trained interpreters were used (trend test, $p < 0.0001$).	Service Utilization The use of both type of interpreters (trained and relative) led to increased referral to medical care (non-interpreter 31%, relatives as interpreter 48%, trained interpreter 42%, $p=0.03$. Increased referral to psychological care with the use of a trained interpreter (no interpreter 4%, relatives as interpreter 3% and trained interpreter 15%, $p = 0.07$)	Diagnostic – Reporting of Symptoms The use of relatives and trained interpreters significantly influenced the proportion of persons reporting traumatic events and psychological symptoms.	Weak
30	How accessible are interpreter services to dialysis patients of Non-English Speaking? Background?	Zimbudzi, E., Thompson, S., & Terrill B. (2010).	To determine the level of interpreter utilization by dialysis patients; to assess how the frequency of interpreter utilization affects patient outcomes. General LEP broken down into number of times an interpreter has been used (0-5+) Setting: Victoria, Australia Study Design: Retrospective Cohort	Frequency of Interpretation Saw reductions in hospital admissions due to hyperkalemia, hypertension & fluid overload correlated with frequency of interpreter use. Those with 0 interpreters saw 10 admissions with fluid overload and hyperkalemia, down to 5 and 2 (respectively) when patient had 5 interpreted encounters. Hypertension moved from 6 (no interpreter) to 2 admissions (5 interpreter encounters). No statistical significance or confounders described.			Weak

Endnotes

- 1 Toronto Public Health. (2011). The Global City: Newcomer Health in Toronto. Retrieved from: <http://www.toronto.ca/legdocs/mmis/2011/hl/bgrd/backgroundfile-42361.pdf>
- 2 Bowen, S. (2015). The Impact of Language Barriers on Patient Safety and Quality of Care. Société Santé en Français. Retrieved from: <https://santefrancais.ca/wp-content/uploads/SSF-Bowen-S.-Language-Barriers-Study.pdf>
- 3 Flores, G. (2006). Language barriers to health care in the United States. *New England Journal of Medicine*, 355: 229-231. Retrieved from: <http://www.nejm.org/doi/full/10.1056/NEJMp058316>
- 4 Sears, J., Khan, K., Ardern, C.I., & Tamim, H. (2013). Potential for patient-physician language discordance in Ontario. *BMC Health Services Research*, 13:535. Retrieved from: <https://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-13-535>
- 5 Toronto Public Health. (2011). The Global City: Newcomer Health in Toronto. Retrieved from: <http://www.toronto.ca/legdocs/mmis/2011/hl/bgrd/backgroundfile-42361.pdf>
- 6 Bowen, S. (2001). Language Barriers in Access to Health Care. Health Canada. Retrieved from: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/hcs-sss/alt_formats/hpb-dgps/pdf/pubs/2001-lang-acces/2001-lang-acces-eng.pdf
- 7 Jacobs, E., Chen, A.H.M., Karliner, L.s., Agger-Gupta, N., & Mutha, S. (2006). The Need for More Research on Language Barriers in Health Care: A Proposed Research Agenda. *The Milbank Quarterly*, 84(1), 111-133. Retrieved from: <http://onlinelibrary.wiley.com/doi/10.1111/j.1468-0009.2006.00440.x/full>
- 8 Naish, J., Brown, J., & Denton, B. (1994). Intercultural consultations: investigation of factors that deter non-English speaking women from attending their general practitioners for cervical screening. *British Medical Journal*, 309, 1126-1128.
- 9 Fortier, J.P., Strobel, C., Aguilera, E. (1998). Language barriers to health care: federal and state initiatives, 1990-1995. *Journal of Health Care for the Poor and Underserved*, 9(5), S81-S100.
- 10 Wilson, E., Chen, A.H., Grumbach, K., Wang, F., & Fernandez, A. (2005). Effects of limited English proficiency and physician language on health care comprehension. *Journal of General Internal Medicine*, 20(9), 800-806.
- 11 Lee, E.D., Rosenberg, C.R., Sixsmith, D.M., Pang, D., & Abularrage, J. (1998). Does a Physician-Patient Language Difference Increase the Probability of Hospital Admission? *Academic Emergency Medicine*, 5(1), 86-89.
- 12 Brown, A.F., Perez-Stable, E.J., Whitaker, E.E., Alexander, M., Gathe, J., & Washington, A.E. (1999). Ethnic differences in hormone replacement prescribing patterns. *Journal of General Internal Medicine*, 14, 663-669.
- 13 Gill, P., Scrivener, G., Lloyd, d., & Dowell, T. (1995). The effect of patient ethnicity on prescribing rates. *Health Trends*, 27, 111-114.
- 14 Chan, A., & Woodruff, R.K. (1999). Comparison of palliative care needs of English- and non-English-speaking patients. *Journal of Palliative Care*, 15, 26-30.
- 15 Hampers, L.C., Cha, S., Gutglass, D.J., Binns, H.J., & Krug, S.E. (1999). Language barriers and resource utilization in a pediatric emergency department. *Pediatrics*, 103, 1253-1256.
- 16 Morales, L. S., Cunningham, W. E., Brown, J. A., Liu, H., & Hays, R. D. (1999). Are Latinos less satisfied with communication by health care providers? *Journal of general internal medicine*, 14(7), 409-417.
- 17 Carrasquillo, O., Orav, E. J., Brennan, T. A., & Burstin, H. R. (1999). Impact of language barriers on patient satisfaction in an emergency department. *Journal of General Internal Medicine*, 14(2), 82-87.
- 18 Hornberger, J., Itakura, H., & Wilson, S. R. (1997). Bridging language and cultural barriers between physicians and patients. *Public Health Reports*, 112(5), 410.
- 19 Statistics Canada. (2017). An Increasingly Diverse Linguistics Landscape: Highlights from the 2016 Census. Retrieved from <http://www.statcan.gc.ca/daily-quotidien/170802/dq170802b-eng.htm?HPA=1>

- 20 Statistics Canada. (2017). Data Tables, 2016 Census: Mother Tongue (8), Knowledge of Official Languages (5), Language Spoken Most Often at Home (8), Other Language(s) Spoken Regularly at Home (9), Age (7) and Sex (3) for the Population Excluding Institutional Residents of Canada, Provinces and Territories, Census Divisions and Census Subdivisions, 2016 Census - 100% Data. Retrieved from <http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/dt-td/Rp-dt-td/Rp>
- 21 Statistics Canada. (2017). Data tables, 2016 Census: Mother Tongue (8), Knowledge of Official Languages (5), Language Spoken Most Often at Home (8), Other Language(s) Spoken Regularly at Home (9), Age (7) and Sex (3) for the Population Excluding Institutional Residents of Canada, Provinces and Territories, Census Divisions and Census Subdivisions, 2016 Census – 100% Data. Retrieved from: <http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/dt-td/Rp-eng.cfm?LANG=E&APATH=3&DETAIL=0&DIM=0&FL=A&FREE=0&GC=0&GID=0&GK=0&GRP=1&PID=109668&PRID=10&PTYPE=109445&S=0&SHOWALL=0&SUB=0&Temporal=2016&THEME=118&V-ID=0&VNAMEE=&VNAMEF=>
- 22 Statistics Canada. (2016). Mother Tongue (8), Knowledge of Official Languages (5), Language Spoken Most Often at Home (8), Other Language(s) Spoken Regularly at Home (9), Age (7) and Sex (3) for the Population Excluding Institutional Residents of Canada, Provinces and Territories, Census Divisions and Census Subdivisions, 2016 Census - 100% Data. Retrieved from <http://www12.statcan.gc.ca/census-recensement/2016/dp-pd/dt-td/Rp>
- 23 Bowen, S. (2001). Language Barriers in Access to Health Care. Health Canada. Retrieved from: https://www.canada.ca/content/dam/hc-sc/migration/hc-sc/hcs-sss/alt_formats/hpb-dgps/pdf/pubs/2001-lang-acces/2001-lang-acces-eng.pdf
- 24 McMurtray, A., Saito, E., & Nakamoto, B. (2009). Language preference and development of dementia among bilingual individuals. *Hawaii Medical Journal*, 68(9), 223.
- 25 Ministry of Health and Long-Term Care. (2017). Patients First: Action Plan for Health Care. Retrieved from: http://www.health.gov.on.ca/en/ms/ecfa/healthy_change/
- 26 Health Quality Ontario. (2017). What is Health Quality – Health Equity and Quality. Retrieved from: Language barriers pose significant impediments to accessing health care services.
- 27 Statistics Canada. (2015). Linguistic Characteristics of Canadians. Retrieved from: <http://www12.statcan.gc.ca/census-recensement/2011/as-sa/98-314-x/98-314-x2011001-eng.cfm#a2>
- 28 City of Toronto. (2012). 2011 Census – Language – Backgrounder. Retrieved from: https://www1.toronto.ca/city_of_toronto/social_development_finance_administration/files/pdf/language_2011_backgrounder.pdf
- 29 Riddick, S. (1998). Improving Access to Limited English-Speaking Consumers: A Review of Strategies in Health Care Settings. *Journal of Health Care for the Poor and Underserved*, 9(1998), S40-S61.
- 30 Aery, A., Kumar, N., Laher, N., & Sultana, A. (2017). Interpreting Consent – A Rights Based Approach to Language Accessibility in Ontario’s health care system. Wellesley Institute. Retrieved from: <http://www.wellesleyinstitute.com/publications/interpreting-consent-a-rights-based-approach-to-language-accessibility-in-ontarios-health-care-system/>
- 31 O’Campo, P., Devotta, K., Dowbor, T., & Pedersen, C. (2014). Reducing the language accessibility gap – Language Services Toronto Program Evaluation Report. St. Michael’s Hospital. Retrieved from: http://stmichaelshospitalresearch.ca/wp-content/uploads/2016/12/LST_Program_Evaluation_Report_July31_one-up.pdf
- 32 Bauer, A.M., & Alegria, M. (2010). The Impact of Patient Language Proficiency and Interpreter Service Use on the Quality of Psychiatric Care: A Systematic Review. *Psychiatric Serv*, 61(8), 765-773.
- 33 Flores, G. (2005). The Impact of Medical Interpreter Services on the Quality of Health Care: A Systematic Review. *Medical Care Research and Review*, 62(3), 255-299.
- 34 Arksey, H., & O’Malley, L. (2007). Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology*, 8(1), 19-32. Retrieved from: <http://www.tandfonline.com/doi/abs/10.1080/1364557032000119616>
- 35 Effective Public Health Practice Project. (n.d.). Quality Assessment Tool for Quantitative Studies. Retrieved from:

<http://www.ehphp.ca/tools.html>

- 36 Bernstein, J., Bernstein, E., Dave, A., Hardt, E., James, T., Linden, J., ... & Safi, C. (2002). Trained medical interpreters in the emergency department: effects on services, subsequent charges, and follow-up. *Journal of Immigrant Health, 4*(4), 171-176.
- 37 Jacobs, E. A., Lauderdale, D. S., Meltzer, D., Shorey, J. M., Levinson, W., & Thisted, R. A. (2001). Impact of Interpreter Services on Delivery of Health Care to Limited-English proficient Patients. *Journal of General Internal Medicine, 16*(7), 468-474.
- 38 Jacobs, E. A., Shepard, D. S., Suaya, J. A., & Stone, E. L. (2004). Overcoming language barriers in health care: costs and benefits of interpreter services. *American Journal of Public Health, 94*(5), 866-869.
- 39 Fagan, M. J., Diaz, J. A., Reinert, S. E., Sciamanna, C. N., & Fagan, D. M. (2003). Impact of interpretation method on clinic visit length. *Journal of General Internal Medicine, 18*(8), 634-638.
- 40 Hacker, K., Choi, Y. S., Trebino, L., Hicks, L., Friedman, E., Blanchfield, B., & Gazelle, G. S. (2012). Exploring the impact of language services on utilization and clinical outcomes for diabetics. *PloS One, 7*(6), e38507.
- 41 Sarver, J., & Baker, D. W. (2000). Effect of language barriers on follow up appointments after an emergency department visit. *Journal of General Internal Medicine, 15*(4), 256-264.
- 42 d'Ardenne, P., Ruaro, L., Cestari, L., Fakhoury, W., & Priebe, S. (2007). Does interpreter-mediated CBT with traumatized refugee people work? A comparison of patient outcomes in East London. *Behavioural and Cognitive Psychotherapy, 35*(3), 293-301.
- 43 Nápoles, A. M., Santoyo-Olsson, J., Karliner, L. S., Gregorich, S. E., & Pérez-Stable, E. J. (2015). Inaccurate Language Interpretation and Its Clinical Significance in the Medical Encounters of Spanish-speaking Latinos. *Medical Care, 53*(11), 940-947.
- 44 Wagner, J., Abbott, G., & Lacey, K. (2005). Knowledge of heart disease risk among Spanish speakers with diabetes: the role of interpreters in the medical encounter. *Ethnicity & Disease, 15*(4), 679-684.
- 45 Flores, G., Abreu, M., Barone, C. P., Bachur, R., & Lin, H. (2012). Errors of medical interpretation and their potential clinical consequences: a comparison of professional versus ad hoc versus no interpreters. *Annals of Emergency Medicine, 60*(5), 545-553.
- 46 Butow, P.N., Goldstein, D., Bell, M.L., Sze, M., Aldridge, L.J., Abdo, S., Tanious, M., Dong, S., Iedema, R., Vardy, J., Ashgari, R., Hui, R., & Eisenbruch, M. (2011). Interpretation in Consultations with Immigrant Patients with Cancer: How Accurate Is It? *Journal of Clinical Oncology, 29*(20), 2801-2807.
- 47 Gany, F., Kapelusznik, L., Prakash, K., Gonzalez, J., Orta, L. Y., Tseng, C. H., & Changrani, J. (2007). The impact of medical interpretation method on time and errors. *Journal of General Internal Medicine, 22*(2), 319-323.
- 48 Leng, J. C., Changrani, J., Tseng, C. H., & Gany, F. (2010). Detection of depression with different interpreting methods among Chinese and Latino primary care patients: a randomized controlled trial. *Journal of Immigrant and Minority Health, 12*(2), 234-241.
- 49 Lion, K. C., Brown, J. C., Ebel, B. E., Klein, E. J., Strelitz, B., Gutman, C. K., ... & Mangione-Smith, R. (2015). Effect of telephone vs video interpretation on parent comprehension, communication, and utilization in the pediatric emergency department: a randomized clinical trial. *JAMA Pediatrics, 169*(12), 1117-1125.
- 50 Grover, A., Deakyn, S., Bajaj, L., & Roosevelt, G. E. (2012). Comparison of throughput times for limited English proficiency patient visits in the emergency department between different interpreter modalities. *Journal of Immigrant and Minority Health, 14*(4), 602-607.
- 51 Locatis, C., Williamson, D., Gould-Kabler, C., Zane-Smith, L., Detzier, I., Roberson, J., Maisiak, R., & Ackerman, M. (2010). Comparing In-Person, Video, and Telephonic Medical Interpretation. *J Gen Intern Med, 25*(4), 345-50.
- 52 de Bocanegra, H. T., Rostovtseva, D., Cetinkaya, M., Rundel, C., & Lewis, C. (2011). Quality of reproductive health services to limited English proficient (LEP) patients. *Journal of Health Care for the Poor and Underserved, 22*(4), 1167-1178.

- 53 Zimbudzi, E., Thompson, S., & Terrill, B. (2010). How accessible are interpreter services to dialysis patients of Non-English-Speaking Background? *Australasian Medical Journal*, 1(3), 205-212.
- 54 Wallbrecht, J., Hodes-Villamar, L., Weiss, S. J., & Ernst, A. A. (2014). No difference in emergency department length of stay for patients with limited proficiency in English. *Southern Medical Journal*, 107(1), 1-5.
- 55 López, L., Rodriguez, F., Huerta, D., Soukup, J., & Hicks, L. (2015). Use of interpreters by physicians for hospitalized limited English proficient patients and its impact on patient outcomes. *Journal of General Internal Medicine*, 30(6), 783-789.
- 56 Hampers, L. C., & McNulty, J. E. (2002). Professional interpreters and bilingual physicians in a pediatric emergency department: effect on resource utilization. *Archives of Pediatrics & Adolescent Medicine*, 156(11), 1108-1113.
- 57 Jacobs, E. A., Fu, P. C., & Rathouz, P. J. (2012). Does a Video Interpreting Network Improve Delivery of Care in the Emergency Department? *Health Services Research*, 47(1pt2), 509-522.
- 58 Davies, S. E., Dodd, K. J., Tu, A., Zucchi, E., Zen, S., & Hill, K. D. (2016). Does English proficiency impact on health outcomes for inpatients undergoing stroke rehabilitation? *Disability and Rehabilitation*, 38(14), 1350-1358.
- 59 Lindholm, M., Hargraves, J. L., Ferguson, W. J., & Reed, G. (2012). Professional language interpretation and inpatient length of stay and readmission rates. *Journal of General Internal Medicine*, 27(10), 1294-1299.
- 60 Eytan, A., Bischoff, A., Rrustemi, I., Durieux, S., Loutan, L., Gilbert, M., & Bovier, P. A. (2002). Screening of mental disorders in asylum-seekers from Kosovo. *Australian & New Zealand Journal of Psychiatry*, 36(4), 499-503.
- 61 Karliner, L. S., Pérez-Stable, E. J., & Gregorich, S. E. (2017). Convenient access to professional interpreters in the hospital decreases readmission rates and estimated hospital expenditures for patients with limited English proficiency. *Medical Care*, 55(3), 199-206.
- 62 Jimenez, N., Jackson, D. L., Zhou, C., Ayala, N. C., & Ebel, B. E. (2014). Postoperative pain management in children, parental English proficiency, and access to interpretation. *Hospital Pediatrics*, 4(1), 23.
- 63 Dang, J., Lee, J., Tran, J. H., Kagawa-Singer, M., Foo, M. A., Nguyen, T. U. N., ... & Tanjasiri, S. P. (2010). The role of medical interpretation on breast and cervical cancer screening among Asian American and Pacific Islander women. *Journal of Cancer Education*, 25(2), 253-262
- 64 Price, E. L., Pérez-Stable, E. J., Nickleach, D., López, M., & Karliner, L. S. (2012). Interpreter perspectives of in-person, telephonic, and videoconferencing medical interpretation in clinical encounters. Patient education and counseling, 87(2), 226-232.
- 65 Chen, L.M., Farwell, W.R. & Jha, A.K. (2009). Primary care visit duration and quality: does good care take longer? *Arch Intern Med*, 169(20):1866-72. doi:10.1001/archinternmed.2009.341.
- 66 Abbo, E.D., Zhang, Q., Zelder, M., & Huang, E.S. (2008). The increasing number of clinical items addressed during the time of adult primary care visits. *J Gen Intern Med*, 23(12):2058-65. doi:10.1007/s11606-008-0805-8.
- 67 Lopez, L., Rodriguez, F., Huerta, D., Soukup, J. & Hicks, L. (2015). Use of Interpreters by Physicians for Hospitalized Limited English Proficient Patients and Its Impact on Patient Outcomes. *Journal of General Internal Medicine*, 30(6), 783-789.
- 68 Karliner, L.S., Kim, S.E., Meltzer, D.O., & Auerback, A.D. (2010). Influence of language barriers on outcomes of hospital care for general medicine inpatients. *Journal of Hospital Medicine*, 5(5), 276-282.
- 69 Flores, G. (2005). The Impact of Medical Interpreter Services on the Quality of Health Care: A Systematic Review. *Medical Care Research and Review*, 62(3), 255-299.
- 70 Bauer, A.M., & Alegria, M. (2010). The Impact of Patient Language Proficiency and Interpreter Service Use on the Quality of Psychiatric Care: A Systematic Review. *Psychiatric Serv*, 61(8), 765-773.
- 71 Flores, G. (2005). The Impact of Medical Interpreter Services on the Quality of Health Care: A Systematic Review. *Medical Care Research and Review*, 62(3), 255-299.

- 72 Bauer, A.M., & Alegria, M. (2010). The Impact of Patient Language Proficiency and Interpreter Service Use on the Quality of Psychiatric Care: A Systematic Review. *Psychiatric Serv*, 61(8), 765-773.
- 73 Grant, M. J., & Booth, A. (2009). A typology of reviews: an analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, 26(2), 91-108.
- 74 Madore, O. (1992). The Canadian and American Health Care Systems. Economics Division. Retrieved from: <http://publications.gc.ca/Collection-R/LoPBdP/BP/bp300-e.htm>