

Do Professional Interpreters Improve Clinical Care for Patients with Limited English Proficiency? A Systematic Review of the Literature

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Objective. To determine if professional medical interpreters have a positive impact on clinical care for limited English proficiency (LEP) patients.

Data Sources. A systematic literature search, limited to the English language, in PubMed and PsycINFO for publications between 1966 and September 2005, and a search of the Cochrane Library.

Study Design. Any peer-reviewed article which compared at least two language groups, and contained data about professional medical interpreters and addressed communication (errors and comprehension), utilization, clinical outcomes, or satisfaction were included. Of 3,698 references, 28 were found by multiple reviewers to meet inclusion criteria and, of these, 21 assessed professional interpreters separately from ad hoc interpreters. Data were abstracted from each article by two reviewers. Data were collected on the study design, size, comparison groups, analytic technique, interpreter training, and method of determining the participants' need for an interpreter. Each study was evaluated for the effect of interpreter use on four clinical topics that were most likely to either impact or reflect disparities in health and health care.

Principal Findings. In all four areas examined, use of professional interpreters is associated with improved clinical care more than is use of ad hoc interpreters, and professional interpreters appear to raise the quality of clinical care for LEP patients to approach or equal that for patients without language barriers.

Conclusions. Published studies report positive benefits of professional interpreters on communication (errors and comprehension), utilization, clinical outcomes and satisfaction with care.

Key Words. Language barriers, health disparities, quality of care, physician–patient communication

According to the 2000 Census, 47 million people in the United States speak a language other than English at home (Shin and Bruno 2003). Half of these

individuals report that they speak English less than “very well.” These individuals are considered to have limited English proficiency (LEP). That is, they are not able to speak, read, write, or understand the English language at a level that permits them to interact effectively with health care providers (OCR 2002). This language barrier puts the health of many LEP individuals, and that of their communities at risk by affecting their ability to access care and communicate with their providers.

It is well established that language barriers contribute to health disparities for LEP patients (Jacobs et al. 2003). These patients have less access to a usual source of care, and lower rates of physician visits and preventive services (Fox and Stein 1991; Kirkman-Liff and Mondragon 1991; Woloshin et al. 1997; Fiscella et al. 2002). Even when they do have access to care, LEP patients often have poorer adherence to treatment and follow-up for chronic illnesses, decreased comprehension of their diagnoses and treatment after emergency department (ED) visits, decreased satisfaction with care, and increased medication complications. (Manson 1988; Crane 1997; Carasquillo et al. 1999; Gandhi et al. 2000) In contrast, language concordance between patients and physicians increases patient satisfaction, patient-reported health status, and adherence with medication and follow-up visits (Manson 1988; Perez-Stable, Napoles-Springer, and Miramontes 1997; Freeman et al. 2002).

Given that over 100 languages are commonly spoken in the United States, (Shin and Bruno 2003) it is often not possible to provide language concordant health care. In one study of the use of medical interpreters in urban primary care practices, physicians reported encountering 20 different languages (Karlner, Perez-Stable, and Gildengorin 2004). Although some LEP patients are fortunate enough to be seen in settings where physician and office staff speak their primary language, this language concordance can readily disappear once these patients present for laboratory testing,

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emergency care, or are admitted to the hospital. Therefore, the majority of providers must use other means to communicate with their LEP patients and, if they receive federal financial assistance, are required to do so by Title VI of the Civil Rights Act of 1964 (OCR 2002). Most often this means is a third person, an interpreter, who can range from a highly trained professional medical interpreter to any available bilingual person (NCIHC 2001).

In their review and analysis of health plans and language assistance programs, (Brach, Fraser, and Paez 2005) recommend the use of professional interpreters to augment the use of bilingual clinicians and staff in order to improve the quality of care delivered and to decrease health disparities. A recent general review of the literature concludes that the quality of medical care is improved by either use of professional interpreters or via direct provision of care by bilingual health care providers (Flores 2005). These reviews are broad and inclusive; however, many of the studies from which they draw their conclusions combined the effects of different types of interpreters (ad hoc, trained, untrained) as well as that of language concordant clinicians without systematically distinguishing among them. Thus, we are still left with the question of the specific effect of professional interpreters on clinical care, and how their effect compares with that of ad hoc interpreters.

Building on these previous reviews, we conducted a focused systematic review of the medical literature to better understand whether use of professional medical interpreters is associated with improved clinical care for LEP patients in the areas of communication errors and patient comprehension, utilization, clinical outcomes, and satisfaction.

METHODS

Data Sources

We conducted a systematic literature search, limited to the English language, in PubMed and PsycINFO for publications between 1966 and September 2005. We also searched the Cochrane Library. These searches produced 3,575 citations (see Appendix for exact search strategies). We also conducted a search for bibliographies on the World Wide Web using the search term *Medical Interpreters*. On the web we found multiple bibliographies, and from these we identified an additional 123 references. In total, we generated 3,698 references from all data sources.

Inclusion/Exclusion Criteria

We included all articles which met the following inclusion criteria: (1) peer-reviewed English-language publication; (2) contained data about use of professional medical interpreters and a relevant clinical topic; and (3) compared results for the group using interpreters to another group (e.g., by type of interpreter, English speakers, language concordant LEP, LEP without interpreter use). We chose to focus on four clinical topics that were most likely to either impact or reflect disparities in health and health care for LEP patients: *communication (errors and comprehension)*, *utilization of clinical care*, *clinical outcomes*, and *satisfaction with clinical care*.

We excluded, without further review, articles in which review of the title and/or abstract confirmed that the focus was not on medical interpreters. Thus, articles about interpretation of radiology techniques or electrocardiograms, translation or validation of clinical assessment of research scales, or cross-cultural health care but not cross-language health care, were excluded. We also excluded review articles that did not have primary data, as well as articles that solely addressed use of American Sign Language interpreters. For the 300 articles for which it was unclear from the title and abstract whether the article contained data regarding professional medical interpreters and one of the previously determined clinical topics, we reviewed the full text of the article and were able to exclude an additional 272 articles.

Abstraction of Included Articles

In order to minimize bias and errors, we abstracted each of the remaining 28 articles that included data about the association of interpreter use with one of the previously determined clinical topics, and compared results for the group using interpreters to another group. All four authors participated in data abstraction. Each article was abstracted by at least two authors. Twelve items were abstracted for each article, including primary and secondary focus, study setting, geographic location, number and type of participants, study design, type of interpreter used, languages included, description of interpreter training, definition of group needing interpreters, comparison groups, statistical analysis, and main study findings about interpreter use. The abstractions were then reviewed and tallied by one of the authors. Discrepancies in any of the items were resolved by consensus between the two original reviewers. Any remaining discrepancies were discussed by all four authors and resolved by consensus.

In establishing whether or not a particular article had data on interpreter use, we first used a broad definition of *interpreter* to include any third-party present in a clinical interaction whose role was to facilitate oral language interpretation between a clinician and patient (NCIHC 2001). A *professional interpreter* was defined as any individual paid and provided by the hospital or health system to interpret; this individual was sometimes referred to in the articles as a “professional interpreter,” and sometimes referred to as a “hospital interpreter.” Because medical interpreting is not yet a universally licensed or credentialed field, training can vary widely (NCIHC 2001). Likewise, description of training varies widely in the published literature. For the purposes of this review we stipulate professional interpreters were trained if the manuscript described this. Training ranged from on-the-job training to formal 40-hour training in medical terminology and skills specific to interpreting in the medical setting. We further specified that an *ad hoc interpreter* was “an untrained person who is called upon to interpret, such as a family member interpreting for her parents, a bilingual staff member pulled away from other duties to interpret, or a self-declared bilingual in a hospital waiting-room who volunteers to interpret” (NCIHC 2001).

Because the quality of the methodology in this literature varies, (Flores 2005; Jacobs et al. 2006) we abstracted information that would allow the reader to evaluate the quality of each study: number of participants, control for confounding variables (for quantitative studies only), method for determining group being studied (e.g., need for an interpreter or LEP status), and description of whether the professional interpreters were trained or not. In addition, for qualitative studies, we abstracted information on the methods used (e.g., direct observation, focus groups, semi-structured interviews). The highest quality quantitative studies have large numbers of participants to allow for statistical power to find differences, control for potential confounding, define the group being studied using a formal measure of either language proficiency or need for a medical interpreter, and use trained professional interpreters. With the exception of controlling for confounding, all of these items are important indicators of quality for qualitative studies as well, although qualitative studies do not require as large sample sizes as quantitative studies do because they do not have the same issue of statistical power to find differences. In addition, analysis of qualitative studies should be rigorous and include a systematic approach to identifying common themes or issues that arise in the data. All four qualitative articles included in this review met these criteria.

Organization of Results

Because our research question focused on the impact of professional interpreter use, we divided articles according to the manner in which they reported their results. The three groups are those that: (1) compared results by type of interpreter (*professional versus ad hoc*), (2) only included professional interpreters (*professional only*), and (3) did not distinguish between professional and ad hoc interpreters (*professional and ad hoc combined*). The first two groups, which both assess professional interpreters independently of ad hoc interpreters, make up the central focus of this review. We include information on the third group (seven studies) to allow the reader to compare how the effect of professional interpreters compares with that of a mix of professional and ad hoc interpreters that are routinely found in practice.

We also organize our results by clinical focus. Articles categorized as *communication (errors and comprehension)* contain data about errors in communication between a patient and a clinician when an interpreter was present or when an interpreter was needed, but not present. We also included in this category articles with data on patient comprehension of care such as diagnoses, medications or follow-up, because comprehension is directly affected by errors in communication or interpretation. We categorized as *utilization* those articles containing data about the effect of interpreter use on utilization of clinical services, such as emergency visits, hospital admissions, numbers of diagnostic tests, or preventive care. We categorized as *clinical outcomes* those articles containing data about the effect of interpreter use on health outcomes, such as hemoglobin A1C levels in diabetic patients, rates of communication sensitive diagnoses (e.g., mental illness), and rates of procedures such as cesarean sections. We categorized as *satisfaction* those articles that contained data either on patient and/or clinician satisfaction with the type, quality, or availability of interpreters, or on the effect of interpreter use on patient satisfaction.

To allow the reader to further evaluate and compare studies, we have created a *comparison group* column in the results tables. This column identifies the groups being compared by outcome in each study. When possible, we maintain uniformity in the language used to identify groups. For example, the most common groups listed are *LEP interpreted* (indicating that this group of LEP patients had access to interpreters during their clinical encounters; the type of interpreter is specified in the adjacent column), and *LEP noninterpreted* (indicating that this group of LEP patients did not have access to interpreters during their clinical encounters). A third commonly listed

comparison group is *language concordant*. Most often, this categorization indicates a group of English-speaking patients who were cared for by English-speaking clinicians. However, this categorization may also indicate a group of patients in a non-English-speaking country who spoke the majority language (e.g., Arabic in Saudi Arabia) being cared for by a clinician who also spoke that language; or, it may indicate a group of patients who spoke a nonmajority language (e.g., Spanish in the United States) who were cared for by a clinician who spoke that language. Many studies combined these groups in their results, in which case we also have combined them, and categorized them as *language concordant*.

When possible we present numerical results and statistical tests for each study. In keeping with the diversity of studies, we report multiple different statistical results ranging from descriptive percentages to *p*-values for comparisons of proportions or means to odds ratios. For qualitative studies that may have used mixed methods and report statistics in their publications, we likewise report these statistics. For other qualitative studies, we report the analytic approach, such as grounded theory or ethnography.

RESULTS

Of the 28 articles included in the study, 10 (36 percent) compared results for professional and ad hoc interpreters, 11 (39 percent) studied only professional interpreters, and seven (25 percent) studied the combined effect of professional and ad hoc interpreters. Of all articles, seven focused on communication and errors, 10 on utilization, four on clinical outcomes, and eight on satisfaction. One article that focused on utilization and clinical outcomes (Tocher and Larson 1998) was counted in both categories.

Locations and Settings

The majority of studies were conducted in outpatient ($n = 16$) and ED ($n = 8$) settings (86 percent). Half of the studies conducted in the ED, however, appear to derive their data from the same parent study (Baker, Hayes, and Fortier 1998; Baker et al. 1996; Sarver and Baker 2000; Derose et al. 2001). Of the four inpatient studies, two focused on obstetric wards (Parsons and Day 1992; Small et al. 1999), one each on a psychiatric hospital (Drennan and Swartz 2002), and an oncology ward (Chan and Woodruff 1999). Most of the studies were conducted in the United States (71 percent). Of the eight from outside the United States, three were from non-English-speaking countries (Switzerland

$n = 2$ [Bischoff et al. 2003a, b], and Saudi Arabia $n = 1$ [Dodd 1984]). The others were from the United Kingdom ($n = 2$) (Parsons and Day 1992; Farooq, Fear, and Oyebode 1997), Australia ($n = 2$) (Chan and Woodruff 1999; Small et al. 1999), and South Africa, where English is one of 11 official languages ($n = 1$) (Drennan and Swartz 2002).

Determination of Population Studied

The studies used a wide range of approaches to determining which of their population needed an interpreter and which did not. Methods ranged from selecting a sample from administrative data of actual interpreter use, to researchers, clerks, or clinicians reporting the patient's primary language as other than the majority language, to asking participants a standardized question. These questions varied, and usually included one or more of the following types of question: ability to speak majority language, primary language, perceived need for an interpreter.

Professional versus Ad Hoc and Professional Only

Quality of Methodology. There are 21 studies which assessed professional interpreters separately from ad hoc interpreters—10 in the *professional versus ad hoc* group and 11 in the *professional only* group. Three of these 21 studies were qualitative and 18 were quantitative, including the one randomized controlled trial in this review (Hornberger et al. 1996) (Table 1). The number of participants/encounters included in the qualitative studies ranged from 13 to 122. Two of the qualitative studies used direct audio-taped observation of clinical encounters and reviewed those tapes for errors. The third qualitative study collected data via patient focus groups and utilized grounded-theory to identify important themes.

The number of participants/encounters included in the quantitative studies ranged from 13 to 4,146. Eleven of the 18 quantitative articles (61 percent) controlled for potential confounding variables in their analyses. Eleven of the 21 articles in this category (52 percent) state clearly that the professional interpreters were trained. Among these 11 studies, one states that telephonic interpreters were trained but it is unclear if the same is true of the in-person professional interpreters used in the study (Hornberger et al. 1996), and two others state that the in-person professional interpreters were trained, but it is unclear if the same is true of the telephonic interpreters (Hornberger, Itakura, and Wilson 1997; Fagan et al. 2003). Only five articles used a standardized measure to define subjects' need for an interpreter (Enguidanos

Table 1: The Impact of Professional Interpreters on Clinical Care (N = 21)

Author (Year), Country	N	Comparison Groups	Interpreter Type (Professional Only/ Ad Hoc)	Control for Confounders (Yes/No) or Qualitative Methods	Outcome Related to Interpreters	Results Related to Interpreters (Statistical Analysis/Test)
Prince and Nelson (1995), United States	34	LEP w/ professional interpreter versus LEP w/ partial language concordance and ad hoc interpreter	In-person professional (Trained: unclear) versus ad hoc—family & friends	Qualitative— audio recordings of directly observed clinical encounters	Type and frequency of errors after ED residents attended 45-hour Spanish course	Major errors occurred during six visits, five of these were with ad hoc interpreters. Professional interpreters present at 46% of visits; no major errors during these visits. (Descriptive statistics only)
Hornberger et al. (1996), United States	49	Pediatric visits randomized to type of interpreter	In-person (Trained: unclear) versus Remote Simultaneous Medical Interpreter (Trained: yes)	No (Randomized- controlled trial)	Number of utterances and errors by modality of interpretation	10% more physician and 28% more maternal utterances ($p < .05$), and 13% fewer errors with Remote Simultaneous Medical Interpreter ($p > .05$) (t -test)
Farooq, Fear, and Oyeboade	20	Interview of LEP patients by language	In-person single interpreter	No	Mental Status Exam score	No significant differences for Mental Status Exam or family history items. (95% CI for

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Table 1: Continued

Author (Year), Country	N	Comparison Groups	Interpreter Type (Professional Only/ Professional versus Ad Hoc) Professionals Trained? (Yes/No/ Unclear)	Control for Confounders (Yes/No) or Qualitative Methods	Outcome Related to Interpreters	Results Related to Interpreters (Statistical Analysis/Test)
(1997), United Kingdom		concordant* psychiatrists versus interview of the same patients via interpreter	(Trained: unclear)		Family history items	mean differences in MSE all cross 1; percent agreement for FH items 90–100%)
Chan and Woodruff (1999), Australia	13	LEP interpreted versus LEP noninterpreted	Telephonic professional (Trained: unclear)	No	Comprehension of terminal diagnosis	Complete comprehension of diagnosis more likely when interpreter used (67% versus 30%), but not significant ($p = .5; \chi^2$)
Flores et al. (2003), United States	13	Professional versus ad hoc interpreters	In-person professional (Trained: unclear)—family & staff	Qualitative—audio recordings of directly observed clinical encounters	Clinical significance of interpretation errors	Professional interpreters made fewer clinically significant errors than adhoc interpreters (53% versus 77%; $p < .0001; \chi^2$)
Utilization						
Enguidanos and Rosen (1997), United States	48	LEP interpreted versus English speakers	In-person professional (Trained: unclear)	No	Adherence to follow-up from ED	Equal adherence rates among LEP and English speakers (71% versus 63%; $p = .76; \chi^2$)

Tocher and Larson (1998) [†] , United States	622	LEP interpreted versus English speakers	In-person professional (Trained: unclear)	Yes	HbA1C frequency Nutrition referral 12-month ED visit 12-month admit rate Total charges	LEP patients with same or better utilization rates on all measures and equal 12 month charges as English speakers (t test; χ^2 ; multiple linear/logistic regression) [§]
Tocher and Larson (1999), United States	166	LEP interpreted versus English speakers	In-person professional (Trained: unclear)	Yes	Time spent with physician Physician perception of time spent and needed.	LEP and English speakers spent same amount of time with physicians (26 minutes; $p > .05$); physicians wanted more time with LEP patients. (t -test; multiple linear regression)
Kravitz et al. (2000), United States	275	LEP interpreted versus language concordant*	In person professional (Trained: yes) versus ad hoc—family & friends	Yes	Time spent with MD	LEP patients spent more time with physicians overall; the effect was confined to follow-up visits with residents for chronic condition when professional interpreters were present (16 additional minutes for Spanish speakers $p = .005$; 10 additional for Russian speakers $p = .013$) (Zellner's seemingly unrelated regression)
Bischoff et al. (2003a, b), Switzerland	723	LEP with interpreter or full language concordant (combined)	In-person professional (Trained: yes) versus ad hoc	Yes	Referral for psychological care at the time of application for asylum	Odds of referral for psychological care higher (OR 3.2; CI 1.2-8.6) for those with adequate language concordance (nurse fluent in

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Table 1: Continued

Author (Year), Country	N	Comparison Groups	Interpreter Type (Professional Only/ Ad Hoc) Professionals Trained? (Yes/No/ Unclear)	Control for Confounders (Yes/No) or Qualitative Methods	Outcome Related to Interpreters	Results Related to Interpreters (Statistical Analysis/Test)
Fagan et al. (2003), United States	613	LEP interpreted versus language concordant	In-person professional (Trained: yes), and telephonic professional (Trained: unclear) versus ad hoc—family & friends	Yes	Time spent with clinician (provider time) & total time spent in clinic from check-in to check-out (clinic time)	patient's language or trained interpreter) compared to those with inadequate concordance (no interpreter). No difference in referral rate for those with partial concordance (nurse with some ability or ad hoc interpreter) compared to those with inadequate concordance. (multiple logistic regression)
Jacobs et al. (2001), United States	4,380	LEP interpreted versus LEP noninterpreted	In-person professional and	Yes	Preventive service rates Office visit rates	After health plan institution of professional interpreter services, existing differences

Bernstein et al. (2002), United States	500	versus language concordant LEP interpreted versus LEP noninterpreted versus language concordant	In-person professional (Trained: yes)	telephonic (Trained: yes)	No	Prescription rates Intensity of ED services ED return rate Clinic referral rate 30-day charges	decreased significantly in all three measures, but least for preventive services. (paired <i>t</i> -tests) [§] LEP with interpreters had lowest ED return rate and highest referral rate; intensity of ED services and 30-day charges closer to language concordant than noninterpreted LEP group. (<i>p</i> < .05 all comparisons; ANOVA, Kruskal-Wallis tests for charges)
Hampers and McNulty (2002), United States	4,146	LEP interpreted versus LEP noninterpreted versus language concordant	In-person professional (Trained: yes)		Yes	Mean test charge IV fluid use Length of ED visit Rate of admission	LEP interpreted patients had utilization closer to language concordant patients on all measures. (multiple logistic/linear regression) [§]

Clinical Outcomes

Parsons and Day (1992), United Kingdom	3,781	LEP interpreted versus LEP noninterpreted versus language concordant	In-person health advocates/professional interpreter (Trained: yes)		No	Instrumental delivery rate Cesarean section rate	After institution of interpreters, LEP patients had lower rates of instrumental delivery (1.4% versus 7%) and Cesarean section (11% versus 9%). Both types of deliveries increased over the same time period at a control hospital. (<i>p</i> < .001; χ^2)
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Table 1: Continued

Author (Year), Country	N	Comparison Groups	Interpreter Type (Professional Only/ Professional versus Ad Hoc) Professionals Trained? (Yes/No/ Unclear)	Control for Confounders (Yes/No) or Qualitative Methods	Outcome Related to Interpreters	Results Related to Interpreters (Statistical Analysis/Test)
Tocher and Larson (1998) [†] , United States	622	LEP interpreted versus English speakers	In-person professiona (Trained: unclear)	Yes	HbA1c, lipid, and creatinine values	LEP patients had HbA1c (8.5% versus 8.4%), LDL (132 versus 122 mg/dL) and creatinine (1.1 versus 1.2 mg/dL) values equal to those of English speakers. ($p > .5$ all compar- isons; t test; multiple linear regression)

Satisfaction

		Type of interpreter: trained professional versus untrained medical staff versus patient's family and friends	In-person professional (Trained: yes, and telephonic professional (Trained: unclear) versus ad hoc—staff, family & friends	No	Client satisfaction with quality of interpretation	Client satisfaction with quality of interpretation versus ad hoc medical staff or family and friends ($p < .001$; t - test)
Hornberger, Itakura, and Wilson (1997), United States	301					Client satisfaction with quality of interpretation
Kuo and Fagan (1999), United States	149 patients; 51 docs	LEP interpreted patients versus resident physicians	In person and telephonic (Trained: unclear) versus	No	Client and patient satisfaction with different types of interpreters	Patients and physicians had high satisfaction with professional in-person interpreters (92% versus 98%; $p = .17$), and low satisfaction with ad hoc staff (40% versus 44%; $p = .05$).

ad hoc—staff, family & friends

Patients more satisfied than physicians when family and friends interpreted (85% versus 62%; $p < .01$) and less satisfied than physicians with professional telephone interpreters (54% versus 75%; $p < .01$) (Wilcoxon Rank-Sum)

Patients using professional telephonic interpreters as satisfied as language concordant patients (77% versus 77% $p = .57$); LEP patients using ad hoc staff (54%; $p < .01$) and family and friends (49%; $p = .007$) much less satisfied than lan-

guage concordant patients both overall and on multiple communication characteristics. (χ^2 ; multiple logistic regression)

Satisfaction with the consultation process and with the doctor's respectfulness increased significantly for allophones after the intervention. ($p = .04$ and $.001$ respectively; multiple linear regression)

Patients preferred trained professional interpreters over family members due to issues of accuracy and family

By method of interpretation, patient:

Overall satisfaction with visit

Satisfaction with seven provider communication characteristics

Yes

Yes

Satisfaction w/communication before and after clinician training in working with interpreters

Preference for type of interpreter

Qualitative—patient focus groups

Telephonic professional (Trained: unclear) versus ad hoc staff, family and friends

In-person professional (Trained: yes)

In-person professional (Trained: yes)

Allophones (non-French speakers) versus language concordant

Professional interpreters versus ad hoc interpreters

Professional interpreters versus ad hoc interpreters

LEP interpreted versus language concordant

536

1,016

122

Lee et al. (2002)

Bischoff et al. (2003a, b #2), Switzerland

Ngo-Metzger et al. (2003), United States

Table 1: Continued

Author (Year), Country	N	Comparison Groups	Interpretor Type (Professional Only/ Professional versus Ad Hoc) Professionals Trained? (Yes/No/ Unclear)	Control for Confounders (Yes/No) or Qualitative Methods	Outcome Related to Interpreters	Results Related to Interpreters (Statistical Analysis/Tests)
Karliner, Perez- Stable, and Gildengorm (2004), United States	158	Clinicians with prior interpreter training versus clinicians w/o prior training	In person professional (Trained: yes) versus ad hoc— family, staff	Yes	Satisfaction with medical care provided during most recent encounter using an interpreter	dynamics. (Grounded Theory analysis) Clinicians reporting prior training on interpreter use had higher odds of being very satisfied or satisfied with their care provided than those with no prior training. (OR 2.6; CI 1.1–6.6). Clinicians with prior training also has higher odds of using a professional (rather than ad hoc) interpreter (OR 3.2; CI 1.4–7.5) (multiple logistic regression)

*Language concordant refers to encounters in which both the patient and the clinician speak the same language; this is most often English, but may be in another language in a non-English speaking country (e.g., Arabic in Saudia Arabia), or in a non-majority language (e.g., Spanish or Chinese in the United States).

†This study by Tocher et al. appears twice in this table because it addressed the impact of professional interpreters on both utilization and clinical outcomes.

§p-Values not listed because there are too many to summarize succinctly.

and Rosen 1997; Chan and Woodruff 1999; Kuo and Fagan 1999; Bernstein et al. 2002; Ngo-Metzger et al. 2003).

Impact on Clinical Care. Overall, these studies found a positive impact of professional interpreters on clinical care for patients with language barriers. The *utilization* studies, in particular, demonstrated that use of trained professional interpreters is associated with decreased disparities between patients with a language barrier as compared with patients receiving care from language concordant clinicians.

Five of these studies examined *comprehension and errors* and used varying comparison groups and examined very different outcomes. Two of the three studies which compared clinically significant errors in interpretation found that errors were much less likely when professional interpreters were used, (Prince and Nelson 1995; Flores et al. 2003) and the third found a statistically nonsignificant trend toward fewer errors with remote simultaneous medical interpretation than in-person professional interpreters (Hornberger et al. 1996). One study, however, still found a worrisomely high error rate (53 percent) for professional interpreters (Flores et al. 2003). Farooq et al. found that psychiatric interviews done using a professional interpreter resulted in the same mental status exam score and family history as did interviews done with the same patients by a language concordant psychiatrist (Farooq, Fear, and Oyebode 1997). The last error and comprehension study was a very small descriptive study by Chan et al., which indicated that inpatient cancer patients were more likely to comprehend their diagnosis if it was presented through a professional interpreter than if they were not given via any interpretation at all (Chan and Woodruff 1999).

Of the nine studies examining *utilization*, three found that use of trained professional interpreters was associated with equal adherence to follow-up from the ED, equal frequency of tests and ED visits and admissions for patients with diabetes, and equal visit lengths as English-speaking patients (Enguidanos and Rosen 1997; Tocher and Larson 1998, 1999). An additional three *utilization* articles found that use of trained professional interpreters was associated with a decrease in utilization disparities; this was true for outpatient preventive services, intensity of ED services, ED return and referral rates, and admission rates from the ED (Jacobs et al. 2001; Bernstein et al. 2002; Hampers and McNulty 2002).

Two studies examined visit length for different types of interpreters and, although both found longer visit times when interpreters were present, they

had conflicting results when comparing types of interpreters. Kravitz et al. (2000) found that the longer visit times were attributable to encounters in which resident physicians used in-person professional interpreters while Fagan et al. (2003) found that longer visit times were attributable to encounters in which ad hoc interpreters or telephonic professional interpreters were used, not those in which in-person professional interpreters were used. The last study, which assessed utilization by interpreter type, found that asylum seekers were more likely to be referred for psychological care when a professional interpreter was present (Bischoff et al. 2003a).

Likewise the two *clinical outcomes* studies found a positive association of professional interpreter use, ranging from lower rates of obstetrical interventions than when no professional interpretation was offered, to equal hemoglobin A1C, lipid, and creatinine values for diabetic LEP and English-speaking patients (Parsons and Day 1992; Tocher and Larson 1998).

The remaining six studies all found a positive association of professional interpreter use with *satisfaction*. Five found an association of higher satisfaction among clinicians and/or patients with professional interpreters than with ad hoc interpreters (Hornberger, Itakura, and Wilson 1997; Kuo and Fagan 1999; Lee et al. 2002; Ngo-Metzger et al. 2003; Karliner, Perez-Stable, and Gildengorin 2004), and one found increased patient satisfaction with communication after a clinician training in use of professional interpreters (Bischoff et al. 2003).

Professional and Ad Hoc Combined. An additional seven articles assessed the association of interpreter use with clinical care, but did not distinguish between professional and ad hoc interpreters. All of these studies show some positive association of interpreter use with improved clinical care, but several of them have mixed results (Table 2).

In one *comprehension and errors* study, Baker et al. (1996) found that although use of interpreters in the ED was associated with an improvement in patients' perceived knowledge of diagnosis and treatment, it did not alter actual knowledge, which was low for all groups. Another study, which used mixed qualitative methods, including direct observation of clinical encounters and semi-structured interviews, found that misattribution of psychiatric symptoms and diagnoses was less common for LEP patients when an interpreter was used than when none was available (Drennan and Swartz 2002). The single *utilization* study found that use of interpreters in an ED was not associated with equal rates of referral for follow-up for LEP patients and

Table 2: The Impact of Professional and Ad Hoc Interpreters Combined (N = 7)

<i>Author (Year) Country</i>	<i>N</i>	<i>Comparison Groups</i>	<i>Interpreter Type Professionals Trained? (Yes/ No/Unclear)</i>	<i>Control for Confounders (Yes/No) or Qualitative Methods</i>	<i>Outcome Related to Interpreters</i>	<i>Results Related to Interpreters (Statistical Analysis/Test)</i>
Baker et al. (1996), United States	530	LEP interpreted versus LEP noninterpreted versus language concordant*	In-person professional (Trained: unclear); ad hoc—family & friends, staff	No	Understanding of ED diagnosis of ED treatment Measured knowledge of diagnosis & treatment	LEP patients with interpreters had higher understanding of diagnoses (57%) and treatment plan (82%) than LEP without interpreters (38% and 58%); language concordant group had highest perceived understanding (67% and 86%). $p < .001$ for all comparisons. No significant differences in measured knowledge of diagnosis and treatment (low in all groups). (χ^2)
Drennan and Swartz (2002), South Africa	Not stated/ unclear	LEP interpreted versus LEP noninterpreted	In person professional (Trained: yes); ad hoc—family & staff	Qualitative— semi- structured interviews, direct	observations, chart reviews	Misattribution of psychiatric symptoms and diagnoses Misattribution less common with interpreter use. (ethnographic and discourse analyses)

continued

Table 2: Continued

Author (Year) Country	N	Comparison Groups	Interpreter Type		Control for Confounders (Yes/No) or Qualitative Methods	Outcome Related to Interpreters	Results Related to Interpreters (Statistical Analysis/Test)
			Professionals Trained? (Yes/ No/Unclear)	No/Untrained			
Utilization							
Sarver and Baker (2000), United States	714	LEP interpreted versus LEP noninterpreted versus language concordant	In-person professional (Trained: unclear); ad hoc—family & friends, staff	Yes	Referral & adherence to follow-up from ED	All LEP had lower, but not statistically significant, referral rates for follow-up than language concordant, (76% versus 75% versus 83%; $p = .05$); all patients had similar adherence to follow-up. (χ^2 ; multiple logistic regression)	
Clinical Outcomes							
Dodd (1984), Saudi Arabia	16,945	Arabic speaking versus non- Arabic speaking doctors using interpreters; (all patients Arabic speakers)	In-person professional (Trained: unclear); ad hoc—clinic nurses	No	Rates of diagnoses: Mental illness; “signs, symptoms and ill-defined conditions” Cesarean section rate	Equal rates of diagnoses for Arabic and non-Arabic speaking doctors using interpreters. (12 per 1,000 versus 14 per 1,000; $p > .1$; χ^2)	
Small et al. (1999), Australia	318	LEP interpreted versus LEP noninterpreted versus	In-person professional (Trained: unclear); ad	No	Cesarean section rate	LEP without interpreters had highest Cesarean section rates (39%); those with interpreters had rates closer	

continued

to English speakers (19% versus 24%). LEP without interpreters were twice as likely to have a c-section as those with interpreters. (OR 2.7; 95% CI 1.0–8.4) (Mantel-Haenszel odds ratio)

Satisfaction

			Yes		
Baker, Hayes, and Fortier (1998), United States	457	LEP Interpreted versus LEP noninterpreted versus Language concordant	In-person professional (Trained: unclear); ad hoc—family & friends, staff	Satisfaction with interpersonal aspects of care in the ED	Patients without interpreters had the lowest mean satisfaction score compared with language concordant patients ($p < .001$); those using interpreters had somewhat higher scores, but still lower than language concordant patients ($p = .005$). (multiple linear regression)
					Women without interpreters were less satisfied on all seven measures than those either with interpreters or with language concordance, ($p < .01$). Interpreters only slightly increased satisfaction for men. (ordered logit regression)
Derose et al. (2001), United States	599	LEP interpreted versus LEP noninterpreted versus language concordant	In-person professional (Trained: unclear); ad hoc—family & friends, staff	Gender differences in satisfaction with interpersonal aspects of care in the ED	Women without interpreters were less satisfied on all seven measures than those either with interpreters or with language concordance, ($p < .01$). Interpreters only slightly increased satisfaction for men. (ordered logit regression)
					Women without interpreters were less satisfied on all seven measures than those either with interpreters or with language concordance, ($p < .01$). Interpreters only slightly increased satisfaction for men. (ordered logit regression)

*Language concordant refers to encounters in which both the patient and the clinician speak the same language; this is most often English, but may be in another language in a non-English-speaking country (e.g., Arabic in Saudi Arabia), or in a non-majority language (e.g., Spanish or Chinese in the United States).

for patients seeing a language concordant physician; all patients, however, had similar rates of adherence for follow-up appointments (Sarver and Baker 2000). Both *clinical outcome* studies demonstrated an association of interpreter use with improved clinical outcomes. Dodd et al. (1984) showed equal rates of diagnoses of mental illness for physicians using interpreters as for language concordant physicians. Small et al. (1999) showed an association with an elimination in a disparity in Cesarean section rates for LEP patients as compared with language concordant patients when interpreters were used. Lastly, Baker et al. showed an associated increase in overall *satisfaction* among LEP patients with interpersonal aspects of care in the ED when interpreters were used, and Derose et al. showed that access to interpreters was associated with higher satisfaction for LEP women than for women with language concordant providers (Baker, Hayes, and Fortier 1998; Derose et al. 2001).

DISCUSSION

Taken as a whole, the findings of this review suggest that professional interpreters are associated with an overall improvement of care for LEP patients. They appear to decrease communication errors, increase patient comprehension, equalize health care utilization, improve clinical outcomes, and increase satisfaction with communication and clinical services for limited English proficient patients.

We examined the studies in three different groups, those that compared the effect of professional and ad hoc interpreters, those that only examined the effect of professional interpreters (compared with either a noninterpreted LEP group, another type of professional interpreter, or most commonly, a language concordant group), and those that did not separate out the effect of professional and ad hoc interpreters. We found that professional interpreters improve clinical care more than ad hoc interpreters do, and that they can raise the quality of clinical care for LEP patients to match or approach that for patients without a language barrier. Even when the effect of professional interpreters is not separated out from that of ad hoc interpreters, there is evidence for a benefit. However, the results in this group of studies are not as strong or consistent.

Weaknesses in study design and analyses make it difficult to assess the full effects of medical interpretation on provision of health care. Only a third of studies used a standardized measure to identify participants' need for an interpreter. Even among the studies using a standardized measure, several asked

about patients' primary language, but did not establish proficiency in the majority language, usually English. Thus, it is likely that the study populations included patients with varying language proficiency in the majority language, ranging from no proficiency to excellent proficiency. This variation in proficiency is likely to weaken the positive effect of interpreter use by including patients who may not have had a significant language barrier in both the interpreted and un-interpreted groups, thus decreasing any measurable difference between the groups. This is particularly true for small studies which have less statistical power to find differences in the first place. Therefore interpreters may be even more effective in improving communication and closing the gap in health disparities than the current literature suggests.

A quarter of the articles did not adequately separate the effects of different types of interpreters used, and half did not make it clear whether or not the professional interpreters in the study had undergone any training. Medical interpreting is a field in evolution, with the ongoing development of standards of practice and codes of ethics (NCIHC 2001). Currently, training ranges from several hours to more than a year; this variation may result in a wide range of competency levels among professional medical interpreters. Of course, ad hoc interpreters—such as friends, family members, secretarial or custodial staff—have no training at all and their fluency in both English and their native language is not known. Not surprisingly then, the results of the studies in which the impact of ad hoc and professional interpreters is combined are often mixed. When only professional interpreters are used, the findings are more consistent; all studies which clearly identified the effect of professional interpreters show better results with use of interpreters.

Lastly, there are analytic limitations to the literature reviewed. All but one of the included publications presented observational data (Hornberger et al. 1996), and many of the quantitative articles reviewed did not control for potential confounding in their analyses. It is possible that something other than interpreter use could have accounted for some of the differences between groups. Most of the utilization articles, however, had large numbers of patients, lending these studies enough statistical power to find differences between groups. In addition, they did control for potential confounding, and overall showed a beneficial effect of professional interpreters on LEP patients' utilization of clinical care. With the exception of preventive services, we were unable to evaluate whether each individual's use of services was medically appropriate. However, the studies did demonstrate that when interpreters were used, LEP patients' utilization rates generally approached or equaled those of English-speaking patients.

It is likely that the improved utilization and clinical outcomes are mediated by the ability of professional interpreters to overcome health communication barriers. Professional interpreters, through their experience, training, and knowledge of both medical and lay terminology are better able to communicate patients' symptoms and questions to clinicians, and clinicians' rationale for treatment and explanations of proper use of therapy to patients. Lower interpretation error rates and improved patient comprehension likely lead to greater patient acceptance of tests, adherence to follow-up and treatments, and thus improved health outcomes. However, there is a relative paucity of studies focused on either patient comprehension or clinical outcomes with adequate comparison groups, numbers, and analytic techniques.

Our review was limited by several factors. The majority of studies in our review were conducted in the United States in limited clinical contexts and our conclusions may not be easily generalized to other countries, cultures or clinical contexts. In addition, our search was conducted in English only, and ended in September 2005. While we conducted an extensive search, it is possible that we missed some articles. Of note, an update of the search strategies in January 2006 identified one additional article that met our inclusion criteria (Cohen et al. 2005). This study viewed a request for an interpreter as a marker of a language barrier, and overall found no association between the risk for serious medical events and a family's request for interpreters. However, a subgroup of Spanish-speaking families requesting interpreters had a two-fold increased risk for serious medical events compared with patients not requesting interpreters. It is possible that we have missed other important studies on this topic published in non-English language peer-reviewed journals. We are reassured that our methodology did capture three studies in non-English speaking countries, and a quarter of the reviewed studies were conducted outside of the United States.

A lack of formal cost analyses of professional interpreters in the published literature precluded us from drawing any conclusions about the cost and cost-benefits of these services. The only such study that we are aware of did find a reasonable cost to benefit ratio of implementing trained, professional interpreter services in a large health maintenance organization (Jacobs et al. 2004). There is also little research describing the costs to not providing these services. This leaves many small health care practices and organizations wondering if the benefits described in our review are worth the cost. Clearly there is a need for more research on the costs of language barriers and the cost-benefits of providing professional interpreter services.

Conclusion and Implications

Health care providers need to recognize that language barriers place LEP patients at a disadvantage that can be overcome by providing better linguistic access. Without access to professional interpreters, this large and growing population will continue to suffer differentials in both health and access to quality health care. Future research will contribute most to this area by focusing on how interpreters can decrease errors in comprehension and improve clinical outcomes, as well as studying the cost-effectiveness of these interventions.

We found that use of professional interpreters is associated with improved quality of health care for patients with limited English proficiency, and that professional interpreter use is likewise associated with a positive impact that is greater than that of ad hoc interpreters. Despite some important weaknesses in the literature, the findings suggest that provision of professional interpreter services can reduce disparities in care for LEP populations.

ACKNOWLEDGMENTS

We would like to acknowledge the following sources of funding: Health Resources Services Administration (HRSA) Fellowship Training Grant in General Internal Medicine grant #1 D14 HP 00178-01 (Dr. Karliner), Robert Wood Johnson Generalist Physician Faculty Scholars program (Dr. Jacobs), the Medicine as a Profession initiative of the Open Society Institute (Dr. Chen), and The California Endowment (Dr. Mutha).

We appreciate assistance from Gloria Won and Carol Allen in conducting the literature search. We thank Dr. Steven Bent for his review of an earlier version of the manuscript, and Indria Cooper for her administrative support.

Disclosures: The authors are unaware of any conflict of interest with regard to this manuscript.

Disclaimers: The authors are unaware of any disclaimers with regard to this manuscript.

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