

Is the use of interpreters in medical consultations justified? A critical review of the literature

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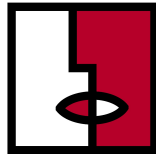
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Table of Content

1. Introduction.....	3
2. Methodology.....	3
3. Human rights.....	4
4. Equity & quality of care with professional interpreters.....	5
4.1. Equity & quality of care	5
4.2. Medical ethics and quality of professional interpreters	6
5. Satisfaction and professional interpreters.....	7
5.1. Patient satisfaction.....	7
5.2. The doctor-patient relation and implications for interpreting strategies.....	8
5.3. Health personnel satisfaction	9
5.4. Knowledge and utilization of professional interpreting services.....	9
6. Access to care.....	11
6.1. Professional interpreters and mental health.....	11
6.2. Access to preventive care.....	12
7. The medical costs of language barriers.....	14
7.1. Professional interpreters and basic health care.....	15
7.2. Test costs.....	16
7.3. Hospital admissions and length of stay (LOS)	16
8. The cost/effectiveness of language assistance in the medical sector.....	17
8.1. Diabetes in Belgium, an example.....	17
9. Conclusions.....	20
References.....	24

Is the use of interpreters in medical consultations justified?

A critical review of the literature

1. Introduction

The use of social translators and interpreters in the medical sector is a hotly debated issue. Is their use in medical consultations justified? Do interpreters substantially improve communication between medical personnel and patients with limited autochthonous language proficiency (LALP)? And, do they improve the outcome of medical consultations? Are they accepted and used by the patients and the health personnel? Are they cost-effective?

The common types of interpreters used to overcome communication barriers are:

- (1) *Professional interpreters*; i.e. persons with a formal background in translation as well as in cultural and medical competences, available either *in situ* or by telephone.
- (2) *Informal or ad hoc interpreters*; including relatives –frequently children, friends, or other persons accompanying the LALP patient- or bilingual health center staff without specific health and/or interpretation training.
- (3) *Bilingual health practitioners*; including physicians and nurses.

Currently, a variety of interventions are being employed internationally by various health care systems aimed at improving access to health care for migrant and minority groups (for a review of effective interventions see Bischoff, 2003). Among these interventions, language and communication remain the central concerns.

Interpreting services in medical care are generally considered most relevant in hospital care, including emergency units, where migrants and minority groups often first access health care (Bischoff, 2003). It is therefore understandable that most literature focuses on hospital-based studies. However, interpreting services are also relevant in other social settings such as refugee centres, primary health care (including home-based care), mental health care and clinical or epidemiological research.

The aim of this report is to review the relevant literature and evaluate the use of interpreters in health care by addressing the diversity of settings where data are currently available. The findings from this report lay the foundation for a thorough discussion on the use of interpreting services, taking into account human rights and equity as well as quality of care, patient and institution satisfaction and cost effectiveness (including the possible recovery of direct and indirect costs) for patients and/or the institutions that employ their services.

2. Methodology

The database used for this systematic literature review was PubMed. Key words were ‘interpreters’ (647 abstracts) and ‘linguistic barriers’ (364 abstracts). Out of these, 67 original research articles and 4 review papers have been selected as relevant for the review. Excluded were articles which were either not considered relevant or which did not contribute anything new to the already saturated information. The majority of research articles make reference to USA, with a focus on Spanish-speaking

communities. Most useful were the 4 review papers (Bowen, 2001; Bischoff, 2003; Flores, 2005; Jacobs *et al.*, 2006).

3. Human rights

The International Covenant on Economic, Social and Cultural Rights resolution of 1966, a UN treaty ratified by over 150 countries worldwide, and by Belgium in 1983, states in article 12 that the "The States Parties to the present Covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health", and mentions as one of the steps to be taken to achieve the full realization of this right the "creation of conditions which would assure to all medical service and medical attention in the event of sickness". "By virtue of article 2.2 and article 3, the Covenant proscribes any discrimination in access to health care and underlying determinants of health, as well as to means and entitlements for their procurement on the grounds of race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth, physical or mental disability, health status (including HIV/AIDS), sexual orientation and civil, political, social or other status, which has the intention or effect of nullifying or impairing the equal enjoyment or exercise of the right to health." The UNFPA State of World Population 2006 states that "rights to education and to health are especially critical, not only for the migrant individuals and families in question, but in the interests of receiving countries. (...) In some receiving countries, the immigrant workforce represents a substantial share of total labour force, and, consequently, the health status of migrants can have a significant impact on national economic output. (...) Failure to promote education and health-care access for immigrants and their families also carries implications for their integration. Poor educational and health status feed discrimination against migrants, and contribute to socio-economic marginalization from mainstream society".

The EU-funded initiative on Migrant-Friendly-Hospitals¹ reports from a needs assessment that "language and communication is contemplated as the most important problem area in dealing with migrant populations and ethnic minorities in clinical routine". From a human rights perspective, the improvement of clinical communication with migrant patients should receive the highest priority. In the US, title VI of the Civil Rights Act (CRA) of 1964 obligates medical caregivers to provide interpretations and translation for patients with low English proficiency. However, in practice, the CRA is largely ignored (Ku & Flores, 2005). In the UK, the Race Relations Act (1976) mentions interpreter services as a means to reduce racial discrimination (Henley and Schott, 1999).

From a human rights perspective, the improvement of clinical communication with migrant patients should receive the highest priority. Moreover, failure to promote health-care access for immigrants and their families also carries implications for their integration.

¹ www.mfh-eu.net

4. Equity & quality of care with professional interpreters

4.1. Equity & quality of care

Inequalities in health for migrant populations are often exacerbated by unequal access to medical services and comparatively poor quality of care. According to the reviewed works, such inequalities often correspond to and are exacerbated by language barriers. In this way, patients with limited autochthonous language proficiency (LALP), who according to Ku & Flores (2005), tend to be immigrants with limited access to health care and who generally make poor use of medical services,² constitute a highly vulnerable population. In this review various examples are provided which illustrate how the use of professional interpreters can significantly improve both quality of care and equity of care for LALP patients.

The literature demonstrates how linguistic barriers have negative implications for quality of care. In a study by Derosé and Baker (2000) in the US, Latinos with poor or no English proficiency reported around 22% fewer physician visits than non-Latinos with native language English after adjusting for other determinants. The effect of limited language proficiency was similar to the effects of having poor health, no health insurance or no regular source of care. Weinick and Krauss (2000) also suggest that the frequently observed finding in which Spanish children are less likely to have a regular source of care is due more so to language barriers than to cultural factors.

Moreover, persons with LALP, when compared to the autochthonous population, were more likely to receive palliative care of lower quality (Chan & Woodruff, 1999) and LALP patients who were *not* assisted by an interpreter or who were assisted by an *ad hoc* interpreter did not receive the same level of service as did their ALP counterparts (Jacobs *et al.* 2006; Flores, 2005; D'Avanzo, 1992; and Chak *et al.* 1984). One study carried out in the Emergency Department of a US hospital (data set of 500 patients) (Bernstein *et al.*, 2002) showed that LALP patients without an interpreter received a poorer quality of service –they received less medication, had fewer tests done and spent less time in the ED– than did the LALP patients who were assisted by an interpreter or the ALP patients of similar clinical and socio-demographic characteristics.

Furthermore, the reviewed works also state that LALP patients show less comprehension of the diagnosis, of the prognosis, of the therapy and of the received care than does the autochthonous population (Flores, 2005; Jacobs *et al.*, 2006). They also follow therapeutic recommendations less often and attend fewer follow-up visits (Bernstein *et al.*, 2002; Hampers & McNulty, 2002; Flores, 2005; Jacobs *et al.*, 2006). And fewer follow-up visits after discharge from the hospital are scheduled for this category of patient (Sarver & Baker, 2000).

Poor adherence to follow up visits and treatment regimes, often attributed to poor comprehension on both sides, can lead to costly complications of the disease. Various studies show the direct relation between lack of adherence and language barriers (David and Rhee, 1998; Crane, 1997). However, this is not only due to the obvious difficulties in obtaining accurate information but also because *good communication can be a source of motivation, reassurance and support as well as an opportunity to clarify expectations* (Kaplan *et al.*, 1989; Bowen, 2001).

In contrast, *the literature clearly shows that LALP patients who were assisted by a professional interpreter generally received the same or similar quality of care and*

² In the US, these are mainly Latin Americans and Asians, with an average medical spending of between 20% and 60% below that of the “white” population (Ku & Flores, 2005).

shared a comparable level of satisfaction as did patients with autochthonous language proficiency (ALP) (Flores, 2005). Moreover, a study by Tocher & Larson (1999) shows that a higher percentage of patients with professional interpreters were followed-up according to the guidelines of the American Diabetes Association, and that they had even more diabetic consultations than did ALP patients.

4.2. Medical ethics and quality of professional interpreters

Linguistic barriers make errors in translation more probable. According to the literature, such errors occur above all with *ad hoc* interpreters. They consist primarily of errors of omission (about frequency and duration of treatment, about allergies and side effects caused by drugs, about dosages, and about relevant data in the patient history) and miscommunication leading to the volunteering of incorrect information both on the side of the physician and on that of the patient (Flores *et al.* 2003, Flores, 2005). *Ad hoc* interpreters also tend to add information for clarification (often undermining the patient's own information), are likely to present their own personal opinion (Flores *et al.* 2003) or to omit questions they consider embarrassing (Flores, 2005). Laws *et al.* (2004) studied transcriptions of clinical interviews by interpreters (Spanish/English) who lacked the appropriate training. They found that 66,1% of translated conversation segments had substantial errors of translation, omissions or simply were not translated. In a similar study, Elderkin-Thompson *et al.* (2001) detected 52% of translation errors affecting the interpretation of symptoms and the credibility of the patients.

As will be developed further in a following section, such errors in translation can lead to increased costs for the patient and medical institution, not to mention can compromise the health of the patient. For instance, *clinical errors can lead to greater costs due to higher patient return rates, more emergency department visits, wrongful injury or death-law suits* (Lee *et al.*, 2005). In a children's hospital in the US, linguistic barriers resulted in more errors of medication and diagnosis, and even in the confusing of two patients (Cohen *et al.* 2005). Also in another study, 63% of translation errors had potential clinical consequences (Flores *et al.* 2003).

In the above mentioned study by Flores *et al.* (2003) about translation errors, the authors show that professional interpreters also make errors with potential medical consequences, albeit less frequently and with fewer adverse implications than *ad hoc* interpreters. One risk described by Hsieh (1982) is that professional interpreters can act as co-diagnosticians in their intent to bridge cultural differences and save time for the physicians. A minor, but also important problem, described for English/Spanish translations in a US hospital (Aranguri *et al.*, 2006) is when professional interpreters opt not to translate the 'small talk', which may be irrelevant in clinical terms, but important for the physician-patient dynamic. The authors therefore suggested training the interpreters in communication strategies.

Good preparation of professional interpreters is indeed an important prerequisite for the health service to function adequately and to minimize translation errors. Training professional interpreters is particularly relevant for complex and delicate issues such as cancer in children (Abbe *et al.*, 2006), mental health in refugees (Miller *et al.*, 2005), and for technical terms that do not have a clear equivalent in the language of the patient, e.g. diabetes in English-Navaho translation (McCabe *et al.*, 2006).

Nevertheless, due to their training, professional interpreters remain the best option to optimise good communication between health personnel and patients as well as to comply with medical ethics.

(1) *Informed consent*. Professional interpreters are the best option to maximise comprehension of *informed consent* for LALP patients (i) when participating in clinical trials or other medical research (Simon *et al.*, 2006; McCabe *et al.*, 2005); and, (ii) in other contexts that require the informed consent of the patient or his/her legal representative (e.g. when undergoing diagnostic tests, treatments and surgical interventions) (Betancourt & Jacobs, 2000).

(2) *Confidentiality*. Professional interpreters protect the patient's right to *intimacy* and *confidentiality* more so than do *ad hoc* interpreters (even when they are relatives or friends accompanying and/or volunteered by the patient) (Juckett, 2005). Institutional protection of intimacy is particularly relevant in sensitive health issues, such as sexual and reproductive health (Betancourt & Jacobs, 2000; Davis & Bath, 2002). Karlsen & Haabeth (1998) emphasized the ethical advantage of telephone interpreting services, as it guarantees anonymity of the patient and reduces his/her fear of becoming a victim to rumours, thereby reducing the risk of occulting relevant information.

In this way, though professional interpreters may themselves make errors in translation, omit information, and affect the practitioner-patient relation, they remain the best option (i) to minimize errors of translation which may have clinical consequences; (ii) to facilitate informed consent and (iii) to ensure the confidentiality of the patient.

- Persons with LALP, when compared to the autochthonous population, were more likely to receive palliative care of lower quality and LALP patients who were *not* assisted by an interpreter or who were assisted by an *ad hoc* interpreter did not receive the same level of service as did their ALP counterparts.
- Patients with LALP, when compared to ALP patients, are more likely to become victims of inadequate treatment and medical errors.
- LALP patients, when compared to ALP patients, exhibit less comprehension of diagnosis and treatment, and adhere less frequently to treatment or follow-up visits.
- Professional interpreters:
 1. Increase comprehension of medical recommendations.
 2. Reduce risk of medical errors related to incorrect translations.
 3. Increase trust and motivation (and therefore can increase adherence).
 4. Are the best option to maximise comprehension of *informed consent* and to ensure *confidentiality* for LALP patients.

5. Satisfaction and professional interpreters

5.1. Patient satisfaction

As expected, all studies show a higher level of satisfaction by LALP patients when assisted by an interpreter during the medical encounter than those without access to an interpreting service. The order of satisfaction per type of interpreter is, on the whole, as

follows: (1) Professional interpreters (*in situ* or by telephone) and bilingual physicians were most valued. Patients' satisfaction was comparable to that of ALP patients; (2) *Ad hoc* interpreters were less highly ranked; and (3), in the absence of interpreters, the medical encounter was least satisfactory (Lee *et al.* 2005; Flores, 2005).

A satisfaction study in an emergency department (ED) in the US (including 2'333 patients) showed that LALP patients who were assisted by professional interpreters exhibited a higher willingness to return to the same ED in case of new problems than those who were not assisted by an interpreter (Carrasquillo *et al.*, 1999). Other studies also show an increase in satisfaction when professional interpreters were used (Ku & Flores, 2005; Bischoff & Grossmann, 2007). The literature goes on to show that the use of professional interpreters increases trust as well as satisfaction and reduces the risk of health problems related to language barriers (Ku & Flores, 2005; Bischoff & Grossmann, 2007).

5.2. The doctor-patient relation and implications for interpreting strategies

Despite the fact that in general professional interpreters were the mostly highly ranked in terms of patient satisfaction, the interpreter-patient and the doctor-interpreter-patient relation also seem to play an important role in satisfaction. Various factors influence satisfaction with the health encounter such as the gender, ethnicity, age, etc. of the patient and the practitioner. However, these factors also play an important role in determining which interpreting strategies are more appropriate in certain situations.

In the literature several examples were found in which demographic factors affected both the preferred interpreting strategy and general satisfaction with the health encounter. For instance, Asian-American patients (Chinese and Vietnamese) preferred professional interpreters, but of their own sex, to *ad hoc* interpreters (relatives) (Ngo-Metzers *et al.*, 2003). On the contrary, a study carried out with Latin American immigrants (including 149 patients) in the US suggests that for sensitive or embarrassing issues, patients prefer bilingual physicians or *ad hoc* interpreters (relatives or friends) to professional interpreters *in situ* or by telephone. However, the physicians that participated in the study (51, with 62% of satisfaction rate) felt more dissatisfied with *ad hoc* interpreters than did their patients (85% of satisfaction rate) (Kuo & Fagan, 1999). Another study, also with Latin Americans, in a paediatric emergency department, showed greater satisfaction of LALP patients with professional interpreters *in situ* than with interpreting services by telephone or *ad hoc* interpreters (García *et al.*, 2005).

Chen (2006) shows the communication problems which arise from concrete social relations in the case study of a Yemeni woman whose husband served as interpreter -limitations which were solved when the husband was substituted by a female professional interpreter. Similarly, a repeated complaint of Spanish nurses is that Maghreb women attend medical centres accompanied by male relatives/interpreters, usually their husbands a situation which often causes profound inconveniences to health professionals as the husbands respond in place of the wives (author's unpublished observation). Even professional interpreters, themselves, do not always receive a positive valuation. A study carried out in England shows that 11% of patients perceived the attitudes of certain interpreters unacceptable (aggressive, rude) (Brooks *et al.*, 2000). These examples suggest that satisfaction with the medical encounter and the effectiveness of the interpreting strategy are often determined by the individual problems and specific social circumstances of each patient.

5.3. Health personnel satisfaction

It is important to take into account that satisfaction resulting from different interpreting strategies is not necessarily the same for physicians as it is for patients. For instance, the physicians of a hospital in the US showed a higher level of satisfaction than did their Spanish-speaking patients when assisted by telephone interpreting services, while the latter showed greater satisfaction with *ad hoc* interpreters than did the physicians (Kuo & Fagan, 1999). Translation through a remote-simultaneous interpreting system was the preferred strategy of the physicians in the study by Hornberger *et al.* (1996). The interpreters who participated in the study also considered that doctor-patient communication using a remote system improved, though they themselves felt more comfortable with *in situ* interpreting. Nonetheless, according to Migrant Friendly Hospital, whether *in situ* or by telephone, health personnel generally see the importance of professional interpreters.

It should be noted, however, that low satisfaction with the health encounter on both the patient and practitioner side can additionally have serious consequences for treatment itineraries. The literature shows that linguistic barriers negatively affect mutual attitudes of health professionals and patients (Schlemmer & Mash, 2006) and this dissatisfaction with the medical encounter and lack of confidence resulting from poor comprehension tend to lead to unnecessary use of medical resources, i.e. repeated medical visits to different health professionals or medical centres for the same problem (author's unpublished observation), increasing the patient's and/or public institutions' direct and indirect medical costs. Contrarily, the presence of interpreters was found to improve communication between LALP patients and health professionals and to increase the number of questions posed to the health professional (Hornberger *et al.* 1996; Green *et al.*, 2005) minimising the likelihood of miscommunication.

It is, therefore, important to remember that mutual understanding between doctors and patients is a basic pillar of any medical encounter. If this pillar fails, the quality of care can diminish considerably, negatively affecting patient and practitioner satisfaction, confidence in the health encounter, and the health status of the patient.

5.4. Knowledge and utilization of professional interpreting services

Despite a favourable evaluation of professional interpreters, in practice health personnel do not always -or even frequently- make use of their services. For instance, in spite of the positive rating of interpreting services, Swiss physicians interviewed by Bischoff & Grossmann (2007) did not consider interpreting services by telephone to be a priority, and Burbano *et al.* (2003) suggest that the perception of 'time lost' searching for an interpreter can be an important reason for *not* using *in situ* or telephone interpreting services. Additionally, interpreting services by telephone were perceived to be awkward and cumbersome (Bischoff & Grossmann, 2007).

Health professionals also tend to be highly concerned with the time spent on a consultation when the intervention of an interpreter is required; therefore their perception of time lost can influence their use of interpreting services. Hampers & McNulty (2002) calculated that LALP patients with professional interpreters spent an average of 16 minutes longer in consultations than ALP patients and Kravitz *et al.* (2000) showed an average of respectively 12.2 and 7.1 minutes more consultation time spent on Spanish-speaking and Russian-speaking patients assisted by a professional interpreter than on ALP patients. However, Jacobs *et al.* (2006) and Flores (2005) argue

in their respective bibliographies that the reviewed studies do not allow any clear conclusions to be reached. In another study, Tocher & Larson (1999) did not find significant differences in time of consultation between LALP patients assisted by a professional interpreter and ALP patients.

In an Out Patient Department of a hospital in the US, Fagan *et al.* (2003) compared the duration of consultations of different strategies: telephone interpreters (36.3 min. mean provider time; 93.6 min. clinic time); *ad hoc* interpreter organised by the patient (34.4 min mean provider time; 92.8 min. clinic time); *in situ* professional interpreter (26.8 min. mean provider time; 91.0 min. clinic time); and ALP patients (28.0 min. mean provider time; 82.4 min. clinic time). However, despite relatively comparable times of consultations for ALP and LALP patients, health professionals perceived that more time was spent with LALP than with ALP patients.

An important obstacle to the use of interpreting services is that even when interpreting services are available, they are either unknown to the health professionals or undervalued (and thus underutilized). For example, a study by Heaney & Moreham (2002) showed that in Australia, a country which has access to a solid telephone interpreting system, there is an under usage of professional interpreters and an over reliance on *ad hoc* interpreters. Another study, carried out with physiotherapists in Australia, indicates that they tend not to utilize interpreting services because they consider them expensive, distrust them and believe that they increase the consultation time (Lee *et al.*, 2005).

In the above mentioned study by Burbano *et al.* (2003), the authors show that even when a hospital (in the US) employs an interpreting service, the physicians prefer to rely on their own, often limited, Spanish skills, request help from other professionals with good Spanish proficiency or rely on the help of relatives with English proficiency. The physicians, however, are well aware of (i) the additional time and work load that this causes for other professionals requested for interpreting who temporarily abandon their own work; (ii) the problems associated with reliance on *ad hoc* interpreters, especially when they are children; and, (iii) the benefits of using professional interpreters.

These results demonstrate the need to promote interpreting services even where they are available, to show their relevance in health encounters and to train health professionals as to their use. According to Hudelson (2005), health professionals need to be shown that linguistic and cultural interpreting is an essential instrument for adequate clinical practice and they need to be made aware of the risks of poor comprehension and communication errors (e.g. formal complaints/litigations) (Lee *et al.*, 2005). Health professionals who received training in the use of interpreting services were shown to employ them more frequently and to be more satisfied with the results (Gerrish *et al.*, 2005; Karliner *et al.*, 2004). Nevertheless, the use of professional interpreters -both *in situ* and telephone interpreting services- requires not only the recognition of their utility but also a well integrated institutional structure which facilitates prompt access to different available strategies and the continuous assessment of their need (Bischoff *et al.*, 1999a).

- LALP patients exhibit a higher level of satisfaction when assisted by a professional interpreter during the medical encounter than those without access to an interpreting service.
- LALP patients who were assisted by professional interpreters exhibited a higher willingness to return to the same ED in case of new problems than those who were not assisted by an interpreter.
- Linguistic barriers negatively affect mutual attitudes of health professionals and patients (Schlemmer & Mash, 2006) and this dissatisfaction with the medical encounter and lack of confidence resulting from poor comprehension tend to lead to unnecessary use of medical resources.
- Although health staff generally evaluates professional interpreting services positively, in practice their utilization of these services is often limited by the perceived 'time loss' and inconvenience of activating them. In order to overcome such barriers and facilitate their daily use, it is necessary that health professionals are well informed about the available interpreting services and their different modalities and for the health system to properly integrate them into the institutional structure.
- Satisfaction with the medical encounter and the effectiveness of the interpreting strategy are often determined by the individual health problems and specific social circumstances of each patient.

6. Access to care

6.1. Professional interpreters and mental health

The presence or absence of professional interpreters in mental health consultations has shown to have significant implications on the health encounter for LALP patients. *Mental health problems become more difficult to explain and are a more complex issue when access to health services is limited.* The difficulty of interpreting symptoms expressed in other 'cultural idioms' increases with the linguistic difficulty (Ku & Flores, 2005) and is particularly relevant in cases of psychological distress (Rosenberg *et al.*, 2006) or when symptoms are presented in a complex way (Rueda-Lara *et al.*, 2003). Various studies indicate that *language barriers prevent people from acceding mental health or discourage the use of mental health services* (Bowen, 2001; Trauer, 1995; Stuart *et al.*, 1996; Roberts and Crockford, 1997). A study by Drennan (1996) in a psychiatric hospital in South Africa showed that the absence of interpreters was associated with delayed visits (in 40% of the cases), with missed scheduled visits, with delay in starting treatment and with delay in patient discharge. Ad hoc interpreters, on the other hand, were associated with loss of information, the need for repeated encounters and uncertain diagnosis.

Linguistic barriers played a fundamental role in the expression and comprehension of symptoms and referrals by asylum seekers in Switzerland (Bischoff *et al.*, 2003). From

the interviews carried out among 723 asylum seekers in 1998, 19% reported severe physical and psychological symptoms while 63% reported traumatic experiences before migration. In cases of 'poor' communication, the number of physical and psychological symptoms reported was 2 to 3 times less than with cases of perceived 'good' communication. The presence of trained interpreters was associated with high levels of symptom reporting, both physical and psychological, whereas the presence of *ad hoc* interpreters was associated with higher reporting of physical symptoms, but with significantly lower percentages of psychological symptoms. The complete absence of interpreters was associated with limited reporting of symptoms, both physical and psychological. Accordingly, adequate language concordance and communication, in contrast to deficient language concordance, allowed for higher reporting of traumatic events and of severe psychological symptoms, permitting a higher percentage of people to be referred to the appropriate specialists.

In practice, health staff is more likely to recur to interpreters in cases of psychological distress due to the complexity of the symptom description by the patient. A study carried out in Switzerland (Blöchliger *et al.*, 1997) shows that more interpreters were used when psychological/psychosocial problems were diagnosed than for purely somatic illnesses. The authors suggest that this may be due to the following factors: (i) if a patient suffers from a psychological/psychosocial problem it is more likely that the health professional or the patient him/herself will seek the presence of an interpreter; (ii) if an interpreter is present, it is more likely that a psychological/psychosocial problem is detected. In this study, neither physicians nor patients perceived any inconveniences with the use of *ad hoc* interpreters, unless these were children. Moreover, in a hospital in the US, Asian American LALP patients assisted by professional interpreting services posed even more questions to physicians about their health and about mental health problems than did ALP patients (Green *et al.*, 2005). In this way, the use of professional interpreters both allows for better communication of complicated symptoms, specifically in relation to psychological or psychosocial problems, and is generally well received by both health staff and LALP patients.

6.2. Access to preventive care

Although linguistic barriers are not the sole cause for discrepancies in access to medical services, there is significant evidence that the use of interpreters improves health service utilization, especially in preventive medicine, specialised treatments and obstetric care (Bischoff *et al.*, 2003; Flores, 2005; Jacobs *et al.*, 2006). The reviewed literature shows that interventions aimed at facilitating linguistic communication increase the number of LALP patients who undergo tests for early cancer detection. In a study carried out in three clinics in Wales, the introduction of professional interpreting services increased the proportion of women who were screened for breast cancer by 16% (Bell *et al.*, 1999). A study in the US by Fox and Stein (1991) showed that language use (English versus Spanish) was strongly correlated with whether the physician discussed mammography with the woman or not. Analyses showed that the most important variable that predicted whether women of all racial groups had a mammogram, at any time or within the last year, was whether their doctors had discussed mammography with them. Hispanic women, (more than half of which over the age of 50 had never had a mammogram) however, were less likely to have physicians who discussed screening with them even though they reported that they were just as motivated as other women to get a mammogram if their doctor made a referral. The data therefore suggests that, due

to the fact that Hispanic women were less likely to speak English, they were less likely to have the topic of mammography discussed with them which, consequently, reduced their access to preventive screening.

By contrast, a number of studies show that introducing interpreters increases LALP patients' use of preventive medicine. In a US hospital, LALP patients assisted by ad hoc interpreters had even more mammography screenings than ALP patients (78% vs. 60%) (David & Rhee, 1998). A qualitative study by Naish *et al.* (1994) concluded that women were interested in cervical screening programmes provided they understood the test and procedures. In this way, language and administration were cited as the main barriers to participation in cervical screenings as opposed to lack of interest, though the latter was reported by physicians as being the primary barrier. Likewise, Marks *et al.* (1987) showed in a study of health behaviour of elderly Hispanic women, that the use of English rather than cultural factors were associated with increased use of screening programmes and Solis *et al.* (1991) found that language ability predicted the use of screening services.

In the study by Jacobs *et al.* (2001), the introduction of interpreting services significantly increased the number of visits by LALP patients to physician recommended preventive services, as well as increased the number of doctor's visits and written prescriptions. These results strongly contrasted with those of the control group and LALP patients without professional interpreting services. And, according to the authors, the costs increase due to interpreter use was moderate. *The authors further suggested that increased use of and access to preventive measures (facilitated by the presence of interpreters), can reduce costly future medical complications.* And, according to Bowen (2001), initial barriers to health services can result in (i) decreased initial costs but increased costs of care at later stages of illness, while (ii), obstacles to the health system may result in an over usage of some services, due to communication barriers and lack of knowledge of the health system (Bowen, 2001). Presently, however, no specific data are available to support or refute this supposition.

- Individuals with LALP have fewer possibilities to access health services, have limited access to preventive care and have fewer possibilities to receive medical check-ups on time when compared to the autochthonous population.
- There is solid evidence that by using professional interpreters, LALP patients approximate ALP patients in health care utilization and quality of care.
- The use of interpreters improves access to preventive services and mental health, *reducing costly future medical complications.*
- The use of professional interpreters also allows for better communication of complicated symptoms which allows LALP patients to be more efficiently referred to the appropriate specialists (singularly important in terms of mental health).
- Initial barriers to health services can potentially result in (i) decreased initial costs but increased costs of care at later stages of illness, while (ii) obstacles to the health system may result in an over usage of some services, due to communication barriers and lack of knowledge of the health system

7. The medical costs of language barriers

Language barriers can increase medical costs in two main ways: (1) they increase the risk of medical errors and complications of the disease (fig. 1); and (2) they can produce unnecessary costs (fig. 2).

Fig.1. Complications of the disease

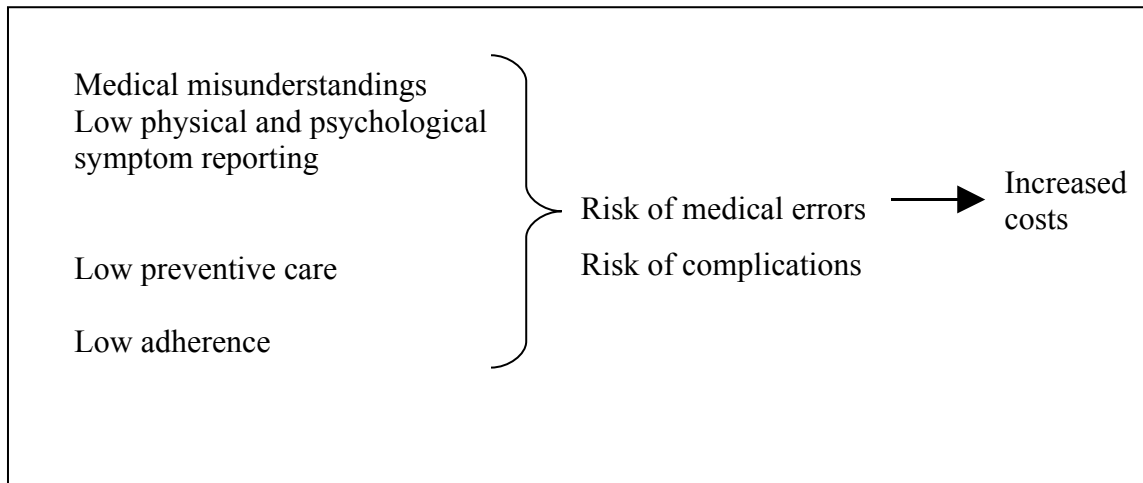
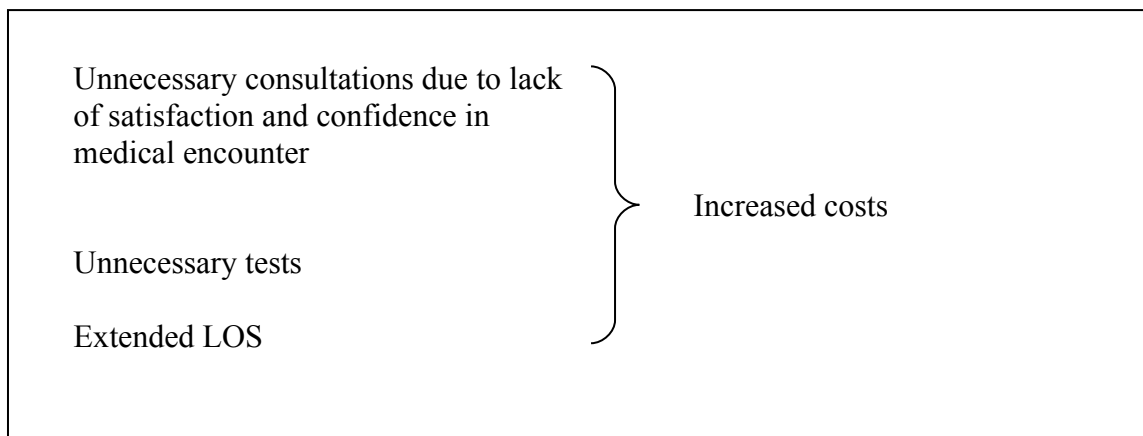


Fig.2. Unnecessary costs



Although there is no specific data available on medical costs related to complications due to linguistic barriers, or on the economic burden of medical complications, (particularly related to diseases such as cancer, diabetes, heart pathologies or psychological disorders), the reviewed literature (see previous chapters) shows that the use of professional interpreters (1) increases the use of preventive care by LALP patients (David & Rhee, 1998; Jacobs *et al.*, 2001; Marks *et al.*, 1987); (2) improves symptom reporting and comprehension (Bischoff *et al.*, 2003; Blöchliger *et al.*, 1997); (3) decreases the risk of dangerous misunderstandings and errors of translation (Flores, 2005); and, as will be seen directly, (4) increases access to basic care (Bernstein *et al.*, 2002). As has been (and will be) shown in the various chapters, these elements all have

significant implications for costs to the health provider and patient. Furthermore, as Jacobs *et al.* (2004) suggest, the costs to the health system for contracting professional interpreters is reasonable (in terms of cost/effectiveness) in the context of general medical costs³.

7.1. Professional interpreters and basic health care

Surveys of patient reported barriers to health care often identify language as the greatest, or one of the greatest, barriers to care, even in countries with pronounced financial barriers to care, such as the United States (Bowen, 2001). In a study by Hu and Covell (1986) at five outpatient clinics in San Diego County, California, the use of health services, (preventive appointments being the most affected), the use of health insurance, hospital admission and frequency of general physical, eye and dental examinations were positively correlated with increased use of English. *Interestingly, the authors noted a stronger correlation between primary language usage and health care utilization than between income and health care utilization.*

As mentioned earlier, studies show that LALP patients who are assisted by interpreters enjoy the same or similar quality of medical service as do ALP patients; however the level of service for LALP patients without professional interpreters or with *ad hoc* interpreters remains lower than that of the ALP cohort (Jacobs *et al.* 2006; Flores, 2005). One study carried out in an Emergency Department of a US hospital (Bernstein *et al.*, 2002) goes on to show that when provided with an interpreter quality of care goes up while costs remain minimal. Average costs, including the patient's first visit, patient costs when admitted and follow-up costs for up to 30 days– were \$5,305 for the LALP group without a professional interpreter; \$7,584 for the LALP group with a professional interpreter; and, \$8,724 for the ALP group. According to the study's authors, the "use of trained interpreters was associated with increased intensity of ED services, reduced ED return rate, increased clinic utilization, and lower 30-day charges, without any simultaneous increase in LOS (length of stay) or cost of visit". These data indicate that access to medical resources and service quality for LALP patients improved considerably when professional interpreters intervened, with an approximation of LALP to ALP patients. *Moreover, though the use of professional interpreters considerably improved in terms of equity, there still remained a difference of \$1,640 in patient costs between the LALP group with interpreters and the ALP group.* In other words, for a similar level of service, LALP patients who were assisted by professional interpreters accrued fewer costs than their ALP counterparts.

In addition to fostering greater utilization of medical services, greater linguistic/cultural sensitivity decreases confusion between health staff and patients -sidestepping the consequent delays and the supplementary diagnostic tests that arise from such miscommunication- and therefore allows patients to more promptly and accurately be referred to adequate specialists (social workers, psychologists) (Helman, 2007).

³ For example, in the US annual Medicaid expenditures in 1996 for persons with mood disorder, diabetes or heart disease were \$1957, \$1563, and \$2328, respectively. Compared with these Medicaid expenditures, the expenditure of \$279 per person per year for interpreter services was reasonable, especially because interpretation improved patient's utilization of preventive and primary care services that potentially may reduce costly complications of these and other conditions (Jacobs *et al.* 2004: 868).

7.2. Test costs

In cases of poor communication during the medical encounter, the practitioner has to consider a wide spectrum of differential diagnoses (Woloshin *et al.*, 1995) and therefore needs to obtain further assurance of the diagnosis by ordering more tests than he/she would in medical encounters with good linguistic concordance (detailed case studies in Chen, 2006; Ku & Flores, 2005). In addition to a greater number of diagnostic tests, linguistic barriers also increase the possibility of being hospitalised and of receiving treatment in cases when it might be unnecessary. The study by Hampers *et al.* (1999) – carried out in the paediatric emergency department of a US hospital, including 2'467 patients, of which 209 were LALP patients– shows an increase both in test costs and in time spent in the emergency department when linguistic barriers were present. For patients with linguistic barriers, the average test costs were \$145 per patient, and the average time spent in the emergency department was 165 min. per patient while in cases of communication without linguistic barriers average test costs decreased to \$104 and time spent was 137 min.

A similar study published three years later by Hampers & McNulty (2002), including 4'146 visits at a paediatric emergency department, of which 550 were LALP patients⁴, showed that, when compared to the ALP cohort, LALP patients without a professional interpreter had higher test costs (+\$5.78). In contrast, LALP patients with an interpreter and those assisted by a bilingual practitioner showed almost no difference in test costs. LALP patients without a professional interpreter were also more likely to receive intravenous hydration (OR 2.2) than those with an interpreter, those assisted by a bilingual practitioner or ALP patients.

7.3. Hospital admissions and length of stay (LOS)

The difference in hospital LOS for LALP patients without interpreter, LALP patients with professional interpreter and ALP patients has significant implications for cost effectiveness, especially if longer LOS is due primarily to poor communication rather than the various diagnoses of the patients. The already mentioned study by Hampers and McNulty (2002) demonstrated that, when compared to ALP patients, LALP patients with an interpreter were more likely to be admitted (OR=1.7). However, LALP patients without interpreter were even more likely to be admitted (OR=2.6).

A retrospective analysis carried out with 44.983 patients admitted between 1993 and 1999 to three Canadian hospitals (John-Baptiste *et al.*, 2004) showed that LALP patients (n = 6.124) were admitted for a longer period of time than ALP patients (n= 38.859) for 7 out of 23 medical and surgical conditions: Unstable coronary syndromes (ALP 3.9 days; LALP 5.0 days); diabetes (ALP 6.4 days; LALP 8.2 days); stroke (ALP 12.1 days; LALP 15.7 days); coronary artery bypass grafting (ALP 8.4 days; LALP 9.0 days); craniotomy procedures (ALP 6.8 days; LALP 7.9 days); elective hip replacement (ALP 7.5 days; LALP 8.5 days); and, major intestinal and rectal procedures (ALP 10.5 days; LALP 11.5 days). In total, LALP patients remained hospitalized 0.5 days (6%) longer than ALP patients. This difference is considerably higher for diabetes (additional 1.8 days) and stroke (additional 3.6 days). Notably, the same study showed no significant statistical difference in intra-hospital mortality between the two groups.

⁴ Study realised at the paediatric emergency department; 150 encounters with a bilingual physician, 239 encounters assisted by a professional interpreter, and 141 encounters with linguistic barriers where it was not possible to have access to an interpreter.

However, as a limitation, data on interpretative services was not routinely recorded, and researchers therefore could not assess whether LALP patients were assisted by *ad hoc* or professional interpreters, or whether they were not assisted by any interpreters. To explain LOS differences between LALP and ALP patients, John-Baptiste and colleagues suggested three hypotheses: (1) Processes of care (complications, number of procedures, and time to procedure) may be altered when a patient has LALP; (2) the quality of the inpatient care for LALP patients may be compromised, leading to longer recovery times and prolonged LOS; and (3) communication aids may also lead to longer LOS if such services take time to access.

- Patients with LALP accrued fewer costs than their ALP counterparts in terms of basic health care while receiving a similar level of service.
- Patients with LALP, when compared to ALP patients, are more likely to receive unnecessary protective actions, such as diagnostic tests and therapeutic interventions to exclude erroneous diagnoses.
- Patients with LALP are more likely to be admitted and tend to have prolonged hospital stays (LOS) when compared to the ALP cohort.

8. The cost/effectiveness of language assistance in the medical sector

8.1. Diabetes in Belgium, an example.

A study by Hertog & Van Gucht (2003) on language barriers in Belgian hospitals estimates that *1 out of every 2 people of immigrant origin ('allochtonen', 'allochtones', or person not having the Belgian nationality at birth) faces linguistic barriers in Belgian hospitals.* In a needs assessment of interpreter services in the medical sector by Cofetis-Fosovet (forthcoming), 73% of medical staff stipulates that linguistic barriers have a negative influence on the quality of care while 59% assert that language assistance is indispensable in their profession.

Diabetes in Belgium

Latest estimations calculate around 550.000 diabetes patients in Belgium (around 5% of the total population). However, there are no exact data on the current number of non-Belgian (or non-Belgian born) diabetes patients. If we assume the following: (i) that the proportion of non-immigrant and immigrant population in Belgian society holds for the diabetic patient demographic (approximating between 10.2% and 13.7% of all diabetes patients of immigrant origin); and (ii) that roughly 1 out of 2 of those face linguistic barriers in Belgian hospitals, *then this would give us between 28.000 and 38.000 diabetic patients facing linguistic problems and, as such, having higher risks of medical complications and greater chances for longer lengths of hospital stays (LOS).*

The importance of linguistic barriers for diabetes care

Lowering blood glucose significantly reduces the risk for costly complications of diabetes⁵, such as diabetic foot, retinopathy, and kidney and heart diseases. Prevention and systematic monitoring to adjust therapeutic measures are the most cost-effective strategies for diabetes control. However, diabetes control is complex because it involves both self-care by the patient and the provision of adequate care by health providers (Chin *et al.*, 2001:273). It requires health education (including information on the disease itself, diet, exercise, home glucose monitoring, insulin or oral anti-diabetic drug administration, self control of complications, etc.) and regular follow-ups. For both health education and follow-ups good communication between the patient and the practitioner is essential.

Therefore, if not adequately addressed, language barriers can create barriers to care. For example, in a study in the US 60% of patients with type I diabetes (insulin-dependents) and 67% with type II diabetes (non-insulin-dependents) reported practising self monitoring of blood glucose less often than recommended. Multivariate analysis revealed that language difficulties were a significant predictor of less than optimal testing (Karter *et al.*, 2000).

Hypothetical cost comparison⁶ examples

1. Medical complications

At the European level, it is estimated that 72% of diabetes patients (DM type II) have at least one complication (Williams, 2002), and between 3% and 8% of diabetic patients have a diabetic foot⁷ (Apelqvist & Tennvall, 2005). Van Acker (2001:13) defines “diabetic foot” as a “diversity of foot abnormalities, resulting from a combination of peripheral polyneuropathy, peripheral vascular disease, limited joint mobility and other consequences of metabolic disturbances, which mostly occur in the lower limbs of patients suffering from diabetes mellitus (...) These abnormalities can lead to infection, ulceration and/or destruction of deep tissues, and in a last stage, to amputation”. Up to 20% of the total costs in diabetes⁸ can be attributed to diabetic foot, and more than 70% of these costs are accrued after amputation (Apelqvist & Tennvall, 2005). According to Van Acker (2000) direct costs per case of diabetic foot in Belgium were:

⁵ For diabetes type I (insulin dependent) see the study carried out between 1983-1993 in the USA and Canada by the National Institute of Diabetes and Digestive and Kidney Diseases. For diabetes type II (non-insulin-dependent) see the UK Prospective Diabetes Study (UKPDS group, 1998).

⁶ Calculations presented in this section are only estimations. Our intention here is only to illustrate a problem (the potential high costs of LALP diabetic patients) with available data from the literature. More research is needed to correctly approach the issue of the cost-effectiveness of medical interpreters.

⁷ In Belgium an estimate of 1.400 – 1.900 diabetic LALP patients could have diabetic foot – 5% (of patients having diabetic foot, supposing that estimates from the Netherlands apply to Belgium - Van Acker, 2001) - of 28.000 – 38.000 diabetic patients facing linguistic difficulties.

⁸ The total direct medical costs of type II diabetes in 8 European countries (Belgium, France, Germany, Italy, the Netherlands, Spain, Sweden and the United Kingdom) was estimated at € 29 billion a year (1999 values). The estimated average yearly cost per patient was € 2.834 (Jönsson, 2002).

Table 1. Direct costs per case of diabetic foot

Direct Costs per Case of Diabetic Foot Problems, in US\$ ⁹ (Van Acker, 2000)			
Wagner Class ¹⁰	Costs to NHC	Cost to Patient	Total
0	698	126	875
1	1.378	256	1.634
2	10.569	1.303	11.872
3	19.676	1.575	21.251
4	19.174	2.118	21.292
5	47.365	4.585	51.950

The vast majority of diabetic foot complications resulting in amputation begin with skin ulcers. Early detection and appropriate treatment of these ulcers may prevent up to 85% of amputations (Armstrong & Lavery, 1998). *If the intervention of an interpreter helps to prevent one case of diabetic foot with gangrene, due to the increased quality of care and preventive measures, his yearly full time salary (€ 40.000, Cofetis, 2007) is fully recovered in avoided medical costs to the NHC.*

2. Length of hospital stays

According to “The Cost of Diabetes in Europe – Type II Study” (Jönsson, 2002), hospitalizations accounted for the greatest proportion (55%, range 30 – 65%) of total direct medical costs for type II diabetes in eight European countries, totalling € 15.9 billion.

In Belgium the diabetes care costs per unit were (in €, 1998 values):

Table 2. Diabetes care costs per unit

General practitioner visit	14.87 – 17.85
Diabetologist visit	22.31
Other specialist visit	22.31
Physiotherapist	13.06 – 14.08
Nurse	1.64 – 4.94
Emergency	14.13 – 14.87

⁹ 1993 value.

¹⁰ Wagner class 0 refers to diabetic foot problems without open dermal lesions; Wagner class 1 refers to superficial ulcers; Wagner class 2 refers to deep ulcers with cellulites; Wagner class 3 refers to very deep ulcers with bone lesions, preseptic or septic; Wagner class 4 refers to partial foot gangrene; and Wagner class 5 refers to whole foot gangrene (Van Acker, 2000).

Day in hospital	197.03
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Now, if the data on length of stay reported in Canada apply to the Belgian context, and LALP diabetes patients are hospitalised on average 1.8 days longer than ALP diabetes patients (John-Baptiste *et al.*, 2004), then this would constitute an extra cost of €1.804.302 over a six month period¹¹ for health provider. Therefore, *preventing the increased length of stay for LALP diabetes patients would correspond to contracting 90 professional interpreters full time.*

- Language difficulties were associated with less than optimal monitoring of diabetes among diabetes patients, a fact which can have costly future consequences.
- If the intervention of an interpreter helps to prevent one case of diabetic foot with gangrene, due to the increased quality of care and preventive measures, his yearly full time salary (€ 40.000, Cofetis, 2007) is fully recovered in avoided medical costs to the NHC.
- Preventing the increased length of stay for LALP diabetes patients would correspond to contracting 90 professional interpreters full time.

9. Conclusions

Consequences of linguistic barriers

The literature review clearly demonstrates that linguistic barriers tend to affect the following factors negatively: (1) Access to medical resources, particularly to preventive care; (2) quality of care; (3) LALP patient satisfaction; (4) health personnel satisfaction, to name a few. Moreover, as highlighted by Bowen (2000), language barriers have been associated with both higher and lower rates of service utilization. Analysis of utilization patterns associated with language fluency indicate that some of the observed difference may be due to differential effects of (a) language barriers influencing initial access and (b) language barriers affecting diagnosis and treatment. For instance, the first barriers can hinder or prevent a person from seeking initial assessment and care and later increase the frequency of emergency services utilization, while the second can affect the quality of care received, increasing the need of the patient to go repeatedly and unnecessarily to various health providers for the same health problem. Linguistic barriers can therefore pose an obstacle to the provision of quality and equity in health care.

¹¹ € 197.03 (average cost per day in hospital, Jönsson, 2002); 1.8 days extra per patient with LALP (mean length of stay is 20 days, Jönsson, 2002); 18.5% of diabetes patients were hospitalised in Belgium during the 6 moth period of the study, Jönsson, 2002; 3575 patients is the estimated amount of LALP diabetic patients hospitalised in Belgium in a 6 month period.

Table 3 compares the health encounter of ALP patients to that of LALP patients not assisted by an interpreter.

Table 3. Comparison ALP patients to LALP patients without interpreter

LALP patients without interpreter, when compared to ALP patients, are <u>less</u> likely:	LALP patients without interpreter, when compared to ALP patients, are <u>more</u> likely:
<ul style="list-style-type: none"> • To access preventive health care and early detection tests for cancer • To report physical and mental symptoms • To understand diagnosis and prognosis • To adhere to treatments and follow-up visits • To be scheduled for follow-up visits after hospital discharge • To be referred to specialists when required • To receive adequate mental health care • To be satisfied with the medical encounter • To return to the same medical center • To understand informed consent 	<ul style="list-style-type: none"> • To receive unnecessary tests, above all in emergency departments • To receive unnecessary treatment • To have increased length of stay (LOS) in hospitals • To be exposed to medical errors • To go repeatedly and unnecessarily to different health providers for the same problem

Furthermore, the literature demonstrates how language barriers can considerably increase medical costs by (1) generating needless medical costs (increased hospitalization, extended length of hospital stays, unnecessary tests and unnecessary consultations due to lack of trust and/or poor communication); and by (2) causing costly medical complications (misdiagnosis, misunderstanding of diagnosis and treatment, decreased treatment adherence and low rates of preventive health care).

Justification for the use of professional interpreters

Nine years ago, Bischoff *et al.* (1999b) emphasized the risks of using *ad hoc* interpreters and the need to recur to professional interpreters. The authors called for "coordination at national level, policy development and training, in order to ensure adequate communication and quality care for migrants" (p. 248). This plea remains valid to this day.

Informal interpreters can misinterpret information provided by the patients and by health professionals, compromise confidentiality and provide incorrect translations due to scarce linguistic, medical and cultural competence. All these factors increase the risk of diagnostic and/or therapeutic errors (Bischoff, 2003; Ku & Flores, 2005; Flores *et al.*, 2003). The use of relatives as *ad hoc* interpreters can interfere with the medical encounter, e.g. when the *ad hoc* interpreter responds in the name of the patient, or when the patient holds back certain information for fear of rumours being disseminated by the *ad hoc* interpreter or of disclosing culturally reproachable behaviour to the *ad hoc* interpreter. Children as *ad hoc* interpreters not only increase the risk of misinterpretations, but also place a responsibility on the child which is untenable. And for delicate or intimate issues (e.g. sexual and reproductive health), the use of *ad hoc* interpreters can even compromise medical ethics.

Concerning professional interpreters, the revised literature shows:

(1) *Quality and quantity of care.* The presence of professional interpreters and bilingual health professionals increases the quantity and quality of received medical care, approximating LALP patients to ALP patients. *In other words, while linguistic barriers tend to result in LALP patients receiving either fewer medical examinations when necessary or additional unnecessary tests and medication than ALP patients, the literature shows that the use of professional interpreters tends to approximate the quality of care and satisfaction of LALP patients to that of ALP patients, and therefore reduces inequities in health care.*

(2) *Cost effectiveness.* The use of professional interpreters also reduces LALP patients' costs and utilization of medical services, particularly in emergency services. As the majority of diagnoses are undertaken on the basis of the clinical interview (see Bischoff, 2003), if communication is limited due to language barriers, then health professionals perceive the need to (i) increase tests in order to be assured that they provide the correct diagnosis, or to (ii) increase therapeutic coverage to guarantee maximum treatment success. It is likely that the so-called 'defensive medicine' reinforces these practices. But even in the case study by Bernstein *et al.* (2002) in an emergency department where LALP patients without interpreter received less medication and had fewer diagnostic tests ordered for them than did ALP patients, the author still showed that the *quality of care* of LALP patients when assisted by professional interpreters approximated that of ALP patients.

On the basis of the available data, it is not possible to confirm whether interpreting services reduce total costs. Further research is needed. But there is little question concerning the potential of a more adequate use of resources targeted at prevention and treatment of disease, as well as at palliative care. In this sense, interpreting services are certainly cost-effective.

Nor are conclusive representative data about cost estimates presently at our disposal. Nonetheless, it can be safely said that, in economic terms, it is preferable to prevent disease than to cure it. Good communication tends to improve the use of preventive services (Jacobs *et al.* 2004) and to improve the follow-ups scheduled and adhered to after emergency attendance, which is likely to reduce the costs of delay in treatments and complications which require hospitalization, costly interventions, etc.

As suggested by Ku & Flores (2005) and Jacobs *et al.* (2004), additional costs of employing interpreting services are relatively moderate when compared to the costs accrued due to the gaps in health care access and current medical costs for patients with LALP.

In general, the intervention of professional interpreters contributes or can contribute:

1. To improved patient and health professional satisfaction
2. To the guarantee of medical ethics in relation to informed consent and confidentiality
3. To the improvement of treatment comprehension and adherence
4. To the improvement of health education and information
5. To the increase of efficacy and efficiency of time used during consultation, although the time in absolute terms is unlikely to be reduced.
6. To the improvement of access to care, above all to preventive medicine and mental health -which in turn contributes to equity in health care
7. To the reduction of the risk of medical errors
8. To the improvement of efficacy and efficiency of referrals to specialists
9. To the reduction of unnecessary costs due to
 - a. Diagnostic tests
 - b. Treatments
 - c. Length of stay
 - d. Repeated visits to different health care providers

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