

Original Research

# Spanish Language Resources for Patients with Developmental Dysplasia of the Hip

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## Abstract

**Background:** In the United States, the majority of patient educational material is written in English, thereby limiting the available resources for the growing Spanish-speaking population. Developmental dysplasia of the hip (DDH) commonly affects Hispanic patients, and patient education is integral to the successful management of this condition. This study aims to analyze the readability and availability of Spanish and English patient education on DDH provided by the *U.S. News and World Report* top 50 pediatric orthopaedic hospitals and the major professional societies.

**Methods:** We performed a cross-sectional analysis by determining the proportion of the top 50 pediatric orthopaedic hospitals and major professional societies providing online English and Spanish resources. We also assessed the readability of the information provided via three measures of readability. Descriptive, univariate, and multivariate analyses were performed.

**Results:** Of the top 50 hospitals ranked by *U.S. News*, 84% (42/50) provided online English language patient education on DDH. In contrast, only 36% (18/50) of the hospitals provided online Spanish language patient education. All of the major orthopaedic professional societies provided English resources, but only two out of three professional societies provided Spanish resources. There were no significant differences in the rates of Spanish language resources and their readability scores between states that had a greater or less than 20% Spanish-speaking population ( $p > 0.05$ ). However, English language materials consistently ranked higher in grade level (9th grade vs. 7-8th grade,  $p < 0.01$ ) and readability measures (11.70 vs. 10.18,  $p < 0.01$ ) than Spanish materials on DDH.

**Conclusion:** The availability of online Spanish language patient education resources is limited, despite the growing Spanish-speaking population in the United States. In States with  $>20\%$  of the population who are Spanish speaking, there was no significant difference in the available Spanish language resources compared to States with a  $<20\%$  Spanish

speaking population, indicating a discordance between educational materials and patient populations. The readability of both English and Spanish language written materials continues to be above the recommended level for patient education.

**Level of Evidence:** Level III

**Key Concepts**

- There is limited online Spanish language patient education on developmental dysplasia of the hip, despite the growing Spanish-speaking population in the United States.
- There is no difference in the availability of Spanish language resources offered by hospitals in States with a greater proportion of Spanish-speaking patients compared to those with a smaller proportion of Spanish-speaking patients.
- The patient education material that is available is above the recommended level for patient education in both English and Spanish translations.

**Introduction**

The U.S. Census Bureau reported in 2020 that over 15 million households in the United States speak Spanish and of those, nearly 3 million households lack English proficiency.<sup>1</sup> In fact, Spanish is the second most common language spoken in the United States<sup>2</sup> and in 2020, the percentage of Hispanics/Latinos grew to 18.5% of the U.S. population, which represents the largest minority group in the country.<sup>3</sup> The Spanish-speaking population is becoming a larger proportion of the patients seen in pediatric orthopaedic clinics nationwide and medical providers must be able to effectively communicate with this population to adequately care for them. However, the currently available patient materials do not always provide appropriate translations to educate Spanish-speaking patients, potentially impacting their care.

Additionally, there is a paucity of pediatric orthopaedic surgeons that can fluently educate the Spanish-speaking patient on their medical conditions. In a previous study by Sobel et al., only 12 out of 334 surgeons (3.6%), who had recently completed their pediatric orthopaedic fellowship, were considered to have Spanish language proficiency.<sup>4</sup> The scarcity of Spanish proficient pediatric orthopaedic surgeons places a stronger emphasis on interpreter services to translate medical conditions for the patient and their families. However, in many cases, professional interpreter services vary in their availability

and the types of services offered from hospital to hospital. In California, where greater than one-third of the population speaks Spanish, there are still several potential language barriers; in fact, approximately 80% of the Spanish-speaking patients in California had to depend on non-qualified interpreters during their orthopaedic appointments.<sup>5</sup> It has also been shown that in pediatric surgery patients, language discordant care was associated with patients and family members asking fewer questions due to language barriers, although they stated they wished to ask more.<sup>6</sup> In contrast, language concordant care resulted in an increased number of patient-asked questions, improved overall communication,<sup>6</sup> increased patient satisfaction, and patient understanding.<sup>7</sup>

Developmental dysplasia of the hip (DDH) refers to a range of abnormalities affecting the hip joint. Abnormalities may include mild dysplasia to subluxation to joint dislocation.<sup>8</sup> The incidence of DDH ranges from 1% to 7% across populations, and it is known to commonly affect Hispanic patients.<sup>9</sup> The management of DDH often requires a detailed conversation about risks, benefits, and alternatives to treatment. A firm understanding of the diagnosis and management is essential to treatment success. A previous study on adolescent idiopathic scoliosis showed discordance

between the availability and readability of patient education and populations.<sup>10</sup> However, to our knowledge, there are no studies that have investigated the availability and readability of English and Spanish language patient education for DDH.

We aim to evaluate the availability and readability of online English and Spanish materials on DDH of the top 50 pediatric orthopaedic hospitals as ranked by *U.S. News and World Report* as well as three major orthopaedic and pediatric professional societies. We hypothesize that the availability of Spanish language materials is lower than English language materials and the readability of all materials is higher than the recommended levels for patient education.

## Methods

We performed a cross-sectional study of the *U.S. News* top 50 pediatric orthopaedic hospitals to determine the availability and readability of online English and Spanish DDH resources.<sup>11</sup> We also assessed patient-centered educational materials available from three professional societies: the American Academy of Orthopaedic Surgeons (OrthoInfo), the Pediatric Orthopaedic Society of North America (OrthoKids), and the American Academy of Pediatrics (Healthy Children). All searches were performed in June 2021.

### *Search Methods*

The top 50 pediatric orthopaedic hospitals were evaluated for publicly available resources on DDH in both Spanish and English. On each website's home page, the keywords "encyclopedia of terms," "definitions," and "glossary" were searched. If there was no encyclopedia, then additional searches for "developmental dysplasia of the hip" and "DDH" were performed. If the search yielded multiple results, the most pertinent article defining DDH was selected. The articles also had to be affiliated with the specific hospital and had to contain a definition of DDH to qualify. Of note, our criteria excluded any additional resources that may have been given in person that was not publicly available and our study aims to focus on online

resources only, as they are the most easily accessible to patients and their families.

For the Spanish language resources, the translation option, if present, was used for the library/encyclopedia of terms. If there was no direct translation available, the website homepage was searched with the terms "displasia congénita de la cadera," "DCC," "displasia en el desarrollo de la cadera," and "DDC." If there were multiple pages, the most specific one that fit the criteria was selected and analyzed.

### *Readability Measurements*

All the written information was copied into a program, BBEdit (Bare Bone Software, Bedford, MA), to remove the associated formatting and leave behind only the written text. We determined readability using different readability scales for English and Spanish, respectively.

For English resources, text files were analyzed through Readability Studios (Oleander Software Ltd. 2019) to calculate Flesch-Kincaid Reading Ease, Fry Graph Grade Level, and SMOG Grade Level scores. The Flesch Reading Ease index score evaluates the difficulty of a text based on sentence length (average number of words in a sentence) and word length (average number of syllables in a word).<sup>12</sup> The Flesch scale ranges from 0-100 with a higher score meaning it is easier to read.<sup>12</sup> The Fry readability formula calculates the grade level by plotting the average number of sentences and syllables per 100 words and finding the intersection.<sup>13</sup> The SMOG Grade Level determines readability by qualifying words that contain three or more syllables as complex.<sup>14</sup>

Spanish texts were analyzed by Spanish counterparts of the three English readability measures. Fernandez-Huerta, the adapted Flesch-Kincaid, was used to measure online Spanish resource readability.<sup>15</sup> Gilliam-Peña-Mountain Grade Level was the Spanish adapted Fry Graph Grade Level,<sup>16</sup> and SOL Grade Level is analogous to the SMOG readability formula.<sup>17</sup> All three of these measurements analyze texts like their English language tests while accounting for the differences between languages, such as Spanish language tending to have more syllables per word than its English counterpart

at the same grade level. Scores were calculated in the Oleander Software Readability Studios 2019.

### Statistical Analysis

Univariate analyses were used to determine trends of readability and availability of English and Spanish resources in observed hospitals and professional societies. Inferential statistics, such as chi-square analysis and t-tests, were used to evaluate the availability and readability of English and Spanish resources in States where greater than or less than 20% of the population was Spanish speaking. Finally, a correlation analysis was performed to evaluate States with greater Spanish-speaking populations and the respective hospitals within that State that provided Spanish language materials. Hospitals without English language resources and/or containing only one ranked hospital were excluded from the correlation analysis. All statistical analysis was performed using Microsoft Excel 2020 (Microsoft Corp., Redmond, WA).

## Results

### Availability

The top 50 pediatric orthopaedic hospitals ranked by *U.S. World and News Report* in 2021 were included in this study. Of the 50 hospitals, 84% (42/50) provided English language patient education on DDH. In comparison, only 36% (18/50) provided Spanish language materials, and 42% (18/42) of the hospitals that provided English resources provided Spanish materials as well. It is important to note that it cannot be determined whether

these hospitals provided other resources outside of our online search criteria.

### Readability

English materials had significantly lower readability scores compared to Spanish materials in terms of the Flesh-Kincaid and Fernandez-Huerta reading ease scores, measuring 58.5 and 68.8, respectively ( $p < 0.01$ ) (Table 1). In general, the higher the readability score, the easier it is to read, and it is recommended to have a score of at least 80 for easy reading.<sup>18</sup> Therefore, the lower-scored English materials were harder to read based on word complexity and sentence length, and based on their readability score, it indicates about a 10-12<sup>th</sup> grade reading level.<sup>18</sup> Similarly, when evaluated for their average grade level readability, English language materials yielded an average grade level of 10 through the Fry Graph Grade Level and 11.9 through the SMOG Grade Level, corresponding to the readability conversion grade level from the Flesh-Kincaid measurement.

Spanish language materials' readability score was 68.8 on the Fernandez-Huerta reading ease scale (equivalent to 8<sup>th</sup>-9<sup>th</sup> grade reading level)<sup>18</sup> and yielded an average of grade level 7 on the Gilliam-Peña-Mountain scale and an average of grade level 9.6 on the SOL grading scale. Spanish language resources were measured at significantly lower grade levels for Fry Graph and SMOG readability when compared to English resources for DDH ( $p < 0.01$ ) but were still written at a grade level above what is recommended for patient education material.

**Table 1. Readability of Hospital Resources**

	English			Spanish		
	Flesch-Kincaid Reading Ease	Fry Graph Grade Level	SMOG Grade Level	Fernandez-Huerta	Gilliam-Peña-Mountain	SOL Grade
<b>Average</b>	58.5	10	11.9	68.8	7	9.6
<b>Median</b>	60.0	9.4	11.7	69.2	7.8	10.2
<b>Standard Deviation</b>	11.5	2.5	2.1	5.3	1.3	1.1

*Note: Children's Hospital Los Angeles, Valley Children's Healthcare & Hospital, University of Iowa Children's Hospital, and Nicklaus Children's Hospital were excluded from the English Fry calculations due to incalculable high syllable count.*

**Table 2. Readability of Professional Societies’ Resources**

	English			Spanish		
	Flesch-Kincaid Reading Ease	Fry Graph Grade Level	SMOG Grade Level	Fernandez-Huerta	Gilliam-Peña-Mountain	SOL Grade
<b>Average</b>	55.7	10.7	12.2	67.4	8	10.8
<b>Median</b>	51.0	11.0	12.8	67.4	8	10.8
<b>Standard Deviation</b>	12.7	3.5	1.7	1.2	1.4	2.6

Of the three professional societies evaluated, two of them provided Spanish materials on DDH. The average Flesch-Kincaid reading score was 55.7 for English resources, and the average Fernandez-Huerta reading score was 67.4 for Spanish resources. English resources consistently ranked higher in grade level at 10.7 and 12.2 for Fry Graph and SMOG Grade levels in comparison to Spanish resources that measured grade level 8 and 10.8 for Gilliam-Peña-Mountain and SOL scales, respectively. However, there were no statistical differences between Spanish and English resources’ readability scores or grade level ( $p>0.05$ ) (Table 2).

Of the 42 hospitals that provided English resources on DDH, only 42% (18/42) of those provided Spanish resources as well. Approximately 47% of hospitals in States where over 20% of the population was Spanish speaking provided online Spanish resources. There was no statistical difference in the rates of Spanish resources provided in States with  $\geq 20\%$  of the population that are Spanish speaking compared to States with  $<20\%$  of the population that are Spanish speaking ( $p>0.05$ ) (Table 3). Additionally, there was no statistical difference between

**Table 3. Availability of Spanish Language Resources**

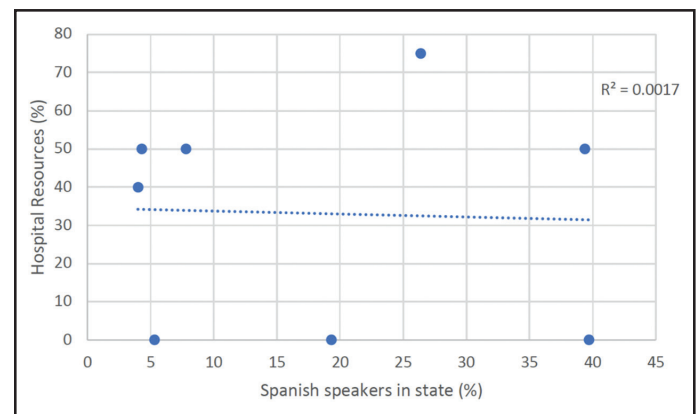
Hospitals	Yes	No	Total
$\geq 20\%$	50% (8/16)	50% (8/16)	16
$<20\%$	38% (10/26)	62% (16/26)	26
Total	42% (18/42)	58% (24/42)	42

Note: Hospitals that lacked English language resources were excluded.

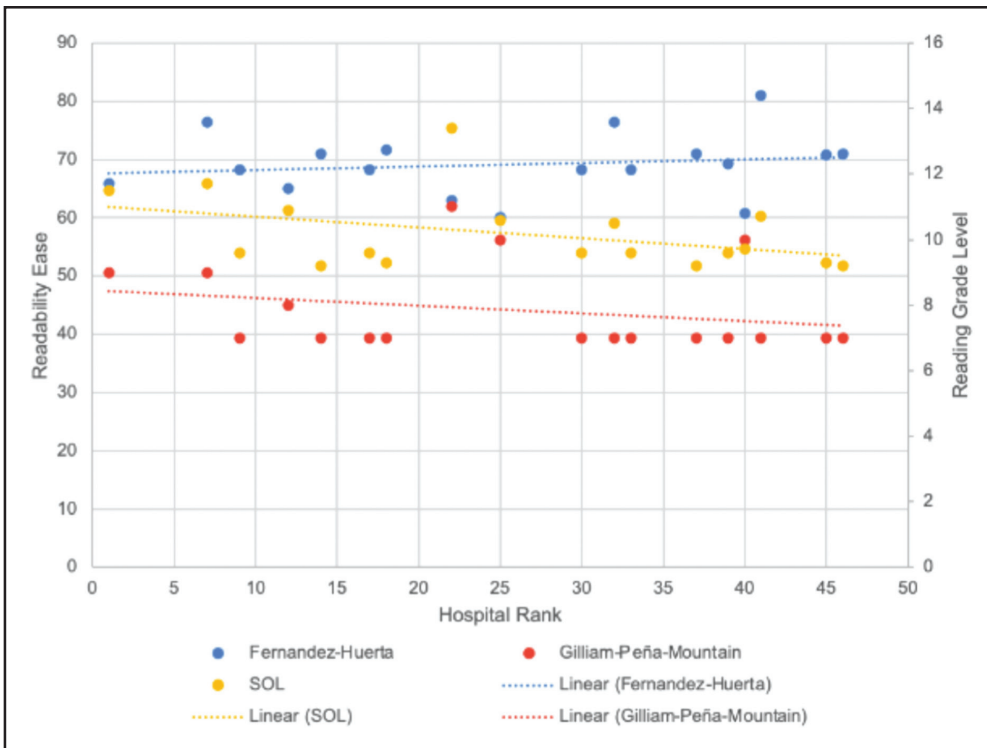
the readability of resources based on the State’s Spanish-speaking population ( $p>0.05$ ). This was true across all three measurements of readability. Correlation analysis also determined that there was no significant correlation in availability of resources in the States with greater Spanish speaking residents (Figure 1). Lastly, there was no correlation between ease of resource readability and hospital rank (Figure 2).

### Discussion

Patient education enhances the communication between medical professionals and their patients, promotes the patient/caregiver’s role in their health, and potentially improves health outcomes. Patient education can be provided directly by medical professionals, translated by interpreter services, or can be offered as written, online resources. It is important for Spanish-speaking patients, who often may not get direct communication from their healthcare providers,



**Figure 1. Percentage of hospitals with Spanish-language resources on DDH compared to Spanish language speakers within each state.**



**Figure 2.** Correlation between hospital rank and readability of Spanish resources. Fernandez Huerta –  $R^2 = 0.025$ , GPM –  $R^2 = 0.0611$ , SOL –  $R^2 = 0.1636$ .

that these online resources be widely available and appropriate for their level of comprehension. When evaluating patient internet use, approximately 64.7% of patients who had internet access reported using it to gather orthopaedic medical information, and younger patients were even more likely to use the internet for orthopaedic information.<sup>19</sup> The increasing use of online resources compounded by the lack of Spanish language proficient pediatric orthopaedic surgeons and varying interpreter services poses a challenge for the Spanish-speaking population and medical community to effectively communicate with one another and stresses the importance of having adequate online patient materials.<sup>4,5</sup> Our study aimed to evaluate the readability and availability of these resources, specifically for DDH patient materials in English and Spanish since DDH represents a common pediatric orthopaedic condition. In this study, we found that resources are widely available in English but not readily available in Spanish. Also, the readability of the material is high but better for Spanish language resources.

In the study, we observed a clear lack of available Spanish language resources on DDH. Most of the hospitals evaluated and all the professional societies provided English language resources; however, less than half of these hospitals and two-thirds of professional societies provided Spanish language counterparts, despite the rapidly growing Spanish-speaking population in the U.S. In fact, the U.S. Census Bureau predicts that the Hispanic population will grow to nearly 25% of the U.S. population by 2045,<sup>20</sup> and it is currently the largest minority group.<sup>3</sup> Additionally, given that DDH is a relatively common medical condition,<sup>21</sup> there is a substantial need for educational materials compared to more rare medical conditions. All of this only underscores the importance of increasing the publicly available Spanish language resources for all medical conditions but especially for common medical conditions, such as DDH.

Of the hospitals and institutions that did provide Spanish language materials, we found that these resources were largely above the recommended reading level and thus

more difficult to read. The American Medical Association recommends that easy-to-read written healthcare materials be rated at a 6<sup>th</sup>-grade reading level or lower, contain one- or two-syllable words, and use layman terms.<sup>22</sup> However, Spanish language resources were rated with an average grade level of 7 or higher. Therefore, not only is there a lack of resources, but the resources that are available are difficult for Spanish-speaking residents to comprehend. Additionally, the readability for English language resources was also above the American Medical Association recommendations. This finding underscores the need for institutions and professional societies to closely evaluate their educational materials and improve their suitability for all patients. Proposed options to improve the readability of these patient materials would include using more layman terms (less medical jargon), limiting the length of paragraphs to 2-3 sentences, and focusing on a few objectives per reading material. Additionally, although not considered in this study, the AMA also recommends the use of simple tables and drawings in patient materials to improve understanding.<sup>22</sup>

Several previous studies have demonstrated that improved patient education enhances the patient's and family's understanding and patient satisfaction with the care delivered.<sup>6,7</sup> Similar findings have also been demonstrated for other common orthopaedic conditions, such as adolescent idiopathic scoliosis.<sup>10</sup> There is an opportunity here for hospitals and professional societies to expand their reach and provide appropriate resource for all patients. Additionally, a lack of health literacy is associated with longer hospitalizations, poor patient understanding, and worse patient outcomes.<sup>23</sup> In contrast, language concordant care has been associated with improved patient outcomes.<sup>24</sup> It is recommended that hospitals and professional societies regularly review their health education materials to bridge the gaps in understanding for their Spanish-speaking residents. Providing suitable online resources is a much more viable option compared to relying on the limited professional translators or ad hoc familial translators to describe all the information accurately to patients in limited visits.

This study does have its limitations. Although the search we performed was systematic and thorough, we only evaluated a small group of pediatric orthopaedic hospitals and professional societies and is unlikely to represent all resources available to patients. It is also possible that there are new resources that have been added since our search or certain resources were overlooked due to our criteria focusing solely on publicly available online patient materials. There may be other materials that hospitals provide in clinic that were not publicly available or online. Additionally, our evaluation of the Spanish language patient materials was based only on readability and availability and a study on the quality of the content of the patient materials presented still needs to be conducted.

In conclusion, online Spanish language materials on DDH are lacking. This deficit is particularly striking when compared to the population size they are serving and has the potential to impact patient care. Medical institutions must address this discrepancy and continually work to improve their Spanish language resources in terms of availability and readability. Offering adequate and appropriate online Spanish patient materials serves as a relatively inexpensive and effective way to improve patient health literacy and potentially, patient outcomes.

## Disclaimer

The authors have no conflicts of interest to report.

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