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Translating the Symptom Screening in Pediatrics Tool (SSPedi) into North American Spanish and Among Spanish-speaking Children Receiving Cancer Treatments, Evaluating Understandability and Cultural Relevance in a Multiple-Phase Descriptive Study

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Complete List of Authors:	Plenert, Erin; Hospital for Sick Children Research Institute, Child Health Evaluative Sciences Grimes, Allison; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Sugalski, Aaron; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Langevin, Anne-Marie; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Nieto, Dominica; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Salaverria, Carmen; Hospital Nacional De Ninos Benjamin Bloom, Department of Oncology Gomez, Sergio; Hospital de Niños Sor María Ludovica, Stem Cell Transplantation Unit Gonzalez, Gisela; Hospital de Niños Sor María Ludovica, Stem Cell Transplantation Unit D'Angelo, Gisela; Hospital de Niños Sor María Ludovica, Stem Cell Transplantation Unit Dupuis, Lee; University of Toronto Leslie Dan Faculty of Pharmacy, Sung, Lillian; Hospital for Sick Children, Division of Haematology/Oncology; Hospital for Sick Children SickKids Learning Institute, CHES

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TITLE: Translating the Symptom Screening in Pediatrics Tool (SSPedi) into North American Spanish and Among Spanish-speaking Children Receiving Cancer Treatments, Evaluating Understandability and Cultural Relevance in a Multiple-Phase Descriptive Study

AUTHORS: Erin Plenert BA, MPH[1]; Allison Grimes MD, MSCI[2]; Aaron Sugalski DO[2]; Anne-Marie Langevin MD[2]; Dominica Nieto BA[2]; Carmen Salaverria MSc[3]; Sergio Gomez MD[4]; Gisela Gonzalez[4]; Gisela D'Angelo[4]; L. Lee Dupuis RPh, PhD[1,5]; Lillian Sung MD, PhD[1, 6]

AFFILIATIONS

[1]Program in Child Health Evaluative Sciences, The Hospital for Sick Children, Peter Gilgan Centre for Research and Learning, 686 Bay Street, Toronto, Ontario, M5G 0A4, Canada

[2]Pediatric Hematology Oncology, University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX, 78229, US

[3]Department of Oncology, Benjamin Bloom Children's Hospital, Bulevar De Los Heroes, San Salvador, El Salvador

[4]Stem Cell Transplantation Unit, Hospital de Niños Sor María Ludovica, Calle 14 1631, La Plata, Argentina

[5]Department of Pharmacy, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, M5G 1X8, Canada

[6]Division of Haematology/Oncology, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, M5G 1X8, Canada

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CORRESPONDING AUTHOR:

Lillian Sung MD, PhD

Division of Haematology/Oncology

The Hospital for Sick Children

555 University Avenue

Toronto, Ontario

M5G 1X8

Telephone: 416-813-5287

Fax: 416-813-5979

Email: lillian.sung@sickkids.ca

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ABSTRACT

Objectives: Symptom screening is important to achieving symptom control. Symptom Screening in Pediatrics Tool (SSPedi) is validated for English-speaking children only. Objectives were to translate SSPedi into Spanish, and to evaluate the understandability and cultural relevance of the translated version among Spanish-speaking children with cancer and pediatric hematopoietic stem cell transplant recipients.

Methods: We conducted a multi-phase, descriptive study to translate SSPedi into Spanish. The first step was to determine whether one Spanish version would be appropriate for both North America and Argentina. Forward and backward translations were performed. The translated version was evaluated by Spanish-speaking children 8-18 years of age receiving cancer treatments.

Primary and Secondary Outcome Measures: Children self-reported difficulty with understanding while cognitive interviews identified incorrect understanding of SSPedi items. Cultural relevance was assessed qualitatively.

Results: This report focuses on North American Spanish as a separate version will be required for Argentinian Spanish SSPedi. There were 20 children from Toronto and San Antonio included in cognitive interviews. The most common types of Spanish spoken were Mexican (13, 65%), Central American (2, 10%) and South American (2, 10%). No child reported that it was hard or very hard to complete Spanish SSPedi. Changes to the instrument itself were not required. After enrollment of 20 respondents, the North American version of Spanish SSPedi was considered satisfactory based upon self-reported difficulty with understanding, adjudicated incorrect understanding and cultural relevance.

Conclusions: We translated and finalized Spanish SSPedi appropriate for use in North America. Future research will translate and evaluate SSPedi for use in Argentina and other Spanish-speaking countries.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

- Multi-center conduct
- Multiple approaches to assessing understandability
- Use of external adjudicators
- Limited by conduct in only two countries
- Limited by no testing in Mexico

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BACKGROUND

Pediatric cancer patients experience prevalent and severely bothersome symptoms during treatment.(1-3) Active symptom screening and reporting are likely to be important in optimizing symptom control. In prior research, we identified the lack of appropriate symptom screening measures for children with cancer(4) and consequently, developed a new tool named the Symptom Screening in Pediatrics Tool (SSPedi).(5) SSPedi asks about the degree to which 15 symptoms bothered the child yesterday or today on a 5-point Likert scale.

To evaluate the psychometric properties of SSPedi, we conducted a multi-center study with 502 English-speaking children with sites in both Canada and the United States. All children enrolled in the study were between the ages of 8-18 and receiving cancer therapies. SSPedi was found to be reliable (internal consistency and test re-test and inter-rater reliability), valid (construct validity), and responsive to change.(5) More precisely, the intraclass correlation coefficients were 0.88 (95% CI 0.82 to 0.92) for test re-test reliability, and 0.76 (95% confidence interval (CI) 0.71 to 0.80) for inter-rater reliability between children and their parents. The mean difference in SSPedi scores between groups that were hypothesized to be more and less symptomatic was 7.8 (95% CI 6.4 to 9.2; $P<0.001$).(5) Construct validity was demonstrated as all hypothesized relationships among measures were observed. SSPedi was responsive to change - those who reported they were much better or worse on a global symptom change scale had significantly changed from their baseline score (mean absolute difference 5.6, 95% CI 3.8 to 7.5; $P<0.001$).

Translation into other languages will be an important component of SSPedi adoption within and outside of North America. We initially chose to focus translation on Spanish as it is a common first language of children in the United States.(6) Consequently, objectives were to translate SSPedi into Spanish and to evaluate the understandability and cultural relevance of the translated version of SSPedi among children with cancer and hematopoietic stem cell transplant (HSCT) recipients.

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METHODS

To translate SSPedi into Spanish, we conducted a multi-phase, descriptive study which was approved by the Hospital for Sick Children's Research Ethics Board (#1000057560) and the Research Ethics Boards of all participating sites. Written informed consent and assent was obtained from all study participants or guardians, in the case of children providing assent. The following reflect the specific steps taken for translation of SSPedi into Spanish. The target countries were the United States, Canada and Argentina. We first determined whether one Spanish version would be appropriate for North America and Argentina. Next, we conducted translation followed by cognitive interviews as further described below.

Translation

In this study, translation of SSPedi included four distinct steps, namely forward translation, reconciliation, back translation and back translation review. We followed the guiding principles for the translation and cultural adaptation process for patient-reported outcomes from the ISPOR Task Force.(7) The generic methods that will be used for SSPedi translations are provided as Appendix 1.

Forward translation involved the independent translation of SSPedi from English (source language) by two professional medical translators, at least one of whom resided in the country targeted for translation. Reconciliation between the translated versions of SSPedi occurred via a translation panel, which consisted of investigators from the enrollment sites, both translators and the Toronto-based team. The Toronto-based research team included one pediatric oncologist, one pediatric pharmacist, one clinical research manager and one clinical research project assistant.

Next, the product of reconciliation was back translated to English by a third translator who did not have knowledge of English SSPedi and who was a native English speaker. The

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translation panel then reviewed the back translation against the source instrument to identify any discrepancies in meaning.

In addition to translating SSPedi itself, the professional medical translators also translated the synonym list. The synonym list was created for the English version of SSPedi to facilitate child self-report. It provides alternative words for each SSPedi symptom and was derived primarily through cognitive interviews with children themselves.

Cognitive Interviewing

The interviews were audio-recorded and sent to Toronto for evaluation and adjudication. The goals were to determine whether children found the Spanish translated version of SSPedi difficult to understand, whether they incorrectly understood it, and whether there were cultural issues with the instrument. Interviews were conducted by trained research associates or nurses with experience in cognitive probing who are fluent in Spanish and English. Children were eligible to participate if they were 8 to 18 years of age; they had a diagnosis of cancer or were HSCT recipients; and Spanish was their first language (permissible for both English and Spanish to be their first language). We excluded participants who had visual or cognitive impairments that precluded completion of SSPedi according to their healthcare provider. Sampling was purposive to ensure that children of varying ages, underlying diagnosis and gender were included.

First, the respondent completed the translated version of SSPedi on paper in the presence of the interviewer. SSPedi could be read aloud if the child was having difficulty with reading. Child respondents rated how easy or hard the translated version of SSPedi was to understand using a 5-point Likert scale ranging from 1=”very hard” to 5=”very easy”. The instrument overall, each of the 15 items and the response scale were evaluated. We reported the number of children who found SSPedi hard or very hard to understand (score of 1 or 2). We also evaluated the child’s understanding of each item and the response scale using cognitive

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probing. Both the interviewer and an independent rater in Toronto who listened to the audio-recording adjudicated understanding using a 4-point Likert scale ranging from 1="completely incorrect" to 4="completely correct". Discrepancies were resolved by consensus. We described the number of items that were rated as partially or completely incorrect (score of 1 or 2). Finally, we asked children whether any questions within SSPedi did not make sense to them in thinking about their day-to-day life in order to assess cultural relevance. Children could have responded to questions in English or Spanish according to their preference.

After each group of five children were interviewed, the study team met to review the responses to identify whether the translated version of SSPedi should be modified. Modification could be made to the script, the instrument itself or a synonym list of terms available for each SSPedi item. Formal evaluation of difficulty with understanding and incorrect understanding was performed after each group of 10 children were interviewed (considered one iteration).

Criteria to consider the Spanish version satisfactory were as follows: no more than one of the last 10 participants found the entire instrument and each item hard to understand, no more than one of the last 10 participants were incorrect in their understanding of each item as adjudicated by the raters, and other questions including those pertaining to cultural relevance did not suggest that modifications were required. Sample size was based upon the suggestion that seven to 10 interviews are sufficient to determine understandability of an item.(8) We therefore intended to enroll up to 10-30 children to allow for up to three iterations consisting of 10 children each. All analyses were descriptive.

Finalization

The final version of Spanish SSPedi was reviewed by all members of the translation panel to ensure cohesiveness and freedom from minor error. The final version was then formatted.

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Patient and Public Involvement

No patients were involved in study design or conduct apart from being participants in the research.

RESULTS

With Spanish-speaking investigators and translators from the United States, Canada and Argentina, we identified that at least two versions of Spanish will be required, namely one appropriate for North America and one appropriate for Argentina. Only the North American version is presented in this manuscript; the Argentinian version will be reported separately. Thus, enrollment sites for this report were The Hospital for Sick Children, Toronto, Canada and University of Texas Health Sciences Center San Antonio, San Antonio, United States.

Between January 2018 and April 2019, we identified 38 children and enrolled 20 participants, at which point North American Spanish SSPedi was considered satisfactory (Figure 1). Table 1 shows the demographics of the included participants. The number of children who were 8-10, 11-14 and 15-18 years of age were 4 (20%), 7 (35%) and 9 (45%) respectively. The most common types of Spanish spoken were Mexican (13, 65%) followed by Central American (2, 10%), South American (2, 10%) and other (3, 15%).

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Table 1: Demographic Characteristics of Participants Evaluating North American Spanish SSPedi

	Cohort 1 (n=10)	Cohort 2 (n=10)
Sex		
Male	6	6
Female	4	4
Age in Years		
8-10	1	3
11-14	4	3
15-18	5	4
Diagnosis		
Leukemia/lymphoma	9	4
Solid tumor	1	3
Brain tumor	0	2
Other*	0	1
Metastatic Disease	0	0
Relapse	1	1
Stem Cell Transplantation	1	1
Active Treatment	7	4
Born in Country of Interview	6	9
Type of Spanish Spoken		
Mexican	5	8
Central American	2	0
South American	1	1
Other	2	1
Inpatient at Interview	0	1
Attending School	5	9

Abbreviation: SSPedi – Symptom Screening in Pediatrics Tool

*Other - primary immunodeficiency (n=1)

None of the child respondents reported that it was hard or very hard to complete Spanish SSPedi overall. Table 2 shows self-reported difficulty with understanding and adjudicated incorrect understanding of SSPedi items. Changes made after the first two iterations were additions to the synonym list only, based on alternative words given by children during the interview process. No changes to the instrument were required. In the last 10 enrolled participants, at most one participant found each item hard to understand and none were incorrect in their understanding of each item. None of the respondents were incorrect in

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their understanding of the response scale. In terms of cultural relevance, no issues were identified by any of the 20 respondents. None of the children interviewed indicated that there were additional symptoms they felt were missing from the tool.

Table 2: Self-reported Difficulty with Understanding and Rater-Adjudicated Incorrectness with North American Spanish SSPedi*

	Cohort 1 (n=10)		Cohort 2 (n=10)	
	Hard to Understand	Incorrect	Hard to Understand	Incorrect
Disappointed or Sad	0	0	0	0
Scared or Worried	0	0	0	0
Cranky or Angry	1	0	1	0
Difficulty Thinking/Remembering	0	0	1	0
Changes in your face/body	0	0	1	0
Tired	0	0	0	0
Mouth sores	2	1	1	0
Headache	0	0	0	0
Hurt or Pain	0	1	0	0
Tingly or numb hands or feet	2	0	1	0
Throwing Up	0	0	0	0
More or less hungry	0	0	0	0
Changes in Taste	0	0	1	0
Constipation	0	0	1	0
Diarrhea	0	0	0	0

* Hard = rated as hard or very hard to understand by participant
Incorrect = rated as partially or completely incorrect by rater

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Thus, after 20 participants, the North American Spanish version of SSPedi was considered satisfactory and appropriate for utilization. Figure 2 shows the final version.

DISCUSSION

We translated a self-report symptom screening tool for pediatric patients with cancer and HSCT recipients named SSPedi into Spanish appropriate for use in North America. The final

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version was acceptable based upon self-reported difficulty with understanding and adjudicated incorrect understanding of different aspects of SSPedi and cultural relevance.

We found that at least two versions of Spanish SSPedi will be needed since Argentinian Spanish was considered sufficiently different from North American Spanish to require a distinct version. Interestingly, different quality of life instruments have taken alternate approaches to Spanish translation. For example, the developers of the PedsQL modules have chosen to translate Spanish for several different countries including the United States, Argentina, Columbia and Spain.(9) In contrast, the Patient-Reported Outcome Measurement Information System has a single Spanish translation version.(10)

We termed this version of Spanish SSPedi “North American” even though we did not include a site in Mexico. However, we noted that the majority of children self-identified their Spanish type as Mexican, thus providing reassurance that this version should be appropriate in that country. Ideally, further testing in Mexico would be conducted to confirm understandability and cultural relevance in that setting. Some could argue that North American Spanish is not a distinct form of Spanish as it reflects the Spanish spoken in several different originating countries. However, a study conducted in the United States or Canada is unlikely to use multiple versions of Spanish. Thus, creating a North America Spanish version addresses a practical clinical and research need in these geographic locations.

In the creation of English SSPedi, we found four items more difficult to understand by children 8-18 years of age, namely ‘changes in how your body and face look’, ‘tingly or numb hands or feet’, ‘feeling more or less hungry than you usually do’, and ‘constipation (hard to poop).(11) Interestingly, three of these four items were similarly hard to understand by at least one participant in this study. This may suggest that difficulty with understanding was not related to Spanish translation but rather, that these are more difficult concepts for children in general to understand.

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The strengths of this study were conduct of the translation according to internationally recognized standards and evaluation in two countries. However, weaknesses included enrollment of a limited number of children and in only two centers. Evaluation in other locations and with additional children may influence the synonym list further although based upon the initial results, it is less likely that changes to the instrument itself will be required.

In summary, we translated and finalized Spanish SSPedi appropriate for use in North America. Future research will translate and evaluate SSPedi for use in Argentina and other Spanish-speaking countries.

ACKNOWLEDGMENTS

We thank all the translators who worked with us on this project and whose expertise and insights greatly assisted the translation and evaluation process.

AUTHOR CONTRIBUTORSHIP

LD and LS developed the study concept and design. EP, DN, CS, SG, GG, and GD were involved in data collection. LS drafted the manuscript. All authors EP, AG, AS, AML, DN, CS, SG, GG, GD, LD, and LS participated in data interpretation, reviewed, revised, and approved the manuscript.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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DATA SHARING

The datasets used or analyzed during the current study are available from the corresponding author on reasonable request.

FIGURE LEGEND

Figure 1: North American Spanish SSPedi Participant Flow Diagram

Figure 2: North American Spanish SSPedi

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Figure 1: North American Spanish SSPedi Participant Flow Diagram

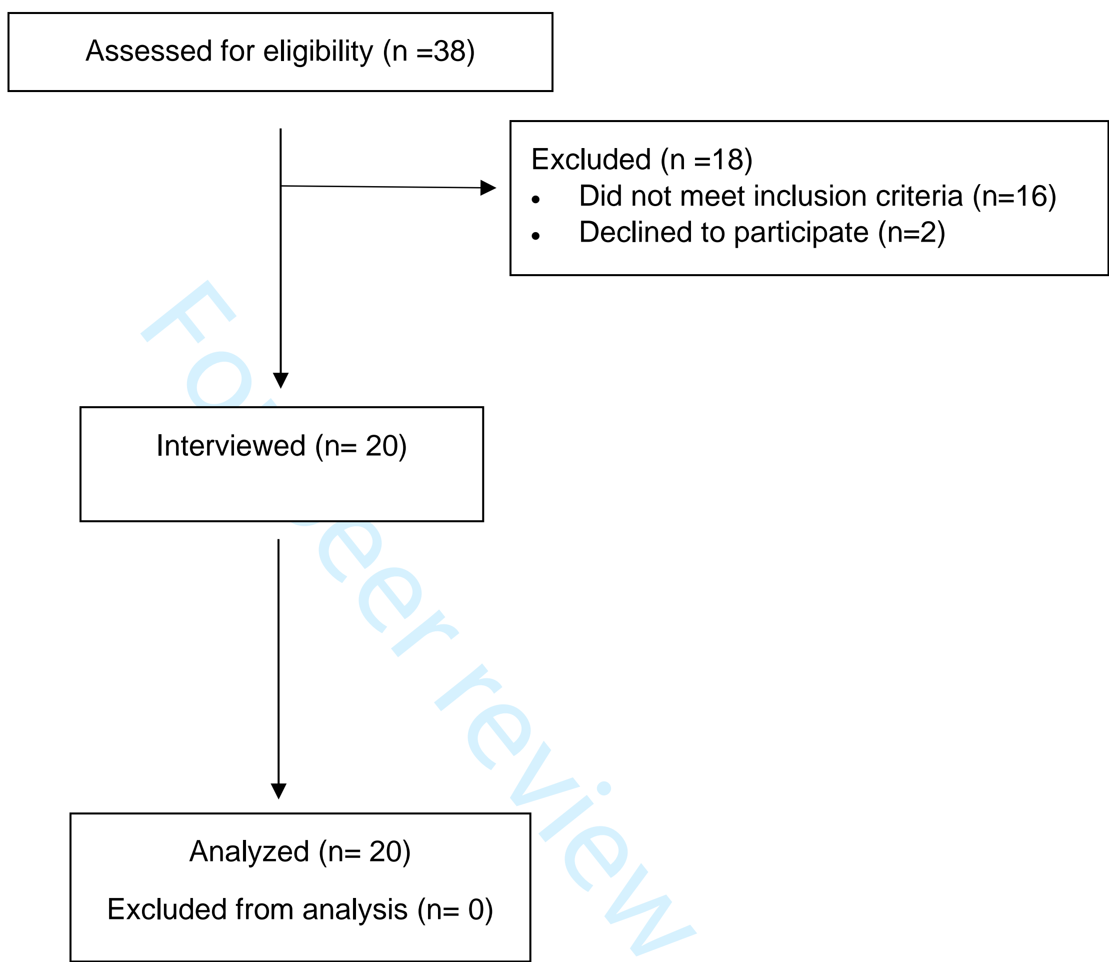

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Figure 2: North American Spanish SSPedi

Spanish SSPedi (North America): detección de síntomas en pediatría

Marca el círculo que mejor describe cuánto te **molestó** cada una de estas cosas **ayer u hoy**:

	No me molestó para nada	Un poco	Más o menos	Mucho	Me molestó muchísimo
Te sientes decepcionado o triste	○	○	○	○	○
Te sientes asustado o preocupado	○	○	○	○	○
Estas de mal humor o enojado	○	○	○	○	○
Te cuesta pensar o recordar cosas	○	○	○	○	○
Notas algún cambio en el cuerpo o la cara	○	○	○	○	○
Te sientes cansado	○	○	○	○	○
Tienes llagas en la boca	○	○	○	○	○
Tienes dolor de cabeza	○	○	○	○	○
Sientes malestar o dolor (que no sea dolor de cabeza)	○	○	○	○	○
Sientes hormigueo o entumecimiento en las manos o los pies	○	○	○	○	○
Tienes vómitos o ganas de vomitar	○	○	○	○	○
Tienes más o menos hambre que de costumbre	○	○	○	○	○
Notas cambios en el gusto	○	○	○	○	○
Tienes estreñimiento (dificultad para hacer popó)	○	○	○	○	○
Tienes diarrea (popó aguada)	○	○	○	○	○

Cuéntanos cualquier otra cosa que te haya molestado recientemente y escríbelo aquí.

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Appendix 1: Guidelines for Conducting Translation of SSPedi

Step	Description	Details
1	Forward translation	Two native speakers of the target language independently produce a forward translation of SSPedi from English into the target language. Both must be professional medical translators and at least one must reside in the country targeted for translation.
2	Reconciliation of forward translations	Translation panel consists of the two forward translators and investigators from enrollment sites where translation will be tested. Discrepancies between translators identified and resolved by consensus. Goal is to produce a single translated version of the tool.
3	Back translation	Forward translation is back translated into English by an independent translator. Back translator must be a native English speaker with no knowledge of English SSPedi.
4	Back translation review	Comparison of back translated version of SSPedi with original SSPedi tool by the research team to detect mistranslations or inaccuracies. Goal is to produce a final translated version of the tool ready for testing.
5	Cognitive interviewing	Goals are to determine if a) SSPedi items and response scale are: • Easy to understand as rated by children • Correctly interpreted as rated by the interviewer and a second adjudicator b) there are any issues with cultural relevancy A minimum of **10** children from target population must be enrolled.
6	Review interview findings	Interview findings are summarized by iterations of 10 children. Translation panel decides whether revisions required or whether translated version is satisfactory. In general, criteria to consider the translation satisfactory are: a) No more than one participants in the last 10 finds an item hard or very hard to understand b) No more than one participant in the last 10 is incorrect in their understanding of an item c) Comments do not indicate other modification or additions to the synonym list are required
7	*Further cognitive interviewing*	*If any changes were made, additional cognitive interviews conducted in iterations of 10 children until the translated version is considered satisfactory*
8	Finalization	The final translated version of SSPedi reviewed by the translation panel to ensure cohesiveness and freedom from minor error.

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Translating the Symptom Screening in Pediatrics Tool (SSPedi) into North American Spanish and Among Spanish-speaking Children Receiving Cancer Treatments, Evaluating Understandability and Cultural Relevance in a Multiple-Phase Descriptive Study

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Complete List of Authors:	Plenert, Erin; Hospital for Sick Children Research Institute, Child Health Evaluative Sciences Grimes, Allison; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Sugalski, Aaron; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Langevin, Anne-Marie; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Nieto, Dominica; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Salaverria, Carmen; Hospital Nacional De Ninos Benjamin Bloom, Department of Oncology Gomez, Sergio; Hospital de Niños Sor María Ludovica, Stem Cell Transplantation Unit Gonzalez, Gisela; Hospital de Niños Sor María Ludovica, Stem Cell Transplantation Unit D'Angelo, Gisela; Hospital de Niños Sor María Ludovica, Stem Cell Transplantation Unit Dupuis, Lee; University of Toronto Leslie Dan Faculty of Pharmacy, Sung, Lillian; Hospital for Sick Children, Division of Haematology/Oncology; Hospital for Sick Children SickKids Learning Institute, CHES

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TITLE: Translating the Symptom Screening in Pediatrics Tool (SSPedi) into North American Spanish and Among Spanish-speaking Children Receiving Cancer Treatments, Evaluating Understandability and Cultural Relevance in a Multiple-Phase Descriptive Study

AUTHORS: Erin Plenert BA, MPH[1]; Allison Grimes MD, MSCI[2]; Aaron Sugalski DO[2]; Anne-Marie Langevin MD[2]; Dominica Nieto BA[2]; Carmen Salaverria MSc[3]; Sergio Gomez MD[4]; Gisela Gonzalez[4]; Gisela D'Angelo[4]; L. Lee Dupuis RPh, PhD[1,5]; Lillian Sung MD, PhD[1, 6]

AFFILIATIONS

[1]Program in Child Health Evaluative Sciences, The Hospital for Sick Children, Peter Gilgan Centre for Research and Learning, 686 Bay Street, Toronto, Ontario, M5G 0A4, Canada

[2]Pediatric Hematology Oncology, University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX, 78229, US

[3]Department of Oncology, Benjamin Bloom Children's Hospital, Bulevar De Los Heroes, San Salvador, El Salvador

[4]Stem Cell Transplantation Unit, Hospital de Niños Sor María Ludovica, Calle 14 1631, La Plata, Argentina

[5]Department of Pharmacy, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, M5G 1X8, Canada

[6]Division of Haematology/Oncology, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, M5G 1X8, Canada

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CORRESPONDING AUTHOR:

Lillian Sung MD, PhD

Division of Haematology/Oncology

The Hospital for Sick Children

555 University Avenue

Toronto, Ontario

M5G 1X8

Telephone: 416-813-5287

Fax: 416-813-5979

Email: lillian.sung@sickkids.ca

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ABSTRACT

Objectives: Symptom screening is important to achieving symptom control. Symptom Screening in Pediatrics Tool (SSPedi) is validated for English-speaking children. Objectives were to translate SSPedi into Spanish, and to evaluate the understandability and cultural relevance of the translated version among Spanish-speaking children with cancer and pediatric hematopoietic stem cell transplant recipients.

Methods: We conducted a multi-phase, descriptive study to translate SSPedi into Spanish. The first step was to determine whether one Spanish version would be appropriate for both North America and Argentina by identification of a single translation that would be acceptable and understood in both regions. Forward and backward translations were performed. The translated version was evaluated by Spanish-speaking children 8-18 years of age receiving cancer treatments.

Primary and Secondary Outcome Measures: Children self-reported difficulty with understanding using a 5-point Likert scale while cognitive interviews identified incorrect understanding of SSPedi items using a 4-point Likert scale. Cultural relevance was assessed qualitatively.

Results: This report focuses on North American Spanish as a separate version will be required for Argentinian Spanish SSPedi. There were 20 children from Toronto and San Antonio included in cognitive interviews. The most common types of Spanish spoken were Mexican (13, 65%), Central American (2, 10%) and South American (2, 10%). No child reported that it was hard or very hard to complete Spanish SSPedi. Changes to the instrument itself were not required.

Conclusions: After enrollment of 20 respondents, the North American version of Spanish SSPedi was considered satisfactory based upon self-reported difficulty with understanding, adjudicated incorrect understanding and cultural relevance. We translated and finalized Spanish SSPedi appropriate for use in North America. Future research will translate and evaluate SSPedi for use in Argentina and other Spanish-speaking countries.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

- Multi-center conduct is a strength as it improves generalizability of the study.
- Multiple approaches to assessing understandability is a strength as it improves robustness and validity of the findings.
- Use of external adjudicators is a strength as it improves reliability of the results.
- The study is limited by conduct in only two countries; this version of SSPedi may not be well-understood in other Spanish-speaking countries.

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BACKGROUND

Pediatric cancer patients experience prevalent and severely bothersome symptoms during treatment.(1-3) Common symptoms experienced include pain, nausea and fatigue.(1) More recent studies have also highlighted the prevalence of changes in hunger and taste as bothersome symptoms in this population.(4-7) Symptoms are important because there is strong correlation between increasing symptom burden and worse quality of life.(8) Active symptom screening and reporting are likely to be central in optimizing symptom control. Active symptom screening may identify symptoms early, improve communication of the extent of bother to the healthcare team and increase earlier and more consistent management strategies.

In prior research, we identified the lack of appropriate symptom screening measures for children with cancer based upon length, content validity or appropriateness (9) and consequently, developed a new instrument named the Symptom Screening in Pediatrics Tool (SSPedi).(10) SSPedi asks about the degree to which 15 symptoms bothered the child yesterday or today on a 5-point Likert scale. These symptoms are disappointed or sad, scared or worried, cranky or angry, problems thinking, body or face changes, tiredness, mouth sores, headache, other pain, tingling or numbness, throwing up, hunger changes, taste changes, constipation and diarrhea.

To evaluate the psychometric properties of SSPedi, we conducted a multi-center study with 502 English-speaking children with sites in both Canada and the United States. All children enrolled in the study were between the ages of 8-18 and were receiving cancer therapies. SSPedi was found to be reliable (internal consistency and test re-test and inter-rater reliability), valid (construct validity), and responsive to change.(10) More precisely, the intraclass correlation coefficients were 0.88 (95% confidence interval (CI) 0.82 to 0.92) for test re-test reliability, and 0.76 (95% CI 0.71 to 0.80) for inter-rater reliability between children and their parents. The mean difference in SSPedi scores between groups that were hypothesized to be more and less symptomatic was 7.8 (95% CI 6.4 to 9.2; P<0.001).(10) Construct validity was

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demonstrated as all hypothesized relationships among measures were observed. SSPedi was responsive to change; those who reported they were much better or worse on a global symptom change scale had significantly changed from their baseline score (mean absolute difference 5.6, 95% CI 3.8 to 7.5; P<0.001).

Translation into other languages will be an important component of SSPedi adoption within and outside of North America. We initially chose to focus translation on Spanish as it is a common first language of children in the United States.(11) The process of translation to Spanish must consider both cultural and linguistic perspectives.(12) Consequently, objectives were to translate SSPedi into Spanish and to evaluate the understandability and cultural relevance of the translated version of SSPedi among children with cancer and pediatric hematopoietic stem cell transplant (HSCT) recipients.

METHODS

To translate SSPedi into Spanish, we conducted a multi-phase, descriptive study that was approved by The Hospital for Sick Children's Research Ethics Board (#1000057560) and the Research Ethics Boards of all participating sites. Written informed consent and assent was obtained from all study participants or guardians (in the case of children providing assent). The following reflect the specific steps taken for translation of SSPedi into Spanish. The target countries were the United States, Canada and Argentina. We first determined whether one Spanish version would be appropriate for North America and Argentina by identification of a single translation that would be acceptable and understood in both regions. Next, we conducted translation followed by cognitive interviews as further described below.

With Spanish-speaking investigators and translators from the United States, Canada and Argentina, we identified that at least two versions of Spanish would be required, namely one appropriate for North America and one appropriate for Argentina. More specifically, the local investigators and translators determined that for some symptoms, language that would be

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commonly used and well understood in one region would not be commonly used or well understood in the other region. In addition, they identified regional differences in terms of grammatical structure and the use of voseo conjugation. Only the North American version is presented in this manuscript; the Argentinian version will be reported separately. Thus, enrollment sites for this report were The Hospital for Sick Children, Toronto, Canada and University of Texas Health Sciences Center San Antonio, San Antonio, United States.

Translation

Translation of SSPedi included four distinct steps, namely forward translation, reconciliation, back translation and back translation review. We followed the guiding principles for the translation and cultural adaptation process for patient-reported outcomes from the ISPOR Task Force.(13) The generic methods that will be used for SSPedi translations are provided as Appendix 1.

Forward translation involved the independent translation of SSPedi from English (source language) by two professional medical translators, at least one of whom resided in the country targeted for translation. Reconciliation between the translated versions of SSPedi occurred via a translation panel, which consisted of investigators from the enrollment sites, both translators and the Toronto-based team. The Toronto-based research team included one pediatric oncologist, one pediatric pharmacist, one clinical research manager and one clinical research project assistant.

Next, the product of reconciliation was back translated to English by a third translator who did not have knowledge of English SSPedi and who was a native English speaker. The translation panel then reviewed the back translation against the source instrument to identify any discrepancies in meaning.

In addition to translating SSPedi itself, the professional medical translators also translated the synonym list. The synonym list was created for the English version of SSPedi to facilitate

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child self-report. It provides alternative words for each SSPedi symptom and was derived primarily through cognitive interviews with children themselves. Examples of synonyms for "te sientes decepcionado" included "te sientes desilusionado", "desencantado" and "fastidiado".

Cognitive Interviewing

Overview: The interviews were audio-recorded and sent to Toronto for evaluation and adjudication. The goals were to determine whether children found the Spanish translated version of SSPedi difficult to understand, whether they incorrectly understood it, and whether there were cultural issues with the instrument. Interviews were conducted by trained research associates or nurses with experience in cognitive interviewing who are fluent in Spanish and English.

Eligibility Criteria: Children were eligible to participate if they were 8 to 18 years of age; they had a diagnosis of cancer or were HSCT recipients; and Spanish was their first language (permissible for both English and Spanish to be their first language). We excluded participants who had visual or cognitive impairments that precluded completion of SSPedi according to their healthcare provider.

Primary and Secondary Outcome Measures: Children self-reported difficulty with understanding using a 5-point Likert scale while cognitive interviews identified incorrect understanding of SSPedi items using a 4-point Likert scale. Cultural relevance was assessed qualitatively.

Procedures: Sampling was purposive to ensure that children of varying age, underlying diagnosis and gender were included. Potential participants were identified on the inpatient ward or outpatient clinic by the healthcare team. Upon confirmation of eligibility, the patient or family was approached to request participation in this study.

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First, the respondent completed the translated version of SSPedi on paper in the presence of the interviewer. SSPedi could be read aloud if the child was having difficulty with reading. Child respondents rated how easy or hard the translated version of SSPedi was to understand using a 5-point Likert scale ranging from 1="very hard" to 5="very easy". The instrument overall, each of the 15 items and the response scale were evaluated. We reported the number of children who found SSPedi hard or very hard to understand (score of 1 or 2). We also evaluated the child's understanding of each item and the response scale using cognitive probing. Both the interviewer and an independent rater in Toronto who listened to the audio-recording adjudicated understanding using a 4-point Likert scale ranging from 1="completely incorrect" to 4="completely correct". Discrepancies were resolved by consensus. We described the number of items that were rated as partially or completely incorrect (score of 1 or 2). Next, we asked children whether any questions within SSPedi did not make sense to them in thinking about their day-to-day life in order to assess cultural relevance. These data were evaluated by the Toronto rater and dichotomized into issues with cultural relevance identified vs. not identified. Finally, we asked whether any important symptoms were missing from Spanish SSPedi. Children could have responded to questions in English or Spanish according to their preference.

After each group of five children were interviewed, the study team met to review the responses to identify whether the translated version of SSPedi should be modified. Modification could be made to the script, the instrument itself or a synonym list of terms available for each SSPedi item. Formal evaluation of difficulty with understanding and incorrect understanding was performed after each group of 10 children were interviewed (considered one iteration).

Criteria to consider Spanish SSPedi satisfactory were as follows: no more than one of the last 10 participants found the entire instrument and each item hard to understand, no more than one of the last 10 participants were incorrect in their understanding of each item as adjudicated by the raters, and other comments including those pertaining to cultural relevance did not suggest that modification was required. Sample size was based upon the suggestion that seven

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to 10 interviews are sufficient to determine understandability of an item.(14) We therefore intended to enroll up to 10-30 children to allow for up to three iterations consisting of 10 children each. All analyses were descriptive.

Finalization

The final version of Spanish SSPedi was reviewed by all members of the translation panel to ensure cohesiveness and freedom from minor error. The final version was then formatted.

Patient and Public Involvement

No patients were involved in study design or conduct apart from being participants in the research.

RESULTS

Between January 2018 and April 2019, we identified 38 children and enrolled 20 participants, at which point North American Spanish SSPedi was considered satisfactory (Figure 1). Table 1 shows the demographics of the included participants. The number of children who were 8-10, 11-14 and 15-18 years of age were 4 (20%), 7 (35%) and 9 (45%) respectively. The most common types of Spanish spoken were Mexican (13, 65%) followed by Central American (2, 10%), South American (2, 10%) and other (3, 15%).

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Table 1: Demographic Characteristics of Participants Evaluating North American Spanish SSPedi

	Cohort 1 (n=10)	Cohort 2 (n=10)
Sex		
Male	6 (60%)	6 (60%)
Female	4 (40%)	4 (40%)
Age in Years		
8-10	1 (10%)	3 (30%)
11-14	4 (40%)	3 (30%)
15-18	5 (50%)	4 (40%)
Diagnosis		
Leukemia/lymphoma	9 (90%)	4 (40%)
Solid tumor	1 (10%)	3 (30%)
Brain tumor	0	2 (20%)
Other*	0	1 (10%)
Metastatic Disease	0	0
Relapse	1 (10%)	1 (10%)
Stem Cell Transplantation	1 (10%)	1 (10%)
Active Treatment	7 (70%)	4 (40%)
Born in Country of Interview	6 (60%)	9 (90%)
Type of Spanish Spoken		
Mexican	5 (50%)	8 (80%)
Central American	2 (20%)	0
South American	1 (10%)	1 (10%)
Other	2 (20%)	1 (10%)
Inpatient at Interview	0	1 (10%)
Attending School	5 (50%)	9 (90%)

Abbreviation: SSPedi – Symptom Screening in Pediatrics Tool
*Other - primary immunodeficiency (n=1)

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None of the child respondents reported that it was hard or very hard to complete Spanish SSPedi overall. Table 2 shows self-reported difficulty with understanding and adjudicated incorrect understanding of SSPedi items. It shows that after enrolling the first 10 participants, two participants found two items (mouth sores and tingly or numb hands or feet) hard to understand and therefore, criteria were not met to consider that version satisfactory. Changes made were additions to the synonym list only, based on alternative words given by children during the interview process. No changes to the instrument itself were required. In the last 10

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enrolled participants, at most one participant found each item hard to understand and none were incorrect in their understanding of each item. None of the respondents were incorrect in their understanding of the response scale. In terms of cultural relevance, no issues were identified by any of the 20 respondents. None of the children interviewed indicated that there were additional symptoms they felt were missing from the tool.

Table 2: Self-reported Difficulty with Understanding and Rater-Adjudicated Incorrectness with North American Spanish SSPedi*

	Cohort 1 (n=10)		Cohort 2 (n=10)	
	Hard to Understand	Incorrect	Hard to Understand	Incorrect
Disappointed or Sad	0	0	0	0
Scared or Worried	0	0	0	0
Cranky or Angry	1	0	1	0
Difficulty Thinking/Remembering	0	0	1	0
Changes in your face/body	0	0	1	0
Tired	0	0	0	0
Mouth sores	2	1	1	0
Headache	0	0	0	0
Hurt or Pain	0	1	0	0
Tingly or numb hands or feet	2	0	1	0
Throwing Up	0	0	0	0
More or less hungry	0	0	0	0
Changes in Taste	0	0	1	0
Constipation	0	0	1	0
Diarrhea	0	0	0	0

* Hard = rated as hard or very hard to understand by participant
Incorrect = rated as partially or completely incorrect by rater

Thus, after 20 participants, the North American Spanish version of SSPedi was considered satisfactory and appropriate for utilization. Figure 2 shows the final version.

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DISCUSSION

We translated a self-report symptom screening tool for pediatric patients with cancer and HSCT recipients named SSPedi into Spanish appropriate for use in North America. The final version was acceptable based upon self-reported difficulty with understanding, adjudicated incorrect understanding of different aspects of SSPedi and cultural relevance. Many patient-reported outcomes incorporated into oncology clinical trials are only validated in English,(15) leading to potential disparities in clinical trial participation. Consequently, translation into non-English languages should be a priority.

We found that at least two versions of Spanish SSPedi will be needed since Argentinian Spanish was considered sufficiently different from North American Spanish to require a distinct version. Interestingly, different quality of life instruments have taken alternate approaches to Spanish translation. For example, the developers of the PedsQL modules have chosen to translate Spanish for several different countries including the United States, Argentina, Columbia and Spain.(16) In contrast, the Patient-Reported Outcome Measurement Information System has a single Spanish translation version.(17)

We termed this version of Spanish SSPedi "North American" even though we did not include a site in Mexico. However, we noted that the majority of children self-identified their Spanish type as Mexican, thus providing reassurance that this version should be appropriate in that country. Ideally, further testing in Mexico would be conducted to confirm understandability and cultural relevance in that setting. Some could argue that North American Spanish is not a distinct form of Spanish as it reflects the Spanish spoken in several different originating countries. However, a study conducted in the United States or Canada is unlikely to use multiple versions of Spanish. Thus, creating a North America Spanish version addresses a practical clinical and research need in these geographic locations.

During the creation of English SSPedi, we found four items more difficult to understand by children 8-18 years of age, namely 'changes in how your body and face look', 'tingly or numb

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hands or feet', 'feeling more or less hungry than you usually do', and 'constipation (hard to poop).(18) Interestingly, three of these four items were similarly hard to understand by at least one participant in this current study focused on Spanish translation. This may suggest that difficulty with understanding was not related to Spanish translation but rather, that these are more difficult concepts for children in general to understand, particularly if respondents had no previous experience with the symptom. This hypothesis is supported by the absence or limited number of self-reported instruments for at least peripheral neuropathy among pediatric cancer patients.(19)

The main implication of this work is that there is now a symptom assessment tool that can be used among North American Spanish speaking children receiving cancer treatments. Given known disparities based upon race, ethnicity and language,(20, 21) development of such a tool may be an important step toward reducing disparities in terms of both clinical trial enrollment and routine clinical care. Future efforts could evaluate barriers to utilization of the translated tool as well as translating SSPedi to other Spanish-speaking populations.

The strengths of this study were conduct of the translation according to internationally recognized standards (13) and evaluation in two countries. Other strengths include its multi-center conduct to improve generalizability, multiple approaches to assessing understandability to improve validity and use of external adjudicators to improve reliability. However, weaknesses included enrollment of a limited number of children and in only two centers. Evaluation in other locations and with additional children may influence the synonym list further although based upon the initial results, it is less likely that changes to the instrument itself will be required. In addition, throughout the SSPedi program, ease or difficulty in understanding has focused on the number of children describing an item as hard or very hard to understand. Focusing on those who find an item neither easy nor hard to understand could lead to different results.

In summary, we translated and finalized Spanish SSPedi appropriate for use in North America based upon self-reported difficulty with understanding, adjudicated incorrect

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understanding of different aspects of SSPedi and cultural relevance. This work is important as translation of patient-reported outcomes to non-English languages may reduce disparities in clinical trial enrollment and cancer care delivery. Future research will translate and evaluate SSPedi for use in Argentina and other Spanish-speaking countries.

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AUTHOR CONTRIBUTORSHIP

LD and LS developed the study concept and design. EP, DN, CS, SG, GG, and GD were involved in data collection. LS drafted the manuscript. All authors EP, AG, AS, AML, DN, CS, SG, GG, GD, LD, and LS participated in data interpretation, reviewed, revised, and approved the manuscript.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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DATA SHARING

The datasets used or analyzed during the current study are available from the corresponding author on reasonable request.

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FIGURE LEGEND

Figure 1: North American Spanish SSPedi Participant Flow Diagram

Figure 2: North American Spanish SSPedi

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Figure 1: North American Spanish SSPedi Participant Flow Diagram

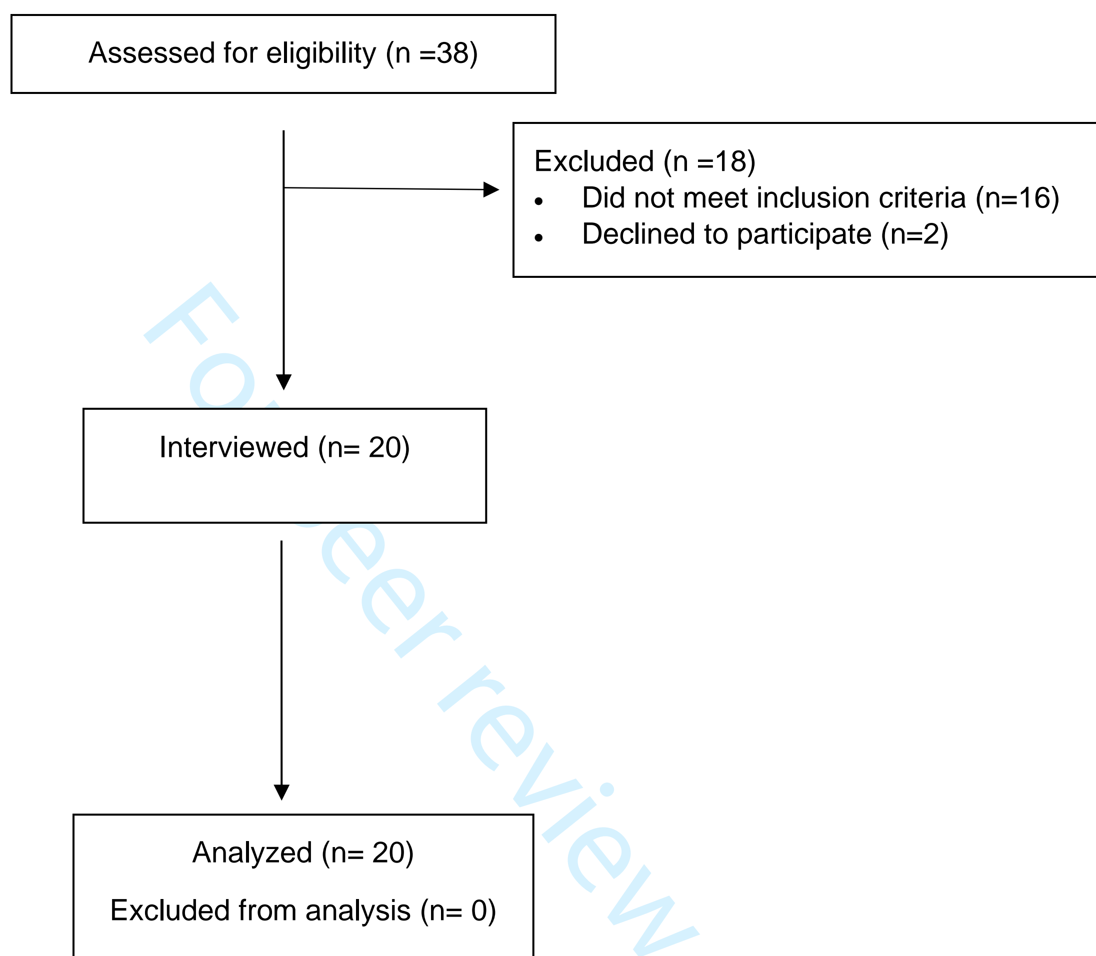

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Figure 2: North American Spanish SSPedi

Spanish SSPedi (North America): detección de síntomas en pediatría

Marca el círculo que mejor describe cuánto te **molestó** cada una de estas cosas **ayer u hoy**:

	No me molestó para nada	Un poco	Más o menos	Mucho	Me molestó muchísimo
Te sientes decepcionado o triste	○	○	○	○	○
Te sientes asustado o preocupado	○	○	○	○	○
Estas de mal humor o enojado	○	○	○	○	○
Te cuesta pensar o recordar cosas	○	○	○	○	○
Notas algún cambio en el cuerpo o la cara	○	○	○	○	○
Te sientes cansado	○	○	○	○	○
Tienes llagas en la boca	○	○	○	○	○
Tienes dolor de cabeza	○	○	○	○	○
Sientes malestar o dolor (que no sea dolor de cabeza)	○	○	○	○	○
Sientes hormigueo o entumecimiento en las manos o los pies	○	○	○	○	○
Tienes vómitos o ganas de vomitar	○	○	○	○	○
Tienes más o menos hambre que de costumbre	○	○	○	○	○
Notas cambios en el gusto	○	○	○	○	○
Tienes estreñimiento (dificultad para hacer popó)	○	○	○	○	○
Tienes diarrea (popó aguada)	○	○	○	○	○

Cuéntanos cualquier otra cosa que te haya molestado recientemente y escríbelo aquí.

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Appendix 1: Guidelines for Conducting Translation of SSPedi

Step	Description	Details
1	Forward translation	Two native speakers of the target language independently produce a forward translation of SSPedi from English into the target language. Both must be professional medical translators and at least one must reside in the country targeted for translation.
2	Reconciliation of forward translations	Translation panel consists of the two forward translators and investigators from enrollment sites where translation will be tested. Discrepancies between translators identified and resolved by consensus. Goal is to produce a single translated version of the tool.
3	Back translation	Forward translation is back translated into English by an independent translator. Back translator must be a native English speaker with no knowledge of English SSPedi.
4	Back translation review	Comparison of back translated version of SSPedi with original SSPedi tool by the research team to detect mistranslations or inaccuracies. Goal is to produce a final translated version of the tool ready for testing.
5	Cognitive interviewing	Goals are to determine if a) SSPedi items and response scale are: • Easy to understand as rated by children • Correctly interpreted as rated by the interviewer and a second adjudicator b) there are any issues with cultural relevancy A minimum of **10** children from target population must be enrolled.
6	Review interview findings	Interview findings are summarized by iterations of 10 children. Translation panel decides whether revisions required or whether translated version is satisfactory. In general, criteria to consider the translation satisfactory are: a) No more than one participants in the last 10 finds an item hard or very hard to understand b) No more than one participant in the last 10 is incorrect in their understanding of an item c) Comments do not indicate other modification or additions to the synonym list are required
7	*Further cognitive interviewing*	*If any changes were made, additional cognitive interviews conducted in iterations of 10 children until the translated version is considered satisfactory*
8	Finalization	The final translated version of SSPedi reviewed by the translation panel to ensure cohesiveness and freedom from minor error.

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Translating the Symptom Screening in Pediatrics Tool (SSPedi) into North American Spanish and Among Spanish-speaking Children Receiving Cancer Treatments, Evaluating Understandability and Cultural Relevance in a Multiple-Phase Descriptive Study

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TITLE: Translating the Symptom Screening in Pediatrics Tool (SSPedi) into North American Spanish and Among Spanish-speaking Children Receiving Cancer Treatments, Evaluating Understandability and Cultural Relevance in a Multiple-Phase Descriptive Study

AUTHORS: Erin Plenert BA, MPH[1]; Allison Grimes MD, MSCI[2]; Aaron Sugalski DO[2]; Anne-Marie Langevin MD[2]; Dominica Nieto BA[2]; Carmen Salaverria MSc[3]; Sergio Gomez MD[4]; Gisela Gonzalez[4]; Gisela D'Angelo[4]; L. Lee Dupuis RPh, PhD[1,5]; Lillian Sung MD, PhD[1, 6]

AFFILIATIONS

[1]Program in Child Health Evaluative Sciences, The Hospital for Sick Children, Peter Gilgan Centre for Research and Learning, 686 Bay Street, Toronto, Ontario, M5G 0A4, Canada

[2]Pediatric Hematology Oncology, University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX, 78229, US

[3]Department of Oncology, Benjamin Bloom Children's Hospital, Bulevar De Los Heroes, San Salvador, El Salvador

[4]Stem Cell Transplantation Unit, Hospital de Niños Sor María Ludovica, Calle 14 1631, La Plata, Argentina

[5]Department of Pharmacy, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, M5G 1X8, Canada

[6]Division of Haematology/Oncology, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, M5G 1X8, Canada

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CORRESPONDING AUTHOR:

Lillian Sung MD, PhD

Division of Haematology/Oncology

The Hospital for Sick Children

555 University Avenue

Toronto, Ontario

M5G 1X8

Telephone: 416-813-5287

Fax: 416-813-5979

Email: lillian.sung@sickkids.ca

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ABSTRACT

Objectives: Symptom screening is important to achieving symptom control. Symptom Screening in Pediatrics Tool (SSPedi) is validated for English-speaking children. Objectives were to translate SSPedi into Spanish, and to evaluate the understandability and cultural relevance of the translated version among Spanish-speaking children with cancer and pediatric hematopoietic stem cell transplant recipients.

Methods: We conducted a multi-phase, descriptive study to translate SSPedi into Spanish. The first step was to determine whether one Spanish version would be appropriate for both North America and Argentina. Once this decision was made, forward and backward translations were performed. The translated version was evaluated by Spanish-speaking children 8-18 years of age receiving cancer treatments.

Primary and Secondary Outcome Measures: Children self-reported difficulty with understanding using a 5-point Likert scale. Cognitive interviews identified incorrect understanding of SSPedi items using a 4-point Likert scale. Cultural relevance was assessed qualitatively.

Results: This report focuses on North American Spanish as a separate version will be required for Argentinian Spanish SSPedi. There were 20 children from Toronto and San Antonio included in cognitive interviews. The most common types of Spanish spoken were Mexican (13, 65%), Central American (2, 10%) and South American (2, 10%). No child reported that it was hard or very hard to complete Spanish SSPedi. Changes to the instrument itself were not required.

Conclusions: After enrollment of 20 respondents, the North American version of Spanish SSPedi was considered satisfactory based upon self-reported difficulty with understanding, adjudicated incorrect understanding and cultural relevance. We translated and finalized Spanish SSPedi appropriate for use in North America. Future research will translate and evaluate SSPedi for use in Argentina and other Spanish-speaking countries.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

- Multi-center conduct is a strength as it improves generalizability of the study.
- Multiple approaches to assessing understandability is a strength as it improves robustness and validity of the findings.
- Use of external adjudicators is a strength as it improves reliability of the results.
- The study is limited by conduct in only two countries; this version of SSPedi may not be well-understood in other Spanish-speaking countries.

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BACKGROUND

Pediatric cancer patients experience prevalent and severely bothersome symptoms during treatment.(1-3) Common symptoms experienced include pain, nausea and fatigue.(1) More recent studies have also highlighted the prevalence of changes in hunger and taste as bothersome symptoms in this population.(4-7) Symptoms are important because there is strong correlation between increasing symptom burden and worse quality of life.(8) Active symptom screening and reporting are likely to be central in optimizing symptom control. Active symptom screening may identify symptoms early, improve communication of the extent of bother to the healthcare team and increase earlier and more consistent management strategies.

In prior research, we identified the lack of appropriate symptom screening measures for children with cancer based upon length, content validity or appropriateness (9) and consequently, developed a new instrument named the Symptom Screening in Pediatrics Tool (SSPedi).(10) SSPedi asks about the degree to which 15 symptoms bothered the child yesterday or today on a 5-point Likert scale. These symptoms are disappointed or sad, scared or worried, cranky or angry, problems thinking, body or face changes, tiredness, mouth sores, headache, other pain, tingling or numbness, throwing up, hunger changes, taste changes, constipation and diarrhea.

To evaluate the psychometric properties of SSPedi, we conducted a multi-center study with 502 English-speaking children with sites in both Canada and the United States. All children enrolled in the study were between the ages of 8-18 and were receiving cancer therapies. SSPedi was found to be reliable (internal consistency and test re-test and inter-rater reliability), valid (construct validity), and responsive to change.(10) More precisely, the intraclass correlation coefficients were 0.88 (95% confidence interval (CI) 0.82 to 0.92) for test re-test reliability, and 0.76 (95% CI 0.71 to 0.80) for inter-rater reliability between children and their parents. The mean difference in SSPedi scores between groups that were hypothesized to be more and less symptomatic was 7.8 (95% CI 6.4 to 9.2; P<0.001).(10) Construct validity was

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demonstrated as all hypothesized relationships among measures were observed. SSPedi was responsive to change; those who reported they were much better or worse on a global symptom change scale had significantly changed from their baseline score (mean absolute difference 5.6, 95% CI 3.8 to 7.5; P<0.001).

Translation into other languages will be an important component of SSPedi adoption within and outside of North America. We initially chose to focus translation on Spanish as it is a common first language of children in the United States.(11) The process of translation to Spanish must consider both cultural and linguistic perspectives.(12) Consequently, objectives were to translate SSPedi into Spanish and to evaluate the understandability and cultural relevance of the translated version of SSPedi among children with cancer and pediatric hematopoietic stem cell transplant (HSCT) recipients.

METHODS

To translate SSPedi into Spanish, we conducted a multi-phase, descriptive study that was approved by The Hospital for Sick Children's Research Ethics Board (#1000057560) and the Research Ethics Boards of all participating sites. Written informed consent and verbal assent were obtained from all study participants or guardians (in the case of children providing assent). Both Spanish and English consent/assent forms were available. The following reflect the specific steps taken for translation of SSPedi into Spanish. The target countries were the United States, Canada and Argentina. We first determined whether one Spanish version would be appropriate for North America and Argentina by identification of a single translation that would be acceptable and understood in both regions. Next, we conducted translation followed by cognitive interviews as further described below.

With Spanish-speaking investigators and translators from the United States, Canada and Argentina, we identified that at least two versions of Spanish would be required, namely one appropriate for North America and one appropriate for Argentina. More specifically, the local

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investigators and translators determined that for some symptoms, language that would be commonly used and well understood in one region would not be commonly used or well understood in the other region. In addition, they identified regional differences in terms of grammatical structure and the use of voseo conjugation. *Voseo* is the use of *vos* as a second-person singular pronoun, instead of, or alongside *tu*. In some countries such as Argentina, *vos* is the written and spoken standard. It can also be found in more casual speech in many other parts of Central and South America. Only the North American version is presented in this manuscript; the Argentinian version will be reported separately. Thus, enrollment sites for this report were The Hospital for Sick Children, Toronto, Canada and University of Texas Health Sciences Center San Antonio, San Antonio, United States.

Translation

Translation of SSPedi included four distinct steps, namely forward translation, reconciliation, back translation and back translation review. We followed the guiding principles for the translation and cultural adaptation process for patient-reported outcomes from the ISPOR Task Force.(13) The generic methods that will be used for SSPedi translations are provided as Appendix 1.

Forward translation involved the independent translation of SSPedi from English (source language) by two professional medical translators, at least one of whom resided in the country targeted for translation. Reconciliation between the translated versions of SSPedi occurred via a translation panel, which consisted of investigators from the enrollment sites, both translators and the Toronto-based team. The Toronto-based research team included one pediatric oncologist, one pediatric pharmacist, one clinical research manager and one clinical research project assistant.

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Next, the product of reconciliation was back translated to English by a third translator who did not have knowledge of English SSPedi and who was a native English speaker. The translation panel then reviewed the back translation against the source instrument to identify any discrepancies in meaning.

In addition to translating SSPedi itself, the professional medical translators also translated the synonym list. The synonym list was created for the English version of SSPedi to facilitate child self-report. It provides alternative words for each SSPedi symptom and was derived primarily through cognitive interviews with children themselves. Examples of synonyms for “te sientes decepcionado” (you feel disappointed) included “te sientes desilusionado” (you feel disillusioned) and “desencantado” (disenchanted).

Cognitive Interviewing

Overview: The interviews were audio-recorded and sent to Toronto for evaluation and adjudication. The goals were to determine whether children found the Spanish translated version of SSPedi difficult to understand, whether they incorrectly understood it, and whether there were cultural issues with the instrument. Interviews were conducted by trained research associates or nurses with experience in cognitive interviewing who are fluent in Spanish and English.

Eligibility Criteria: Children were eligible to participate if they were 8 to 18 years of age; they had a diagnosis of cancer or were HSCT recipients; and Spanish was their first language (permissible for both English and Spanish to be their first language). We excluded participants who had visual or cognitive impairments that precluded completion of SSPedi according to their healthcare provider.

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3 *Primary and Secondary Outcome Measures:* Children self-reported difficulty with understanding
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5 using a 5-point Likert scale. Cognitive interviews identified incorrect understanding of SSPedi
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7 items using a 4-point Likert scale. Cultural relevance was assessed qualitatively.
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12 *Procedures:* Sampling was purposive to ensure that children of varying age, underlying
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14 diagnosis and gender were included. Potential participants were identified on the inpatient ward
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16 or outpatient clinic by the healthcare team. Upon confirmation of eligibility, the patient or family
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18 was approached to request participation in this study.
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20 First, the respondent completed the translated version of SSPedi on paper in the presence
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22 of the interviewer. SSPedi could be read aloud if the child was having difficulty with reading. We
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24 evaluated four aspects, namely ease or difficulty with understanding as reported by the child,
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26 correct or incorrect understanding as evaluated by two raters, cultural relevance and missing
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28 items. Child respondents rated how easy or hard the translated version of SSPedi was to
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30 understand using a 5-point Likert scale ranging from 1="very hard" to 5="very easy". The
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32 instrument overall, each of the 15 items and the response scale were evaluated. We reported
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34 the number of children who found SSPedi hard or very hard to understand (score of 1 or 2). We
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36 also evaluated the child's understanding of each item and the response scale using cognitive
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38 probing. Both the interviewer and an independent rater in Toronto who listened to the audio-
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40 recording adjudicated understanding using a 4-point Likert scale ranging from 1="completely
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42 incorrect" to 4="completely correct". Discrepancies were resolved by consensus. We described
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44 the number of items that were rated as partially or completely incorrect (score of 1 or 2). Next,
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46 we asked children whether any questions within SSPedi did not make sense to them in thinking
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48 about their day-to-day life in order to assess cultural relevance. These data were evaluated by
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50 the Toronto rater and dichotomized into issues with cultural relevance identified vs. not
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52 identified. Finally, we asked whether any important symptoms were missing from Spanish
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SSPedi. Children could have responded to questions in English or Spanish according to their preference.

Evaluation of Responses and Sample Size Justification: After each group of five children were interviewed, the study team met to review the responses to identify whether the translated version of SSPedi should be modified. Modification could be made to the script, the instrument itself or a synonym list of terms available for each SSPedi item. Formal evaluation of difficulty with understanding and incorrect understanding was performed after each group of 10 children were interviewed (considered one iteration).

Criteria to consider Spanish SSPedi satisfactory were as follows: no more than one of the last 10 participants found the entire instrument and each item hard to understand, no more than one of the last 10 participants were incorrect in their understanding of each item as adjudicated by the raters, and other comments including those pertaining to cultural relevance did not suggest that modification was required. Sample size was based upon the suggestion that seven to 10 interviews are sufficient to determine understandability of an item.(14) We therefore intended to enroll up to 10-30 children to allow for up to three iterations consisting of 10 children each. All analyses were descriptive.

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Finalization

The final version of Spanish SSPedi was reviewed by all members of the translation panel to ensure cohesiveness and freedom from minor error. The final version was then formatted.

Patient and Public Involvement

No patients were involved in study design or conduct apart from being participants in the research.

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RESULTS

Between January 2018 and April 2019, we identified 38 children and enrolled 20 participants (Figure 1). Table 1 shows the demographics of the included participants. The number of children who were 8-10, 11-14 and 15-18 years of age were 4 (20%), 7 (35%) and 9 (45%) respectively. The most common types of Spanish spoken were Mexican (13, 65%) followed by Central American (2, 10%), South American (2, 10%) and other (3, 15%). After enrollment of 20 children, the North American Spanish SSPedi was considered satisfactory

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Table 1: Demographic Characteristics of Participants Evaluating North American Spanish SSPedi

	Cohort 1 (n=10)	Cohort 2 (n=10)
Sex		
Male	6 (60%)	6 (60%)
Female	4 (40%)	4 (40%)
Age in Years		
8-10	1 (10%)	3 (30%)
11-14	4 (40%)	3 (30%)
15-18	5 (50%)	4 (40%)
Diagnosis		
Leukemia/lymphoma	9 (90%)	4 (40%)
Solid tumor	1 (10%)	3 (30%)
Brain tumor	0	2 (20%)
Other*	0	1 (10%)
Metastatic Disease	0	0
Relapse	1 (10%)	1 (10%)
Stem Cell Transplantation	1 (10%)	1 (10%)
Active Treatment	7 (70%)	4 (40%)
Born in Country of Interview	6 (60%)	9 (90%)
Type of Spanish Spoken		
Mexican	5 (50%)	8 (80%)
Central American	2 (20%)	0
South American	1 (10%)	1 (10%)
Other	2 (20%)	1 (10%)
Inpatient at Interview	0	1 (10%)
Attending School	5 (50%)	9 (90%)

Abbreviation: SSPedi – Symptom Screening in Pediatrics Tool
*Other - primary immunodeficiency (n=1)

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None of the child respondents reported that it was hard or very hard to complete Spanish SSPedi overall. Table 2 shows self-reported difficulty with understanding and adjudicated incorrect understanding of SSPedi items. It shows that after enrolling the first 10 participants, two participants found two items (mouth sores and tingly or numb hands or feet) hard to understand and therefore, criteria were not met to consider that version satisfactory. Changes made were additions to the synonym list only, based on alternative words given by children during the interview process. No changes to the instrument itself were required. In the last 10

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enrolled participants, at most one participant found each item hard to understand and none were incorrect in their understanding of each item. None of the respondents were incorrect in their understanding of the response scale. In terms of cultural relevance, no issues were identified by any of the 20 respondents. None of the children interviewed indicated that there were additional symptoms they felt were missing from the tool.

Table 2: Self-reported Difficulty with Understanding and Rater-Adjudicated Incorrectness with North American Spanish SSPedi*

	Cohort 1 (n=10)		Cohort 2 (n=10)	
	Hard to Understand	Incorrect	Hard to Understand	Incorrect
Disappointed or Sad	0	0	0	0
Scared or Worried	0	0	0	0
Cranky or Angry	1	0	1	0
Difficulty Thinking/Remembering	0	0	1	0
Changes in your face/body	0	0	1	0
Tired	0	0	0	0
Mouth sores	2	1	1	0
Headache	0	0	0	0
Hurt or Pain	0	1	0	0
Tingly or numb hands or feet	2	0	1	0
Throwing Up	0	0	0	0
More or less hungry	0	0	0	0
Changes in Taste	0	0	1	0
Constipation	0	0	1	0
Diarrhea	0	0	0	0

* Hard = rated as hard or very hard to understand by participant
Incorrect = rated as partially or completely incorrect by rater

Thus, after 20 participants, the North American Spanish version of SSPedi was considered satisfactory and appropriate for utilization. Figure 2 shows the final version.

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DISCUSSION

We translated a self-report symptom screening tool for pediatric patients with cancer and HSCT recipients named SSPedi into Spanish appropriate for use in North America. The final version was acceptable based upon self-reported difficulty with understanding, adjudicated incorrect understanding of different aspects of SSPedi and cultural relevance. Many patient-reported outcomes incorporated into oncology clinical trials are only validated in English,(15) leading to potential disparities in clinical trial participation. Consequently, translation into non-English languages should be a priority.

We found that at least two versions of Spanish SSPedi will be needed since Argentinian Spanish was considered sufficiently different from North American Spanish to require a distinct version. Interestingly, different quality of life instruments have taken alternate approaches to Spanish translation. For example, the developers of the PedsQL modules have chosen to translate Spanish for several different countries including the United States, Argentina, Columbia and Spain.(16) In contrast, the Patient-Reported Outcome Measurement Information System has a single Spanish translation version.(17) It is possible that the Argentinian version would be appropriate for other countries where voseo conjugation is prominent, such as several countries in Central America. However, we cannot be sure without explicit evaluation of the Argentinian version in those countries.

We termed this version of Spanish SSPedi "North American" even though we did not include a site in Mexico. However, we noted that the majority of children self-identified their Spanish type as Mexican, thus providing reassurance that this version should be appropriate in that country. Ideally, further testing in Mexico would be conducted to confirm understandability and cultural relevance in that setting. Some could argue that North American Spanish is not a distinct form of Spanish as it reflects the Spanish spoken in several different originating countries. However, a study conducted in the United States or Canada is unlikely to use multiple

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versions of Spanish. Thus, creating a North America Spanish version addresses a practical clinical and research need in these geographic locations.

During the creation of English SSPedi, we found four items more difficult to understand by children 8-18 years of age, namely 'changes in how your body and face look', 'tingly or numb hands or feet', 'feeling more or less hungry than you usually do', and 'constipation (hard to poop).(18) Interestingly, three of these four items were similarly hard to understand by at least one participant in this current study focused on Spanish translation. This may suggest that difficulty with understanding was not related to Spanish translation but rather, that these are more difficult concepts for children in general to understand, particularly if respondents had no previous experience with the symptom. This hypothesis is supported by the absence or limited number of self-reported instruments for at least peripheral neuropathy among pediatric cancer patients.(19)

The main implication of this work is that there is now a symptom assessment tool that can be used among North American Spanish speaking children receiving cancer treatments. Given known disparities based upon race, ethnicity and language,(20, 21) development of such a tool may be an important step toward reducing disparities in terms of both clinical trial enrollment and routine clinical care. Future efforts could evaluate barriers to utilization of the translated tool as well as translating SSPedi to other Spanish-speaking populations.

The strengths of this study were conduct of the translation according to internationally recognized standards (13) and evaluation in two countries. Other strengths include its multi-center conduct to improve generalizability, multiple approaches to assessing understandability to improve validity and use of external adjudicators to improve reliability. However, weaknesses included enrollment of a limited number of children and in only two centers. Evaluation in other locations and with additional children may influence the synonym list further although based upon the initial results, it is less likely that changes to the instrument itself will be required. In addition, throughout the SSPedi program, ease or difficulty in understanding has focused on the

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number of children describing an item as hard or very hard to understand. Focusing on those who find an item neither easy nor hard to understand could lead to different results.

In summary, we translated and finalized Spanish SSPedi appropriate for use in North America based upon self-reported difficulty with understanding, adjudicated incorrect understanding of different aspects of SSPedi and cultural relevance. This work is important as translation of patient-reported outcomes to non-English languages may reduce disparities in clinical trial enrollment and cancer care delivery. Future research will translate and evaluate SSPedi for use in Argentina and other Spanish-speaking countries.

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AUTHOR CONTRIBUTORSHIP

LD and LS developed the study concept and design. EP, DN, CS, SG, GG, and GD were involved in data collection. LS drafted the manuscript. All authors EP, AG, AS, AML, DN, CS, SG, GG, GD, LD, and LS participated in data interpretation, reviewed, revised, and approved the manuscript.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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DATA SHARING

The datasets used or analyzed during the current study are available from the corresponding author on reasonable request.

FIGURE LEGEND

Figure 1: North American Spanish SSPedi Participant Flow Diagram

Figure 2: North American Spanish SSPedi

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Figure 1: North American Spanish SSPedi Participant Flow Diagram

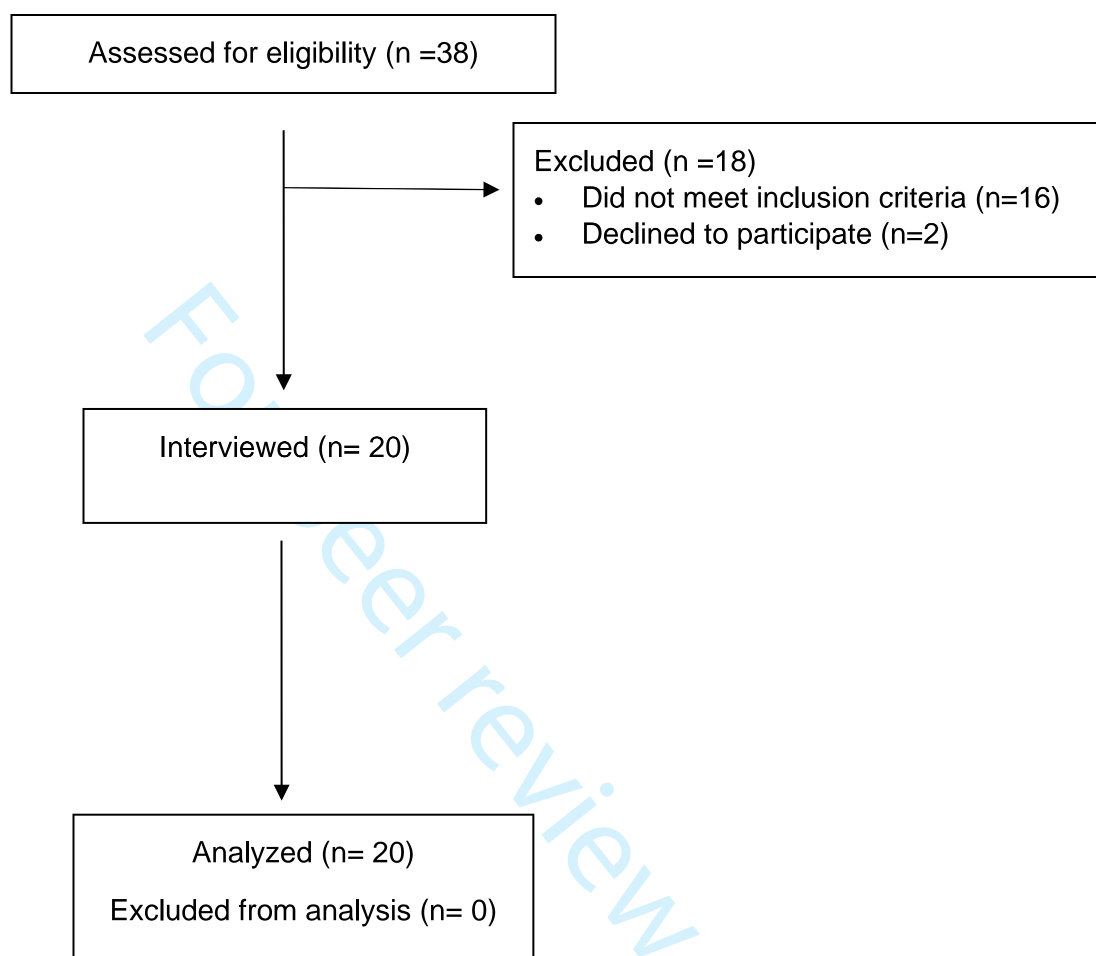

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Figure 2: North American Spanish SSPedi

Spanish SSPedi (North America): detección de síntomas en pediatría

Marca el círculo que mejor describe cuánto te **molestó** cada una de estas cosas **ayer u hoy**:

	No me molestó para nada	Un poco	Más o menos	Mucho	Me molestó muchísimo
Te sientes decepcionado o triste	○	○	○	○	○
Te sientes asustado o preocupado	○	○	○	○	○
Estas de mal humor o enojado	○	○	○	○	○
Te cuesta pensar o recordar cosas	○	○	○	○	○
Notas algún cambio en el cuerpo o la cara	○	○	○	○	○
Te sientes cansado	○	○	○	○	○
Tienes llagas en la boca	○	○	○	○	○
Tienes dolor de cabeza	○	○	○	○	○
Sientes malestar o dolor (que no sea dolor de cabeza)	○	○	○	○	○
Sientes hormigueo o entumecimiento en las manos o los pies	○	○	○	○	○
Tienes vómitos o ganas de vomitar	○	○	○	○	○
Tienes más o menos hambre que de costumbre	○	○	○	○	○
Notas cambios en el gusto	○	○	○	○	○
Tienes estreñimiento (dificultad para hacer popó)	○	○	○	○	○
Tienes diarrea (popó aguada)	○	○	○	○	○

Cuéntanos cualquier otra cosa que te haya molestado recientemente y escríbelo aquí.

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Appendix 1: Guidelines for Conducting Translation of SSPedi

Step	Description	Details
1	Forward translation	Two native speakers of the target language independently produce a forward translation of SSPedi from English into the target language. Both must be professional medical translators and at least one must reside in the country targeted for translation.
2	Reconciliation of forward translations	Translation panel consists of the two forward translators and investigators from enrollment sites where translation will be tested. Discrepancies between translators identified and resolved by consensus. Goal is to produce a single translated version of the tool.
3	Back translation	Forward translation is back translated into English by an independent translator. Back translator must be a native English speaker with no knowledge of English SSPedi.
4	Back translation review	Comparison of back translated version of SSPedi with original SSPedi tool by the research team to detect mistranslations or inaccuracies. Goal is to produce a final translated version of the tool ready for testing.
5	Cognitive interviewing	Goals are to determine if a) SSPedi items and response scale are: • Easy to understand as rated by children • Correctly interpreted as rated by the interviewer and a second adjudicator b) there are any issues with cultural relevancy A minimum of **10** children from target population must be enrolled.
6	Review interview findings	Interview findings are summarized by iterations of 10 children. Translation panel decides whether revisions required or whether translated version is satisfactory. In general, criteria to consider the translation satisfactory are: a) No more than one participants in the last 10 finds an item hard or very hard to understand b) No more than one participant in the last 10 is incorrect in their understanding of an item c) Comments do not indicate other modification or additions to the synonym list are required
7	*Further cognitive interviewing*	*If any changes were made, additional cognitive interviews conducted in iterations of 10 children until the translated version is considered satisfactory*
8	Finalization	The final translated version of SSPedi reviewed by the translation panel to ensure cohesiveness and freedom from minor error.

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Translating the Symptom Screening in Pediatrics Tool (SSPedi) into North American Spanish and Among Spanish-speaking Children Receiving Cancer Treatments, Evaluating Understandability and Cultural Relevance in a Multiple-Phase Descriptive Study

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Complete List of Authors:	Plenert, Erin; Hospital for Sick Children Research Institute, Child Health Evaluative Sciences Grimes, Allison; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Sugalski, Aaron; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Langevin, Anne-Marie; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Nieto, Dominica; University of Texas Health Science Center at San Antonio, Division of Hematology-Oncology Salaverria, Carmen; Hospital Nacional De Ninos Benjamin Bloom, Department of Oncology Gomez, Sergio; Hospital de Niños Sor María Ludovica, Stem Cell Transplantation Unit Gonzalez, Gisela; Hospital de Niños Sor María Ludovica, Stem Cell Transplantation Unit D'Angelo, Gisela; Hospital de Niños Sor María Ludovica, Stem Cell Transplantation Unit Dupuis, Lee; University of Toronto Leslie Dan Faculty of Pharmacy, Sung, Lillian; Hospital for Sick Children, Division of Haematology/Oncology; Hospital for Sick Children SickKids Learning Institute, CHES
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TITLE: Translating the Symptom Screening in Pediatrics Tool (SSPedi) into North American Spanish and Among Spanish-speaking Children Receiving Cancer Treatments, Evaluating Understandability and Cultural Relevance in a Multiple-Phase Descriptive Study

AUTHORS: Erin Plenert BA, MPH[1]; Allison Grimes MD, MSCI[2]; Aaron Sugalski DO[2]; Anne-Marie Langevin MD[2]; Dominica Nieto BA[2]; Carmen Salaverria MSc[3]; Sergio Gomez MD[4]; Gisela Gonzalez[4]; Gisela D'Angelo[4]; L. Lee Dupuis RPh, PhD[1,5]; Lillian Sung MD, PhD[1, 6]

AFFILIATIONS

[1]Program in Child Health Evaluative Sciences, The Hospital for Sick Children, Peter Gilgan Centre for Research and Learning, 686 Bay Street, Toronto, Ontario, M5G 0A4, Canada

[2]Pediatric Hematology Oncology, University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX, 78229, US

[3]Department of Oncology, Benjamin Bloom Children's Hospital, Bulevar De Los Heroes, San Salvador, El Salvador

[4]Stem Cell Transplantation Unit, Hospital de Niños Sor María Ludovica, Calle 14 1631, La Plata, Argentina

[5]Department of Pharmacy, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, M5G 1X8, Canada

[6]Division of Haematology/Oncology, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, M5G 1X8, Canada

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CORRESPONDING AUTHOR:

Lillian Sung MD, PhD

Division of Haematology/Oncology

The Hospital for Sick Children

555 University Avenue

Toronto, Ontario

M5G 1X8

Telephone: 416-813-5287

Fax: 416-813-5979

Email: lillian.sung@sickkids.ca

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ABSTRACT

Objectives: Symptom screening is important to achieving symptom control. Symptom Screening in Pediatrics Tool (SSPedi) is validated for English-speaking children. Objectives were to translate SSPedi into Spanish, and to evaluate the understandability and cultural relevance of the translated version among Spanish-speaking children with cancer and pediatric hematopoietic stem cell transplant recipients.

Methods: We conducted a multi-phase, descriptive study to translate SSPedi into Spanish. The first step was to determine whether one Spanish version would be appropriate for both North America and Argentina. Once this decision was made, forward and backward translations were performed. The translated version was evaluated by Spanish-speaking children 8-18 years of age receiving cancer treatments.

Primary and Secondary Outcome Measures: Primary outcome was child self-reported difficulty with understanding of the entire instrument and each symptom using a 5-point Likert scale. Secondary outcomes were incorrect understanding of SSPedi items identified by cognitive interviews with the children using a 4-point Likert scale and cultural relevance, which was assessed qualitatively.

Results: This report focuses on North American Spanish as a separate version will be required for Argentinian Spanish SSPedi based on different common vocabulary and grammatical structure. There were 20 children from Toronto and San Antonio included in cognitive interviews. The most common types of Spanish spoken were Mexican (13, 65%), Central American (2, 10%) and South American (2, 10%). No child reported that it was hard or very hard to complete Spanish SSPedi. Changes to the instrument itself were not required based upon understanding or cultural relevance.

Conclusions: We translated and finalized Spanish SSPedi appropriate for use in North America. Future research will translate and evaluate SSPedi for use in Argentina and other Spanish-speaking countries.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

- Multi-center conduct is a strength as it improves generalizability of the study.
- Multiple approaches to assessing understandability is a strength as it improves robustness and validity of the findings.
- Use of external adjudicators is a strength as it improves reliability of the results.
- The study is limited by conduct in only two countries; this version of SSPedi may not be well-understood in other Spanish-speaking countries.

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BACKGROUND

Pediatric cancer patients experience prevalent and severely bothersome symptoms during treatment.(1-3) Common symptoms experienced include pain, nausea and fatigue.(1) More recent studies have also highlighted the prevalence of changes in hunger and taste as bothersome symptoms in this population.(4-7) Symptoms are important because there is strong correlation between increasing symptom burden and worse quality of life.(8) Active symptom screening and reporting are likely to be central in optimizing symptom control. Active symptom screening may identify symptoms early, improve communication of the extent of bother to the healthcare team and increase earlier and more consistent management strategies.

In prior research, we identified the lack of appropriate symptom screening measures for children with cancer based upon length, content validity or appropriateness(9) and consequently, developed a new instrument named the Symptom Screening in Pediatrics Tool (SSPedi).(10) SSPedi asks about the degree to which 15 symptoms bothered the child yesterday or today on a 5-point Likert scale. These symptoms are disappointed or sad, scared or worried, cranky or angry, problems thinking, body or face changes, tiredness, mouth sores, headache, other pain, tingling or numbness, throwing up, hunger changes, taste changes, constipation and diarrhea.

To evaluate the psychometric properties of SSPedi, we conducted a multi-center study with 502 English-speaking children with sites in both Canada and the United States. All children enrolled in the study were between the ages of 8-18 and were receiving cancer therapies. SSPedi was found to be reliable (internal consistency and test re-test and inter-rater reliability), valid (construct validity), and responsive to change.(10) More precisely, the intraclass correlation coefficients were 0.88 (95% confidence interval (CI) 0.82 to 0.92) for test re-test reliability, and 0.76 (95% CI 0.71 to 0.80) for inter-rater reliability between children and their parents. The mean difference in SSPedi scores between groups that were hypothesized to be more and less symptomatic was 7.8 (95% CI 6.4 to 9.2; P<0.001).(10) Construct validity was

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demonstrated as all hypothesized relationships among measures were observed. SSPedi was responsive to change; those who reported they were much better or worse on a global symptom change scale had significantly changed from their baseline score (mean absolute difference 5.6, 95% CI 3.8 to 7.5; P<0.001).

Translation into other languages will be an important component of SSPedi adoption within and outside of North America. We initially chose to focus translation on Spanish as it is a common first language of children in the United States.(11) The process of translation to Spanish must consider both cultural and linguistic perspectives.(12) Consequently, objectives were to translate SSPedi into Spanish and to evaluate the understandability and cultural relevance of the translated version of SSPedi among children with cancer and pediatric hematopoietic stem cell transplant (HSCT) recipients.

METHODS

To translate SSPedi into Spanish, we conducted a multi-phase, descriptive study that was approved by The Hospital for Sick Children's Research Ethics Board (#1000057560) and the Research Ethics Boards of all participating sites. Written informed consent and verbal assent were obtained from all study participants or guardians (in the case of children providing assent). Both Spanish and English consent/assent forms were available. The following reflect the specific steps taken for translation of SSPedi into Spanish. The target countries were the United States, Canada and Argentina. We first determined whether one Spanish version would be appropriate for North America and Argentina by identification of a single translation that would be acceptable and understood in both regions. Next, we conducted translation followed by cognitive interviews as further described below.

With Spanish-speaking investigators and translators from the United States, Canada and Argentina, we identified that at least two versions of Spanish would be required, namely one appropriate for North America and one appropriate for Argentina. More specifically, the local

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investigators and translators determined that for some symptoms, language that would be commonly used and well understood in one region would not be commonly used or well understood in the other region. In addition, they identified regional differences in terms of grammatical structure and the use of voseo conjugation. *Voseo* is the use of *vos* as a second-person singular pronoun, instead of, or alongside *tu*. In some countries such as Argentina, *vos* is the written and spoken standard. It can also be found in more casual speech in many other parts of Central and South America. Only the North American version is presented in this manuscript; the Argentinian version will be reported separately. Thus, enrollment sites for this report were The Hospital for Sick Children, Toronto, Canada and University of Texas Health Sciences Center San Antonio, San Antonio, United States.

Translation

Translation of SSPedi included four distinct steps, namely forward translation, reconciliation, back translation and back translation review. We followed the guiding principles for the translation and cultural adaptation process for patient-reported outcomes from the ISPOR Task Force.(13) The generic methods that will be used for SSPedi translations are provided as Appendix 1.

Forward translation involved the independent translation of SSPedi from English (source language) by two professional medical translators, at least one of whom resided in the country targeted for translation. Reconciliation between the translated versions of SSPedi occurred via a translation panel, which consisted of investigators from the enrollment sites, both translators and the Toronto-based team. The Toronto-based research team included one pediatric oncologist, one pediatric pharmacist, one clinical research manager and one clinical research project assistant.

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Next, the product of reconciliation was back translated to English by a third translator who did not have knowledge of English SSPedi and who was a native English speaker. The translation panel then reviewed the back translation against the source instrument to identify any discrepancies in meaning.

In addition to translating SSPedi itself, the professional medical translators also translated the synonym list. The synonym list was created for the English version of SSPedi to facilitate child self-report. It provides alternative words for each SSPedi symptom and was derived primarily through cognitive interviews with children themselves. Examples of synonyms for "te sientes decepcionado" (you feel disappointed) included "te sientes desilusionado" (you feel disillusioned) and "desencantado" (disenchanted).

Cognitive Interviewing

Overview: The interviews were audio-recorded and sent to Toronto for evaluation and adjudication. The goals were to determine whether children found the Spanish translated version of SSPedi difficult to understand, whether they incorrectly understood it, and whether there were cultural issues with the instrument. Interviews were conducted by trained research associates or nurses with experience in cognitive interviewing who are fluent in Spanish and English.

Eligibility Criteria: Children were eligible to participate if they were 8 to 18 years of age; they had a diagnosis of cancer or were HSCT recipients; and Spanish was their first language (permissible for both English and Spanish to be their first language). We excluded participants who had visual or cognitive impairments that precluded completion of SSPedi according to their healthcare provider.

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Primary and Secondary Outcome Measures: Primary outcome was child self-reported difficulty with understanding of the entire instrument and each symptom using a 5-point Likert scale. Secondary outcomes were incorrect understanding of SSPedi items identified by cognitive interviews with the children using a 4-point Likert scale and cultural relevance, which was assessed qualitatively.

Procedures: Sampling was purposive to ensure that children of varying age, underlying diagnosis and gender were included. Potential participants were identified on the inpatient ward or outpatient clinic by the healthcare team. Upon confirmation of eligibility, the patient or family was approached to request participation in this study.

First, the respondent completed the translated version of SSPedi on paper in the presence of the interviewer. SSPedi could be read aloud if the child was having difficulty with reading. We evaluated four aspects, namely ease or difficulty with understanding as reported by the child, correct or incorrect understanding as evaluated by two raters, cultural relevance and missing items. Child respondents rated how easy or hard the translated version of SSPedi was to understand using a 5-point Likert scale ranging from 1="very hard" to 5="very easy". The instrument overall, each of the 15 items and the response scale were evaluated. We reported the number of children who found SSPedi hard or very hard to understand (score of 1 or 2). We also evaluated the child's understanding of each item and the response scale using cognitive probing. Both the interviewer and an independent rater in Toronto who listened to the audio-recording adjudicated understanding using a 4-point Likert scale ranging from 1="completely incorrect" to 4="completely correct". Discrepancies were resolved by consensus. We described the number of items that were rated as partially or completely incorrect (score of 1 or 2). Next, we asked children whether any questions within SSPedi did not make sense to them in thinking about their day-to-day life in order to assess cultural relevance. These data were evaluated by the Toronto rater and dichotomized into issues with cultural relevance identified vs. not

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identified. Finally, we asked whether any important symptoms were missing from Spanish SSPedi. Children could have responded to questions in English or Spanish according to their preference.

Evaluation of Responses and Sample Size Justification: After each group of five children were interviewed, the study team met to review the responses to identify whether the translated version of SSPedi should be modified. Modification could be made to the script, the instrument itself or a synonym list of terms available for each SSPedi item. Formal evaluation of difficulty with understanding and incorrect understanding was performed after each group of 10 children were interviewed (considered one iteration).

Criteria to consider Spanish SSPedi satisfactory were as follows: no more than one of the last 10 participants found the entire instrument and each item hard to understand, no more than one of the last 10 participants were incorrect in their understanding of each item as adjudicated by the raters, and other comments including those pertaining to cultural relevance did not suggest that modification was required. Sample size was based upon the suggestion that seven to 10 interviews are sufficient to determine understandability of an item.(14) We therefore intended to enroll up to 10-30 children to allow for up to three iterations consisting of 10 children each. All analyses were descriptive.

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Finalization

The final version of Spanish SSPedi was reviewed by all members of the translation panel to ensure cohesiveness and freedom from minor error. The final version was then formatted.

Patient and Public Involvement

No patients were involved in study design or conduct apart from being participants in the research.

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RESULTS

Between January 2018 and April 2019, we identified 38 children and enrolled 20 participants (Figure 1). Table 1 shows the demographics of the included participants. The number of children who were 8-10, 11-14 and 15-18 years of age were 4 (20%), 7 (35%) and 9 (45%) respectively. The most common types of Spanish spoken were Mexican (13, 65%) followed by Central American (2, 10%), South American (2, 10%) and other (3, 15%). After enrollment of 20 children, the North American Spanish SSPedi was considered satisfactory

Table 1: Demographic Characteristics of Participants Evaluating North American Spanish SSPedi

	Cohort 1 (n=10)	Cohort 2 (n=10)
Sex		
Male	6 (60%)	6 (60%)
Female	4 (40%)	4 (40%)
Age in Years		
8-10	1 (10%)	3 (30%)
11-14	4 (40%)	3 (30%)
15-18	5 (50%)	4 (40%)
Diagnosis		
Leukemia/lymphoma	9 (90%)	4 (40%)
Solid tumor	1 (10%)	3 (30%)
Brain tumor	0	2 (20%)
Other*	0	1 (10%)
Metastatic Disease	0	0
Relapse	1 (10%)	1 (10%)
Stem Cell Transplantation	1 (10%)	1 (10%)
Active Treatment	7 (70%)	4 (40%)
Born in Country of Interview	6 (60%)	9 (90%)
Type of Spanish Spoken		
Mexican	5 (50%)	8 (80%)
Central American	2 (20%)	0
South American	1 (10%)	1 (10%)
Other	2 (20%)	1 (10%)
Inpatient at Interview	0	1 (10%)
Attending School	5 (50%)	9 (90%)

Abbreviation: SSPedi – Symptom Screening in Pediatrics Tool
*Other - primary immunodeficiency (n=1)

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None of the child respondents reported that it was hard or very hard to complete Spanish SSPedi overall. Table 2 shows self-reported difficulty with understanding and adjudicated incorrect understanding of SSPedi items. It shows that after enrolling the first 10 participants, two participants found two items (mouth sores and tingly or numb hands or feet) hard to understand and therefore, criteria were not met to consider that version satisfactory. Changes made were additions to the synonym list only, based on alternative words given by children during the interview process. No changes to the instrument itself were required. In the last 10 enrolled participants, at most one participant found each item hard to understand and none were incorrect in their understanding of each item. None of the respondents were incorrect in their understanding of the response scale. In terms of cultural relevance, no issues were identified by any of the 20 respondents. None of the children interviewed indicated that there were additional symptoms they felt were missing from the tool.

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Table 2: Self-reported Difficulty with Understanding and Rater-Adjudicated Incorrectness with North American Spanish SSPedi*

	Cohort 1 (n=10)		Cohort 2 (n=10)	
	Hard to Understand	Incorrect	Hard to Understand	Incorrect
Disappointed or Sad	0	0	0	0
Scared or Worried	0	0	0	0
Cranky or Angry	1	0	1	0
Difficulty Thinking/Remembering	0	0	1	0
Changes in your face/body	0	0	1	0
Tired	0	0	0	0
Mouth sores	2	1	1	0
Headache	0	0	0	0
Hurt or Pain	0	1	0	0
Tingly or numb hands or feet	2	0	1	0
Throwing Up	0	0	0	0
More or less hungry	0	0	0	0
Changes in Taste	0	0	1	0
Constipation	0	0	1	0
Diarrhea	0	0	0	0

* Hard = rated as hard or very hard to understand by participant
Incorrect = rated as partially or completely incorrect by rater

Thus, after 20 participants, the North American Spanish version of SSPedi was considered satisfactory and appropriate for utilization. Figure 2 shows the final version.

DISCUSSION

We translated a self-report symptom screening tool for pediatric patients with cancer and HSCT recipients named SSPedi into Spanish appropriate for use in North America. The final version was acceptable based upon self-reported difficulty with understanding, adjudicated incorrect understanding of different aspects of SSPedi and cultural relevance. Many patient-reported outcomes incorporated into oncology clinical trials are only validated in English,(15) leading to potential disparities in clinical trial participation. Consequently, translation into non-English languages should be a priority.

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We found that at least two versions of Spanish SSPedi will be needed since Argentinian Spanish was considered sufficiently different from North American Spanish to require a distinct version. Interestingly, different quality of life instruments have taken alternate approaches to Spanish translation. For example, the developers of the PedsQL modules have chosen to translate Spanish for several different countries including the United States, Argentina, Columbia and Spain.(16) In contrast, the Patient-Reported Outcome Measurement Information System has a single Spanish translation version.(17) It is possible that the Argentinian version would be appropriate for other countries where voseo conjugation is prominent, such as several countries in Central America. However, we cannot be sure without explicit evaluation of the Argentinian version in those countries.

We termed this version of Spanish SSPedi "North American" even though we did not include a site in Mexico. However, we noted that the majority of children self-identified their Spanish type as Mexican, thus providing reassurance that this version should be appropriate in that country. Ideally, further testing in Mexico would be conducted to confirm understandability and cultural relevance in that setting. Some could argue that North American Spanish is not a distinct form of Spanish as it reflects the Spanish spoken in several different originating countries. However, a study conducted in the United States or Canada is unlikely to use multiple versions of Spanish. Thus, creating a North America Spanish version addresses a practical clinical and research need in these geographic locations.

During the creation of English SSPedi, we found four items more difficult to understand by children 8-18 years of age, namely 'changes in how your body and face look', 'tingly or numb hands or feet', 'feeling more or less hungry than you usually do', and 'constipation (hard to poop).(18) Interestingly, three of these four items were similarly hard to understand by at least one participant in this current study focused on Spanish translation. This may suggest that difficulty with understanding was not related to Spanish translation but rather, that these are more difficult concepts for children in general to understand, particularly if respondents had no

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previous experience with the symptom. This hypothesis is supported by the absence or limited number of self-reported instruments for at least peripheral neuropathy among pediatric cancer patients.(19)

The main implication of this work is that there is now a symptom assessment tool that can be used among North American Spanish speaking children receiving cancer treatments. Given known disparities based upon race, ethnicity and language,(20, 21) development of such a tool may be an important step toward reducing disparities in terms of both clinical trial enrollment and routine clinical care. Future efforts could evaluate barriers to utilization of the translated tool as well as translating SSPedi to other Spanish-speaking populations.

The strengths of this study were conduct of the translation according to internationally recognized standards(13) and evaluation in two countries. Other strengths include its multi-center conduct to improve generalizability, multiple approaches to assessing understandability to improve validity and use of external adjudicators to improve reliability. However, weaknesses included enrollment of a limited number of children and in only two centers. Evaluation in other locations and with additional children may influence the synonym list further although based upon the initial results, it is less likely that changes to the instrument itself will be required. In addition, throughout the SSPedi program, ease or difficulty in understanding has focused on the number of children describing an item as hard or very hard to understand. Focusing on those who find an item neither easy nor hard to understand could lead to different results.

In summary, we translated and finalized Spanish SSPedi appropriate for use in North America based upon self-reported difficulty with understanding, adjudicated incorrect understanding of different aspects of SSPedi and cultural relevance. This work is important as translation of patient-reported outcomes to non-English languages may reduce disparities in clinical trial enrollment and cancer care delivery. Future research will translate and evaluate SSPedi for use in Argentina and other Spanish-speaking countries.

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AUTHOR CONTRIBUTORSHIP

LD and LS developed the study concept and design. EP, DN, CS, SG, GG, and GD were involved in data collection. LS drafted the manuscript. All authors EP, AG, AS, AML, DN, CS, SG, GG, GD, LD, and LS participated in data interpretation, reviewed, revised, and approved the manuscript.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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DATA SHARING

The datasets used or analyzed during the current study are available from the corresponding author on reasonable request.

FIGURE LEGEND

Figure 1: North American Spanish SSPedi Participant Flow Diagram

Figure 2: North American Spanish SSPedi

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Figure 1: North American Spanish SSPedi Participant Flow Diagram

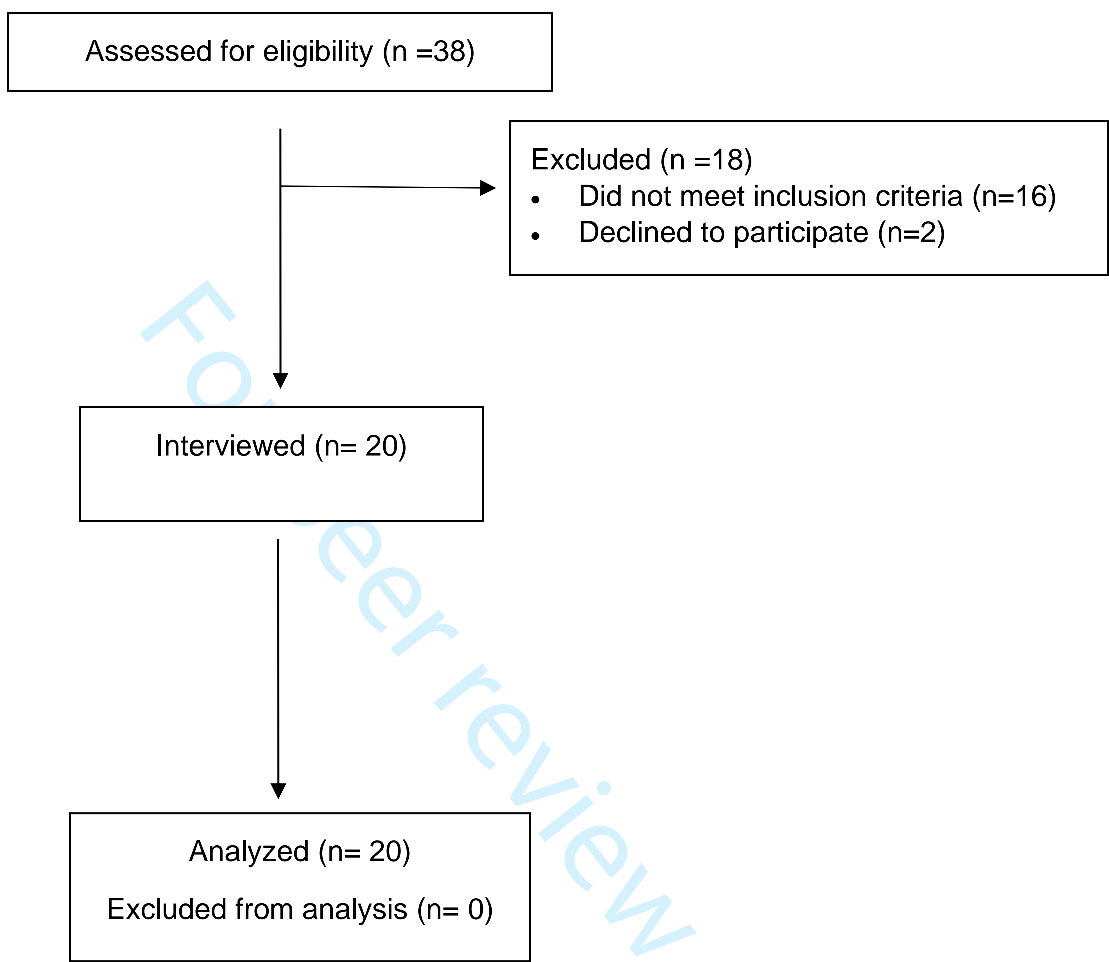

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Figure 2: North American Spanish SSPedi

Spanish SSPedi (North America): detección de síntomas en pediatría

Marca el círculo que mejor describe cuánto te **molestó** cada una de estas cosas **ayer u hoy**:

	No me molestó para nada	Un poco	Más o menos	Mucho	Me molestó muchísimo
Te sientes decepcionado o triste	○	○	○	○	○
Te sientes asustado o preocupado	○	○	○	○	○
Estas de mal humor o enojado	○	○	○	○	○
Te cuesta pensar o recordar cosas	○	○	○	○	○
Notas algún cambio en el cuerpo o la cara	○	○	○	○	○
Te sientes cansado	○	○	○	○	○
Tienes llagas en la boca	○	○	○	○	○
Tienes dolor de cabeza	○	○	○	○	○
Sientes malestar o dolor (que no sea dolor de cabeza)	○	○	○	○	○
Sientes hormigueo o entumecimiento en las manos o los pies	○	○	○	○	○
Tienes vómitos o ganas de vomitar	○	○	○	○	○
Tienes más o menos hambre que de costumbre	○	○	○	○	○
Notas cambios en el gusto	○	○	○	○	○
Tienes estreñimiento (dificultad para hacer popó)	○	○	○	○	○
Tienes diarrea (popó aguada)	○	○	○	○	○

Cuéntanos cualquier otra cosa que te haya molestado recientemente y escríbelo aquí.

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Appendix 1: Guidelines for Conducting Translation of SSPedi

Step	Description	Details
1	Forward translation	Two native speakers of the target language independently produce a forward translation of SSPedi from English into the target language. Both must be professional medical translators and at least one must reside in the country targeted for translation.
2	Reconciliation of forward translations	Translation panel consists of the two forward translators and investigators from enrollment sites where translation will be tested. Discrepancies between translators identified and resolved by consensus. Goal is to produce a single translated version of the tool.
3	Back translation	Forward translation is back translated into English by an independent translator. Back translator must be a native English speaker with no knowledge of English SSPedi.
4	Back translation review	Comparison of back translated version of SSPedi with original SSPedi tool by the research team to detect mistranslations or inaccuracies. Goal is to produce a final translated version of the tool ready for testing.
5	Cognitive interviewing	Goals are to determine if a) SSPedi items and response scale are: • Easy to understand as rated by children • Correctly interpreted as rated by the interviewer and a second adjudicator b) there are any issues with cultural relevancy A minimum of **10** children from target population must be enrolled.
6	Review interview findings	Interview findings are summarized by iterations of 10 children. Translation panel decides whether revisions required or whether translated version is satisfactory. In general, criteria to consider the translation satisfactory are: a) No more than one participants in the last 10 finds an item hard or very hard to understand b) No more than one participant in the last 10 is incorrect in their understanding of an item c) Comments do not indicate other modification or additions to the synonym list are required
7	*Further cognitive interviewing*	*If any changes were made, additional cognitive interviews conducted in iterations of 10 children until the translated version is considered satisfactory*
8	Finalization	The final translated version of SSPedi reviewed by the translation panel to ensure cohesiveness and freedom from minor error.

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Translating the Symptom Screening in Pediatrics Tool (SSPedi) into North American Spanish and Among Spanish-speaking Children Receiving Cancer Treatments, Evaluating Understandability and Cultural Relevance in a Multiple-Phase Descriptive Study

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TITLE: Translating the Symptom Screening in Pediatrics Tool (SSPedi) into North American Spanish and Among Spanish-speaking Children Receiving Cancer Treatments, Evaluating Understandability and Cultural Relevance in a Multiple-Phase Descriptive Study

AUTHORS: Erin Plenert BA, MPH[1]; Allison Grimes MD, MSCI[2]; Aaron Sugalski DO[2]; Anne-Marie Langevin MD[2]; Dominica Nieto BA[2]; Carmen Salaverria MSc[3]; Sergio Gomez MD[4]; Gisela Gonzalez[4]; Gisela D'Angelo[4]; L. Lee Dupuis RPh, PhD[1,5]; Lillian Sung MD, PhD[1, 6]

AFFILIATIONS

[1]Program in Child Health Evaluative Sciences, The Hospital for Sick Children, Peter Gilgan Centre for Research and Learning, 686 Bay Street, Toronto, Ontario, M5G 0A4, Canada

[2]Pediatric Hematology Oncology, University of Texas Health Science Center at San Antonio, 7703 Floyd Curl Drive, San Antonio, TX, 78229, US

[3]Department of Oncology, Benjamin Bloom Children's Hospital, Bulevar De Los Heroes, San Salvador, El Salvador

[4]Stem Cell Transplantation Unit, Hospital de Niños Sor María Ludovica, Calle 14 1631, La Plata, Argentina

[5]Department of Pharmacy, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, M5G 1X8, Canada

[6]Division of Haematology/Oncology, The Hospital for Sick Children, 555 University Avenue, Toronto, Ontario, M5G 1X8, Canada

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CORRESPONDING AUTHOR:

Lillian Sung MD, PhD

Division of Haematology/Oncology

The Hospital for Sick Children

555 University Avenue

Toronto, Ontario

M5G 1X8

Telephone: 416-813-5287

Fax: 416-813-5979

Email: lillian.sung@sickkids.ca

KEY WORDS: SSPedi, symptoms, translation, Spanish

WORD COUNTS: Abstract 276; Text 3,086; Tables 2; Figures 2; Appendix 1

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ABSTRACT

Objectives: Symptom screening is important to achieving symptom control. Symptom Screening in Pediatrics Tool (SSPedi) is validated for English-speaking children. Objectives were to translate SSPedi into Spanish, and to evaluate the understandability and cultural relevance of the translated version among Spanish-speaking children with cancer and pediatric hematopoietic stem cell transplant recipients.

Methods: We conducted a multi-phase, descriptive study to translate SSPedi into Spanish. The first step was to determine whether one Spanish version would be appropriate for both North America and Argentina. Once this decision was made, forward and backward translations were performed. The translated version was evaluated by Spanish-speaking children 8-18 years of age receiving cancer treatments.

Primary and Secondary Outcome Measures: Primary outcome was child self-reported difficulty with understanding of the entire instrument and each symptom using a 5-point Likert scale. Secondary outcomes were incorrect understanding of SSPedi items identified by cognitive interviews with the children using a 4-point Likert scale and cultural relevance, which was assessed qualitatively.

Results: This report focuses on North American Spanish as a separate version will be required for Argentinian Spanish SSPedi based on different common vocabulary and grammatical structure. There were 20 children from Toronto and San Antonio included in cognitive interviews. The most common types of Spanish spoken were Mexican (13, 65%), Central American (2, 10%) and South American (2, 10%). No child reported that it was hard or very hard to complete Spanish SSPedi. Changes to the instrument itself were not required based upon understanding or cultural relevance.

Conclusions: We translated and finalized Spanish SSPedi appropriate for use in North America. Future research will translate and evaluate SSPedi for use in Argentina and other Spanish-speaking countries.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

- Multi-center conduct is a strength as it improves generalizability of the study.
- Multiple approaches to assessing understandability is a strength as it improves robustness and validity of the findings.
- Use of external adjudicators is a strength as it improves reliability of the results.
- The study is limited by conduct in only two countries; this version of SSPedi may not be well-understood in other Spanish-speaking countries.

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BACKGROUND

Pediatric cancer patients experience prevalent and severely bothersome symptoms during treatment.(1-3) Common symptoms experienced include pain, nausea and fatigue.(1) More recent studies have also highlighted the prevalence of changes in hunger and taste as bothersome symptoms in this population.(4-7) Symptoms are important because there is strong correlation between increasing symptom burden and worse quality of life.(8) Active symptom screening and reporting are likely to be central in optimizing symptom control. Active symptom screening may identify symptoms early, improve communication of the extent of bother to the healthcare team and increase earlier and more consistent management strategies.

In prior research, we identified the lack of appropriate symptom screening measures for children with cancer based upon length, content validity or appropriateness(9) and consequently, developed a new instrument named the Symptom Screening in Pediatrics Tool (SSPedi).(10) SSPedi asks about the degree to which 15 symptoms bothered the child yesterday or today on a 5-point Likert scale. These symptoms are disappointed or sad, scared or worried, cranky or angry, problems thinking, body or face changes, tiredness, mouth sores, headache, other pain, tingling or numbness, throwing up, hunger changes, taste changes, constipation and diarrhea.

To evaluate the psychometric properties of SSPedi, we conducted a multi-center study with 502 English-speaking children with sites in both Canada and the United States. All children enrolled in the study were between the ages of 8-18 and were receiving cancer therapies. SSPedi was found to be reliable (internal consistency and test re-test and inter-rater reliability), valid (construct validity), and responsive to change.(10) More precisely, the intraclass correlation coefficients were 0.88 (95% confidence interval (CI) 0.82 to 0.92) for test re-test reliability, and 0.76 (95% CI 0.71 to 0.80) for inter-rater reliability between children and their parents. The mean difference in SSPedi scores between groups that were hypothesized to be more and less symptomatic was 7.8 (95% CI 6.4 to 9.2; P<0.001).(10) Construct validity was

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demonstrated as all hypothesized relationships among measures were observed. SSPedi was responsive to change; those who reported they were much better or worse on a global symptom change scale had significantly changed from their baseline score (mean absolute difference 5.6, 95% CI 3.8 to 7.5; P<0.001).

Translation into other languages will be an important component of SSPedi adoption within and outside of North America. We initially chose to focus translation on Spanish as it is a common first language of children in the United States.(11) The process of translation to Spanish must consider both cultural and linguistic perspectives.(12) Consequently, objectives were to translate SSPedi into Spanish and to evaluate the understandability and cultural relevance of the translated version of SSPedi among children with cancer and pediatric hematopoietic stem cell transplant (HSCT) recipients.

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METHODS

To translate SSPedi into Spanish, we conducted a multi-phase, descriptive study that was approved by The Hospital for Sick Children's Research Ethics Board (#1000057560) and the Research Ethics Boards of all participating sites. Written informed consent and verbal assent were obtained from all study participants or guardians (in the case of children providing assent). Both Spanish and English consent/assent forms were available. The following reflect the specific steps taken for translation of SSPedi into Spanish. The target countries were the United States, Canada and Argentina. We first determined whether one Spanish version would be appropriate for North America and Argentina by identification of a single translation that would be acceptable and understood in both regions. Next, we conducted translation followed by cognitive interviews as further described below.

With Spanish-speaking investigators and translators from the United States, Canada and Argentina, we identified that at least two versions of Spanish would be required, namely one appropriate for North America and one appropriate for Argentina. More specifically, the local

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investigators and translators determined that for some symptoms, language that would be commonly used and well understood in one region would not be commonly used or well understood in the other region. In addition, they identified regional differences in terms of grammatical structure and the use of voseo conjugation. *Voseo* is the use of *vos* as a second-person singular pronoun, instead of, or alongside *tu*. In some countries such as Argentina, *vos* is the written and spoken standard. It can also be found in more casual speech in many other parts of Central and South America. Only the North American version is presented in this manuscript; the Argentinian version will be reported separately. Thus, enrollment sites for this report were The Hospital for Sick Children, Toronto, Canada and University of Texas Health Sciences Center San Antonio, San Antonio, United States.

Translation

Translation of SSPedi included four distinct steps, namely forward translation, reconciliation, back translation and back translation review. We followed the guiding principles for the translation and cultural adaptation process for patient-reported outcomes from the ISPOR Task Force.(13) The generic methods that will be used for SSPedi translations are provided as Appendix 1.

Forward translation involved the independent translation of SSPedi from English (source language) by two professional medical translators, at least one of whom resided in the country targeted for translation. Reconciliation between the translated versions of SSPedi occurred via a translation panel, which consisted of investigators from the enrollment sites, both translators and the Toronto-based team. The Toronto-based research team included one pediatric oncologist, one pediatric pharmacist, one clinical research manager and one clinical research project assistant.

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Next, the product of reconciliation was back translated to English by a third translator who did not have knowledge of English SSPedi and who was a native English speaker. The translation panel then reviewed the back translation against the source instrument to identify any discrepancies in meaning.

In addition to translating SSPedi itself, the professional medical translators also translated the synonym list. The synonym list was created for the English version of SSPedi to facilitate child self-report. It provides alternative words for each SSPedi symptom and was derived primarily through cognitive interviews with children themselves. Examples of synonyms for “te sientes decepcionado” (you feel disappointed) included “te sientes desilusionado” (you feel disillusioned) and “desencantado” (disenchanted).

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Cognitive Interviewing

Overview: The interviews were audio-recorded and sent to Toronto for evaluation and adjudication. The goals were to determine whether children found the Spanish translated version of SSPedi difficult to understand, whether they incorrectly understood it, and whether there were cultural issues with the instrument. Interviews were conducted by trained research associates or nurses with experience in cognitive interviewing who are fluent in Spanish and English.

Eligibility Criteria: Children were eligible to participate if they were 8 to 18 years of age; they had a diagnosis of cancer or were HSCT recipients; and Spanish was their first language (permissible for both English and Spanish to be their first language). We excluded participants who had visual or cognitive impairments that precluded completion of SSPedi according to their healthcare provider.

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Primary and Secondary Outcome Measures: Primary outcome was child self-reported difficulty with understanding of the entire instrument and each symptom using a 5-point Likert scale. Secondary outcomes were incorrect understanding of SSPedi items identified by cognitive interviews with the children using a 4-point Likert scale and cultural relevance, which was assessed qualitatively.

Procedures: Sampling was purposive to ensure that children of varying age, underlying diagnosis and gender were included. Potential participants were identified on the inpatient ward or outpatient clinic by the healthcare team. Upon confirmation of eligibility, the patient or family was approached to request participation in this study.

First, the respondent completed the translated version of SSPedi on paper in the presence of the interviewer. SSPedi could be read aloud if the child was having difficulty with reading. We evaluated four aspects, namely ease or difficulty with understanding as reported by the child, correct or incorrect understanding as evaluated by two raters, cultural relevance and missing items. Child respondents rated how easy or hard the translated version of SSPedi was to understand using a 5-point Likert scale ranging from 1="very hard" to 5="very easy". The instrument overall, each of the 15 items and the response scale were evaluated. We reported the number of children who found SSPedi hard or very hard to understand (score of 1 or 2). We also evaluated the child's understanding of each item and the response scale using cognitive probing. Both the interviewer and an independent rater in Toronto who listened to the audio-recording adjudicated understanding using a 4-point Likert scale ranging from 1="completely incorrect" to 4="completely correct". Discrepancies were resolved by consensus. We described the number of items that were rated as partially or completely incorrect (score of 1 or 2). Next, we asked children whether any questions within SSPedi did not make sense to them in thinking about their day-to-day life in order to assess cultural relevance. These data were evaluated by the Toronto rater and dichotomized into issues with cultural relevance identified vs. not

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identified. Finally, we asked whether any important symptoms were missing from Spanish SSPedi. Children could have responded to questions in English or Spanish according to their preference.

Evaluation of Responses and Sample Size Justification: After each group of five children were interviewed, the study team met to review the responses to identify whether the translated version of SSPedi should be modified. Modification could be made to the script, the instrument itself or a synonym list of terms available for each SSPedi item. Formal evaluation of difficulty with understanding and incorrect understanding was performed after each group of 10 children were interviewed (considered one iteration).

Criteria to consider Spanish SSPedi satisfactory were as follows: no more than one of the last 10 participants found the entire instrument and each item hard to understand, no more than one of the last 10 participants were incorrect in their understanding of each item as adjudicated by the raters, and other comments including those pertaining to cultural relevance did not suggest that modification was required. Sample size was based upon the suggestion that seven to 10 interviews are sufficient to determine understandability of an item.(14) We therefore intended to enroll up to 10-30 children to allow for up to three iterations consisting of 10 children each. All analyses were descriptive.

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Finalization

The final version of Spanish SSPedi was reviewed by all members of the translation panel to ensure cohesiveness and freedom from minor error. The final version was then formatted.

Patient and Public Involvement

No patients were involved in study design or conduct apart from being participants in the research.

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RESULTS

Between January 2018 and April 2019, we identified 38 children and enrolled 20 participants (Figure 1). Table 1 shows the demographics of the included participants. The number of children who were 8-10, 11-14 and 15-18 years of age were 4 (20%), 7 (35%) and 9 (45%) respectively. The most common types of Spanish spoken were Mexican (13, 65%) followed by Central American (2, 10%), South American (2, 10%) and other (3, 15%). After enrollment of 20 children, the North American Spanish SSPedi was considered satisfactory

Table 1: Demographic Characteristics of Participants Evaluating North American Spanish SSPedi

	Cohort 1 (n=10)	Cohort 2 (n=10)
Sex		
Male	6 (60%)	6 (60%)
Female	4 (40%)	4 (40%)
Age in Years		
8-10	1 (10%)	3 (30%)
11-14	4 (40%)	3 (30%)
15-18	5 (50%)	4 (40%)
Diagnosis		
Leukemia/lymphoma	9 (90%)	4 (40%)
Solid tumor	1 (10%)	3 (30%)
Brain tumor	0	2 (20%)
Other*	0	1 (10%)
Metastatic Disease	0	0
Relapse	1 (10%)	1 (10%)
Stem Cell Transplantation	1 (10%)	1 (10%)
Active Treatment	7 (70%)	4 (40%)
Born in Country of Interview	6 (60%)	9 (90%)
Type of Spanish Spoken		
Mexican	5 (50%)	8 (80%)
Central American	2 (20%)	0
South American	1 (10%)	1 (10%)
Other	2 (20%)	1 (10%)
Inpatient at Interview	0	1 (10%)
Attending School	5 (50%)	9 (90%)

Abbreviation: SSPedi – Symptom Screening in Pediatrics Tool
*Other - primary immunodeficiency (n=1)

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None of the child respondents reported that it was hard or very hard to complete Spanish SSPedi overall. Table 2 shows self-reported difficulty with understanding and adjudicated incorrect understanding of SSPedi items. It shows that after enrolling the first 10 participants, two participants found two items (mouth sores and tingly or numb hands or feet) hard to understand and therefore, criteria were not met to consider that version satisfactory. Changes made were additions to the synonym list only, based on alternative words given by children during the interview process. No changes to the instrument itself were required. In the last 10 enrolled participants, at most one participant found each item hard to understand and none were incorrect in their understanding of each item. None of the respondents were incorrect in their understanding of the response scale. In terms of cultural relevance, no issues were identified by any of the 20 respondents. None of the children interviewed indicated that there were additional symptoms they felt were missing from the tool.

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Table 2: Self-reported Difficulty with Understanding and Rater-Adjudicated Incorrectness with North American Spanish SSPedi*

	Cohort 1 (n=10)		Cohort 2 (n=10)	
	Hard to Understand	Incorrect	Hard to Understand	Incorrect
Disappointed or Sad	0	0	0	0
Scared or Worried	0	0	0	0
Cranky or Angry	1	0	1	0
Difficulty Thinking/Remembering	0	0	1	0
Changes in your face/body	0	0	1	0
Tired	0	0	0	0
Mouth sores	2	1	1	0
Headache	0	0	0	0
Hurt or Pain	0	1	0	0
Tingly or numb hands or feet	2	0	1	0
Throwing Up	0	0	0	0
More or less hungry	0	0	0	0
Changes in Taste	0	0	1	0
Constipation	0	0	1	0
Diarrhea	0	0	0	0

* Hard = rated as hard or very hard to understand by participant
Incorrect = rated as partially or completely incorrect by rater

Thus, after 20 participants, the North American Spanish version of SSPedi was considered satisfactory and appropriate for utilization. Figure 2 shows the final version.

DISCUSSION

We translated a self-report symptom screening tool for pediatric patients with cancer and HSCT recipients named SSPedi into Spanish appropriate for use in North America. The final version was acceptable based upon self-reported difficulty with understanding, adjudicated incorrect understanding of different aspects of SSPedi and cultural relevance. Many patient-reported outcomes incorporated into oncology clinical trials are only validated in English,(15) leading to potential disparities in clinical trial participation. Consequently, translation into non-English languages should be a priority.

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We found that at least two versions of Spanish SSPedi will be needed since Argentinian Spanish was considered sufficiently different from North American Spanish to require a distinct version. Interestingly, different quality of life instruments have taken alternate approaches to Spanish translation. For example, the developers of the PedsQL modules have chosen to translate Spanish for several different countries including the United States, Argentina, Columbia and Spain.(16) In contrast, the Patient-Reported Outcome Measurement Information System has a single Spanish translation version.(17) It is possible that the Argentinian version would be appropriate for other countries where voseo conjugation is prominent, such as several countries in Central America. However, we cannot be sure without explicit evaluation of the Argentinian version in those countries.

We termed this version of Spanish SSPedi "North American" even though we did not include a site in Mexico. However, we noted that the majority of children self-identified their Spanish type as Mexican, thus providing reassurance that this version should be appropriate in that country. Ideally, further testing in Mexico would be conducted to confirm understandability and cultural relevance in that setting. Some could argue that North American Spanish is not a distinct form of Spanish as it reflects the Spanish spoken in several different originating countries. To emphasize this point, four children identified their Spanish type as Central or South American. However, regardless of Spanish type of origin, there is likely to be changes in how Spanish is understood and used upon moving to North America. In addition, a study conducted in the United States or Canada is unlikely to use multiple versions of Spanish. Thus, creating a North America Spanish version addresses a practical clinical and research need in these geographic locations.

During the creation of English SSPedi, we found four items more difficult to understand by children 8-18 years of age, namely 'changes in how your body and face look', 'tingly or numb hands or feet', 'feeling more or less hungry than you usually do', and 'constipation (hard to poop).(18) Interestingly, three of these four items were similarly hard to understand by at least

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one participant in this current study focused on Spanish translation. This may suggest that difficulty with understanding was not related to Spanish translation but rather, that these are more difficult concepts for children in general to understand, particularly if respondents had no previous experience with the symptom. This hypothesis is supported by the absence or limited number of self-reported instruments for at least peripheral neuropathy among pediatric cancer patients.(19)

The main implication of this work is that there is now a symptom assessment tool that can be used among North American Spanish speaking children receiving cancer treatments. Given known disparities based upon race, ethnicity and language,(20, 21) development of such a tool may be an important step toward reducing disparities in terms of both clinical trial enrollment and routine clinical care. Future efforts could evaluate barriers to utilization of the translated tool as well as translating SSPedi to other Spanish-speaking populations.

The strengths of this study were conduct of the translation according to internationally recognized standards(13) and evaluation in two countries. Other strengths include its multi-center conduct to improve generalizability, multiple approaches to assessing understandability to improve validity and use of external adjudicators to improve reliability. However, weaknesses included enrollment of a limited number of children and in only two centers. Evaluation in other locations and with additional children may influence the synonym list further although based upon the initial results, it is less likely that changes to the instrument itself will be required. In addition, throughout the SSPedi program, ease or difficulty in understanding has focused on the number of children describing an item as hard or very hard to understand. Focusing on those who find an item neither easy nor hard to understand could lead to different results.

In summary, we translated and finalized Spanish SSPedi appropriate for use in North America based upon self-reported difficulty with understanding, adjudicated incorrect understanding of different aspects of SSPedi and cultural relevance. This work is important as translation of patient-reported outcomes to non-English languages may reduce disparities in

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clinical trial enrollment and cancer care delivery. Future research will translate and evaluate SSPedi for use in Argentina and other Spanish-speaking countries.

ACKNOWLEDGMENTS

We thank all the translators who worked with us on this project and whose expertise and insights greatly assisted the translation and evaluation process.

AUTHOR CONTRIBUTORSHIP

LD and LS developed the study concept and design. EP, DN, CS, SG, GG, and GD were involved in data collection. LS drafted the manuscript. All authors EP, AG, AS, AML, DN, CS, SG, GG, GD, LD, and LS participated in data interpretation, reviewed, revised, and approved the manuscript.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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DATA SHARING

The datasets used or analyzed during the current study are available from the corresponding author on reasonable request.

FIGURE LEGEND

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Figure 1: North American Spanish SSPedi Participant Flow Diagram

Figure 2: North American Spanish SSPedi

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Figure 1: North American Spanish SSPedi Participant Flow Diagram

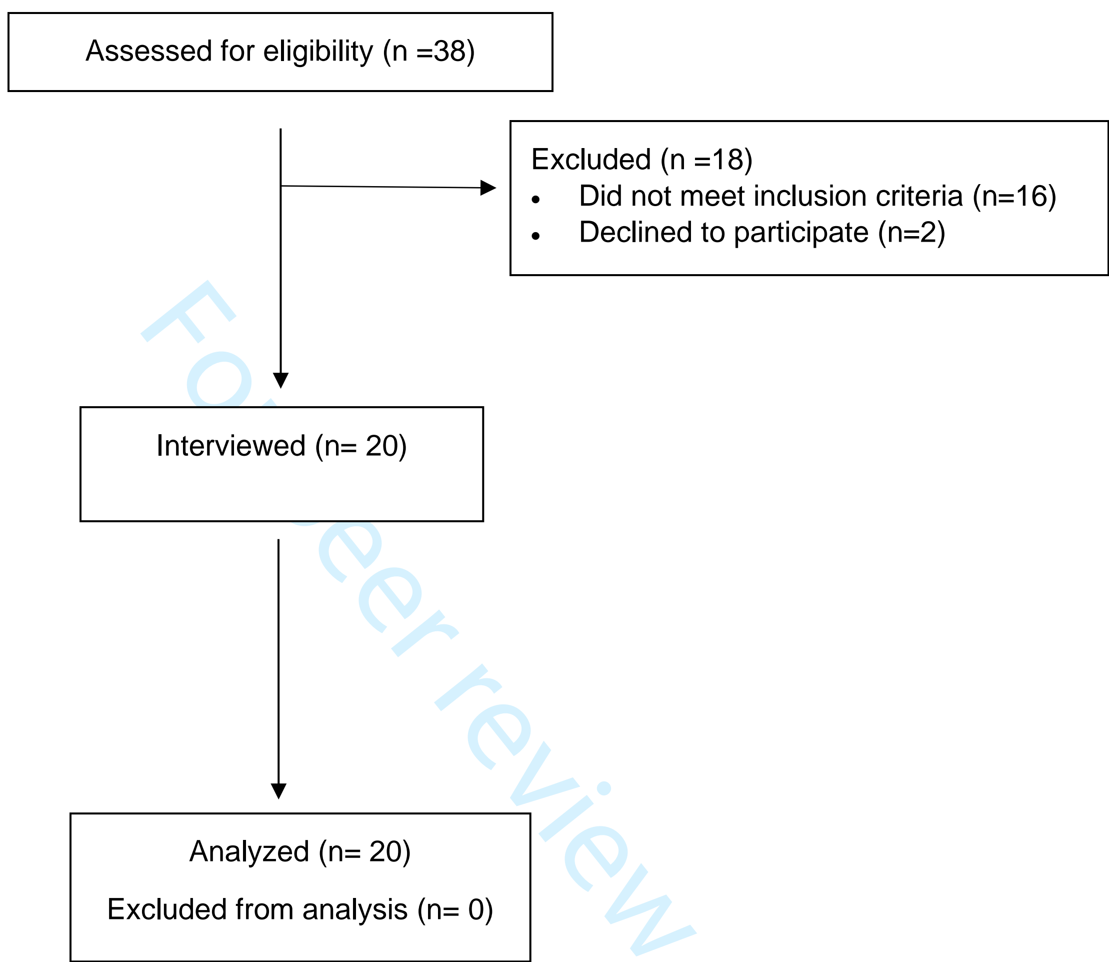

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Figure 2: North American Spanish SSPedi

Spanish SSPedi (North America): detección de síntomas en pediatría

Marca el círculo que mejor describe cuánto te **molestó** cada una de estas cosas **ayer u hoy**:

	No me molestó para nada	Un poco	Más o menos	Mucho	Me molestó muchísimo
Te sientes decepcionado o triste	○	○	○	○	○
Te sientes asustado o preocupado	○	○	○	○	○
Estas de mal humor o enojado	○	○	○	○	○
Te cuesta pensar o recordar cosas	○	○	○	○	○
Notas algún cambio en el cuerpo o la cara	○	○	○	○	○
Te sientes cansado	○	○	○	○	○
Tienes llagas en la boca	○	○	○	○	○
Tienes dolor de cabeza	○	○	○	○	○
Sientes malestar o dolor (que no sea dolor de cabeza)	○	○	○	○	○
Sientes hormigueo o entumecimiento en las manos o los pies	○	○	○	○	○
Tienes vómitos o ganas de vomitar	○	○	○	○	○
Tienes más o menos hambre que de costumbre	○	○	○	○	○
Notas cambios en el gusto	○	○	○	○	○
Tienes estreñimiento (dificultad para hacer popó)	○	○	○	○	○
Tienes diarrea (popó aguada)	○	○	○	○	○

Cuéntanos cualquier otra cosa que te haya molestado recientemente y escríbelo aquí.

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Appendix 1: Guidelines for Conducting Translation of SSPedi

Step	Description	Details
1	Forward translation	Two native speakers of the target language independently produce a forward translation of SSPedi from English into the target language. Both must be professional medical translators and at least one must reside in the country targeted for translation.
2	Reconciliation of forward translations	Translation panel consists of the two forward translators and investigators from enrollment sites where translation will be tested. Discrepancies between translators identified and resolved by consensus. Goal is to produce a single translated version of the tool.
3	Back translation	Forward translation is back translated into English by an independent translator. Back translator must be a native English speaker with no knowledge of English SSPedi.
4	Back translation review	Comparison of back translated version of SSPedi with original SSPedi tool by the research team to detect mistranslations or inaccuracies. Goal is to produce a final translated version of the tool ready for testing.
5	Cognitive interviewing	Goals are to determine if a) SSPedi items and response scale are: • Easy to understand as rated by children • Correctly interpreted as rated by the interviewer and a second adjudicator b) there are any issues with cultural relevancy A minimum of **10** children from target population must be enrolled.
6	Review interview findings	Interview findings are summarized by iterations of 10 children. Translation panel decides whether revisions required or whether translated version is satisfactory. In general, criteria to consider the translation satisfactory are: a) No more than one participants in the last 10 finds an item hard or very hard to understand b) No more than one participant in the last 10 is incorrect in their understanding of an item c) Comments do not indicate other modification or additions to the synonym list are required
7	*Further cognitive interviewing*	*If any changes were made, additional cognitive interviews conducted in iterations of 10 children until the translated version is considered satisfactory*
8	Finalization	The final translated version of SSPedi reviewed by the translation panel to ensure cohesiveness and freedom from minor error.

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