Cross-cultural adaptation of the Clear Communication Index to Brazilian Portuguese

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ABSTRACT

OBJECTIVE: To perform a cross-cultural adaptation of the Clear Communication Index instrument from the Centers for Disease Control and Prevention (CDC-CCI) from English to Brazilian Portuguese.

METHODS: This study comprised initial discussion about the conceptual equivalence of the instrument by a committee formed by experts on health education. We performed translations, synthesis of translations, back-translations, revision by the committee, and linguistic revision. Semantic equivalence was obtained by analyzing the referential and general meaning of each item by the committee, resulting in a pre-final version of the instrument. Subsequently, thirty professionals with health sciences degrees performed a pre-test. These professionals used the pre-final version of the instrument to assess a health education material. A questionnaire was applied to evaluate the acceptability of the instrument, the understanding of each of the 20 items, as well as the individual and professional variables. We analyzed the scores attributed to the health education material, the variables related to healthcare professionals, the proportions of the acceptability of the instrument, and the comprehension of each item.

RESULTS: After we obtained the conceptual equivalence of the instrument, the committee of experts, the instrument’s main author, and the linguist produced the pre-final version using two translations, a synthesis of the translations, and two back-translations. A general equivalence was maintained in 15 of the 20 items (75%), four of the items were slightly altered (20%), and one item was very altered (5%). Nineteen items presented referential equivalence or near equivalence (95%). We then carried out with the pre-test, in which the professionals used the pre-final version. Two items in the domains of “risks” and “main message” were unclear and needed to be revised.

CONCLUSION: The process of cross-cultural adaptation of the Clear Communication Index provided an adapted version to the Brazilian Portuguese language.

DESCRIPTORS: Health communication. Health education. Translations. Validation studies
INTRODUCTION

Healthcare systems should pay attention to the quality of the messages offered to the public in printed and online materials\(^1\)–\(^3\). Educational materials must be constructed based on an understanding of the target audience. Evaluations of educational materials, however, have shown several serious problems\(^1,2,4\). Hence, it is recommended that the evaluation and validation of health messages should occur prior to their availability to the public\(^1,3,5\).

The North American English language by Baur and Prue\(^6\) validated in 2014 the Clear Communication Index from the U.S. Centers for Disease Control and Prevention (CDC-CCI) as one of the instruments available in the literature to evaluate information on health. The CDC-CCI is a tool comprised of a series of questions based on health literacy and communication research. Professionals can use the CDC-CCI to develop new messages and materials about health topics and to evaluate existing ones, regardless of the format or channel of distribution. The CDC’s communication researchers developed the CDC-CCI\(^6\) to make sure the agency’s information is accurate, accessible, and actionable for its many different audiences. The instrument was also part of CDC’s implementation of the federal Plain Writing Act\(^7\), which requires federal government agencies to communicate clearly with the public, and the National Action Plan to Improve Health Literacy\(^8\). Both the law and action plan aim to establish clear and simple language for communication in health as the norm.

The CDC-CCI tool produces a numeric score that characterizes a message or material and is available in two versions. The full version consists of four open-ended introductory questions and 20 scored items that affect information clarity and audience comprehension, according to scientific literature\(^6\). The full version works best with longer-form print materials, such as handouts, flyers, webpages, and short reports. The modified Index has the same four open-ended introductory questions and only 13 of the 20 scored items. The modified Index can be used for short messages and materials, such as social media posts, infographics, and call center or podcast scripts. The 20 scored items have yes or no response options with an assigned point value. The scoring scale is 0–100 points with 90–100 points total as the recommended scoring range. The score represents how closely the material follows the Index criteria.

Although the CDC-CCI and similar tools were developed in English to evaluate English-language materials, there are few cross-culturally adapted tools for assessing health education materials in other languages and cultural contexts, such as Brazilian Portuguese. The development of better health education materials in the Brazilian Public Health System is of utmost importance for health promotion as well as to enhance access to information in health. We chose this index for four reasons. First, this instrument presents validity and reliability in its original version\(^6\). Second, it has the ability to assess “Main Message and Call to Action,” “Language,” “Information Design,” “State of the Science (scientific knowledge),” “Behavioral Recommendations,” “Numbers,” and “Risk in a short time,” which is a necessary aspect in daily routines at healthcare services. Third, as it was developed to be used by healthcare professionals, mainly in public healthcare services, the index is a good fit for those responsible for health education and health publicity actions in Brazil. Fourth, since it was projected to be used during the creation and evaluation of health communication materials for a wide range of public and communication channels, it affects the general public. Thus, this study sought to conduct a cross-cultural adaptation of the original CDC-CCI instrument in English to the Brazilian Portuguese language (BR-CDC-CCI), evaluating the semantic and conceptual equivalence, acceptability, and comprehension of the items.

METHODS

This study was approved by the Research Ethics Committee of the Universidade Federal de Minas Gerais (UFMG) under protocol CAAE 79108017.9.0000.5149.
We performed a cross-cultural adaptation of the CDC-CCI to help design and assess health messages and materials\(^8,10\). Four translators participated in the development of this research (two Brazilians and two Americans); a committee of experts consisting of Professors from the Schools of Dentistry and Pharmacy of the Universidade Federal de Minas Gerais (UFMG); a linguist; the main author of the original instrument, Cynthia Baur (CB), Professor at the University of Maryland, USA; and 30 primary healthcare professionals in public health, all volunteers, from a small city of the state of Minas Gerais, southeast Brazil. The sample size of 30 was similar to other studies in the cross-cultural adaptation of healthcare instruments\(^11\) and consisted of a convenience sample of health professionals with higher education degrees who work at ten Primary Health Care Units in Minas Gerais. We approached these professionals at the Primary Health Care Unit where they work, and they provided written consent to participate in this project.

The CDC-CCI instrument, in its full version, consists of four introductory open-ended questions and 20 close-ended questions, with two answer options: “Yes” (score = 1) or “No” (score = 0), which the person who performs the scoring uses to evaluate the clarity and understanding of the information. The open-ended questions have no quantitative value, and each of the other 20 items is worth 1 point. Total scores vary from zero to 20 and are converted into a score on a scale of 0–100. The recommended minimum score is 90. The 20 questions encompass seven areas: “Main Message and Call to Action,” “Language,” “Information Design,” “State of the Science (scientific knowledge),” “Behavioral Recommendations,” “Numbers,” and “Risk.”\(^6\) There is a short version called the “Modified Index,” with 13 questions in the same seven areas described above. For this study, we used the full version.

After consulting the author responsible for validating the instrument (CB), the cross-cultural adaptation process followed the recommendations set forth in international literature, which include conceptual and semantic equivalences\(^9,10\).

Conceptual equivalence refers to the validity of concepts (domains) explored in the instrument being adapted and is obtained through feedback from the group who will use the instrument; in this case, experts in health education. This equivalence establishes whether or not the instrument can be understood and accepted in the new cultural context. The conceptual equivalence establishes if the measurability of the seven domains in both the adapted instrument and the original are similar\(^10\).

Semantic equivalence depicts the correspondence of the meaning or correct translation of items (terms and words)\(^9,10\) by a committee of experts. The semantic equivalence is based on the comparison of the meanings between the original instrument and the back-translations. Semantic equivalence can be evaluated from two aspects: a) the referential meaning that refers to similarities in meanings of items and can signal vocabulary or grammatical mistakes or discrepancies and b) the general meaning of each item that refers to the similarities of the ideas transmitted by the pairs of items.

The conceptual and semantic equivalence was obtained through translations, synthesis of the translations, back-translations, revision by a committee of experts in health, a linguist, and pre-tests (Figure 1).

The committee of experts in health education assessed conceptual equivalence by checking the applicability, time of use, and capacity to measure (in its 20 questions in seven sections) the domain of “clarity of health materials” by the CDC-CCI in the Brazilian context. We discussed how different public and communication channels would use this instrument. In this moment, the researchers did not assess public health professionals.

Once the experts established conceptual equivalence, the subsequent step consisted of two translations from the original English to Brazilian Portuguese (T1 and T2), by two independent translators, both Brazilian with fluency in English. One of the translators had knowledge and practice in health, having familiarity with the terms and concepts present in the instrument. The other had no specific knowledge regarding the instrument’s technical terms.
Four researchers, experts in health sciences, compared the two translations (T1 and T2), identifying discrepancies. This comparison generated a synthesis of the translations (T1 and T2), which aimed to identify possible difficulties in understanding the instrument. They compared the meaning of words in the different languages (English and Brazilian Portuguese) so that the same results were obtained in both translations.

Following the synthesis of the two translations (T1 and T2), two separate translators, native speakers from the United States with fluency in Brazilian Portuguese, performed independently two back-translations to English. The back-translators had no knowledge of the objectives of this work and did not have access to the original instrument. We sent the back-translations to the main author responsible for the validation of the original instrument (CB) in order to evaluate the quality of the translations and suggest modifications in the instrument. After this stage, the first version of the instrument was completed.

Subsequently, we conducted a review of the back-translations and a synthesis of the translations. Thus, a committee of experts composed of the same four researchers in health sciences, all four translators, a linguist, and two health professionals with experience in health research took the instrument in the original version as a reference. The establishment of a committee of experts was necessary for the achievement of a consensus regarding the conceptual and semantic equivalence of the items.

The committee of experts received the back-translation and original version of the CDC-CCI. For referential meaning, the committee evaluated these two versions without knowing which was the original and which had been back-translated. A visual analog scale was used for referential meaning evaluation. The committee judged the equivalence of the pairs.

Figure 1. Flowchart of the steps of cross-cultural adaptation of the U.S. English language CDC-CCI to the Brazilian Portuguese language
of statements (original and back-translated) by consensus, with a scale from zero to 100% using the following categories: “non-equivalent” (<80%), “near equivalent” (80–89%), and “equivalent” (90–100%).

For the general meaning evaluation, the committee used a scale from zero to 100%. They evaluated each pair of statements, having to reach a consensus. They classified them as: unaltered (UA), slightly altered (SA), very altered (VA), and completely altered (CA). In this step, the committee was aware of the two versions (the original and the back-translated). The scales used for the semantic equivalence can be seen in Figure 2.

Following semantic equivalence (referential and general meaning evaluation), the research team approached primary healthcare professionals at their places of work in Minas Gerais to perform a pre-test of the Brazilian Portuguese draft instrument (BR-CDC-CCI) in May and June 2018. The researchers asked the healthcare professionals to use the instrument to assess the health education material "Rational Use of Drugs" from the Ministry of Health. The research team chose this health education material because it is publicly available, about a common topic, and includes features that the CDC-CCI is designed to evaluate. The professionals used the draft BR-CDC-CCI instrument to score the "Rational Use of Drugs" material. Each of the 30 professionals completed questionnaires on the acceptability of the instrument as a whole, the understanding of each of the 20 items, and individual and professional profiles. For acceptability, we included a general and dichotomous question ("Yes" or "No"): “Do you think that this instrument would be acceptable for Brazilian professionals?” Regarding the understanding of each item, we included the following question: “After you read the BR-CDC-CCI items and evaluation criteria, mark those that were understood (“Yes”) and those that were not understood (“No”). For the items not understood, write in the corresponding space any problem with comprehension you had.” Professionals also reported the amount of time spent answering the items of the instrument. In addition, the professionals answered questions about their age, sex, time since graduation, type of health sciences degree, public service time, and whether they had completed a graduate degree.

We analyzed the scores from the 30 primary care professionals using the Statistical Package for Social Sciences (SPSS for Windows, version 25.0, SPSS Inc., Chicago, IL). The variables related to the profiles and individual characteristics of the healthcare professionals were statistically analyzed by measuring the frequency and central tendency. The statistical analyses also included the calculation of the proportions of acceptability of the instrument and comprehension of each item from the BR-CDC-CCI.

RESULTS

We carried out the cross-cultural adaptation systematically. The first assessment by the experts showed that the applicability, time of use, and capacity to obtain the necessary domains of “clarity of health materials” could be obtained in the Brazilian version of the CDC-CCI. The group considered that the instrument would be used for

![Figure 2. The scales used in the semantic equivalence of Br-CDC-CCI. Belo Horizonte, 2019](http://doi.org/10.11606/s1518-8787.2020054001561)
healthcare professionals when creating and evaluating health information materials in a wide range of communication channels and for a diverse public. They considered the instrument necessary, practical, and useful in the Brazilian context and approved its Conceptual Equivalence.

We changed some sections of the English CDC-CCI in which cities, units of measurement, or U.S. public institutions were mentioned. Examples of this first step were changes of "Springfield" to "São Paulo" (item 18), "ounces" to "grams" (item 16), and "Public health organizations (...) (ASTHO)" to Brazilian Health Organizations such as "CONASS, CONASEMS." Other considerations included the exclusion of links to U.S. government agencies and institutions, where we inserted Brazilian equivalents. The author responsible for the validation of the original instrument (CB) also highlighted the need to maintain the term "primary audience" instead of "main audience" throughout the instrument. The idea of "primary" is for educators to focus on the most important audience who will use the information, even though other "secondary" audiences may also see the information if it is posted on a website, for example.

Table shows the BR-CDC-CCI adaptation process, from the synthesis of translations to the adapted version, including the conceptual and semantic equivalence evaluations. For referential equivalence, nineteen items presented equivalence or near equivalence (95%), while only question 18 was "non-equivalent." In the general equivalence between the original instrument and the back-translation, 15 of the 20 items were unaltered (UA=75%); four of the items, questions 2, 3, 5 and 18, were slightly altered (SA=20%); and one item, question 1, was very altered (VA=5%).

The committee of experts highlighted the need for a review by a linguist, who evaluated the material and made recommendations. The main changes occurred in questions 18, considered no referential equivalent, and 1, which was very altered. The changes, as suggested by consensus, are presented in Table. In accordance with the assessment of the committee, question 1 presented a misunderstanding by not specifying what the "Main Message" would be in the context of the information, and for not defining what the educational materials would be. The committee observed linguistic and grammatical errors in questions 2, 3, 5, and 18 and did not approve them as maximum equivalence. Among these were the differences between the terms "section" and "session" in question 2; "highlighted" and "emphasized" in question 3; "calls to action for the primary audience" and "calls to action directed to the public" in question 5; and "web" and "internet" in question 18. We corrected the differences with the aid of a linguist.

The majority of the primary healthcare professionals involved in the pre-test were female (87%), with an average age of 36.8 years (range 24–49), average time since completion of undergraduate degree of 13 years (range 3–31), and 53% with a graduate-level degree. Most of the professionals were nurses (57%), 20% were dentists, and 23% were healthcare professionals in other areas (Speech Therapist, Physician, Nutritionist, and Psychologist). In relation to professionals’ understanding of the BR-CDC-CCI items, six professionals (20%) did not understand question 18 regarding the nature of the risk, and five (17%) did not understand question 1 regarding the main message. One (3%) professional did not understand question 5, regarding call to action, and question 14, regarding behavioral directions. All 30 professionals understood the rest of the questions (Table).

In view of these considerations, the committee and the linguist re-evaluated questions 1, 5, 14, and 18. Items 5 and 14 were considered confusing by one professional each, since they did not understand the meaning of the words "primary audience" and the example of the nutrition behavioral recommendation using folic acid. As items 1 and 18 continued to be a problem, the committee observed that the pre-final version should be clarified, and certain sentences shortened. The committee changed the order of some words and removed others, making the final Brazilian version clearer than the previous one (Table).
Table. Semantic Equivalence (Referential Meaning Equivalence—RME and General Meaning Equivalence—GME) between the original CDC-CCI (in English) and the version in Brazilian Portuguese by a committee of experts, and Conceptual Equivalence (Comprehension-Compr. and Acceptability-Accept.) of the pre-final Brazilian version of the CDC-CCI by health professionals.

| Baur & Prue | Brazilian translator 1 and 2 + Committee | Synthesis of translations | Backtranslation 1 | Backtranslation 2 | RME | GME | Conceptual equivalence (Health Professionals) | Adapted Version of the BR-CDC-CCI |
|-------------|-----------------------------------------|--------------------------|------------------|------------------|-----|-----|---------------------------------------------|----------------------------------|
| Original    | (American translator 1) + Baur revision | (American translator 2) + Baur revision | Semantic equivalence (Committee) | (Committee) | (n=30) | (n=30) | (100%)                                    | (100%)                           |
|             |                                         |                          |                  |                  | Yes = 25 | No = 05 | 70% VA                                    | 100%                             |
|             |                                         |                          |                  |                  | (83%) | (17%) |                                        |                                  |
|             |                                         |                          |                  |                  | No = 0 |                   |                                        |                                  |
|             |                                         |                          |                  |                  | 1. Does the material contain a main message? | A main message is the only thing you want to communicate to a person or group that they should remember. One topic, such as heart disease or seasonal flu, is not a main message statement. If the material contains several messages and no main message, answer no. | No = 0 |                   |                                        |                                  |
|             |                                         |                          |                  |                  | Yes = 30 | No = 0 | 80% SA                                    | 100%                             |
|             |                                         |                          |                  |                  | (100%) | (0%)   |                                        |                                  |
|             |                                         |                          |                  |                  | No = 0 |                   |                                        |                                  |
|             |                                         |                          |                  |                  | 1. Does the material contain one main message? | A main message is the only thing you want to communicate to a person or group that they should remember. One topic, such as heart disease or seasonal flu, is not a main message statement. If the material contains several messages and no main message, answer no. | No = 0 |                   |                                        |                                  |
|             |                                         |                          |                  |                  | Yes = 30 | No = 0 | 100%                                      | 100%                             |
|             |                                         |                          |                  |                  | (100%) | (0%)   |                                        |                                  |
|             |                                         |                          |                  |                  | No = 0 |                   |                                        |                                  |

1. Does the material have a main message? The main message is the one thing you want to communicate to a person or group and what they should remember. A topic, such as heart disease or seasonal flu, is not a main message. If the material contains multiple messages and no main message, answer no. NOTE: If you answered No for Question 1, check 0 for Question 2-4 and go on to Question 5.

2. Is the main message at the top, the beginning, or in the front of the material? The main message should be in the first paragraph or section. A section is a block of text between headers. For a Web material, the first section must be fully visible without scrolling.

1. O material contém uma mensagem principal? Uma mensagem principal é a única coisa que você quer comunicar a uma pessoa ou grupo e que eles devem lembrar. Um tópico, tal como doença cardíaca ou gripe sazonal, não é uma mensagem principal. Se o material contiver várias mensagens e nenhuma mensagem principal, responda Não. Se você respondeu Não para a Pergunta 1, marque 0 para as Perguntas 2 a 4 e siga para a Pergunta 5.

2. A mensagem principal está no topo, no início ou na parte da frente do material? Uma mensagem principal deve estar no primeiro parágrafo ou seção. Uma seção é um bloco de texto entre cabeçalhos. Para materiais da web, a primeira seção deve estar completamente visível sem rolagem.

3. Is the main message highlighted with visual cues? If the main message is highlighted through the use of fonts, colors, shapes, lines, arrows, or headings, such as “What you need to know,” answer yes.

3. A mensagem principal é enfatizada com indicações visuais? Se a mensagem principal for enfatizada com fonte, cor, formas, linhas, setas ou títulos, tais como “O que você precisa saber”, responder sim.

3. Is the main message emphasized with visual cues? If the main message is emphasized with fonts, color, shapes, lines, arrows, or headings, such as “What you need to know,” answer yes.

3. A mensagem principal é enfatizada com indicações visuais? Se a mensagem principal for enfatizada com fonte, cor, formas, linhas, setas ou títulos, tais como “O que você precisa saber”, responda sim.

(Continue)
Table. Semantic Equivalence (Referential Meaning Equivalence—RME and General Meaning Equivalence—GME) between the original CDC-CI (in English) and the version in Brazilian Portuguese by a committee of experts, and Conceptual Equivalence (Comprehension-Compr. and Acceptability-Accept.) of the pre-final Brazilian version of the CDC-CI by health professionals. (Continuation)

| Brazilian translator | Synthesis of translations | Backtranslation 1 | Backtranslation 2 | RME | GME | Conceptual equivalence (Health Professionals) | Adapted Version of the BR-CDC-CI |
|----------------------|----------------------------|-------------------|-------------------|------|-----|-------------------------------------------|---------------------------------|
| Brazilian translator 1 and 2 + Committee | (American translator 1) + Baur revision | (American translator 2) + Baur revision | Semantic Equivalence (Committee) | Compr (n=30) | Accept (n=30) |
| Original | 4. Does the material contain at least one visual element that conveys or supports the main message? Consider photographs, drawings, graphics, and infographics as visual elements. If the visual element does not have a caption or labels, answer “No.” If there are human figures that are not performing the recommended behaviors, answer “No.” | 4. Does the material contain at least one visual element that conveys or supports the main message? Consider as examples of visual elements photographs, designs, graphs, and infographics. If the visual element does not have a legend or label, answer no. If it has human figures that are not performing the recommended behaviors, answer no. | 4. Does the material contain at least one visual element that transmits or gives support to the main message? Consider as examples of visual elements photographs, designs, graphs, and infographics. If the visual element does not have a legend or label, answer no. If it has human figures that are not performing the recommended behaviors, answer no. | 04. Does the material contain at least one visual element that conveys or supports the main message? For example, count photographs, line drawings, graphs and infographics as visuals. If the visual does not have a caption or labels, answer no. If the visual has human figures who are not performing the recommended behaviors, answer no. | Yes = 30 (100%) | No = 0 (0%) | 100% |
| 5. Does the material include one or more calls to action for the primary audience? If the material includes a specific behavioral recommendation, a stimulus for more information, a request to share information with another person, or a broad call for program or policy change, answer yes. If the call to action is for someone other than the primary audience, answer no. | 5. Does the material include one or more calls to action for the primary audience? If the material includes a specific behavioral recommendation, a stimulus to obtain more information, a request to share information with someone else, or a broad call to change the program or policy, answer yes. If the call to action is for someone that is not from the primary audience, answer no. | 5. Does the material include one or more calls to action for the primary audience? If the material includes a specific behavioral recommendation, a stimulus to obtain more information, a request to share information with someone else, or a broad call for program or policy change, answer yes. If the call to action is for someone other than the primary audience, answer no. | 5. Does the material include one or more calls to action for the primary audience? If the material includes a specific behavioral recommendation, a stimulus to obtain more information, a request to share information with someone else, or a broad call for program or policy change, answer yes. If the call to action is for someone other than the primary audience, answer no. | Yes = 29 (97%) | No = 1 (3%) | 100% |

(Continue)
Table. Semantic Equivalence (Referential Meaning Equivalence—RME and General Meaning Equivalence—GME) between the original CDC-CCI (in English) and the version in Brazilian Portuguese by a committee of experts, and Conceptual Equivalence (Comprehension-Compr. and Acceptability-Accept.) of the pre-final Brazilian version of the CDC-CCI by health professionals. (Continuation)

| Baur & Prus | Brazilian translator 1 and 2 + Committee | (American translator 1) + Baur revision | (American translator 2) + Baur revision | Semantic Equivalence (Committee) | Conceptual Equivalence (Health Professionals) | Adapted Version of the BR-CDC-CCI |
|-------------|------------------------------------------|----------------------------------------|----------------------------------------|---------------------------------|---------------------------------------------|----------------------------------|
| Original    | Synthesis of translations                | Backtranslation 1                     | Backtranslation 2                      | RME GME                         | Compr (n=30) | Accept (n=30) |
| 7. Does the material always use words that the primary audience uses? | O material usa sempre palavras que o público-alvo utiliza? | Se todos os termos especializados ou desconhecidos são explicados ou descritos (não apenas definidos) na primeira vez em que são usados, responda sim. Siglas e abreviações devem ser escritas por extenso e explicadas, se desconhecidas para o público-alvo. | Se todos os termos especializados ou desconhecidos são explicados ou descritos (não apenas definidos) na primeira vez em que são usados, responda sim. Siglas e abreviações devem ser escritas por extenso e explicadas, se desconhecidas para o público-alvo. | | 100% | UA | Yes = 30 | (100%) No = 0 | (0%) | 100% |
| 8. Does the material use lists with bullets or numbers? | O material usa listas com marcadores ou números? | Se o material contiver uma lista com mais de 7 itens, e a lista não for dividida em sub-listas, responder “Não”. Se a lista for apenas de informações adicionais ou de referências, ou estiver no final do material, responder “Não”. | Se o material contiver uma lista com mais de 7 itens, e a lista não for dividida em sub-listas, responder “Não”. Se a lista for apenas de informações adicionais ou de referências, ou estiver no final do material, responder “Não”. | Yes = 30 | (100%) No = 0 | (0%) | 100% |
| 9. Is the material organized in blocks with headings? | O material é organizado em blocos com títulos? | Este item aplica-se a textos e listas. Se os blocos contiverem mais de uma ideia cada, responder “Não”. Se os títulos não estiverem de acordo com os blocos de informação, responder “Não”. | Este item aplica-se a textos e listas. Se os blocos contiverem mais de uma ideia cada, responder “Não”. Se os títulos não estiverem de acordo com os blocos de informação, responder “Não”. | Yes = 30 | (100%) No = 0 | (0%) | 100% |
| 10. Is the most important information the primary audience needs summarized in the first paragraph or section? | A informação mais importante que o público-alvo principal precisa está resumida no primeiro parágrafo ou seção? | A informação mais importante deve incluir uma mensagem principal. Uma seção é um bloco de texto entre cabeçalhos. Para um material da web, a primeira sessão deve ser completamente visível sem rolagem da página. | A informação mais importante deve incluir uma mensagem principal. Uma seção é um bloco de texto entre cabeçalhos. Para um material da web, a primeira sessão deve ser completamente visível sem rolagem da página. | Yes = 30 | (100%) No = 0 | (0%) | 100% |

For a Web material, if the headings do not correspond to the blocks of information, answer “No.”
Brazilian version of Clear Communication Index Marinho AMCL et al.

| Baur & Prue | Brazilian translator 1 and 2 + Committee | (American translator 1) + Baur revision | (American translator 2) + Baur revision | Semantic equivalence (Committee) | Conceptual equivalence (Health Professionals) | Adapted Version of the BR-CDC-CCI |
|-------------|-------------------------------------------|----------------------------------------|----------------------------------------|----------------------------------|-----------------------------------------------|----------------------------------|
| **Original** | Synthesis of translations | Backtranslation 1 | Backtranslation 2 | RME | GME | Compr (n=30) | Accept (n=30) |
| 11. Does the material explain which trusted sources, such as experts and government representatives, know and do not know about the subject matter? If the material addresses both, answer “Yes.” If the material addresses only one (what is known or what is not known), answer no. | 11. O material explica o que fontes confiáveis, tais como especialistas no assunto e os representantes governamentais, sabem e não sabem sobre o assunto? Se o material abordar os dois, resposta “Sim”. Se o material abordar apenas um (o que se sabe ou o que não se sabe), responder não. | 11. Does the material explain what authoritative sources, such as subject matter experts and agency spokespersons, know or do not know about the issue? If the material addresses both, answer yes. If the material addresses only one (what one knows or does not know), answer no. | 11. Does the material explain what authoritative sources, such as subject matter experts and agency spokespersons, know or do not know about the topic? If the material addresses both, answer yes. If the material addresses only one (what is known or not known), answer no. | Yes = 30 (100%) No = 0 (0%) | 100% | 100% |
| 12. Does the material include one or more behavioral recommendations for the primary audience? If no, STOP here and do not answer Part B. | 12. O material inclui uma ou mais recomendações comportamentais para o público-alvo? Se não, PARE aqui e não responda a Parte B. | 12. Does the material include one or more behavioral recommendations for the main audience? If not, STOP here and do not answer Part B. | 12. Does the material include one or more behavioral recommendations for the primary audience? If no, STOP here and do not score Part B. | Yes = 30 (100%) No = 0 (0%) | 100% | 100% |
| 13. Does the material explain why the behavioral recommendation(s) is (are) important for the primary audience? If the material uses only numbers to explain the importance of behavioral recommendation without offering other relevant information to the audience, answer no. | 13. O material explica por que a(s) recomendação(es) comportamental(is) é(a) importante(s) para o público-alvo? Se o material usa apenas números para explicar a importância do comportamento, responder não. | 13. Does the material explain why the behavioral recommendation(s) is important for the main audience? If the material has only numbers to explain the importance of the behavioral recommendation without other relevant information for the public, answer No. | 13. Does the material explain why the behavioral recommendation(s) is important? If you offer only numbers to explain the importance of the behavioral recommendation with no other relevant information for the audience, answer no. | Yes = 30 (100%) No = 0 (0%) | 100% | 100% |
| 14. Do the behavioral recommendations include specific instructions on how to carry out the behavior? This may include step-by-step instructions or a simple description for example: Look for cereals that have 100% of the recommended daily amount of folic acid. If the material includes information about when and how to get in touch with a physician or other health professional, answer “Yes.” If the material mentions when and how often to carry out a behavior, answer “Yes.” | 14. As recomendações comportamentais incluem instruções específicas sobre como realizar o comportamento? Isso pode incluir instruções passo-a-passo ou uma descrição simples por exemplo: Procure cereais com 100% de valor diário de ácido fólico. Se o material incluir informações sobre quando e como entrar em contato com um médico ou outro profissional de saúde, responder “Sim”. Se o material mencionar quando e com que frequência realizar um comportamento, responder “Sim”. | 14. Do the behavioral recommendations include specific instructions about how to perform the behavior? This may include step-by-step instructions or a simple description (for example: Look for cereals with 100% of the daily value of folic acid. If the material includes information about when and how to get in contact with a doctor or other healthcare professional, answer yes. If the material mentions when and how often to perform a behavior, answer yes. | 14. Does the behavioral recommendation(s) include specific directions about how to perform the behavior? This may include step-by-step directions or a simple description (for example: Look for cereal with 100% daily value of folic acid). If the material includes information about when and how to contact a medical provider or health official, answer yes. If the material mentions when or how often to perform a behavior, answer yes. | Yes = 29 (97%) No = 1 (3%) | 100% | 90% |

(Continue)
### Brazilian version of Clear Communication Index Marinho AMCL et al.

**Table.** Semantic Equivalence (Referential Meaning Equivalence—RME and General Meaning Equivalence—GME) between the original CDC-CCI (in English) and the version in Brazilian Portuguese by a committee of experts, and Conceptual Equivalence (Comprehension-Compr. and Acceptability-Accept.) of the pre-final Brazilian version of the CDC-CCI by health professionals. (Continuation)

| Baur & Prue 1 and 2 + Committee | (American translator 1) + Baur revision | American translator 2 + Baur revision | Semantic Equivalence (Committee) | Conceptual equivalence (Health Professionals) | Adapted Version of the BR-CDC-CCI |
|----------------------------------|----------------------------------------|--------------------------------------|----------------------------------|-----------------------------------------------|----------------------------------|
| Original                         | Synthesis of translations              | Backtranslation 1                     | Backtranslation 2                 | RME GME (n=30) Accept (n=30)                  |                                  |

| 15. | Does the material always have numbers that the primary audience uses? Many people find numbers distracting or confusing. Make sure the numbers in the material are familiar and necessary to base or explain the main message. Otherwise, take them out. Whole numbers are used by most people. The types of numbers used vary for each audience. |
| 16. | Does the material always explain what the numbers mean? For example, “the recommended amount of meat as part of a healthy meal is 3 to 4 ounces, which is similar to the size of a playing card.” |

**Calculations?**

- Addition, subtraction, multiplication, and division involve calculations.
- The calculation of a common denominator for comparison purposes is a mathematical calculation. Use the same denominator, even for absolute risk (e.g., 1 of 3), on all material so that the primary audience does not need to calculate.

**NOTA:** para este item, Sim é pontuado 0 e Não é pontuado 1.

**17.** Should the audience perform mathematical calculations? Adding, subtracting, multiplying, and dividing involve calculations. Use the same denominator, even for absolute risk (e.g., 1 of 3), throughout material so that audiences do not have to calculate. NOTE: for this item, Yes is scored 0 and No is scored 1.

**Adicionar, subtrair, multiplicar e dividir envolvem cálculos.** Use o mesmo denominador para fins de comparação é um cálculo matemático. Use o mesmo denominador, mesmo para risco absoluto (exemplo: 1 de 3), em todo o material para que o público não precise calcular.

**NOTA:** para este item, o “sim” corresponde a 0 e o “não” corresponde a 1.

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(Continue)
18. Does the material explain the nature of the risk? If the material identifies the threat or possible harm and how and why people may be affected by it, answer yes. If the material only mentions the threat or possible harm without any explanation, answer no. For example, in saying that there are 1,000 new cases of a contagious disease in Springfield, does the material also state that people in Springfield may be more likely to contract the disease? Why could they be more prone to becoming ill and how serious is the threat of the disease?

19. Does the material address both the risks and the benefits of the recommended behaviors? This includes real risks and benefits and those perceived by your audience. If the material addresses only risks or only benefits, answer no. If no behavioral recommendation is presented, the answer does not apply (NA).

18. O material explica a natureza do risco? Se o material indicar a ameaça ou dano e como e porque as pessoas podem ser afetadas, responda sim. Se o material tiver apenas a ameaça ou o dano, mas nenhuma explicação, responda não. Por exemplo, ao afirmar que existem 1000 novos casos de uma doença contagiosa em São Paulo, o material afirma também que as pessoas em São Paulo podem ser mais propensas a contrair a doença? Por que elas podem ser mais propensas a adoecer e quão séria é a ameaça da doença?

19. O material aborda tanto os riscos quanto os benefícios dos comportamentos recomendados? Isso inclui riscos e benefícios reais e aqueles percebidos pelo seu público. Se o material abordar apenas riscos ou apenas benefícios, responda não. Se nenhuma recomendação comportamental for apresentada, responda não se aplica (NA).

18. Does the material explain the nature of the risk? If the material indicates the threat or harm and how and why people can be affected, answer yes. If the material has only the threat or the harm, but no explanation, answer No. For example, when affirming that there are 1,000 new cases of a contagious disease in Springfield, does the material also affirm that the people in Springfield may be more prone to contracting the disease? Why might they be more prone to getting sick and how serious is the threat of disease?

19. Does the material address both the risks and the benefits of the recommended behaviors? This includes real risks and benefits and those perceived by their audience. If the material addresses only risks or only benefits, answer No. If no behavioral recommendation is present, answer Not Applicable (NA).

18. O material explica a natureza do risco? Se o material apresenta o risco, o modo e o motivo pelo qual as pessoas podem ser afetadas, responda sim. Se o material apresenta apenas o risco, mas nenhuma explicação, responda não. Por exemplo, ao apresentar a ocorrência de mil novos casos de uma doença contagiosa em São Paulo, o material também declara que as pessoas em São Paulo podem estar mais propensas a contrair a doença, o motivo para tal e quão sério é o risco?

19. O material aborda tanto os riscos quanto os benefícios dos comportamentos recomendados? Isso inclui riscos e benefícios reais e aqueles percebidos pelo seu público. Se o material abordar apenas riscos ou apenas benefícios, responda não. Se nenhuma recomendação de comportamento foi apresentada, responda não se aplica (NA).

Table. Semantic Equivalence (Referential Meaning Equivalence—RME and General Meaning Equivalence—GME) between the original CDC-CCI (in English) and the version in Brazilian Portuguese by a committee of experts, and Conceptual Equivalence (Comprehension-Compr. and Acceptability-Accept.) of the pre-final Brazilian version of the CDC-CCI by health professionals. (Continuation)
The CDC-CCI instrument aims to contribute to the improved performance of healthcare professionals who create educational materials, since it leads them to critically analyze their own communicative capacity. The use of the CDC-CCI can improve the development and transmission of health messages, as well as the public’s orientation regarding actions and better results in health.

Low health literacy is considered a social determinant of health, with low literacy being a predictor of worse health outcomes. Professionals’ use of tools to adapt health messages and materials for low literacy audiences can contribute to improvements in the public’s adherence to care and therapeutic outcomes, as well as to reduce social inequalities. The BR-CDC-CCI, after its final validation, can offer healthcare professionals a practical resource, guiding them in the creation and evaluation of materials and educational messages in health, following the example of other studies in the literature.

The adaptation of the CDC-CCI instrument is a crucial stage, since it provides an opportunity to test its feasibility in Brazil. This study obtained the results of the conceptual and
semantic equivalence using robust methods that were used in other processes for adapting instruments from English to Brazilian Portuguese\textsuperscript{11–13}. One adapted instrument must be equivalent to the source instrument in such a way that its meaning is the same for the majority of the desired population\textsuperscript{10} in their different cultural and linguistic contexts. For this, original instruments and adaptation "must dialogue with each other" according to a team of judges. These judges should have the ability to understand whether or not the representation of the original instrument is similar to the representation in its final population, which, in this context, is a final population of healthcare professionals or others involved in the development of health education materials.

In this research, two items showed that divergences need to be rigorously analyzed, and the corrected versions should be included in the final format of an instrument. The misunderstanding generated by items 1 (main message) and 18 (nature of risk) made it difficult to evaluate the domains "Main Message" and "Risk" in the Brazilian context. These items were misunderstood in the process of obtaining equivalence (referential and general) and remained critical during the pre-test with 30 health professionals. Such misunderstanding may have two possible causes: semantic/syntax difficulty or the professionals did not consider these two items relevant for evaluation. The second reason could result in the exclusion of items for the Brazilian context, given that the "Main Message" and "Risk" domains would perform differently than the original instrument. As the problems detected were of syntax, our corrections allowed the two domains to follow the original instrument.

Following the evaluation by the committee, the pre-test version of question 1 remained the same as in the synthesis of the translations, but the pre-test with the 30 professionals showed they were confused about what the “Main Message” would be. Modifications to the order of words made the question clearer. In question 18, the word “damage,” contained in the explanation of the question, was replaced by “risk,” repeating the term already used in the question to reinforce the meaning in the original version of the CDC-CCI. We corrected the misunderstanding on what the instrument calls the “Main Message” and “Risk” during the adaptation process. These findings reinforce those found in other studies, highlighting the importance of the work of the committee of experts and pre-test in cross-cultural adaptations\textsuperscript{11,12,14,15}.

This study also observed the importance of the participation of translators compatible with the criteria that the literature advocates. The independent translations and back-translations allowed us to locate the errors and discrepancies in ambiguous or unmatched items between the two languages. Translation by both a translator with health training and one without this training made it possible to detect a greater range of difficulties in understanding the instrument\textsuperscript{11–13}. The author of the instrument observed additional discrepancies or misalignments not detected during translation, synthesis, or back-translations, giving greater credibility and fidelity to the initial proposal.

A future study will evaluate some psychometric properties of the BR-CDC-CCI, after we complete this cross-cultural adaptation. The adapted instrument still needs to undergo a process of evaluation in larger groups of professionals and materials. Despite the fact that the Brazilian National Health System has the same principles –such as comprehensiveness, universality, equitability– for the whole country, some cultural differences between regions and professional groups are likely to occur. Testing the BR-CDC-CCI with a larger number of health professionals located in different Brazilian regions and professionals with different training and experiences is necessary. These evaluation methods could allow the assessment of reliability and validity. We also will do a qualitative assessment to compare this instrument with others\textsuperscript{6,17,18}. Other instruments that evaluate the quality of written clinical treatment choices could also be used when we evaluate and create health education materials\textsuperscript{24,25}. In conclusion, the process of cross-cultural adaptation of the Clear Communication Index provided an adapted instrument to the Brazilian Portuguese language, which this is the first step in a longer process of testing and refining the BR-CDC-CCI for broad use among health professionals.
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