



ORIGINAL ARTICLE

Cross-cultural adaptation of National Early Warning Score 2 to Angolan Portuguese[☆]

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ABSTRACT

Objective: To make a cross-cultural adaptation of the National Early Warning Score 2 (NEWS 2) from English to Angolan Portuguese.

Methods: A methodological research of cross-cultural adaptation was conducted, involving sequential stages of forward translation, translation synthesis, back-translation, and the application of the Delphi Panel methodology for analyzing semantic, idiomatic, experiential, and conceptual equivalence between the translated and the original versions. This process culminated in the development of a pre-final version, which subsequently underwent testing in a cohort of nurses ($n = 37$). The Intraclass Correlation Coefficient was calculated to assess inter-rater reliability of ratings. Cronbach's alpha was used for evaluating the internal consistency and reliability within the items of the NEWS 2 score.

Results: The cross-cultural adaptation process allowed us to prepare the final version of this tool. The data collected during the testing phase facilitated the examination of inter-rater reliability of ratings and the internal consistency and reliability within the items of the NEWS2 score. The Intraclass Correlation Coefficient observed at this step was 0.992. The Cronbach's alpha was 0.993.

Conclusion: The cross-cultural adaptation of the NEWS 2 scoring system to Angolan Portuguese was successful, providing healthcare professionals in Angola with the means to effectively use the tool.

African relevance

- Adapted National Early Warning Score 2 (NEWS2) in Angolan Portuguese enhances healthcare communication and patient care in Angola and Portuguese-speaking African regions.
- Successful adaptation acknowledges the need for culturally relevant tools in African healthcare, respecting local nuances.
- Culturally adapted NEWS2 strengthens healthcare systems in Angola and could serve as a model for other African nations.
- NEWS2 in Angolan Portuguese enhances patient safety by aiding accurate assessment and response to deteriorating conditions across Africa.

Introduction

The deterioration of the patients' clinical state is frequently preceded by the worsening of physiological parameters that can be simply

measured by the healthcare team. Failure to respond to the deterioration of respiratory, hemodynamic, or cerebral functions will place patients at risk of cardiorespiratory arrest and avoidable death ([1,2]).

Over the years, many Early Warning Scores (EWSs) have been developed and implemented across numerous contexts to trigger Rapid Response Teams within hospital and prehospital settings, with a significant degree of variation in the physiological parameters involved. The Early Warning Score (EWS), developed in 1997 by Morgan and colleagues, was the first to be used [3].

The National Early Warning Score (NEWS) was developed in 2012 by a working party at the Royal College of Physicians (RCP) in the United Kingdom [4]. It uses the following physiological parameters: i) systolic blood pressure, ii) heart rate, iii) respiratory rate, iv) temperature, v) oxygen saturation, vi) neurological status (following the AVPU scale - Alert-Verbal-Pain-Unresponsive), and vii) the presence or absence of supplemental oxygen. Compared to 33 other EWSs, NEWS demonstrated a better capacity to discriminate the increased risk of unplanned ICU

[☆] Cross-Cultural Adaptation of National Early Warning Score 2 to Angolan Portuguese.

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Table 1
The cross-cultural adaptation process.

Stages	Description
Stage 1 - Forward translation	Two independent translations (T1 and T2). Bilingual translators whose mother tongue is Portuguese from Angola.
Stage 2 - Synthesis of the translations	Synthesized T1 and T2 into one common translation T-12.
Stage 3 - Back translation	Three independent back translations of T-12 into English (BT1, BT2 and BT3). Bilingual translators with English as their mother tongue.
Stage 4 - Expert committee review	Delphi Panel methodology (25 Experts: Three rounds). Produce a pre-final version.
Stage 5 - Test of the pre-final version	37 nurses who worked in inpatient units using 10 simulated clinical cases.
Stage 6 - Submission of documentation to the developers of NEWS 2	E-mail submitted to Royal College of Physicians.

admission, cardiorespiratory arrest, and in-hospital death within 24 h [4]. In Portugal, in 2014, a study was undertaken to translate, adapt, and validate the NEWS for the Portuguese language and culture [5].

NEWS 2, an updated version of the NEWS, was introduced in December 2017 with refinements that included adjustments to oxygen saturation and modifications to the level of consciousness assessment, improving the sensitivity and specificity of the scoring system, providing healthcare professionals with a more nuanced tool for early recognition of patients at risk of deterioration. The NEWS 2 score is determined by the values attributed to each of the items, resulting in a total score ranging from 0 (indicating the most favourable prognosis) to 20 (indicating the least favorable prognosis) ([6,7]). In 2019, a development occurred with the cross-cultural adaptation of NEWS 2 to Brazilian Portuguese [8].

While translating international instruments into Portuguese may appear straightforward, adapting the vocabulary and culture presents a significant challenge. Indeed, the absence of validation work for the EWs in the Angolan context highlights the need for local research and adaptation. The unique context of Angola, with the influences of local African languages, its ethnic and linguistic diversity, resulting in variations in vocabulary, pronunciation, and grammatical structure, coupled with the decision of the Angolan government not to adopt the Portuguese language orthographic agreement signed in 1990, underlines the importance of considering specific linguistic and cultural nuances in the development and validation of clinical assessment tools. So, it becomes crucial to conduct studies that consider the local context, cultural sensitivities, and linguistic particularities.

Methods

A methodological research of cross-cultural adaptation of scales was conducted according to the recommendations by Beaton et al., authorized by the RCP, author of the scale, before the start of the entire process [9].

The process of adapting the NEWS 2 scoring system to Angolan Portuguese involved six stages, ensuring linguistic and cultural relevance, as summarized in Table 1.

Stage 1: Forward Translation. Two bilingual translators, who are native Angolan Portuguese speakers and have lived in English-speaking countries for over five years, independently translated the NEWS 2 scoring system from English to Angolan Portuguese, resulting in two versions: T1 and T2.

Stage 2: Synthesis of the Translations. The two translators, along with the researcher, synthesized T1 and T2 into a single version, T-12, through collaborative discussions.

Stage 3: Back Translation. Three translators, native English speakers who have lived in Angola for over five years, independently back-translated the T-12 version into English, producing three back-translations: BT1, BT2, and BT3. This step ensured the translated content accurately reflected the original English version.

Stage 4: Expert Committee and Delphi Consensus. An expert committee conducted a Delphi consensus methodology, a structured communication technique used to facilitate group communication effectively in dealing with complex problems. This methodology involves multiple rounds of anonymous feedback from a panel of experts, allowing for the convergence of individual opinions towards a collective consensus. This iterative process helps in generating reliable consensus opinions on various topics by minimizing biases such as dominance and group conformity. A panel of 25 Angolan experts (83 % of the 30 invited) were selected based on their knowledge, expertise, and availability to participate in the panel, which included physicians and nurses in the areas of internal medicine, surgery, emergency rooms, intensive care units, and/or teachers at universities or at teaching courses in these fields. The iterative process spanned three rounds, focusing on achieving consensus on semantic, idiomatic, experiential, and conceptual equivalence. Prior to the Delphi rounds, a pilot test of the preliminary questionnaire was conducted to identify and rectify any issues, ensuring clarity and relevance. Feedback from the pilot test led to necessary adjustments, optimizing the questionnaire for the actual Delphi rounds ([10,11]). The experts reviewed the original NEWS 2 scale and all translations (T1, T2, T-12, BT1, BT2, and BT3). The process maintained a response rate above 90 %, culminating in a pre-final version.

Stage 5: Test of the Pre-final Version. The pre-final version was tested with a cohort of 37 nurses from various regions across Angola. These nurses, trained in different hospitals and experienced in both inpatient and outpatient settings, evaluated the pre-final version using 10 simulated clinical cases. The test was conducted anonymously, with no contact between participants, in a controlled environment following prior training, which involved three clinical cases used in NEWS 2 training by RCP online learning. The participants were directed to score all the clinical cases according to the “adapted NEWS 2 scoring system to Angolan Portuguese” obtained in the previous stage, the pre-final version. Following the scoring, they were further guided to systematize the accurate response to the NEWS 2 scoring system, as per the translated “Clinical response to NEWS 2 trigger thresholds adapted to Angolan Portuguese”. Interrater reliability was measured using the Intraclass Correlation Coefficient (ICC) with a “Two-way mixed” model, type “Absolute agreement.” The ICC reference values used were: <0.40 = Poor, 0.40–0.59 = Fair, 0.60–0.74 = Good, and ≥0.75 = Excellent [12]. Cronbach’s alpha assessed the internal consistency and reliability of the NEWS 2 items. The statistical analysis was performed using IBM SPSS Statistics software version 25.

Stage 6: Submission of Documentation to the Developers of NEWS 2. The final version of the adapted NEWS 2 scoring system was submitted via e-mail to the Royal College of Physicians (RCP), the original developers of the scale.

The ethical considerations pertinent to the study were observed throughout all stages of the process. The project obtained approval from two distinct local ethics committees (*Clínica Sagrada Esperança* and Faculty of Medicine of the University Agostinho Neto). All participants remained anonymous, and before the beginning of the study, they signed an informed consent form.

Results

The cross-cultural adaptation process was conducted, and resulted in discrepancies emerging in the adaptation of terms such as “Physiological

Table 2
Characteristics of the 25 participants in the Delphi Panel.

Characteristics	N = 25
Mean age (range) - years	44.8 (33–63)
Mean work experience time (range) - years	18.8 (6–36)
Academic degrees - n (%)	Graduated - 21 (84.0) Master's Degree - 1 (4.0) Doctors of Philosophy - 3 (12.0)
Profession - n (%)	Physicians - 21 (84.0) Nurses - 4 (16.0)
Practice Specializations - n (%)	Intensive Care - 11 (44.0) Internal Medicine - 6 (24.0) Emergency Medicine - 4 (14.0) Surgery - 3 (12.0) Nurse Supervision - 1 (4.0)

Table 3
Intraclass Correlation Coefficient – NEWS 2 inter-rater reliability of ratings.

Items	Intraclass correlation	95 % confidence interval	
		Lower bound	Upper bound
Respiration rate	0.992	0.982	0.988
SpO ₂ scale 1	0.995	0.989	0.998
SpO ₂ scale 2	0.992	0.982	0.998
Air or oxygen?	0.950	0.893	0.988
Systolic blood pressure	0.986	0.970	0.996
Pulse rate	0.979	0.956	0.994
Consciousness	0.989	0.976	0.997
Temperature	0.994	0.986	0.998
Total NEWS 2	0.992	0.990	0.995

Parameter", "SpO₂ Scale 1 and 2", "On Oxygen", "Pulse" and in the elements of the neurological status assessment as per the AVPU scale – "Alert", "Verbal", "Pain" and "Unresponsive". It's noteworthy that in Angola, the employment of the AVPU scale is not customary. All these discrepancies were subject to consideration within the Delphi Panel, where terms were selected based on the rationale that they better align with the Angolan context.

During the adaptation of the clinical response to NEWS 2 trigger thresholds for cross-cultural contexts, discrepancies in understanding arose for terms like "Total 5 or more" and "Registered nurse" particularly considering the regulatory requirements in Angola, where nursing practice requires the compulsory registration. Consensus led to the adaptation of "Total 5 or more" to "Total 5 – 6" and "Registered nurse" to "Shift Lead Nurse" to improve precision in interpretation.

In Table 2, the characteristics of the participants in the Delphi Panel are presented, involving 25 experts. The average work experience time was 18.8 years. The majority, constituting 21 (84.0 %), were physicians, with 11 (44.0 %) specialized in Intensive Care, and three holding doctorates.

During the pilot test of the Delphi method, various issues were identified and subsequently rectified. These included ambiguities in question wording, technical hurdles concerning platform utilization, concerns regarding question length, challenges in comprehending instructions, and suggestions for additional content. By meticulously analysing this feedback, researchers refined the questionnaires to ensure clarity, relevance, and user-friendliness for the Delphi panel.

The pre-final version, once obtained, underwent testing by a cohort of 37 nurses operating in inpatient units, using 10 simulated clinical cases created by the researcher. Table 3 outlines the inter-rater

Parâmetros fisiológicos	Pontuação						
	3	2	1	0	1	2	3
Frequência respiratória (ciclos por minuto)	≤8		9–11	12–20		21–24	≥25
Saturação de oxigénio (%) - Escala 1 (Não usar em DPOC)	≤91	92–93	94–95	≥96			
Saturação de Oxigénio (%) - Escala 2 (Usar exclusivamente em DPOC)	≤83	84–85	86–87	88–92 ≥93 em ar ambiente	93–94 com Oxigénio	95–96 com Oxigénio	≥97 com Oxigénio
Em ar ambiente ou com Oxigénio?		com Oxigénio		em Ar ambiente			
Pressão arterial sistólica (mmHg)	≤90	91–100	101–110	111–219			≥220
Pulso (pulsações por minuto)	≤40		41–50	51–90	91–110	111–130	≥131
Nível de consciência				Vigil			Confusão mental Resposta ao estímulo verbal, doloroso ou não responde.
Temperatura (°C)	≤35.0		35.1–36.0	36.1–38.0	38.1–39.0	≥39.1	

Chart 1. The adapted NEWS 2 scoring system to Angolan Portuguese.

Pontuação do NEWS	Frequência de Monitorização	Resposta Clínica
0	Pelo menos a cada 12 horas	<ul style="list-style-type: none"> Manter monitorização de rotina com o NEWS
1 - 4	Pelo menos a cada 4 a 6 horas	<ul style="list-style-type: none"> Informar o enfermeiro responsável do turno que deverá observar o doente Enfermeiro responsável do turno deve decidir se é necessário aumentar a frequência de monitorização ou intensificar os cuidados prestados
3 num parâmetro individual	Pelo menos de hora em hora	<ul style="list-style-type: none"> Enfermeiro responsável do turno deve informar a equipa médica responsável pelo doente que deverá observar o doente e decidir se é necessário intensificar os cuidados prestados
5 ou mais Limite de resposta Urgente	Pelo menos de hora em hora	<ul style="list-style-type: none"> Enfermeiro responsável do turno deve informar imediatamente a equipa médica responsável pelo doente Observação urgente por um médico ou equipa com competências em atendimento ao doente grave Prestar cuidados num local com equipamento de monitorização
7 ou mais Limite de resposta Emergente	Monitorização contínua dos sinais vitais	<ul style="list-style-type: none"> Enfermeiro responsável do turno deve informar imediatamente a equipa médica responsável pelo doente Observação emergente pela equipa de cuidados intensivos Considerar a possibilidade de transferência para uma unidade de cuidados intermédios ou intensivos Prestar cuidados num local com equipamento de monitorização contínua

Chart 2. Clinical response to NEWS 2 trigger thresholds adapted to Angolan Portuguese.

reliability of NEWS 2 ratings using the Intraclass Correlation Coefficient (ICC). The ICC illustrated excellent reliability for each individual item of the scale, along with the total score 0.994 (0.990–0.950). Noteworthy is the calculation of Cronbach’s alpha at 0.993, emphasizing the remarkable internal consistency and reliability within the components of the adapted NEWS 2 scoring system.

When participants were instructed to systematize the accurate response to the NEWS 2 scoring system in accordance with the protocol, after scoring, the ICC revealed excellent inter-rater reliability 0.894 (0.853–0.928).

The final version of the NEWS 2 scoring system and the clinical response to NEWS 2 trigger thresholds adapted to Angolan Portuguese are presented in [Charts 1 and 2](#).

Discussion

The cross-cultural adaptation process of the NEWS 2 scoring system followed the stages proposed by the employed methodology and proved successful [9].

An adaptation process of NEWS 2 has already been conducted to ensure linguistic and cultural relevance for the Brazilian context and

enabled healthcare professionals in Brazil with means to effectively use NEWS 2 as a tool for assessing the severity of illness and identifying patients at risk of clinical deterioration [8].

The use by the researcher of the Delphi Methodology with its essential components, including anonymity, iteration, controlled feedback, and statistical stability of consensus, to adapt NEWS 2 from English to Angolan Portuguese is unprecedented. As of now, there are no publications documenting a similar process. The Delphi method’s limitations were mitigated by ensuring a diverse and representative panel with relevant expertise and perspectives, preserving anonymity throughout the process, conducting a pilot test before all Delphi rounds to identify and address potential issues, maintaining the researcher’s neutrality, and meticulously planning the entire process [10].

One significant strength of our adaptation process was the thorough testing of the pre-final version with a diverse group of 37 nurses from various regions nationwide, using simulated clinical cases. These nurses brought extensive experience from their training in different hospitals and their work in both inpatient and outpatient units. Involving this diverse group ensured that the adapted NEWS 2 scoring system aligned with the nuances of different healthcare settings and regional practices within the country. Their input provided valuable insights into the

practical applicability and effectiveness of the adapted tool, making it more relevant and useful for healthcare practitioners throughout Angola. The use of simulated clinical cases, either created or adapted by the researcher, has previously been employed in Brazil and Portugal. This approach mitigated ethical concerns associated with real-time cases ([5,8]).

When comparing the final versions of the translated NEWS 2 in Brazil and Portugal, juxtaposed with our developed version in Angola, disparities surfaced, particularly in several terminologies. These differences were notably conspicuous in the “SpO₂ % Scales 1 and 2”, where the Angolan version favoured the use of the written-out form over abbreviations, a contrast from the Brazilian version. Additionally, an explanatory note was incorporated beneath these terms to elucidate the general contexts suitable for each scale’s application, a feature absent in the original, Brazilian and Portuguese versions. Variations were also discernible in the translation of the term “Pulse”, differing from the Portuguese version, as well as in the interpretations of the “AVPU Scale”—specifically in delineating “Alert” and “Unresponsive”—and in the term “Confusion”. Regarding the clinical response to NEWS 2 trigger thresholds, the primary disparity was pinpointed in the term “Registered nurse” ([5,8]). These discrepancies underscore the critical importance of considering distinct linguistic and cultural nuances during the development and validation of clinical assessment tools.

The cross-cultural adaptation of the NEWS 2 scoring system to Angolan Portuguese was successful, providing healthcare professionals in Angola with the means to effectively use the tool. There is ongoing research to assess the psychometric properties of the “adapted NEWS 2 scoring system” and the “clinical response to NEWS 2 trigger thresholds adapted to Angolan Portuguese”, with the aim of integrating the results highlighted in this paper.

Dissemination of results

The research findings were shared with Angola’s healthcare community through various channels, including public presentations at healthcare institutions and conferences, specialized training programs, and online dissemination via social media and forums, aiming to inform and empower healthcare professionals. This facilitated the integration of NEWS2 into clinical practice, ultimately enhancing patient care and healthcare outcomes in Angola.

Authors’ contribution

Authors contributed as follow to the conception or design of the work; the acquisition, analysis, or interpretation of data for the work; and drafting the work or revising it critically for important intellectual content: ET 60 %; AE 25 %, MLA 15 %.

All authors approved the version to be published and agreed to be

accountable for all aspects of the work.

Declaration of generative AI and AI-assisted technologies in the writing process

The authors declare that no generative artificial intelligence (AI) or AI-assisted technologies were utilized in the writing process of this manuscript.

Declaration of competing interest

The authors declare no conflicts of interest.

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