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Content validation and usability of an application for cornea donor selection

Validação de conteúdo e usabilidade de um aplicativo para a seleção de doadores de córnea

Validación de Contenido y Usabilidad de una Aplicación para la Selección de Donantes de Córnea

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Abstract

Objective: to validate the content and usability of a mobile application prototype aimed at the identification and selection of potential cornea donors**. Method:** a methodological study based on Interaction Design, for the development of a mobile application prototype focused on the identification of potential cornea donors. Content and usability validation was carried out by 14 expert judges from the health and technology fields, using an instrument adapted from the literature and the System Usability Scale (SUS). The Content Validity Index (CVI) was used to analyze agreement among the judges regarding the content, as well as to calculate the SUS scale for usability evaluation. **Results:** the prototype achieved a global CVI of 0.97 among health specialists and 0.95 among technology specialists. The mean SUS score was 87.14 points, classified as "best imaginable", with a Cronbach's alpha of 0.86. The judges provided specific suggestions to improve layout and navigation flow. **Conclusion:** the prototype demonstrated clarity, functionality, and high usability, showing potential to support healthcare professionals in the identification, selection, and notification of potential cornea donors, contributing to an increase in ocular tissue procurement rates.

Descriptors:
Donor Selection. Corneal Transplantation. Mobile Applications. Usability. Validation Study.

What is known about the topic?
The limited familiarity of healthcare professionals with donor selection criteria compromises the identification and procurement of corneas. Mobile technologies have the potential to enhance care practices, support decision-making, and facilitate the notification of potential donors.

What does this study add to the topic?
A mobile application prototype is presented and validated, with evidence of content validity and high usability, aimed at supporting decision-making in the screening of potential cornea donors, contributing to the reduction of losses of viable ocular tissues for transplantation.

Resumo

Objetivo: *validar o conteúdo e a usabilidade de um protótipo de aplicativo móvel voltado à identificação e seleção de potenciais doadores de córnea.* ***Método:*** *estudo metodológico baseado no Design de Interação, para a elaboração de um protótipo de aplicativo móvel voltado à identificação de*

potenciais doadores de córnea. A validação de conteúdo e da usabilidade foi realizada por 14 juízes especialistas das áreas da saúde e da tecnologia, utilizando um instrumento adaptado da literatura e a escala System Usability Scale (SUS). O Índice de Validade de Conteúdo (IVC) foi utilizado para a análise da concordância entre os juízes sobre o conteúdo, bem como para o cálculo da escala SUS para a avaliação da usabilidade. ***Resultados:*** *o protótipo obteve IVC global de 0,97 entre os especialistas da saúde e de 0,95 entre os da tecnologia. A média da escala SUS foi de 87,14 pontos, classificada como "melhor imaginável" com Alfa de Cronbach de 0,86. Os juízes ofereceram sugestões pontuais para o aprimoramento do layout e da fluidez da navegação.* ***Conclusão:*** *o protótipo demonstrou clareza, funcionalidade e alta usabilidade, apresentando potencial para apoiar profissionais da saúde na identificação, seleção e notificação de potenciais doadores de córnea, contribuindo para um incremento nas taxas de captação de tecidos oculares.*

Descritores:
Seleção de Doadores. Transplante de Córnea. Aplicativos Móveis. Usabilidade. Estudos de Validação.

Resumen

Objetivo: *validar el contenido y la usabilidad de un prototipo de aplicación móvil para la identificación y selección de potenciales donantes de córnea.* ***Método:*** *estudio metodológico basado en el Diseño de Interacción para el desarrollo de un prototipo de aplicación móvil destinada a la identificación de potenciales donantes de córnea. La validación de contenido y usabilidad fue realizada por 14 jueces expertos de los campos de la salud y la tecnología, utilizando un instrumento adaptado de la literatura y la escala System Usability Scale (SUS). El Índice de Validez de Contenido (IVC) se utilizó para analizar la concordancia entre los jueces sobre el contenido, así como para calcular la escala SUS para la evaluación de la usabilidad.* ***Resultados:*** *el prototipo obtuvo un IVC global de 0,97 entre los expertos en salud y de 0,95 entre los expertos en tecnología. La puntuación media en la escala SUS fue de 87,14 puntos, clasificada como "la mejor imaginable", con un alfa de Cronbach de 0,86. Los jueces ofrecieron sugerencias específicas para mejorar el diseño y la fluidez de la navegación.* ***Conclusión:*** *el prototipo demostró claridad, funcionalidad y alta usabilidad, mostrando potencial para ayudar a los profesionales de la salud a identificar, seleccionar y notificar a posibles donantes de córnea, contribuyendo así a un aumento en las tasas de obtención de tejido ocular.*

Descriptores:
Selección de Donantes. Trasplante de Córnea. Aplicaciones Móviles. Usabilidad. Estudio de Validación.

INTRODUCTION

Vision loss resulting from diseases affecting the cornea is among the three leading causes of blindness worldwide, making this condition a global concern[1,2]. Blindness caused by corneal disorders is considered reversible, and visual rehabilitation can be achieved through corneal transplantation, with the corneal graft originating from donors diagnosed with brain death or after cardiorespiratory arrest.[2–5]

In Brazil, the most recent data indicate that more than 12,000 corneal transplants were performed from January to September 2024.[6] Despite this significant number, the corneal transplant rate was approximately 23.4% lower than the estimated need in the country during this period.[6] Globally, it is estimated that there is only one available cornea for every 70 individuals awaiting a corneal graft.[7]

Although it is considered the most commonly performed type of transplant worldwide, achieving good success rates, the shortage of donors still represents a significant global challenge for transplant systems.[2,3,5,8,9] It is worth noting that the process of searching for and selecting Potential Cornea Donors

(PD), in general, is shared among various healthcare professionals and is guided by a series of highly specific regulations and regulatory frameworks.[3,8]

Among the challenges that hinder the identification of PD and the procurement of corneas for transplantation, the low notification rate stands out, often associated with healthcare professionals' lack of knowledge regarding the specific eligibility criteria for tissue donation and the notification procedures.[5,8,10,11] This scenario reinforces the need for the development and implementation of innovative solutions aimed at expanding the identification and notification of PD.[8,10]

Optimizing the PD identification process requires efforts to ensure clear communication, the sharing of standard operating procedures among those involved, the awareness and proper training of healthcare professionals, and investments in technology to facilitate this process.[3,10]

The adoption of Mobile Health (mHealth) technologies has been established as an alternative to optimize care processes, improving communication efficiency, and facilitating decision-making.[12–14] Mobile applications have already demonstrated a positive impact on continuing education, support for daily work activities, and assistance in various healthcare areas, providing fast and reliable information to professionals in real time.[14–17] However, there is still a lack of digital tools specifically designed for the active search and selection of cornea donors by healthcare professionals, particularly in the Brazilian context, which limits agility in the identification and notification of these cases.[8,18]

In corneal transplantation context, searches conducted in Brazilian mobile application stores did not identify specific tools to assist healthcare professionals in the process of identifying and selecting PD. In light of the above, this study aimed to validate the content and usability of a mobile application prototype to support the identification and selection of potential cornea donors.

METHODS

This is a methodological study, conducted from November 2024 to March 2025, derived from a section of the dissertation entitled "*Desenvolvimento e validação de um protótipo para identificação e seleção de potenciais doadores de tecidos oculares*." The study was conducted in accordance with the recommendations of the Consensus-based Standards for the selection of health Measurement Instruments (COSMIN) initiative, aligned with the guidelines of the EQUATOR network. The development of the mobile application prototype followed the stages of Interaction Design proposed by Helen Sharp et al. (2013)[19]: 1. Identification of needs (main doubts and difficulties in identifying and selecting potential cornea donors); 2. Definition of the content, variables, and functionalities of the mobile application prototype; 3. Construction of the application prototype (visual representation and development using hyperlinks); 4. Validation of the prototype by judges (analysis of the content, appearance, functionalities, and usability of the application).[19]:

The stages related to the definition of content and functionalities up to the construction of the prototype (stages 1 to 3) were carried out previously, based on the analysis of healthcare professionals' perceptions regarding the main doubts and difficulties related to the identification and selection of potential cornea donors. The graphical version of the prototype, including its screens and visual elements, was developed by the authors. The prototype was created using Microsoft Excel software, employing hyperlinks to simulate navigation, interface, and functionalities of a mobile application interactively.

Once the construction of the prototype was completed, the fourth stage of the methodological process began (focus of this article), which consisted of validating the content, appearance, functionalities, and usability of the technology. Validation was performed by two groups of expert judges: the first composed of healthcare professionals with direct or indirect involvement in the ocular tissue donation process (content judges); and the second composed of professionals from the information technology and computer science fields with experience in application development and/or user experience (technical judges). The selection of judges followed the criteria and scoring proposed by Melo et al. (2024)[20], establishing as inclusion criteria a minimum score of five points for judges in the healthcare field and three points for judges in the technology field. The search for participants was conducted through researchers' contacts, adopting the snowball sampling strategy, in which one participant refers another.

The invitation letter was sent to the judges by email, along with the Free and Informed Consent Term (FICT). After acceptance, a second email was sent containing the application prototype in its simulated version developed in Microsoft Excel for download, a file with five fictitious clinical cases for simulating the screening process of potential donors using the prototype, and the link to access the electronic questionnaire intended for recording the evaluations.

The questionnaire consisted of approximately 40 items, with specific versions for each group of judges, according to their areas of expertise. Judges from the healthcare field evaluated criteria related to the objective, structure, appearance, functionalities, and interface of the prototype (items 1 to 17). Judges from the technology field analyzed criteria related to operability, structure, appearance, functionalities, and interface (items 18 to 26). The items were adapted from instruments previously used by Saboia (2017), Tavares (2018), and Perdigão (2022)[21–23] for the validation of health technologies. For usability assessment, both groups responded to the System Usability Scale (SUS), in a version translated and validated into Portuguese by Lourenço, Carmona, and Lopes (2022).[24] All items were evaluated using a five-point Likert scale, ranging from "1 – strongly disagree" to "5 – strongly agree."

Data analysis was performed using Jamovi software. To evaluate the judges' responses to items related to objective, structure, appearance, functionalities, and interface, the Content Validity Index (CVI) was used, calculated as the proportion of positive responses (scores 4 and 5) relative to the total number of responses. A minimum agreement of 80% among the judges was considered as the validation criterion.[25] The SUS scale was analyzed according to the recommendations of its authors[26,27]: for odd-numbered items, 1 was subtracted from the assigned score, while for even-numbered items, the score was subtracted from 5. The sum of the values was multiplied by 2.5, resulting in a final score ranging from 0 to 100. For interpretation, the following cut-off points were adopted: up to 20.5 (worst imaginable), 21–38.5 (poor), 39–52.5 (average), 53–73.5 (good), 74–85.5 (excellent), and 86–100 (best imaginable).[28] Cronbach's alpha coefficient was used to estimate reliability, adopting a lower limit of 0.70 as acceptable.[29]

The study was submitted to the Research Ethics Committee (REC) of the Universidade Estadual do Ceará (UECE), in accordance with Resolution No. 466/2012 of the Brazilian National Health Council (CNS). Data collection was initiated only after obtaining a favorable opinion (CAAE: 82532524.0.0000.5534).

RESULTS

Seven judges from the healthcare field and seven from the technology field participated in the study. Participants' ages ranged from 22 to 57 years, with a mean age of 40.1 years (±10.5 years). Regarding academic background, three judges were physicians (21.4%), four were nurses (28.6%), five held degrees in Computer Science (35.7%), and two had degrees in Information Technology (14.3%). The length of professional experience in their area of expertise ranged from two to 29 years, with a median of 13.5 years, including judges working in seven different states of the country.

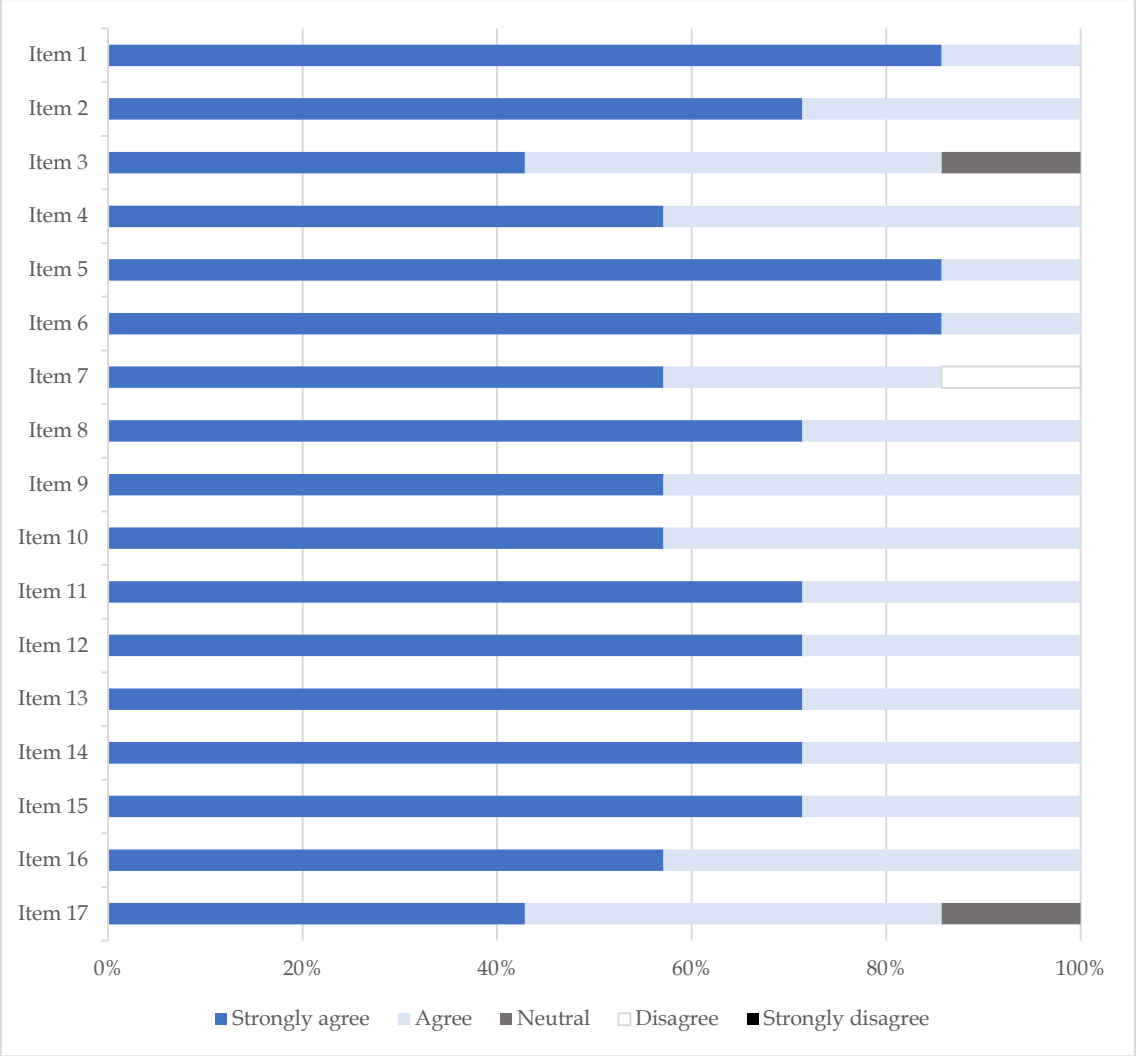
The scores assigned to the judges, according to the criteria of Melo et al. (2024)[20], ranged from five to 14 points among participants from the healthcare field, with a median of nine points. Among the judges from the technology field, scores ranged from three to 12 points, with a median of eight points.

Regarding the evaluation by healthcare judges of items 1 to 17, which covered aspects related to the objective, structure, appearance (visual design), functionalities, and interface of the prototype, a predominance of maximum scores was observed, indicating a high level of agreement among experts (Figure 1). The global CVI analysis was 0.97, with high agreement across all statements. In the individual item analysis, 14 items (82.3%) presented a CVI equal to 1.00 (100%), reflecting full agreement regarding the adequacy of language, clarity, organization, quantity, and relevance of the information and content adopted in the prototype.

Only three items (3, 7, and 17) presented an individual CVI of 0.86, related, respectively, to the prototype's ability to promote changes in healthcare professionals' behavior and attitudes; to the scientific coherence of the information and concepts and the absence of language errors; and to the comprehensiveness of the content in relation to the needs of the context of active search and selection of PD. Evaluations classified as "neutral" were assigned by two different judges to items 3 and 17. Item 7 received one response in the "disagree" category, assigned by a third judge, suggesting a specific perception of inadequacy regarding scientific consistency or language quality. Only one judge justified the evaluation assigned to item 3, highlighting that:

> *when evaluating the aspect related to promoting changes in behavior and attitudes among healthcare professionals, especially regarding the active search and selection of potential cornea donors, I observed that the prototype plays a significant role in facilitating this process, but not directly in the field of professionals' attitudes or behaviors (H6).*

Figure 1. Evaluation by healthcare judges regarding the objective, structure, presentation, functionalities, and interface of the prototype. Fortaleza, CE, Brazil, 2025.

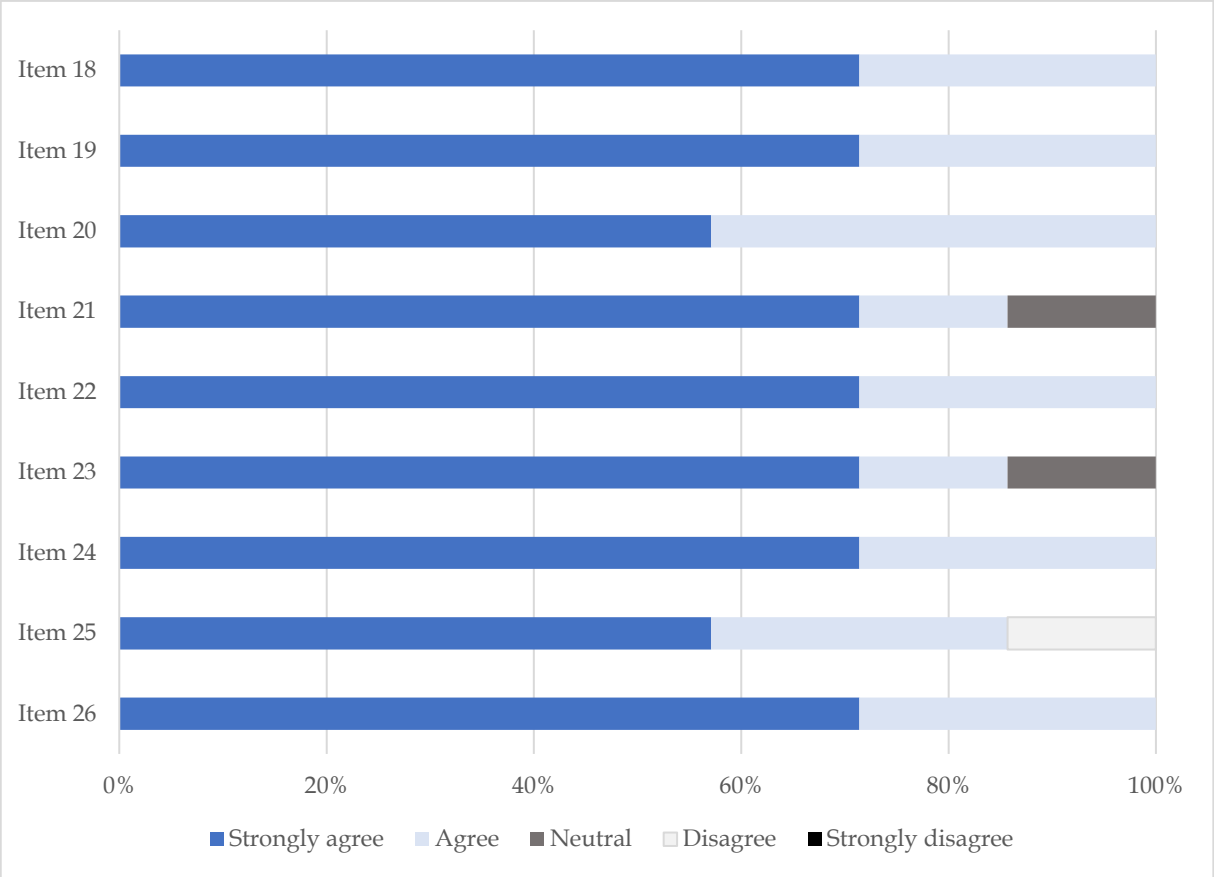


Source: Prepared by the authors (2025).

Concerning the evaluation by the technology judges, a predominance of maximum scores was also observed, reflecting high agreement regarding the clarity of the proposal, the adequacy of operability, and the functionalities developed, as well as the appropriateness of the graphical interface (Figure 2). The overall CVI among the technical experts was 0.95. Individual item analysis revealed maximum agreement (CVI=1.0) in six of the nine statements analyzed. Only three statements – item 21 (ease of use of functions), item 23 (clarity and adequacy of displayed messages), and item 25 (adequacy of the amount of information) – received evaluations in the "neutral" or "disagree" categories by the same judge, resulting in an individual CVI of 0.85 for these items. In the justification, the evaluator highlighted that:

> *Initially, I thought that the "contact" option would provide information about the research group [...], however, it is a search by country, regions, and states, which makes navigation confusing [...]. It would be simpler to present a clear list of states. The application has an interesting proposal by offering information and functionalities, such as the calculation of hemodilution. It would be useful to include an option so that, when entering the weight, the other fields would be filled automatically. [...] (T4)*

Figure 2. Evaluation by technology judges regarding the structure, presentation, functionalities, and interface of the prototype. Fortaleza, CE, Brazil, 2025.

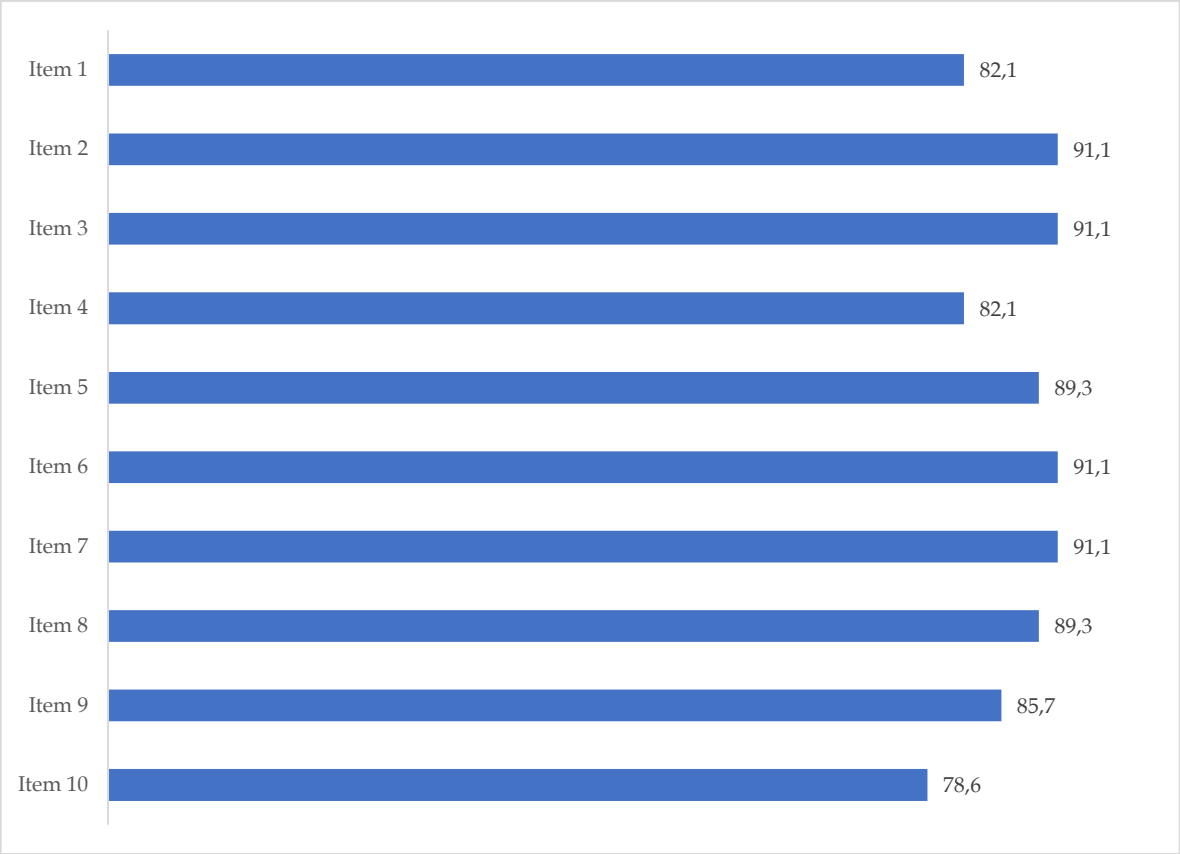


Source: Prepared by the authors (2025).

The evaluation of the prototype's usability, using the SUS scale, showed an overall mean score of 87.14 points. The total scores assigned to each judge - calculated from the weighted sum of the 10 items of the SUS scale - ranged from 60.0 to 100.0, with a median of 90.0 points.

The analysis of the scores assigned to each of the 10 items of the scale showed values ranging from 78.6 to 91.1 (Figure 3). The highest scores were observed in items related to ease of use (items 3 and 7), clarity of the prototype (item 2), and absence of inconsistencies (item 6). The lowest score was assigned to item 10, which addresses the need for prior learning. These values reflect a high perceived usability of the technology.

Figure 3. Mean scores assigned to the SUS scale items in the evaluation of the prototype's usability by healthcare and technology judges. Fortaleza, CE, Brazil, 2025.



Source: Prepared by the authors (2025).

The instrument demonstrated good internal reliability (Cronbach's alpha of 0.86), and no statistically significant differences were observed between the healthcare and technology groups, according to the Mann-Whitney U test ($p > 0.05$ for all items).

DISCUSSION

In recent decades, the literature has consolidated evidence on the importance of mHealth in education, clinical decision support, and various aspects related to health promotion, prevention, and care.[14,15,30,31] Mobile applications have been widely used to improve care quality, offering fast, remote, and low-cost access to critical information, which contributes to safer and more efficient decision-making.[17]

Despite advances in the field of transplantation, there is still a lack of initiatives focused on incorporating mHealth to support the identification, selection, and notification of potential ocular tissue donors.[11] This gap reinforces the relevance and innovative nature of this study. The absence of technological tools for this purpose directly impacts one of the most critical points in the donation process: the identification of PD. It is estimated that a significant proportion of hospital deaths correspond to unrecognized potential donors, resulting in the loss of viable tissues for transplantation.[11]

The use of digital technologies can help minimize these losses, reduce screening errors, and increase the efficiency of organ and tissue procurement processes. The prototype developed in this study aligns with this perspective by centralizing essential information on eligibility criteria for donation, automating relevant calculations (such as age and time since death), and offering a structured decision-making flow, reducing ambiguities in the process of searching for and selecting potential donors.

The literature suggests that well-designed applications, with appropriate content, intuitive interfaces, and ease of use, can enhance user engagement and reduce the occurrence of errors.[18] Therefore, it is essential to measure the usability of digital technologies, as well as to evaluate the clarity, relevance of content, visual design, and overall functionality of the tools, considering the needs of the target audience.

The prototype under study was positively evaluated by both healthcare and technology judges, with global CVI values of 0.97 and 0.95, respectively. The CVI has been widely used to measure the

proportion of judges in agreement regarding the evaluated aspects of an instrument. In general, values equal to or greater than 0.78 are considered indicative of content validity.[25,32]

Among healthcare experts, the technology was considered adequate in terms of content, appearance, functionalities, and interface. The observed variations were related to items such as the technology's ability to promote changes in users' behavior and attitudes; the scientific coherence of the information and concepts; and the comprehensiveness of the content.

The classification of "neutral" or "disagree" may have occurred due to differences in interpretation among judges regarding the scope of the application. For example, in the case of the statement about behavior change, some evaluators may have considered the prototype's potential as a driver of reflection and reorganization of practice, while others may have interpreted this change as the practical use of the tool at specific moments in the screening process.

Regarding comprehensiveness, the decision to include only the basic criteria for notification – such as age, time since death, cause of death, and signs of sepsis – may have influenced the judges' perception of completeness. A complete clinical and social screening of PD involves a detailed investigation, with in-depth analysis of multiple aspects, including, but not limited to: previous pathologies – specific neoplasms, prior transplantation, infections, among others; risk behaviors – recent tattoos, incarceration, homelessness, drug use, among other exposures, as well as ocular trauma and other relevant conditions.[3,4,10]

As this is a prototype focused on the initial selection and notification of PD, the more specific clinical and social criteria were intentionally omitted from the technology and directed to the eye bank team during the complementary secondary screening performed after notification. This intentional simplification of the tool may have influenced the judge's perception regarding the partial comprehensiveness of the content presented in the prototype. Among the judges from the technology field, a high level of agreement was observed regarding the clarity of the proposal, operability, functionalities, and adequacy of the interface. Full agreement in six of the nine evaluated items with maximum scores reinforces the technical adequacy of the prototype. These results suggest that the tool meets the fundamental principles of functional design and operability, which are essential aspects for its future application in real-world contexts.

Only three statements did not achieve maximum scores in the opinion of a single technical judge (items 21, 23, and 25), resulting in a CVI of 0.85 for these items, associated with specific suggestions for improvement. The professional provided suggestions to enhance the prototype regarding the ease of use of functions, the adequacy of displayed messages, and the amount of information. The comment highlighted navigation difficulties on the screen that includes contact information for the State Transplant Centers across the country. The need to click on the state of interest to display the corresponding contact was perceived as not very intuitive. Thus, the organization of a single list of states and their respective Transplant Center contacts was suggested as a strategy to improve the fluidity of system navigation. This observation, although isolated, highlights sensitive aspects of the user experience and will be considered in a future version of the technology, enhancing navigation flow and operational efficiency.

Usability is an attribute related to user acceptability of a system interface.[33] This aspect is generally tested in relation to the effectiveness and efficiency of the technical system in achieving specific objectives and user satisfaction with the technology.[18,34] Among standardized questionnaires for its assessment, the SUS scale stands out as a validated instrument, with quick application and reliability, which can be applied to different sample sizes.[13]

The literature suggests varying cut-off scores for SUS results.[26,28] However, there is consensus that the value of 87.1 observed in this study indicates a high level of usability, being associated with greater confidence, a lower learning curve, and greater user engagement with the technology.[14,28] The mean score obtained by the prototype – classified as "best imaginable" – indicates that the system meets the main usability criteria: being easy to learn, easy to use, error-tolerant, and pleasant to interact with.[13,14,24,27]

Two items of the SUS scale – item 4 (need for assistance from a person with technical knowledge to use the system) and item 10 (need to learn new things to use the system) – showed greater dispersion in responses, suggesting that, for a minority of judges, there may be aspects to be improved to promote greater initial user autonomy and optimize the system familiarization curve.

The specialists provided additional feedback in the comments section about the prototype, contributing to a deeper understanding of the user experience. Among the positive aspects, statements highlighted the intuitive and easy-to-understand interface, the clear organization of information – facilitating agile use in the hospital environment – and the practical applicability of the tool in accelerating

active search and reducing the loss of potential donors. As additional suggestions for improvement, the judges indicated, in general terms, adjustments to the visual design to improve navigation flow, as well as greater emphasis on donor exclusion criteria, to reduce potential screening errors.

The incorporation of digital technologies in the field of ocular tissue donation is a promising strategy to minimize issues associated with low donor notification rates and to increase the availability of tissues for transplantation. The prototype developed in this study stands out for offering an intuitive interface, practical functionalities, and structured information to support clinical decision-making, representing an advance in the application of mHealth in the field of transplantation.

It is worth noting that the version analyzed is not yet available for open access, consisting of a prototype created for the validation of content, functionalities, operability, and usability. The suggestions for improvement obtained will be used for the subsequent development of the application in its final version on platforms compatible with Android and IOS systems. The results obtained suggest that the prototype has the potential to be incorporated into professional routines in an intuitive manner, reducing barriers to its adoption and contributing to greater efficiency in the screening and notification of potential cornea donors.

This study has some limitations that should be considered when interpreting its results. First, the developed prototype was validated in a simulated environment, using Microsoft Excel software with navigation via hyperlinks, which may not fully reflect the user experience in a definitive mobile application. Although the evaluation performed by expert judges demonstrated excellent adequacy in terms of content and usability, the absence of testing in a real clinical environment limits the generalization of the findings regarding the practical effectiveness of the technology in everyday care settings.

Another aspect to be highlighted refers to the recruitment strategy of the professionals participating in the needs assessment and validation stages, carried out through purposive and chain sampling, based on previously established technical criteria. Although this approach ensured the qualification of participants, it is acknowledged that the non-probabilistic selection may, to some extent, limit the breadth of institutional contexts and practical experiences reflected in the study.

Furthermore, a limitation to be highlighted is the so-called "technological Tower of Babel", which encompasses both the diversity of operating systems, software versions, and mobile device models, as well as the fragmentation of Brazilian hospital systems. This heterogeneity includes everything from the coexistence of disconnected digital platforms to the persistent use of paper-based medical records in many institutions, which currently makes it unfeasible to integrate the application with electronic health records.

Despite the identified limitations, this study contributes significantly to the field of ocular tissue donation by providing a technology validated in terms of content and usability, aimed at supporting the identification and selection of potential donors. Future research is recommended to advance the validation of the application in real clinical environments, analyzing its impact on indicators such as the rate of identification and the rate of notification of potential donors. The development of the final version of the tool and its large-scale implementation may strengthen ocular tissue procurement strategies and, consequently, contribute to increasing corneal donation and transplantation rates, benefiting patients awaiting this procedure for vision restoration.

CONCLUSION

The validated mobile application prototype represents a promising technology, with the potential to be incorporated into routine care in an intuitive and safe manner, contributing to improving initial screening and strengthening active search strategies in ocular tissue donation, fostering an increase in the availability of tissues for transplantation.

CONTRIBUITIONS

Contributed to the conception or design of the study/research: Pessôa, J.P.F., Beltrão, B.A., Freitas, T.V.S. Contributed to data collection: Pessôa, J.P.F. Contributed to the analysis and/or interpretation of data: Pessôa, J.P.F., Beltrão, B.A., Freitas, T.V.S. Contributed to article writing or critical review: Pessôa, J.P.F., Beltrão, B.A., Freitas, T.V.S. Final approval of the version to be published: Pessôa, J.P.F., Beltrão, B.A., Freitas, T.V.S

REFERENCES

1. Hashemian MN, Zia MJ, Khorrami-Nejad M, Abed QS, Hashemian H. Long-term outcomes of corneal transplantation: a review of 8,378 patients. BMC Ophthalmol. 2025;25:39. doi:10.1186/s12886-024-03826-7.

2. Ribas LGA, Viana AFG, Ribeiro ALN, Arndt CG, Diamante AC, Marcolino GJ, et al. Impact of the COVID-19 pandemic on corneal transplantation: challenges and obstacles. Rev Eletr Acervo Saúde. 2024;24:e15904. doi:10.25248/reas.e15904.2024.

3. Romano V, Passaro ML, Ruzza A, Parekh M, Airaldi M, Levis HJ, et al. Quality assurance in corneal transplants: donor cornea assessment and oversight. Surv Ophthalmol. 2024;69:465–82. doi:10.1016/j.survophthal.2023.12.002.

4. Magalhães ACM, Carvalho EAP, Boteon JE, Silva LCS, Faria TBC, Cruz RCSC, et al. Impact of the SARS-CoV-2 pandemic on ocular tissue donations for transplants in a university hospital. Braz J Transplant. 2024;27. doi:10.53855/bjt.v27i1.553.

5. Silva ICN, Pimentel RRS, Moraes ELD, Santos MJ. Family refusal for corneal donation for transplantation: associated factors and trends. Acta Paul Enferm. 2023;37:eAO00001471. doi:10.37689/acta-ape/2024AO00001471.

6. Brazilian Association of Organ Transplantation. Numerical data of organ donation and transplants performed by state and institution in the period: January–September 2024 [Internet]. 2024 [cited 2024 Oct 15]. Available from: https://site.abto.org.br/.

7. Gain P, Jullienne R, He Z, Aldossary M, Acquart S, Cognasse F, et al. Global survey of corneal transplantation and eye banking. JAMA Ophthalmol. 2016;134:167–73. doi:10.1001/jamaophthalmol.2015.4776.

8. Szkodny D, Wróblewska-Czajka E, Stryja M, Gara F, Wylęgała E. Exploring the potential of an eye tissue donor reporting app in enhancing the procurement of corneal donors: mixed methods observational study. JMIR Form Res. 2024;8:e50398. doi:10.2196/50398.

9. Colby K. Update on corneal transplant in 2021. JAMA. 2021;325:1886. doi:10.1001/jama.2020.17382.

10. Bezerra CAG, Melo LRS, Feitosa DVS, Linhares SSM, Rodrigues IDCV, Otero LM, et al. Relevant criteria for reporting potential corneal donors: an integrative review. Rev Eletr Acervo Saúde. 2024;24:e14376. doi:10.25248/reas.e14376.2024.

11. Szkodny D, Wróblewska-Czajka E, Stryja M, Gara F, Wylęgała E. A web application for reporting eye donors: idea, development and doctor's opinion. Transplant Proc. 2023;55:2003–8. doi:10.1016/j.transproceed.2023.07.025.

12. Carvalho BM, Furtado MCC, Chinalia GT, Caritá EC, Sanguino GZ. Baby Date: a mobile application for teaching nursing care to newborns in primary care. Rev Latino-Am Enfermagem. 2024;32:e4164. doi:10.1590/1518-8345.7022.4164.

13. Maqbool B, Herold S. Potential effectiveness and efficiency issues in usability evaluation within digital health: a systematic literature review. J Syst Softw. 2024;208:111881. doi:10.1016/j.jss.2023.111881.

14. Tao D, Liu K. How do self-motivation and social motivation contribute to consumers' acceptance of m-health services? Health Policy Technol. 2024;13:100878. doi:10.1016/j.hlpt.2024.100878.

15. Alhawatmeh H, Aljarrah M, Hweidi IM, Al-Nsair N, Alyahya MS, Abuhammad S. Boosting knowledge, attitudes, and practices: an experimental controlled study evaluating the effectiveness of m-health training on antimicrobial resistance for hemodialysis nurses. SAGE Open Med. 2025;13:20503121251318153. doi:10.1177/20503121251318153.

16. Alipour J, Mehdipour Y, Zakerabasali S, Karimi A. Nurses' perspectives on using mobile health applications in southeastern Iran: awareness, attitude, and obstacles. PLoS One. 2025;20:e0316631. doi:10.1371/journal.pone.0316631.

17. Chandran VP, Balakrishnan A, Rashid M, Kulyadi GP, Khan S, Devi ES, et al. Mobile applications in medical education: a systematic review and meta-analysis. PLoS One. 2022;17:e0265927. doi:10.1371/journal.pone.0265927.

18. Chumkasian W, Fernandez R, Win KT, Petsoglou C, Lord H. Adaptation of the MAUQ and usability evaluation of a mobile phone–based system to promote eye donation. Int J Med Inform. 2021;151:104462. doi:10.1016/j.ijmedinf.2021.104462.

19. Rogers Y, Sharp H, Preece J. Interaction design: beyond human-computer interaction. 3rd ed. Bookman; 2013.

20. Melo ESJ, Silva MJN, Silva APN, Braga HFGM, Oliveira BSB, Monteiro FPM, et al. Criteria for selecting experts in the evaluation of educational technologies in nursing: integrative review. Rev Rene. 2024;25:e92942. doi:10.15253/2175-6783.20242592942.

21. Perdigão RLD. Development and evaluation of a mobile application usability for use in the perioperative period of children undergoing pediatric kidney transplantation [dissertation]. Fortaleza: Universidade Estadual do Ceará; 2022.

22. Tavares VMB. Development and validation of a mobile health application for home caregivers managing gastric tubes [dissertation]. Fortaleza: Universidade de Fortaleza; 2018.

23. Saboia DM. Construction and validation of an educational app for preventing urinary incontinence in women after childbirth [dissertation]. Fortaleza: Universidade Federal do Ceará; 2017.",

24. Lourenço DF, Valentim EC, Lopes MHBM. Translation and cross-cultural adaptation of the System Usability Scale to Brazilian Portuguese. Aquichan. 2022;22:1–16. doi:10.5294/aqui.2022.22.2.8.

25. Polit DF, Beck CT. Nursing research: principles and methods. 7th ed. Porto Alegre: Artmed; 2016.",

26. Bangor A, Kortum P, Miller J. Determining what individual SUS scores mean: adding an adjective rating scale. J Usability Stud. 2009;4:114–23.

27. Brooke J. SUS: a retrospective. J Usability Stud. 2013;8:29–40.

28. Lourenço DF, Valentim EC, Lopes MHBM. Translation and cross-cultural adaptation of the System Usability Scale to Brazilian Portuguese. Aquichan. 2022;22:1–16. doi:10.5294/aqui.2022.22.2.8.

29. Bonett DG, Wright TA. Cronbach's alpha reliability: interval estimation, hypothesis testing, and sample size planning. J Organ Behav. 2015;36:3–15. doi:10.1002/job.1960.

30. Santos JRFM, Lima MA, Machado ALG, Oliveira EAR, Brito AA, Veloso ML, et al. Building m-health technology to promote breastfeeding. Rev Enferm UFPI. 2025;14:e4740. doi:10.26694/reufpi.v14i1.4740.",

31. Ribeiro YC, Louro TQ, Barreto ACM, Gobatto M, Palermo MVA, Silva CVS. Semioapp application validity for teaching skin semiology in older adults. Rev Enferm UFPI. 2023;11:e3148. doi:10.26694/reufpi.v11i1.3148.

32. Dixon J, Lazenby M. Expert panel content validation for evidence-based projects: adaptation of the content validity index [Internet]. 2023 [cited 2025 Mar 15]. Available from: https://scholarlycommons.library.emory.edu.

33. Silva LP, Torres FAF, Santos AJS, Soares LG, Bezerra AM, Nascimento MNR. Construction of a mobile application as a strategy for medication adherence in the elderly population. Rev Enferm UFPI. 2023;12:e2992. doi:10.26694/reufpi.v12i1.2992.

34. Tao D, Shao F, Wang H, Yan M, Qu X. Integrating usability and social cognitive theories with the technology acceptance model to understand young users' acceptance of a health information portal. Health Informatics J. 2020;26:1347–62. doi:10.1177/1460458219879337.

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