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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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INTEROPERABILITY IN PERUVIAN BLOOD BANKS: PERCEPTION AND CHALLENGES FOR THE IMPLEMENTATION OF AN INTEGRATED INFORMATION SYSTEM

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Abstract.

Introduction: Blood banks play a fundamental role in healthcare systems, ensuring the availability of safe blood for transfusions. However, the fragmentation of information systems in Peruvian blood banks limits the traceability and efficiency of donor data management. This study aims to evaluate the perception of healthcare professionals regarding the need for an interoperable information system for blood banks.

Methods: A cross-sectional study was conducted in public (MINSA), social security (ESSALUD), and private sector blood banks in Lima, Peru. A structured survey was applied to 65 professionals to assess the current status of their information systems, perceived limitations, and their acceptance of a new interoperable platform. The data were analyzed using descriptive and inferential statistics.

Results: Most participants (85%) reported having an information system, but only 22% confirmed its interconnection with other blood banks. Furthermore, 97% supported the implementation of a new system with a centralized database for donor traceability. The main barriers identified were insufficient network infrastructure (43%) and budget constraints (31%).

Conclusion: The results highlight the urgent need for an interoperable information system in Peruvian blood banks. Its implementation could enhance efficiency, reduce redundant testing, and improve transfusion safety. Future research should focus on feasibility assessments and policy recommendations.

Key words. Blood Bank, interoperability, blood donors, serology reactive donors.

Introduction.

Blood donation is an essential activity for health systems, as it guarantees the supply of blood components necessary for transfusions and other medical treatments [1]. However, in many developing countries, the culture of donation is not yet sufficiently rooted. In America, it is estimated that only 67% of donors are voluntary and unpaid, while in Europe this figure rises to 93%. This gap reflects a significant challenge in promoting altruistic donation, especially in low- and middle-income countries [2].

In addition to the low rate of voluntary donation, blood banks face another critical problem: the detection of serology-reactive donors. In Peru, studies carried out in hospitals such as Daniel Alcides Carrión and María Auxiliadora have identified considerable seroprevalences of infections such as HIV, hepatitis B and C, HTLV I-II, syphilis and Chagas disease [3,4]. This situation not only compromises transfusion safety but also generates significant economic losses due to the discarding of contaminated blood units.

In this context, the implementation of interoperable computer systems in blood banks is presented as an innovative solution to improve donor traceability, reduce the risks associated with blood transfusion and optimize available resources [5]. Interoperability in health allows the secure and efficient exchange of information between different institutions, facilitating donor monitoring, early identification of infections and the integration of clinical data in real time [6].

The implementation of computerized systems in blood banks has significantly improved efficiency, accuracy and safety. Successful experiences include the Macau Integrated Blood Banking System (SIBAS), which optimized workflows and operations for over five years [7]. Computer-assisted self-interviewing (CASI) has improved donor screening by increasing disclosure of risk behaviors and reducing errors [8]. During the COVID-19 pandemic [9], a patient blood management system helped optimize blood utilization and maintain transfusion safety [10].

In Peru, the absence of a unified system that interconnects all blood banks represents a barrier to the efficient management of blood donation and transfusion. The development of a centralized information system would not only benefit blood banks but would also strengthen public health strategies through early identification of communicable diseases and integration with other information platforms, such as the national registry of identification of Peru which is the Registro Nacional de Identificación y Estado Civil (RENIEC) and the Integral Health Insurance: Seguro Integral de Salud (SIS) [11]. In this way, transfusion safety and the efficiency of the whole health system could be improved.

Based on these considerations, the present study aims to evaluate the need for an interoperable computer tool in blood banks in Peru from the perspective of medical technologists, identifying the challenges, benefits and opportunities that its implementation could represent.

Methodology.

Type of study: The present study had a quantitative, descriptive and cross-sectional approach. We sought to analyze the perception and opinion of medical technologists about the implementation of an interoperable computer tool for blood banks in Peru.

Study design: A non-experimental cross-sectional design was used, since the data was collected at a single moment and without manipulating the study variables. This design made it possible to describe the current situation in blood banks regarding the use of computer systems and the acceptance of an interoperable tool.

Population and sample: The study population was made up of medical technologists who work in blood banks of type II hospitals affiliated with the Sociedad Peruana de Hemoterapia y Banco de Sangre (SPHBST) in Lima. The sample was selected through non-probabilistic convenience sampling, due to the availability of time and access of the participants. A total of 65 participants were obtained from the health sectors: Seguro Social de Salud (ESSALUD), Ministerio de Salud (MINSA) and the private sector.

Inclusion and exclusion criteria:

Medical technologists from the blood bank area who had more than one year of experience in their service were included in the study. These participants were selected due to their knowledge and experience managing computer systems in blood banks, which ensured an informed opinion on the need and feasibility of a computer tool for interoperability. Medical technologists with less than one year of experience in the Blood Bank area were excluded from the study, as their limited time in the service could affect the quality and relevance of the responses regarding the implementation of a specialized IT tool.

Study variables:

The assessment of the need for an interoperable IT tool was established as the main variable. It was operationally defined as the opinion of medical technologists regarding the expected characteristics and benefits of a computer system that facilitates interoperability between blood bank services.

Dimensions and indicators:

• Opinion on the current system: Availability, modernity and ease of access to the current computer system.

• Requirements for an ideal IT tool: Scope of the database (national or regional), sector involved (public/private), agency in charge.

• Key aspects of interoperability: Access by DNI, demographic and biological information, registration of donation attempts.

• Difficulties in implementation: Technological limitations, internet connection, conflict of interest, budget.

Data collection techniques and instruments:

Since the objective of this research work is due to a social phenomenon, a survey was used, which is defined as a set of questions that will allow us to evaluate the objectives of a research work. In this case, the survey was conducted through Google Forms, after evaluation by experts regarding its content. Email was used as a means of sending the survey to the participants.

Procedures and data analysis:

The data collection process began with the preparation of the questionnaire, which was subjected to validation by three expert judges in the area, who worked in the hospitals: Rebagliati, Instituto Nacional del Niño and Instituto Nacional de Enfermedades Neoplásicas (INEN). After validation, approval of the questionnaire was obtained and requested access to the WhatsApp group of the Sociedad Peruana de Hemoterapia y Banco de Sangre, where the president authorized the participation of the researcher. In this group, the objective of the study was explained and the members' support in completing the survey was requested.

Additionally, to expand the coverage of the sample, social networks such as Facebook and Instagram were used, as well as in-person visits to different blood donation points such as the main shopping centers in the city of Lima, the capital city, among them La Rambla, Santa Anita Mall and Jockey Plaza. After an arduous collection process, the questionnaire was closed after two months on July 15 with a total of 65 participants from three health sectors: ESSALUD, MINSA and the private sector. Subsequently, the information was organized, and data analysis was carried out by creating two-dimensional tables and bar graphs to present the results in a clear and understandable manner.

Ethical considerations:

Considering the regulations established in the Declaration of Helsinki, the confidentiality of the medical technologists surveyed was respected. Access to any medical history of carrier donors was not required, thus guaranteeing compliance with ethical principles in the research.

Results.

The analysis of the survey applied to medical technologists working in the Blood Bank area shows that most services have a computer system for the registration of donors reactive to serology (85%). However, only 22% of those surveyed indicated that their system has interconnection with other Blood Bank services, which shows a limitation in interoperability.

Regarding the need for a new IT tool, 97% of participants considered its implementation beneficial, with 94% supporting a national database and including both the public and private sectors (95%). Furthermore, the majority agreed that the national blood bank program: Programa Nacional de Hemoterapia y Bancos de Sangre (PRONAHEBAS) should oversee monitoring and registering the database (94%) (Table 1).

Finally, the main difficulties with the implementation of a new interoperability system were identified, the most frequent being the lack of an adequate computer network (43%) and poor Internet connection (31%). Other barriers mentioned were conflicts of interest (23%) and budget availability (3%). These findings highlight the need to optimize the technological infrastructure and adequately manage resources to guarantee the effectiveness of the proposed tool (Table 2).

Discussion.

The results of this study reflect the current situation of the computer systems used in Blood Bank services in various health sectors in Lima, as well as the perception of professionals regarding the need for an interoperability tool. Both key strengths and deficiencies were identified, which can serve as a basis for the design of future optimization strategies.

One of the most significant findings was that 85% of participants indicated that their services have a computer system to manage serology-reactive donors. However, only 22% reported that these systems are interconnected with other Blood Banks. This lack of interoperability represents a critical limitation, as it can generate redundancies in records and make donor traceability difficult. Previous studies have shown that interoperability between information systems, especially in blood banks, contributes significantly to transfusion safety and optimization of resources [12,13]. A notable example is the Aragon Blood and Tissue Bank in Spain, which has implemented an innovative management system based on an advanced mathematical algorithm, which has optimized blood processing, improved the management of blood products and reduced waste [14].

Regarding the modernity and accessibility of the systems, 83% and 88% of the participants, respectively, considered that their

Table 1. *Interpretation of survey data.*

Type of questions	Nro.	Questions	Yes				No				TOTAL	
			MINSA (N=39)	ESSALUD (N=21)	PRIVATE (N=5)	%	MINSA (N=39)	ESSALUD (N=21)	PRIVATE (N=5)	%		
			N	N	N		N	N	N		N	%
Computer system available	1	Does your Blood Bank service have a computer system for donors reactive to serology?	34	17	4	85%	5	4	1	15%	65	100%
	2	Is your computer system modern?	32	19	3	83%	7	2	2	17%	65	100%
	3	Is your computer system easy to access?	35	18	4	88%	4	3	1	12%	65	100%
	4	Does your computer system have any interconnection with another Blood Bank service?	6	5	3	22%	33	16	2	78%	65	100%
Ideal software	5	Do you consider it beneficial to access a new computer tool that includes a database of serology-reactive donors and that facilitates the interoperability process between Blood Bank services?	39	19	5	97%	0	2	0	3%	65	100%
	6	If your answer was affirmative, do you agree with a national database?	37	19	5	94%	2	2	0	6%	65	100%
	7	Do you agree with a database only at the Metropolitan Lima level?	10	6	1	26%	29	15	4	74%	65	100%
	8	Do you consider a database that includes only the public health sector?	6	1	4	17%	33	20	1	83%	65	100%
	9	Do you consider a database that includes both the public and private health sectors?	38	19	5	95%	1	2	0	5%	65	100%
	10	Do you consider that PRONAHEBAS should be in charge of the monitoring and registration process of the database of donors reactive to serology?	38	18	5	94%	1	3	0	6%	65	100%
New computer tool that facilitates the interoperability of Blood Bank services	11	Do you think it is necessary to know the demographic data of serology-reactive donors?	38	19	5	95%	1	2	0	5%	65	100%
	12	Do you think it is necessary to know the risk behaviors of serology-reactive donors?	38	19	5	95%	1	2	0	5%	65	100%
	13	Do you consider that it is necessary to know the biological conditions of donors reactive to serology?	35	18	5	89%	4	3	0	11%	65	100%
	14	Do you consider that access to the new computer tool is only through the national identification number (DNI) or immigration card?	35	19	4	89%	4	2	1	11%	65	100%
	15	Do you consider that it is necessary to manage information about blood donation attempts by serology-reactive donors?	38	20	5	97%	1	1	0	3%	65	100%
	16	Do you consider that statistical management of the population of donors reactive to serology is necessary?	34	20	4	89%	5	1	1	11%	65	100%

Table 2. *Discrepancies in managing a new computer tool.*

Alternatives / Health Sector		MINSA	ESSALUD	PRIVATE	Total	
					N	%
1	Computer network system	14	12	2	28	43%
2	Poor internet connection	14	5	1	20	31%
3	Conflict of interest	9	4	2	15	23%
4	Budget under consideration	2	0	0	2	3%
Total		39	21	5	65	100%

current platforms are modern and easily accessible. In Cuba, for example, an instrument was developed to evaluate the implementation of a computer system in the national network of blood banks, which resulted in significant improvements in the quality and efficiency of the processes [15]. In the Peruvian context, it has been identified that type II blood banks operate with isolated information systems, which leads to an inefficient use of resources and time. Previous research determined the necessary conditions to develop a proposal for interoperability between these systems, underlining the importance of sharing information, especially about donors and the inventory of blood units, to facilitate their distribution in emergency situations [16].

Regarding the acceptance of an interoperability tool, 97% of the participants expressed their support for the implementation of a database of donors reactive to serology, which coincides with previous findings [17]. At the international level, the World Health Organization (WHO) has published guidelines for the implementation of quality systems in blood establishments, emphasizing the importance of traceability and information management from donor recruitment to transfusion to patients [18].

Furthermore, 94% of the participants considered that PRONAHEBAS should be the entity responsible for the supervision and registration of the database, which underlines the need for a clear regulatory framework and the active participation of government entities in the management of this information. The implementation of robust computer systems for data management of donors, recipients, inventories, laboratory tests and transfusion records has been shown to improve efficiency and accuracy in inventory management and traceability of blood units, but they always require an institution to guide and regulate these processes [19].

In relation to the geographical scope of the database, 74% of respondents rejected the idea of a platform limited to Metropolitan Lima, while 95% supported a database that includes both the public and private sectors. This suggests that Blood Bank professionals perceive that national and multisectoral coverage is essential to optimize transfusion safety and avoid unnecessary repetition of tests in different health institutions [20].

Regarding possible obstacles to the implementation of the IT tool, the main factor identified was the lack of an adequate IT network system (43%), followed by a poor internet connection (31%) and conflicts of interest (23%). The lack of technological infrastructure has been previously documented. For example, Elhaj noted a lack of modelling of key aspects, such as blood component preparation, serological testing, and transfusion safety, which could lead to inefficiencies and risks in healthcare [21]. Without clear and detailed documentation of these processes, the optimization of management in blood banks is seriously limited.

This study has some limitations, including the small sample size and the application of self-administered surveys, which could generate selection and response biases. However, the data obtained are valuable to guide future approaches and analyses on interoperability tools and software in blood banks.

In conclusion, the findings of this study highlight the importance of moving towards the interoperability of computer systems in blood banks. This would not only improve efficiency, security and quality in information management, but would also optimize the processes related to blood donation and transfusion in a country like Peru. The implementation of interoperable and robust systems is essential to ensure effective and safe management of blood resources.

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