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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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ASSESSMENT OF THE IMPLEMENTATION OF WHO INFECTION PREVENTION AND CONTROL (IPC) CORE COMPONENTS IN KAZAKHSTAN: FINDINGS BASED ON THE IPCAF TOOL

Aldabekova G[1]*, Khamidullina Z[1], Abdrashidova S[1], Musina A[1], Kassymbek S[1], Kokisheva G[1], Suleimenova Zh[1], Sarsenbieva A[1], Kamalbekova G[1]*.

[1]NJSC «Astana medical university», Astana, Republic of Kazakhstan.

Abstract.

Background: Infection prevention and control (IPC) is crucial for ensuring patient safety and healthcare quality. In Kazakhstan, thorough assessments of IPC capacity remain limited due to the scarce use of standardized international tools. This study examined the readiness of IPC systems in selected healthcare facilities, utilizing the WHO Infection Prevention and Control Assessment Framework (IPCAF).

Methods: The research involved a cross-sectional assessment conducted in four healthcare facilities. The WHO IPCAF tool from 2018 was employed to evaluate eight essential IPC components. Each facility collectively completed the questionnaire with a team of IPC specialists, including epidemiologists, infection control practitioners, and quality managers. IPCAF scores were grouped into basic (201-400), intermediate (401-600), and advanced (over 600) categories.

Results: The assessment revealed that IPC capacity differed among the four facilities. Two facilities reached an intermediate IPC level, while the other two were at a basic level. No facility was classified as advanced. The strongest areas were identified in CC8, focusing on infrastructure, materials, and equipment, and CC3, which centered on training and education. The weakest results appeared in CC1 (IPC program) and CC6 (monitoring, audit, and feedback). Moderate performance in CC4 (HAI surveillance) and CC5 (multimodal strategies) indicated partial readiness but also highlighted operational and diagnostic challenges.

Conclusion: The study's conclusions reveal that basic IPC foundations are set in several facilities, yet significant gaps remain in governance, monitoring, and surveillance. These insights underline the necessity for stronger leadership, sustained financing, improved microbiological capabilities, and systematic implementation of multimodal IPC strategies. This research provides key baseline evidence to bolster national efforts to reinforce IPC systems in Kazakhstan.

Key words. Infection prevention and control, IPCAF, healthcare-associated infections, IPC capacity, WHO standards, Kazakhstan.

Introduction.

Infection prevention and control (IPC) is crucial for maintaining healthcare quality and patient safety at every level of medical care. When healthcare facilities fail to follow IPC standards properly, they are more likely to see an increase in infections acquired in hospitals, which contributes to a rise in antimicrobial resistance and places a significant financial burden on health systems [1,2]. These issues are especially severe in nations with economies undergoing transition, where limited resources, inadequate staff training, and deficient infrastructure hinder effective IPC program implementation [3]. To ensure IPC practices are consistently evaluated and to support planning based on solid evidence, the World Health Organization (WHO) has created the Infection Prevention and Control Assessment Framework (IPCAF).This tool allows healthcare facilities to perform a thorough self-assessment in eight main areas: IPC program structure (CC1), guidelines and standard operating procedures (CC2), training and education for healthcare workers (CC3), surveillance of hospital-acquired infections (CC4), use of multimodal strategies for IPC implementation (CC5), monitoring, audits and feedback (CC6), staffing and workload considerations (CC7), and infrastructure, environment and availability of equipment (CC8)[4].

The IPCAF tool is widely recognized and used around the world, proving itself as invaluable for pinpointing systemic weaknesses and steering national improvements in IPC. Take Germany as an example: a repeat of the IPCAF assessment across 660 hospitals revealed ongoing progress in IPC, although it also highlighted continuing challenges with implementing multimodal strategies (CC5) and addressing staffing (CC7) [5]. In places like Turkey and Northern Cyprus, an evaluation of 68 healthcare facilities showed robust regulatory structures, but weaknesses in surveillance capability and training coverage were evident [6]. In Georgia, using the IPCAF in several multi-profile hospitals provided crucial insights, especially revealing gaps in monitoring and feedback mechanisms [7].

Assessments like these have been carried out in different regions around the world. For instance, in Austria, smaller hospitals have relied on IPCAF to gauge their preparedness for preventing healthcare-associated infections (HAI) [8]. In both Indonesia and Bangladesh, this tool has shaped national strategies aimed at combating antimicrobial resistance [9,10]. Meanwhile, in Côte d'Ivoire and Kenya, IPCAF has played a role in launching basic infection prevention and control (IPC) programs within primary healthcare settings [11,12]. In Uganda, IPCAF-based and quality improvement interventions have been implemented in hospital settings, contributing to improvements in infection prevention and control practices [13].

Despite the worldwide use of IPCAF-based evaluations, Kazakhstan had not yet undertaken a comprehensive national review using these standardized international tools. It is only in recent years that Kazakhstan initiated systematic efforts to roll out IPCAF, highlighting the importance of evidence-based analysis for making informed decisions on IPC policy and capacity-building.

The goal of this study is to evaluate how well the eight WHO IPC core components have been implemented in healthcare

facilities throughout Kazakhstan using the IPCAF tool. It aims to identify existing gaps and suggest recommendations for bolstering IPC systems at a national level.

Materials and Methods.

Study Design. A cross-sectional descriptive study was conducted to examine how effectively the WHO Infection Prevention and Control (IPC) core components were being implemented in healthcare facilities across the Republic of Kazakhstan.

This study was designed as a cross-sectional descriptive pilot assessment conducted at the facility level and aimed to generate baseline evidence on IPC system capacity; it was not intended to provide nationally representative conclusions.

The research utilized the standardized WHO Infection Prevention and Control Assessment Framework (IPCAF), which offers a structured method to evaluate IPC systems in eight different areas.

Participants and Data collection.

The assessment was conducted in four purposively selected public healthcare facilities. Facilities were selected based on predefined criteria, including multi-profile or tertiary-level hospital status, public ownership, bed capacity exceeding 300 beds, presence of a formally established IPC team or IPC committee, and availability of trained personnel capable of completing the IPCAF assessment.

Facility selection was based on feasibility and readiness to implement the IPCAF tool and did not involve random sampling; therefore, the selected facilities were not intended to represent the national healthcare system.

We conducted the assessment in four healthcare facilities, involving a total of 33 specialists. Participants were professionals in key IPC roles, including epidemiologists, quality management staff, infectious disease physicians, and members of IPC committees. For data collection, a structured questionnaire based on the official WHO IPCAF tool (2018 edition) was used [4].

This questionnaire was specifically adapted to fit Kazakhstan's national context and was translated into Russian and Kazakh to ensure clarity and consistency. Each facility completed one consolidated IPCAF questionnaire as a single, facility-level assessment. The questionnaire was completed by a multidisciplinary IPC team through structured group discussions, involving epidemiologists, infection control practitioners, and quality management staff. Responses were reached by collective consensus rather than through aggregation of individual submissions, in order to reflect an institutional-level assessment of IPC practices.

When necessary, participants received remote methodological support from regional IPC coordinators to facilitate accurate interpretation of IPCAF components and scoring criteria.

Assessment Instrument: IPCAF. The IPCAF tool evaluates eight core infection prevention and control components that are recommended by the World Health Organization (WHO). These components include: 1)the IPC Program (referred to as CC1), 2) IPC Guidelines (CC2), 3) IPC Education and Training (CC3), 4) Healthcare-Associated Infection (HAI) Surveillance (CC4), 5)Multimodal Strategies for IPC Implementation (CC5), 6) the Monitoring and Audit of IPC Practices along with Feedback (CC6), 7) Workload, Staffing, and Bed Occupancy (CC7), 8) the Built Environment, Materials, and Equipment for IPC (CC8).

Each component is scored out of 100 points, allowing a facility to reach a full score of 800.

Based on WHO methodology, healthcare facilities are grouped into four IPC capacity levels: inadequate (0-200 points), basic (201-400 points), intermediate (401-600 points), and advanced (601-800 points).

This classification system adheres to the WHO's guidelines as outlined in their 2018 document, Infection Prevention and Control Assessment Framework at the Facility Level'.

Scores for individual questions within the IPCAF tool were determined using the WHO's specific scoring system, which ranges from 0 to 20 points. Scores for the components (CC1-CC8) were added together to generate the total score for a facility. Facilities were categorized strictly according to WHO-defined thresholds, without extrapolation beyond the assessed institutions.

Ethical Considerations: This study followed the ethical guidelines outlined in the Declaration of Helsinki. It received approval from the Ethics Committee of Astana Medical University, as documented in Protocol No. 10, dated November 26, 2024.

Statistical Analysis: Before participating, all participants provided written informed consent. The analysis involved both quantitative and qualitative variables. Quantitative measurements, such as IPCAF component scores (CC1-CC8) and total scores, were summarized using means and standard deviations (SD). Qualitative data was described based on absolute (N) and relative frequencies (%). Descriptive statistics helped compare IPC performance across facilities and core IPCAF components. Given the pilot nature of the study and the limited number of facilities, all analyses were descriptive, and no national-level inferences were made.

Graphical tools such as histograms, radar charts, and boxplots were utilized to illustrate score distributions and variability. The statistical analysis was conducted using SPSS version 24.0.

Results.

An assessment was conducted on four healthcare facilities, involving 33 specialists in Infection Prevention and Control (IPC), using the WHO's Infection Prevention and Control Assessment Framework (IPCAF). The results are presented as descriptive, facility-level findings, given the limited number of facilities included in the study.

The analysis revealed significant differences among the eight core IPC components, though most facilities were rated at an intermediate level in IPC capacity.

Total IPCAF scores ranged from 235.3 to 533.0 points. The median total score was 478.0 points, with an inter-facility range of 297.7 points. While the mean total score was 469.5 points (SD 58.7), these measures are reported for descriptive purposes only and should be interpreted with caution due to the small sample size (N=4). The distribution of total IPCAF scores across facilities is illustrated in Figure 2 for visual comparison.

According to WHO's IPCAF classification, most facilities

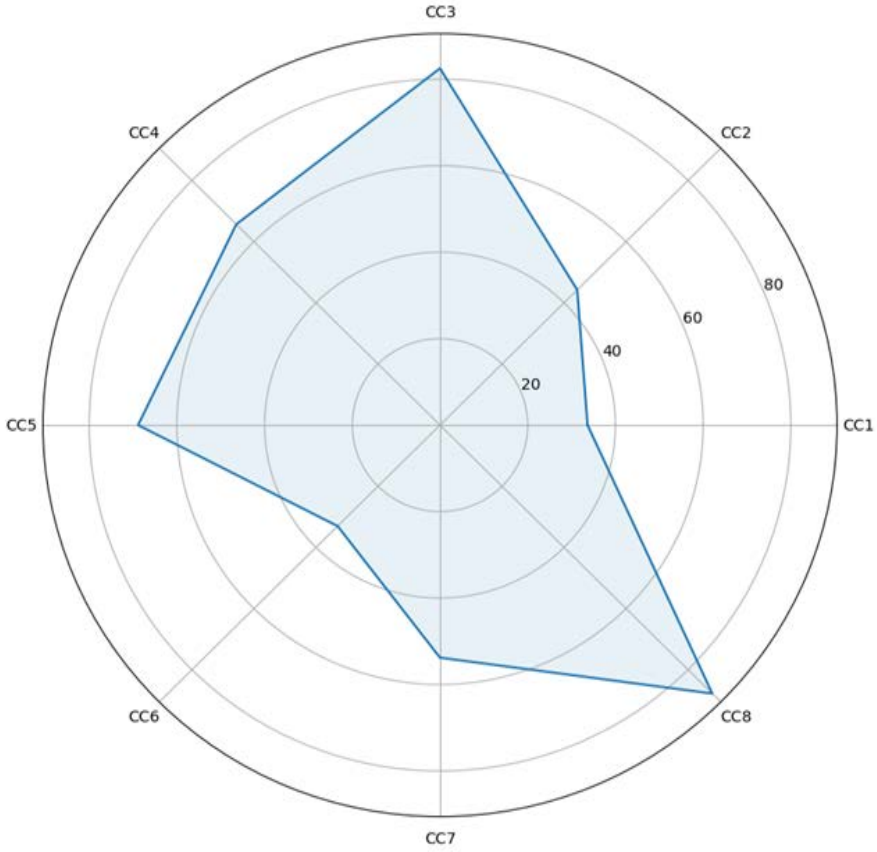

Figure 1. *Radar chart of mean scores across the eight WHO IPCAF core components (CC-CC8).*

Table 1. *Descriptive statistics of IPCAF component scores (CC1-CC8).*

Component	Mean	SD	Min	Max	IQR
CC1 - IPC Program	33.6	-	12.8	40.5	33.0-35.5
CC2 - IPC Guidelines	44.2	-	32.5	45.0	45.0-45.0
CC3 - Training	82.5	-	57.5	92.5	72.5-92.5
CC4 - HAI Surveillance	65.7	-	35.0	77.5	57.5-77.5
CC5 - Multimodal Strategies	68.8	-	10.0	85.0	70.0-75.0
CC6 - Monitoring and Feedback	33.0	-	15.0	42.5	27.5-37.5
CC7 - Staffing and Workload	53.8	-	5.0	70.0	50.0-65.0
CC8 - Infrastructure and Resources	87.8	-	27.5	100.0	87.5-95.0

were rated at an intermediate IPC level, which corresponds to scores between 401 and 600 points. A smaller group of facilities displayed a basic IPC level, falling within the 201-400 point range. None of the evaluated facilities achieved an advanced IPC level, which surpassed 600 points. These findings suggest that while IPC systems in the surveyed Kazakh healthcare facilities are operational, they are not yet adequately developed to reach high-performance standards. To align with international best practices, they require targeted improvements.

Descriptive statistics for the eight IPCAF core components are presented in Table 1. Given the small sample size, medians, ranges, and interquartile ranges (IQRs) are emphasized to describe variability across facilities, while mean values are provided as supplementary descriptive indicators.

The mean score for CC1 was 33.6 points, with scores ranging from 12.8 to 40.5 points. Most facilities reported having an IPC program, but several lacked formalized goals, clear leadership engagement, and dedicated funding mechanisms. As for CC2, the mean score was 44.2 points and ranged from 32.5 to 45.0 points. Most facilities noted the consistent availability of IPC guidelines that aligned with national or international standards, and there was minimal variability across institutions. This component showcased strong performance, garnering a mean score of 82.5 points with a range from 57.5 to 92.5 points. Regular IPC training was widely implemented; however, competency assessments and refresher courses were applied inconsistently. The CC4 component had a mean score of 65.7 points, with scores ranging from 35.0 to 77.5. Although surveillance structures were present, several facilities lacked routine microbiological support or standardized data collection processes. CC5 exhibited significant variability, with a mean score of 68.8 points ranging from 10.0 to 85.0 points. Facilities varied greatly in their adoption of system changes, reminders, workflow improvements, and in the presence of IPC champions.

Among the domains, this was one of the weakest, with a mean score of 33.0 points and a range of 15.0 to 42.5 points. Many facilities did not conduct regular IPC audits or lacked formal means to provide structured feedback. The mean score for CC7 stood at 53.8 points, with scores spanning from 5.0 to 70.0. Results reflected uneven staffing adequacy, with some institutions reporting critical shortages. CC8 emerged as the strongest component, boasting a mean score of 87.8 points ranging from 27.5 to 100.0. Most facilities reported high availability of essential IPC infrastructures, though a handful of facilities showed significant deficiencies.

Figure 1 presents a radar chart illustrating the mean scores of the eight IPCAF core components (CC1-CC8) across the assessed healthcare facilities.

The chart illustrates a clear imbalance in how IPC measures are put into action, with notable differences among the various components. The highest levels of performance are seen in CC8, which focuses on infrastructure, materials, and equipment, and CC3, which pertains to training and education. This suggests a strong presence of crucial IPC resources and frequent educational efforts for staff. We observe moderate performance in CC4, concerning HAI surveillance, and CC5, which involves deploying multimodal strategies. This reflects a partial adoption of structured surveillance methods and related evidence-based practices. CC7, which deals with staffing and workload, presents an average score, indicating inconsistency in staff sufficiency and workload standards across different sites. In stark contrast, the lowest scores appear in CC1, pertaining to the IPC program, and CC6, which involves monitoring, auditing, and feedback. These results shine a light on systemic weaknesses, such as poor IPC governance, a lack of leadership involvement, unestablished IPC objectives, and the limited implementation of regular evaluations and feedback procedures.

Overall, the radar chart vividly highlights the uneven progress in developing IPC components. While there's a robust infrastructure and solid training capacity, there are also marked weaknesses in organizational and monitoring functions.

Discussion.

In this study, we explore one of the initial efforts to evaluate the infection prevention and control (IPC) systems within healthcare facilities in Kazakhstan, utilizing the World Health Organization's IPCAF tool [4]. Given the limited number of facilities included, the findings are interpreted at the facility level, with emphasis on variability across institutions rather than on aggregated summary measures. The analysis of all eight components of the IPCAF revealed that the implementation level of IPC varies considerably, with distinct differences between various domains.

Two out of the four facilities achieved an intermediate level of IPC readiness, scoring between 401 and 600 points. The remaining two facilities were placed at a basic level, with scores ranging from 201 to 400. None of these organizations reached the advanced category. This pattern indicates that while certain IPC elements are already implemented, their overall performance remains inconsistent and does not fully meet WHO standards. This distribution highlights heterogeneity in IPC system maturity across facilities, indicating that while core IPC elements are present, their degree of development and integration varies substantially.

Similar challenges have been identified in reports from countries like Georgia, Uganda, and other regions with similar health system environments. In these places, fragmented governance and resource limitations hinder progress in IPC development [7-13].

Among the components assessed, CC8 (infrastructure, supplies, and equipment) and CC3 (training and education) were the strongest performers. The facilities generally had access to critical IPC infrastructure, including hand hygiene stations, personal protective equipment (PPE), and sterilization resources, and they reported regular training for their staff. International experiences from countries like Turkey, Austria, and Indonesia highlight that initial improvements in IPC often focus on enhancing material resources and building staff capacity [5,6,9].

While the lowest scores were observed in CC1 (IPC program) and CC6 (monitoring, audit, and feedback), these findings point to underlying systemic weaknesses in IPC governance and performance evaluation. Low facility-level performance in these domains suggests persistent gaps in leadership engagement, strategic planning, and the availability of structured monitoring mechanisms. In particular, insufficient audit and feedback capacity may limit not only the effectiveness of IPC implementation but also the ability of facilities to critically appraise and accurately report their own practices. Similar deficiencies in monitoring and feedback systems have been documented in healthcare settings in Germany, Bangladesh, Côte d'Ivoire, and Kenya, where limited use of standardized evaluation tools and irregular communication of audit findings constrain continuous quality improvement [5-12]. Consequently, even in the presence of adequate infrastructure and training, IPC performance improvements may remain inconsistent and difficult to sustain.

Moderate scores were observed for CC4 (healthcare-associated infection surveillance) and CC5 (multimodal strategies), indicating partial implementation of these components across the assessed facilities. The substantial inter-facility variability suggests uneven operationalization rather than consistent performance, reflecting differences in institutional capacity, resources, and organizational practices. Given the limited number of facilities and the reliance on self-assessment, these findings should be interpreted as exploratory, facility-level observations rather than as nationally representative patterns. Although multimodal interventions are widely recognized as effective tools for achieving sustainable behavior change, their inconsistent and often unstructured application across facilities may be partly influenced by limited monitoring and feedback capacity, which constrains systematic implementation and evaluation.

Considerable differences in CC7 (workload, staffing, and bed occupancy) reveal uneven human resource distribution in the facilities studied. Shortages of IPC specialists and high workloads reflect common issues in low- and middle-income countries, where human resource limitations continue to be a major barrier to IPC development [3,10,12].

Looking at the current assessment, Kazakhstan is evidently at a transitional point in developing its IPC system. Basic structures are taking shape, but crucial mechanisms for governance, monitoring, and workforce stability are still underdeveloped. Despite assessing only a few organizations, the study's findings reflect regional trends, highlighting key areas where advancement is both needed and possible. To align with the WHO Global IPC Standards and the International Health Regulations (IHR 2005), it is crucial to empower leadership in IPC, enhance surveillance and monitoring systems, and broaden multimodal intervention strategies [4].

Based on these findings, the following areas deserve focus: establishing a national framework for IPC governance and funding [4], creating standardized systems for IPC monitoring and audits [5,7], adopting evidence-based approaches to bolster the IPC workforce [3,12], and upgrading laboratory and surveillance capabilities for monitoring healthcare-associated infections [9-11]. Implementing broader multimodal IPC strategies will be key for achieving consistent and sustainable improvements in practice [5,6].

This study offers notable strengths, which enhance the significance of its findings despite involving a limited number of participating facilities. It represents one of the first applications of the WHO IPCAF tool in the context of Kazakhstan, providing structured and internationally comparable data on IPC system capacity. The use of a standardized assessment framework supports methodological consistency and facilitates comparison with findings from other settings. Moreover, completion of the IPCAF questionnaire by multidisciplinary IPC teams within each facility supports internal consistency and consensus-based reporting of institutional practices, although it does not substitute for external validation.

However, several limitations need consideration. The study included only four healthcare facilities, which affects the representativeness of the findings and limits broad generalization to the national level. Since IPCAF relies on self-assessment, there is a risk of reporting bias, especially in institutions with limited experience in structured monitoring. Importantly, no external verification mechanisms-such as on-site audits, independent observations, or qualitative interviews-were employed, which restricts the ability to validate self-reported IPC practices against actual implementation.

The absence of on-site verification or observational audits restricts evaluation of actual adherence to IPC practices. Additionally, the IPCAF tool mainly assesses structures and processes; it does not capture critical clinical outcomes like healthcare-associated infection rates or antimicrobial resistance patterns. Differences in facility size, staffing, and resource availability may have also influenced component scores, contributing to the heterogeneity observed in the results. Despite these limitations, the study provides valuable baseline information and points out key priority areas where targeted interventions could notably enhance IPC systems in Kazakhstan.

Conclusion.

A recent multicenter study utilizing the WHO's IPCAF tool revealed that healthcare facilities in Kazakhstan mainly operate at an intermediate level of infection prevention and control (IPC) implementation. The study highlighted strengths in infrastructure, the availability of essential IPC resources, and staff training, but significant shortcomings remain in areas such as IPC governance, monitoring and audit systems, surveillance capacity, and staffing. To enhance patient safety, reduce healthcare-associated infections, and align with WHO's global IPC standards, it is critical to strengthen national IPC leadership, standardize monitoring processes, improve workforce capacity, and expand multimodal IPC strategies. For example, adopting consistent training programs can ensure uniformity in practice across different facilities.

Author Contributions.

Conceptualization, A.G., M.A. and Kh.Z.; methodology, A.G. and Ka.G.; software, A.S.; validation, A.G. and K.S.; formal analysis, A.G., Ka.G. and Kh.Z.; investigation, S.Zh.; resources, Kh.Z. and S.A.; data curation, A.S., S.Zh. and K.S.; writing-original draft preparation, A.G.; writing-review and editing, A.G. and K.G.; visualization, A.G.; supervision, M.A.; project administration, Kh.Z.; funding acquisition, A.G. All authors have read and agreed to the published version of the manuscript." All authors have read and agreed to the published version of the manuscript.

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Institutional Review Board Statement.

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