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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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RISK PREDICTION MODEL FOR ACUTE KIDNEY INJURY IN PATIENTS WITH SEVERE ACUTE PANCREATITIS

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Abstract.

This research is dedicated to pinpointing the risk factors associated with acute kidney injury (AKI) in patients diagnosed with severe acute pancreatitis (SAP). Additionally, it endeavors to construct a nomogram that can accurately predict the risk of AKI in such patients. A total of 60 SAP patients, who were admitted to our hospital between July and December 2024, were selected as the research subjects. These patients were divided into a control group, which did not experience AKI, and an observation group, which had developed AKI. Extensive general information, including age, gender, and body mass index, as well as comprehensive clinical data, such as various laboratory test results and disease severity scores, were meticulously collected for all patients. Univariate analysis was initially carried out to screen out potential factors related to AKI. Subsequently, the factors that demonstrated statistical significance in the univariate analysis were incorporated into the multivariate Logistic regression analysis to identify the independent risk factors for AKI in SAP patients. By leveraging R software, a nomogram for predicting the risk of AKI in SAP patients was successfully established, with its foundation being the relevant factors determined from the univariate and multivariate analyses. The predictive performance of this nomogram was evaluated by means of the concordance index (C-index). To further validate the stability and accuracy of the model, the Bootstrap method was adopted. This involved conducting resampling with replacement 1000 times within the development cohort of the nomogram. In each resampling process, a resampled dataset with an identical sample size was constructed and utilized as the training set, while the original development cohort served as the validation set. Through this repeated process, the relatively calibrated C-index was calculated to comprehensively assess the performance of the model.

Key words. Acute kidney injury, severe acute pancreatitis.

Introduction.

Severe acute pancreatitis (SAP) is a highly critical and life - threatening condition. It is often accompanied by a wide array of complications, among which acute kidney injury (AKI) stands out as one of the most severe and concerning. The incidence of AKI in SAP patients has been reported to range from 20% to 50% in previous studies [1,2]. The presence of AKI in SAP patients not only significantly elevates the risk of mortality but also substantially increases the morbidity, leading to a more protracted hospital stay and a higher likelihood of long - term health problems. For instance, patients with AKI and SAP are more likely to develop subsequent chronic kidney disease. Identifying the risk factors for AKI in SAP patients is of utmost importance as it can offer valuable insights for early detection and prevention. Developing a reliable and accurate prediction model, such as a nomogram, can provide clinicians with a practical and visual tool. This tool can assist in making timely and appropriate clinical decisions, such as early initiation of renal - protective measures, optimization of fluid management, and timely referral to nephrology services, ultimately leading to improved patient outcomes.

Materials and Methods.

Study Participants: In this study, 60 SAP patients admitted to our hospital from July 2024 to December 2024 were recruited. The diagnosis of SAP was made in accordance with the revised Atlanta classification criteria [3], which take into account clinical symptoms, laboratory findings (such as elevated serum amylase and lipase levels), and imaging features (such as pancreatic necrosis on computed tomography). The patients were then classified into two distinct groups. The control group consisted of patients who did not develop AKI during their hospitalization, while the observation group was composed of those who were diagnosed with AKI. The diagnosis of AKI was based on the kidney disease. Improving Global Outcomes (KDIGO) criteria [4], which define AKI by specific changes in serum creatinine levels and urine output over a short period.

Data Collection: For all 60 patients, a comprehensive set of data was collected. General information included age, which was recorded in years, gender (categorized as male or female), and body mass index (BMI), calculated as weight in kilograms divided by the square of height in meters. Clinical data encompassed a wide range of laboratory test results, such as white blood cell count, serum creatinine, blood urea nitrogen, serum amylase, lipase, C - reactive protein, and various electrolyte levels. Disease severity scores, including the Acute Physiology and Chronic Health Evaluation II (APACHE II) score and the Bedside Index for Severity in Acute Pancreatitis (BISAP) score, were also collected. These scores help in objectively assessing the severity of the disease and predicting patient prognosis.

Risk Factor Identification:

The collected data underwent a systematic analysis. First, univariate analysis was performed. In this step, each variable was examined individually to determine its association with the development of AKI in SAP patients. Statistical tests such as the chi - square test for categorical variables and the independent samples t - test for continuous variables were used. Variables that showed a p - value less than 0.05 in the univariate analysis were

considered potentially associated with AKI. These variables were then entered into the multivariate Logistic regression analysis. This analysis was used to identify the independent risk factors for AKI in SAP patients, controlling for the potential confounding effects of other variables. Odds ratios and 95% confidence intervals were calculated to quantify the strength of the associations.

Nomogram Development:

After identifying the independent risk factors through multivariate Logistic regression analysis, R software was utilized to develop a nomogram. The nomogram was constructed in a way that visually represents the relationship between the identified risk factors and the predicted probability of AKI in SAP patients. Each risk factor was assigned a point value based on its coefficient in the Logistic regression model. By summing up the points corresponding to a patient's specific risk factors, an overall score could be obtained, which was then translated into a predicted probability of developing AKI.

Model Evaluation:

The predictive performance of the nomogram was evaluated using the concordance index (C - index). The C - index ranges from 0.5 to 1.0, with 0.5 indicating that the model's predictions are no better than random, and 1.0 indicating perfect discrimination. To enhance the reliability of the model evaluation, the Bootstrap method was employed. This method involved resampling the development cohort 1000 times with replacement. In each resampling, a new training set was created, and the performance of the model was evaluated using the original development cohort as the validation set. Through this iterative process, the relatively calibrated C - index was calculated. This approach helps to account for potential overfitting and provides a more accurate assessment of the model's stability and accuracy in different datasets.

Results.

Baseline Characteristics:

When comparing the baseline characteristics of the control group and the observation group, several notable differences were observed. The average age of patients in the observation group was significantly higher than that in the control group ($p = 0.03$), with the mean age in the observation group being 58.2 ± 8.5 years and in the control group being 52.6 ± 7.8 years. The proportion of male patients was also higher in the observation group, although this difference did not reach statistical significance ($p = 0.08$). In terms of BMI, the two groups did not show a significant difference. Regarding laboratory test results, the observation group had significantly higher levels of serum creatinine ($p < 0.001$), blood urea nitrogen ($p < 0.001$), and C - reactive protein ($p < 0.001$) compared to the control group. The APACHE II score and BISAP score were also significantly higher in the observation group, indicating a more severe disease state.

Risk Factor Analysis:

Through univariate analysis, variables such as age, serum creatinine level, blood urea nitrogen level, C - reactive protein level, APACHE II score, and BISAP score were found to be potentially associated with AKI in SAP patients. In the subsequent multivariate Logistic regression analysis, age (odds ratio = 1.05, 95% confidence interval: 1.01 - 1.09, $p = 0.02$), serum creatinine level (odds ratio = 1.32, 95% confidence interval: 1.11 - 1.57, $p < 0.001$), and APACHE II score (odds ratio = 1.28, 95% confidence interval: 1.05 - 1.56, $p = 0.02$) were identified as independent risk factors for AKI in SAP patients.

Nomogram and Model Evaluation:

The nomogram for predicting AKI risk in SAP patients was successfully developed. The C - index of the nomogram was calculated to be 0.82, indicating good predictive performance. After applying the Bootstrap method and calculating the relatively calibrated C - index, the value was 0.80, which further validated the stability and accuracy of the model. The nomogram provides a user - friendly and visual way for clinicians to estimate the risk of AKI in SAP patients based on the identified independent risk factors.

Discussion.

This study successfully identified several independent risk factors for AKI in SAP patients, namely age, serum creatinine level, and APACHE II score. These findings are consistent with previous research [5,6]. Older age may be associated with reduced renal reserve and a higher susceptibility to the hemodynamic and inflammatory insults associated with SAP. Elevated serum creatinine level reflects impaired renal function, and a higher APACHE II score indicates a more severe overall physiological derangement, both of which increase the risk of AKI.

The development of the nomogram offers a practical tool for clinical practice. Clinicians can use this nomogram to quickly assess the risk of AKI in SAP patients upon admission or during the course of treatment. However, this study has certain limitations. The relatively small sample size of 60 patients may limit the generalizability of the results. Additionally, the single - center design of the study may introduce selection bias. Future studies with larger sample sizes and multi - center designs are warranted to further validate the established nomogram and risk factors. Moreover, prospective studies are needed to assess the impact of using this nomogram on actual patient management and outcomes.

Conclusion.

In conclusion, the nomogram developed in this study can serve as a valuable tool for predicting the risk of AKI in SAP patients. By identifying the independent risk factors and providing a visual prediction model, it can assist clinicians in making more informed decisions regarding patient management. However, further research is required to overcome the current limitations and improve the accuracy and applicability of the model.

Availability of Data and Materials.

The datassets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Approval and Consent to Participate.

Ethical approval was obtained from Qingdao Jiaozhou Central Hospital Ethics Committee; consent was obtained from all participants.

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Conflict of interest.

The authors declare no conflicts of interest statement.

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