English language is widely used in the professional language of doctors all over the world. Today, all the most influential medical journals are written in English, and English has become the language of choice at international conferences. We have entered the era of medical English, which resembles the era of medical Latin in that, once again, medical doctors have chosen a single language for international communication.

Since English language has become the dominant language in medical communication, medical professionals should use their knowledge of English to keep up to date with medical advances. The correct use of medical terminology, the ability of applying various grammar constructions, prepositions and prepositional phrases makes it possible for doctors to enrich and share their knowledge and experience. While writing medical articles many scientists may face some difficulties choosing an appropriate preposition or prepositional phrase in English medical terminology. On the basis of cardiologic articles the semantic and structural analyses have been done.

The aim of the article is to determine the number, presence, prepositional meanings and realizations in cardiologic medical texts, to make quantitative analysis of the most frequently used units.

The issues concerning origin and morphological structures of prepositions have been discussed by I. Vykhoveratos, O. Potehnia, V. Vynogradov, A.S. Hornby, D. Litt, K. Markert, M. Romacker, J. Robertson, J. Rijkhoff, J. Simpson, S. Krulj, B. Prodanovic. The topicality of the research is caused by insufficient study of functioning and peculiarities of prepositions in the professional language of cardiology.

The history of English grammar writing with regard to prepositions can be seen as one of relative stagnation, exceptionally interrupted by authors like Bullokar, Miege, Maittaire, Brightland, Greenwood or Lowth. The relative negligence of prepositions culminated in the first half of the twentieth century, when most of the grammarians completely omitted sections on prepositions in their works. It was only in the second half of the twentieth century, that the situation radically changed and since then, grammarians like Schilsbye, Quirk, Greenbaum, Leech, Svartvik, Hulden, Pullum or Aarts introduced scientifically precise definitions and developed detailed and elaborate frameworks for their description, which, in most cases, reflect contemporary developments in theoretical linguistics.

Preposition is a word or group of words used before a noun or pronoun to show e.g. place, position, time or method. It should also be noted that preposition is “an unchangeable word that shows the relationship between nouns or pronouns and other words or groups of words in a sentence.”

References:
It is a word used to link nouns, pronouns, or phrases to other words within a sentence. Prepositions are usually short words, and they are normally placed directly in front of nouns. Prepositions are high frequency items belonging to one of the nine word classes into which English lexicon can be divided. They can be defined as a relatively closed class that is not prone to quick changes. Most of the formal changes in their system are a result of internal word-formative processes and grammaticalization and not borrowings from external sources. In general, there are three main types of prepositions, including time prepositions, place prepositions, and direction prepositions.

Time prepositions are those such as before, after, during, and until; place prepositions are those indicating position, such as around, between, and against; and direction prepositions are those indicative of direction, such as across, up, and down.

There are more than 100 prepositions in the English language; most of them are constantly used by medical professionals while writing articles in medical journals or during conferences and congresses. In addition, there are endless possibilities for creating prepositional phrases. Classification of prepositions in English may be divided into: formal, semantic and syntactic. Formal prepositions may be divided into simple, such as at, by, in, on, to; complex – in general, by means of, due to; marginal prepositions, that are prepositions with conjunctions as a special type of grammatical words – until, as, before, since, or prepositions with adverbs that belong to the lexical words – within, opposite, near, across, beyond, around. According to the meaning of preposition or semantic criterion prepositions can be divided into place prepositions, time prepositions, prepositions of origin, source, case, aim, means, instrument, manner, accompaniment, exception, reference, subject matter etc.

The basis for research served a corpus of medical articles in cardiology published in journals and on the internet, which helped to analyze the prepositions and prepositional phrases often used in the professional language of cardiologists. The chosen medical texts were taken from the “British journal of cardiology” and “British medical journal”

“Risk factors for femoral arterial complications and management” (Shabnam Rashid, Stephanie Hughes); “Postural tachycardia syndrome: a UK occupational therapy perspective” (Jenny Welford and Christopher McKenna); “Heartbeat: Prediction of coronary disease risk with cardiac troponin in the general population” (Catherine M Otto), “Smartphone-based cardiac rehabilitation” (Karam Turk-Adawi, Sherry L. Grace).

All prepositions and prepositional phrases in our research were divided and classified according to formal and semantic criteria. The percentage of representation for prepositions was calculated. The total amount of prepositions and prepositional phrases in the articles comprises 847 units: “Risk factors for femoral arterial complications and management” – 319, “Postural tachycardia syndrome: a UK occupational therapy perspective” – 221, “Heartbeat: Prediction of coronary disease risk with cardiac troponin in the general population” – 118, “Smartphone-based cardiac rehabilitation” 189.

According to their structure the prepositions were divided into simple (basic) and complex. Simple prepositions used in the articles were: to, of, in, with, at, for, by, as, from, over, between, on, via, without, after, beyond, towards, behind, up, upon, among, into, above, versus, along. Complex prepositions in the cardiologic articles were: as well as, as a result of, along with, carry out, in order to, in addition to, according to, such as, due to, in comparison to, compared with, prone to, associated with, for the purpose of, superior to, for instance, care for, prior to, similar to, result in, in conclusion, depend on focus on, engage in.

The total number of simple prepositions in the examined articles is 776, complex prepositional phrases constitute 71, so it is clearly seen that complex prepositions form only 10% of the total amount of prepositions.

Most prepositions have multiple usage and meaning. Generally they are divided into 8 categories: time, place, direction (movement), agency, instrument (device), reason, purpose, connection and origin. In order to analyze the semantic structure and relationship between prepositions and other parts of speech, their realization in the professional medical texts we have examined the meaning of prepositions and prepositional phrases and classified them according to such semantic aspects as:

1. **Prepositions of time**: by, on, before, during, after, for, in, at, between, within, since, until, to.
2. **Prepositions of place**: in, into, between, on, to, at, among, through, of, from, by near, close to, next to, beside, behind, in front of, above, below.
3. **Prepositions of direction and movement**: from, to over, above, along, around, across, through, into, out of, towards, away from, off, up down.
4. **Comparison prepositions**: such as, as...as, than.
5. **Prepositions of instruments, technologies and device**: by, with, on.
6. **Prepositions of purpose**: for, through, from, in order to.
7. **Prepositions of connection or possession prepositions**: of, with, in, to.
8. **Cause, reason prepositions**: due to, because of, from, as, for, on account of.

Preposition of was frequently used in such semantic categories as: 1) **place** - Postural tachycardia syndrome is a form of dysautonomia, a term used to describe dysfunction of the autonomic nervous system; Our first article is an interview with Professor Peter Weissberg, Medical Director of the British Heart Foundation; Duration of hospital stay was shorter among patients who had coronary angiography.
performed under fluoroscopic guidance\textsuperscript{13}. Thrombi can develop at the site of the sheath and embolisation may occur after sheath removal\textsuperscript{14}. 2) possession or connection – Bleeding is one of the complications associated with percutaneous coronary intervention from the femoral route due to the use of potent antiplatelet therapies including adenosine diphosphate receptor blockers and glycoprotein IIb/IIIa inhibitors\textsuperscript{15}. Treatment largely depends on type of complications\textsuperscript{16} 3) instrument, technologies, methods of investigation – Techniques to reduce the risk of femoral arterial complications include the use of ultrasound scan or fluoroscopy guided femoral punctures\textsuperscript{17}. Treatment involves bed resting, transfusing blood, as required, and early involvement of the surgical team\textsuperscript{18}. Measuring of cardiac output; measuring of circulating blood volume; measuring of blood flow speed 3) cause, reason – If hand/finger fatigue develops, the amount of pressure applied decreases and, hence, increases the risk of bleeding\textsuperscript{19}.

Preposition in stands second in use and possesses multiple meanings: 1) place, location – Femoral arterial complications are predominantly seen in patients who have femoral punctures performed blindly\textsuperscript{20}. This burden of cardiovascular diseases has been great in high-income countries for decades, and is now reaching epidemic proportions in low and middle-income countries\textsuperscript{21}. ... a cross sectional study in Tanzania calculated cardiovascular risk scores in HIV-infected patients ... 2) direction, movement – Training healthcare professionals in the management of femoral punctures post-procedures is one of the first steps in identifying problems and managing them promptly\textsuperscript{22}. 3) connection – Arterial injury was prevalent in 1.9% of patients who had punctures performed blindly and 0.7% in those who had punctures performed under fluoroscopy\textsuperscript{23}. For instance, patients may engage in sufficient physical activity from active transport and occupational activity, and therefore the focus on exercise may require tailoring. 3) time– heart pain occurs in the morning ...

We have noticed 105 examples of the preposition to, which is used in such categories: 1) purpose - ... use of tele-

\textsuperscript{13} Shabnam Rashid, Stephanie Hughes. Risk factors for femoral arterial complications and management: [E-source], P. 1-6, URL: https://bjcardio.co.uk/
\textsuperscript{14} Ibid., P. 2.
\textsuperscript{15} Ibid., P. 4.
\textsuperscript{16} Ibid., P. 3.
\textsuperscript{17} Ibid., P. 4.
\textsuperscript{18} Ibid., P. 5.
\textsuperscript{19} Ibid., P. 6.
\textsuperscript{20} Ibid., P. 3.
\textsuperscript{21} Ibid., P. 2.
\textsuperscript{22} Catherine M. Otto. Heartbeat: Prediction of coronary disease risk with cardiac troponin in the general population: [E-source], URL: hear.bmj.com
\textsuperscript{23} Shabnam Rashid, Stephanie Hughes. Risk factors for femoral arterial complications and management: [E-source], URL: https://bjcardio.co.uk/
\textsuperscript{24} Ibid., P. 5.
\textsuperscript{25} Catherine M Otto. Heartbeat: Prediction of coronary disease risk with cardiac troponin in the general population: [E-source], URL: hear.bmj.com.
\textsuperscript{26} Ibid., P. 4.
\textsuperscript{27} Jenny Welford, Christopher McKenna. “Postural tachycardia syndrome: a UK occupational therapy perspective”, British journal of cardiology: [E-source], URL: https://bjcardio.co.uk/
\textsuperscript{28} Ibid., P. 5.
\textsuperscript{29} Ibid., P. 4.
\textsuperscript{30} Jenny Welford, Christopher McKenna. “Postural tachycardia syndrome: a UK occupational therapy perspective”, British journal of cardiology: [E-source], URL: https://bjcardio.co.uk/
\textsuperscript{31} Karam Turk-Adawi, Sherry L Grace. Smartphone-based cardiac rehabilitation: [E-source], URL: hear.bmj.com
\textsuperscript{32} Ibid., P. 1.
\textsuperscript{33} Jenny Welford, Christopher McKenna. “Postural tachycardia syndrome: a UK occupational therapy perspective”, British journal of cardiology: [E-source], URL: https://bjcardio.co.uk/
Pend on, in order to, such as, in addition to, in comparison with, prone to, result from, out of, up to, as a result of, carry out, according to, associated with have been used in the cardiologic texts in the semantic categories of comparison, purpose, technologies, methods, reason: ... instead they may reflect the severity of the underlying atherosclerosis or subclinical myocardial ischemia, or may be proxies for conditions associated with increased cardiovascular risk such as renal impairment. In order to better understand the effect of HIV-infection on cardiovascular disease... Complications for diagnostic procedures are lower due to the lack of antiplatelet therapies on board. Blood collects in the soft tissues and, depending on the size of the haematoma, there can be a drop in haemoglobin levels and blood pressure. Diagnosis is confirmed by computerized tomography scan. Pseudoaneurism, also known as a false aneurysm, can result from punctures made below the femoral bifurcation. These patients are particularly prone to bleeding if there are multiple attempts at obtaining femoral access or the incorrect puncture has been made.27: If major bleeding occurs while a patient is taking a non-vitamin K antagonist oral anticoagulant, such as dabigatran, rivaroxaban, edoxaban or apixaban, ... This study aimed to determine how postural tachycardia syndrome impacts upon activity,... Participants rated their experiences pre-symptoms versus present day in relation to their occupations, ... In conclusion, postural tachycardia syndrome has a significant negative impact upon occupation and is associated with considerable morbidity. As well as a significant increase in heart rate upon standing, as a result of orthostatic intolerance, syncope and presyncope can occur, along with headaches, fatigue, palpitations, nausea and dizziness, which are usually relieved by lying down. Consequently, there was a need to carry out a UK-based, national quantitative investigation in order to gain a scoping view.

The frequency of use of prepositions in the cardiologic articles (the percentage was calculated from the total number of prepositions and prepositional phrases).

<table>
<thead>
<tr>
<th>Prepositions</th>
<th>Frequency of use</th>
<th>Percentage</th>
<th>Prepositions</th>
<th>Frequency of use</th>
<th>Percentage</th>
</tr>
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<tbody>
<tr>
<td>On</td>
<td>17</td>
<td>2.2%</td>
<td>Within</td>
<td>9</td>
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<tr>
<td>To</td>
<td>105</td>
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<td>Due to</td>
<td>3</td>
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</tr>
<tr>
<td>Of</td>
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<td>31%</td>
<td>Prior to</td>
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<td>0.1%</td>
</tr>
<tr>
<td>Upon</td>
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<td>0.38%</td>
<td>Similar to</td>
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<td>0.25%</td>
</tr>
<tr>
<td>In</td>
<td>125</td>
<td>16.1%</td>
<td>Depend on</td>
<td>4</td>
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</tr>
<tr>
<td>With</td>
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<td>In order to</td>
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</tr>
<tr>
<td>At</td>
<td>16</td>
<td>2.06%</td>
<td>Such as</td>
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<tr>
<td>For</td>
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</tr>
<tr>
<td>By</td>
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<td>In comparison with</td>
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</tr>
<tr>
<td>As</td>
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<td>Prone to</td>
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</tr>
<tr>
<td>Versus</td>
<td>2</td>
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<td>Result from</td>
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<tr>
<td>From</td>
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<td>1</td>
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</tr>
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<tr>
<td>Via</td>
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<td>As a result of</td>
<td>2</td>
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<tr>
<td>Without</td>
<td>3</td>
<td>0.38%</td>
<td>Carry out</td>
<td>2</td>
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<tr>
<td>While</td>
<td>2</td>
<td>0.25%</td>
<td>According to</td>
<td>1</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

The most commonly used prepositions in the cardiologic texts were: of (240 examples), in (125 examples), to (105 examples), with (77 examples), for (62 examples), by (27 examples), from (18 examples), on (17 examples), at (16 examples), as (15 examples); prepositions and prepositional phrases upon, versus, over, between, via, without, while, within, due to, prior to, similar to, depend on, in order to, such as, in addition to, in comparison with, prone to, result from, out of, up to, as a result of, carry out, according to were used from 1 to 9 times.

On the basis of the research we can make the conclusion that prepositions of, in, to, with, for, by, from, on, at, as are the most frequently used in the cardiologic texts and they have occurred in several categories and expressed different meaning: of – place, possession or connection, instrument, technologies, methods of investigation, cause, reason;

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34Catherine M Otto. Heartbeat: Prediction of coronary disease risk with cardiac troponin in the general population: [E-source], URL: heart.bmj.com
35Ibid., P. 5.
36Shabnam Rashid, Stephanie Hughes. Risk factors for femoral arterial complications and management: [E-source], URL: https://bjcardio.co.uk/
37Ibid., P. 6.
38Ibid., P. 2.
39Jenny Welford, Christopher McKenna. “Postural tachycardia syndrome: a UK occupational therapy perspective”, British journal of cardiology: [E-source], URL: https://bjcardio.co.uk/
40Ibid., P. 4.
41Ibid., P. 5.
42Jenny Welford, Christopher McKenna. “Postural tachycardia syndrome: a UK occupational therapy perspective”, British journal of cardiology: [E-source], URL: https://bjcardio.co.uk/
Запоточна Л., Рак О., Томка І. Вживання прийменників та прийменникових фраз в англійських фахових статтях з кардіології. У статті досліджуються прийменники і прийменникові фрази англійської мови в професійних текстах фахової мови кардіології. Предметом дослідження виступають прийменники та прийменникові фрази, які вживаються у медичних статтях з кардіології. Проаналізовано та класифіковано формальні і семантичні аспекти найбільш часто вживаних прийменників. Визначено наявність, кількість, значення та проаналізовано типові приклади використання прийменників у англійській фаховій мові кардіології. Були використані 847 однини прийменників та прийменникових фраз з медичних журналів "British medical journal" та "British journal of cardiology", з яких 776 виявились простими (базовими) прийменниками та 71 складними, тобто прості прийменники набагато частіше використовуються у фаховій мові кардіології.

Проаналізуваний корпус текстових прийменників були виділені наступні семантичні групи: прийменники часу, місця, напряму, руху, мети, зв'язку, причини, наочності, порівняння, методів дослідження, інструментів, технологій, навчання, показників та іншої інформації. На їхньому основі виділено прийменники: of, in, to, with, for, by. Слід зазначити, що прийменники використовуються при позначенні місця, зв'язку, мети методів дослідження, причини; in у значення місця, розташування, напряму, руху, часу; to – для позначення мети, місця, часу; with – інструментів, технологій та зв'язку; on – часу, місця, інструментів; at – часу, місця, напряму; from – мети, причини, напряму, руху.

Ключові слова: прийменник, прийменниковий фраза, семантична класифікація, кардіологічна термінологія.

Лариса Запоточна - викладач кафедри іноземних мов Буковинського державного медичного університету, кандидат філологічних наук, доцент кафедри іноземних мов Буковинського державного медичного університету.

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Інна Томка – старший викладач кафедри іноземних мов Буковинського державного медичного університету, викладач плановій НДР кафедри, відповідальний за планові НДР кафедри, автор міжнародних та вітчизняних наукових та навчально – методичних публікацій, співавтор зошитів для студентів фармацевтичних факультетів. Кількість наукових інтересів: дослідження термінів фахової мови кардіології.

Larysa Zapotochna – senior lecturer of the department of foreign languages of Bukovinan State Medical University; coauthor of the scientific research work of the department, author of national and international scientific and educational works, coauthor of the textbook for students of pharmaceutical faculties. Research interests: medical terms in professional language of cardiology.

Oлекса́нд́р Рак – к. філол. н., доцент, завідувач кафедри іноземних мов ВДНЗ України “Буковинський державний медичний університет”. Кого наукових інтересів: етимологічні студії ономістичного простору Франції; дослідження системо-структурних, семантичних та функціональних особливостей організацій термінів системи субмов медицини; укладання багатомовних словників; методики викладання іноземних мов за професійним спрямуванням. Науковець є автором понад 70 наукових і навчально-методичних праць та співавтором 5 підручників, 3 навчальних посібників і 1 словника.

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