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ARTICLE

Frame Representation of Medical Terminological System in Kazakh and English

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ABSTRACT

This work is motivated by the growing interest in cognitive linguistics and the ways in which we understand the world and perceive extralinguistic reality, particularly in the context of medical terminology. The aim of this article is to conduct a comprehensive study of the medical terminology in both English and Kazakh, highlighting the connections between the frames within the field of medicine as reflected in these two languages. To model the medical terminological system, we employed the frame method, which is well-established in both Kazakh and foreign linguistics. Additionally, we utilized a theoretical approach and comparative analysis to examine the medical terms in English and Kazakh. The article addresses the development of the medical terminology system while considering contemporary aspects of cognitive linguistics. We constructed a frame scheme based on linguistic data from both languages, identifying the main macrocategories, subframes, and slots within the medical terminological system. We drew parallels between the linguistic and lexico-semantic completeness of the subframes and slots through examples from dictionary entries in Kazakh and English, and we established relationships among terminology used across different medical fields. The findings presented in this study can serve as a foundation for optimizing and systematizing the terminological systems of national languages, particularly in the realm of medical terminology.

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ARTICLE INFO
Received: 26 March 2025 | Revised: 21 April 2025 | Accepted: 25 April 2025 | Published Online: 8 May 2025
DOI: https://doi.org/10.30564/fls.v7i5.9233

CITATION

Issakova, S., Khassangaliyeva, B., Issakova, A., et al., 2025. Frame Representation of Medical Terminological System in Kazakh and English. Forum for Linguistic Studies. 7(5): 739–747. DOI: https://doi.org/10.30564/fls.v7i5.9233

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Keywords: Frame; Cognitive Linguistics; Subject Area; Definition; Modelling; Medical Terminology

1. Introduction

The relevance of this topic stems from the prominence of cognitive linguistics, which focuses on how humans understand the world and organize knowledge through various language categories. This field is closely linked to the construction and verbalization of knowledge and ideas about the contemporary terminological system. Cognitive linguistics studies language as the main mechanism for information coding and transformation. Terminology science has become one of the key areas of cognitive linguistics, which considers semantic features and grammatical structures, as well as laws connected to the functioning problems of the terminological base in various professional industries. Currently, terminology science is an interdisciplinary field that encompasses linguistics, conceptology (the study of concepts), subject-specific knowledge, logic, computer science, and psychology. The interpretation of an individual's experiences and knowledge, as reflected in the semantics of terminology, can be effectively explored through a cognitive approach. Terms, as products of human cognitive activity, mirror the level of understanding in specific domains such as law, economics, and medicine. The knowledge garnered through these terms serves as a foundation for creating interdisciplinary dictionaries, which are essential for effective scientific communication. Terms are expected to meet specific industry standards. They should be part of a coherent system linked to concepts, possess clear definitions, and be concise, pleasant to pronounce, unambiguous, devoid of synonyms, and emotionally neutral.

According to P. Faber and S.M. Martinez [1], frame terminology representation emphasizes cognitive functions and conceptual areas, making it valuable for a deep understanding of knowledge during the translation process. Multilingual corpora play a crucial role in extracting semantic and syntactic information. Recent advancements include the extraction and alignment of terminological bases through a conceptual approach, particularly across two language systems. A. Repar et al. argue that employing bilingual alignment of terminological systems can enhance the quality of monolingual terms by 10% [2], which is vital for the systematization and unification of terminological units. Key methods in this area include mastering and optimizing algorithms and cross-language embedding, which facilitate engagement with lexemes across all language levels. One of the significant challenges in terminology is the adaptation of supranational terms into national lexical systems, which involves consideration of both lexical and conceptual levels. When a term is imported, its original form may change, leading to localization or retaining its original form. Ł. Biel and A. Doczekalska examine the relationship between terms and concepts [3], offering a categorization of transfer techniques ranging from foreignization to domestication. They also describe imports, modifications (both non-denominative and denominative), localization, and zero transfer at the terminological and conceptual levels.

For non-native speakers it is very important to create working glossaries with a unified terminological apparatus, and multilingual dictionaries are critical in terminological system standardisation. Online resources with terminological dictionaries make it possible to implement the accessibility principle, consider current terminology and provide a complete reflection of semantic subtleties. The advantage of such dictionaries is the possibility of additions and regular changes, as well as the replacement of terms with new terminological units in the process of expanding the conceptual field [4]. It has been established that effective communication is characterised by a common purpose, trust, respect and cooperation between the doctor and the patient. To achieve this purpose medical terminology that is understandable to the patient should be used, as well as follow the etiquette rules and behavioural rules. The problems of the formation, functioning and development of medical terms arise due to the lack of a unified concept of term formation, taking into account the experience and positive achievements of scientists from different generations [5].

The objective of this study is to analyze the medical terminological system through frame modelling, identify frames related to the field of medicine, explore the relationships between different frames in the context of English and Kazakh languages, and understand the characteristics of the medical terminological base using national linguistic resources. The focus will be on the dictionaries and linguistic entries of both languages, allowing for a comparative analysis of the medical terminological systems in Kazakh and English, with frames serving as representatives of the medical domain.

2. Materials and Methods

The research materials and sources include electronic dictionaries, specialized medical literature, and online resources covering medical terminology in English and Kazakh languages. These sources provide a comprehensive

foundation for understanding medical terminology, particularly in the context of eye diseases and their treatment.

The selection of research materials was guided by the article's purpose and objectives. Frame analysis of medical terms required relying on lexicographic sources. The identification of definitional, structural, and thematic frames of medical terms was conducted using encyclopedic, explanatory, and translation dictionaries of medical terminology. These lexicographic sources provide clear definitions, structural features, and thematic groups of terms. Terminological dictionaries are specialized reference works containing precise definitions of term units, facilitating accurate usage in professional discourse.

Frame analysis is a sophisticated method for examining the interaction between semantic and cognitive language spaces. It enables modeling human experience, revealing principles of knowledge structuring and representation within linguistic units, and uncovering methods of activating shared knowledge that support communication. To analyze the meaning of lexical units from a cognitive perspective, researchers must identify the knowledge domain based on the word's meaning and structure it by constructing a frame that defines the specific semantic context.

Consequently, frame analysis, combined with conceptual analysis, allows for determining a term's unique characteristics and reflecting the semantic features of objects and phenomena. The study follows a comprehensive methodology with the following stages:

1) Definitional Frame:

– collect multiple definitions of eye disease names from lexicographic sources;

– compare and analyze definitions from electronic and printed dictionaries;

– differentiate genus and species concepts to establish higher and lower-level core terminals.

2) Structural Frame:

– analyze term formation (through affixes, word combinations, etc.);

– identify term origin sources.

3) Thematic Frame:

– identify the medical field-related thematic frame;

– determine its subframes and first and second-level slots;

– analyze the meaning of lexical units within slots, identifying positive and negative connotations.

The research employs diverse methodological approaches, including:

1) descriptive methods for systematic language phenomenon analysis;

2) component analysis of lexical meaning;

3) cognitive modeling of language units;

4) mathematical statistical and empirical methods.

Thus, our study contributed to identifying priority areas in linguistics that warrant further investigation, focusing on key vectors for the development of the terminological system.

3. Results and Discussion

In this section, we analyze the definitional, structural, and thematic frames of terminology within the field of Ophthalmology, specifically focusing on its relevance to the broader subject area of Medicine. Our analysis reveals that terms within this discipline are characterized by their inherent frame nature, which is closely linked to their definitions. Each term corresponds to a specific concept, elucidated through its definition. This relationship underscores the frame nature of the term, as definitions not only delineate concepts but also establish a framework for understanding them. The definitional schemes in Ophthalmology are interconnected through various relationships, forming a cohesive structure of scientific knowledge. This structure may include elements that serve as components of multiple, analogous definitional schemes. As noted by P.A. Florensky, "any technical name is reflected in its definition … reasoning about the existence of a complex of signs that relate to the definition posed … testifies to the possibility of this complex," highlighting the intricate connections within the field [6].

To exemplify the frame nature of terminology in Ophthalmology, we present definitions of several eye diseases.

Glaucoma is defined as an increase in intraocular pressure leading to vision impairment. It can occur as an independent condition or as a secondary effect of another disease. Symptoms include double vision and progressive vision loss, which may ultimately result in blindness. Patients are advised to seek medical attention from an ophthalmologist and adhere to prescribed treatment regimens diligently [7].

Glaucoma is prevalent among individuals over the age of 40, with elevated intraocular pressure being the primary symptom. The normal range for intraocular pressure in healthy individuals is between 18 to 25 mmHg ("millimeters of mercury", a measurement of eye pressure).

There are two primary types of glaucoma. The acute form manifests abruptly, causing severe pain in the eye socket and head, along with symptoms such as redness, vomiting, and rapidly decreasing visual acuity. In contrast, the chronic form develops gradually and may initially present without pain or redness, making it particularly insidious. Patients may only become aware of their condition upon closing the healthy eye or during routine eye examinations.

A key indicator of glaucoma is the excavation of the optic nerve head, where elevated intraocular pressure causes vascular changes, resulting in the displacement of the nerve head. This condition underscores the importance of monitoring eye health, especially in at-risk populations [8–11].

Glaucoma, often referred to as "black water" disease, is a condition characterized by increased intraocular pressure [12].

Additionally, the study identified the occurrence of eyelid bumps, often referred to as bruises, which resemble pimples. These lesions occur when bacteria infect the hair follicles of the eyelashes, leading to blockage and subsequent infection of the sebaceous glands. Although patients may experience mild discomfort, these conditions are generally manageable and treatable, particularly in pediatric populations (infants, children and adolescents) [9]. This disease is primarily associated with infections caused by Staphylococcus bacteria, which can enter the eye through contaminated hands. Key findings indicate that dehydration, blood loss, and pre-existing health conditions can exacerbate symptoms and lead to severe outcomes. Patients typically present with symptoms including redness and swelling of the eyelid margins, accumulation of purulent discharge, and inflammation of the conjunctiva. Notably, pus may accumulate at the base of the eyelashes and spread, resulting in conjunctivitis. Treatment protocols recommend the use of antibiotics such as penicillin and sulfacetamide, with a strong emphasis on avoiding manipulation of the affected area to prevent further complications, including facial spread of the infection [7].

One particular observation includes the formation of eyelid bump characterized as a purulent wound resembling a small grain, attributed to inflammation of the mucous membrane of the affected eyelid. Each terminal node is associated with specific indicators that deepen the understanding of the clinical situation. These indicators encompass symptoms such as conjunctival redness, excessive tearing, light sensitivity, ocular irritation, and the perception of fog or smoke in the visual field. Furthermore, there are instances of subtle changes in visual acuity, including the rupture of blood vessels at the disc margin.

The inflammation of the eyelids' mucous membrane can manifest unilaterally or bilaterally, although cases of simultaneous presentation in both eyes are rare. Symptoms of inflammation observed in patients included:

1) redness of the eyes;
2) excessive tearing;
3) itching;
4) light sensitivity;
5) swelling of the inner eye.

Thus, the terms "glaucoma" and "eyelid bump" in the context of ocular health reflect stereotypical situations characterized by specific clinical presentations. Their definitions contribute to a deeper understanding of the conditions affecting the eye and underscore the importance of accurate diagnosis and treatment in managing ocular infections.

The analysis of the definitions surrounding the terms "glaucoma" and "eyelid bump" reveals that the concept of Genus is central to understanding these medical conditions. This framework encompasses general knowledge about specific diseases, identifying key parameters such as eye pressure, intraocular pressure, visual impairment, and associated inflammatory responses. These higher-order classifications serve not only to name the conditions but also guide the identification of lower-order species traits. Specific manifestations are categorized as terminal nodes, which include distinct clinical signs. Patients may experience symptoms such as blurred vision, diplopia, progressive vision loss, and disruptions in the nervous system. Additional indicators include rapid decline in visual acuity, erythema and swelling of the eyebrows, accumulation of purulent discharge, and excessive tearing.

In the context of a medical history, disease definitions become more precise and reflect the patient's clinical progression. For instance, a diagnosis of blindness may be described in detail, such as "right mixed blindness of the I-degree; left mixed blindness of the II-degree post-surgery; postoperative conjunctivitis". This structured diagnosis incorporates multiple categories: state, sign, cause, temporal factors, spatial context, consequences, and quantity. The medical history document serves a text-forming function, providing informative descriptions and substantiating evidence. A preliminary diagnosis, such as "waterlogging", is elaborated upon with descriptions of complications and comorbidities, alongside detailed accounts of patient complaints, including visual disturbances and discomfort exacerbated by light exposure. The physician documents the outcomes of laboratory and instrumental examinations, with the primary objective being to substantiate the diagnosis through empirical evidence. The integration of descriptive reasoning expands the terminological field within the medical documentation.

Taking into account all the above, we can conclude that the definitions analyzed elucidate the underlying causes and progression of diseases, serving as cognitive tools that facilitate the exchange of knowledge between healthcare providers and patients. These definitions provide important information about the disease, including its symptoms and affected organs, thereby contributing to the broader understanding of the clinical landscape.

The findings underscore the importance of precision in medical terminology, particularly in contexts where direct communication with the recipient is not feasible. As noted by Antonova [10], "the requirement for accuracy increases" under such circumstances. This is particularly evident in the accuracy of medical diagnoses, which relies heavily on a communicative-pragmatic approach to fact establishment derived from laboratory and instrumental research. This

approach influences the actions of healthcare professionals, such as prescribing medications based on the information provided.

The definition of a term is recognized as a complex, multi-level structure that encompasses scientific knowledge related to its meaning. The intricate nature of this terminology can be better understood through frame descriptions. For instance, within the subject area of "eye diseases", the term "cataract" serves as a focal point. The associated terms include congenital cataract, traumatic cataract, complicated cataract, radiative cataract, and several others [11].

In the studied terminology, the structural frame is characterized by the presence of multi-component terms. An example is the term "visual organ", which includes several components: eyeball, visual tract, and auxiliary structures of the eye. Each of these components is associated with specific terminology. For instance, the inner wall of the eye is described as being very thin, separating the eyeball from the retinal cavity, while the upper wall delineates the boundary between the eyeball and the cranial cavity. Furthermore, the lower wall separates the eye from the maxillary cavity, and there are two openings at the base of the eye that correspond to the trigeminal nerve branch and the optic nerve [13].

The research outcomes indicate that the structural frame is integral to the creation of new terminological units, thereby regulating knowledge and enhancing the cognitive framework of medical professionals. The applications of these terms not only define their meanings but also facilitate a deeper understanding of new concepts among practitioners.

The thematic frame of "Prevention" in the context of eye diseases is comprised of a primary subframe titled "Types and Methods", which is further divided into two secondary subframes: personal prevention and social prevention. Each secondary subframe contains specific slots dedicated to various preventative measures.

The personal prevention subframe includes components such as doctor-patient consultations and individualized research slots. Conversely, the social prevention subframe encompasses five key slots: seminars, training sessions, consultations, actions, and informational texts. Within the thematic frame of "Prevention", lexical units of common usage are predominantly featured, reflecting the communicative objective of conveying information and offering protection against eye diseases.

A detailed examination of the informational texts within the social prevention subframe reveals their strategic placement in medical settings. For instance, several informational texts are displayed in the corridors of medical institutions housing departments of eye diseases, as well as within the eye doctor's office. Notably, an informational text titled "Eye Exercises" (see **Figure 1**) serves a preventative function by promoting eye health. This text includes terms such as "pupil", "eye muscle", "eye pain", "eye opening", "blinking", "eye closing", and "eye rolling". It effectively outlines a method for preventing eye diseases through eye exercises, targeting all patients who visit the eye doctor, and aligning with the social prevention subframe.

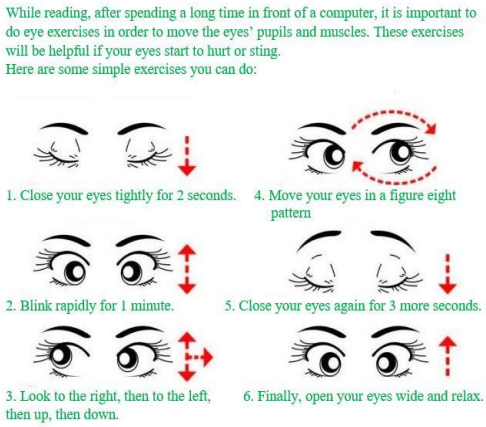

Figure 1. "Eye exercises".

Furthermore, another informational text titled "Distance From Monitor To Eyes" (see **Figure 2**), prominently placed near the entrance of the eye doctor's office, underscores the recommendation that the distance between the monitor and the eyes should be maintained at 50–70 cm (centimetres) to prevent vision loss.

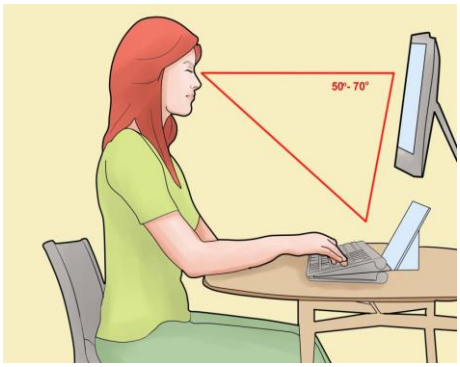

Figure 2. "Distance from monitor to eyes".

Additionally, an informational text titled "Two Simple Eye Exercises For Kids" (see **Figure 3**) is displayed in the corridor of the eye diseases department within a regional children's hospital. This text is directed at children with eye ailments and their parents, incorporating terms such as "eye strain" and "eye fatigue". It emphasizes the importance of specific exercises that can alleviate eye strain and fatigue, thereby enhancing awareness among patients.

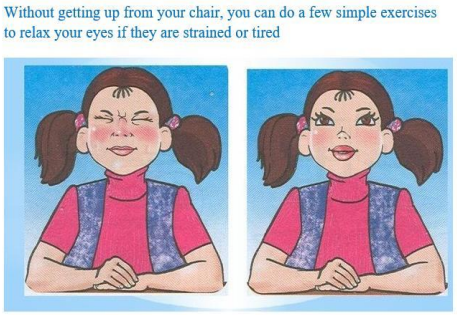

Figure 3. "Two simple eye exercises for kids".

The subframe of medical social expertise includes the following slots: 4 levels of visual impairment, classification into 3 groups of disability based on visual acuity and field of vision, full blindness, partial blindness, rehabilitation of disabled individuals, and employment opportunities.

The "Treatment" frame is divided into two main subframes: treatment methods and research methods, which collectively integrate three interrelated secondary subframes, along with several tertiary subframes. Various research methodologies employed in the treatment of eye diseases contribute to a specialized vocabulary. The physical examination subframe includes terms formed by adding the suffix "-tion" to the verbs, denoting actions and processes such as "inspection" (external examination), "palpation" (hands-on examination), "auscultation" (diagnostic listening), and "consultation" (professional advice).

The laboratory research terminology encompasses various methods employed in controlled environments and tissues outside the human body, grounded in the principles of fundamental sciences such as Histology, Microbiology, Biochemistry, Cytogenetics, and Immunology. The terminology is characterized by complex terms that include components from specialized fields, particularly ophthalmology. Examples of these terms include ophthalmodynomometry, ophthalmonletismography, rheop-hthalmography, ophthalmosphygmography, and ultrasound dopplerography. Notably, the term "ultrasound dopplero-graphy" illustrates the combination of input and native elements (ultra + sound) to create a specific scientific term.

The treatment methods can be categorized into two interconnected subframes, each possessing distinct terminological vocabulary. Within the conservative treatment subframe, we identify two main categories:

1) Monolexemic nouns. These terms are derived from verbs through the Latin suffix "-tion" and include multicomponent complex terms following the models A+N and N+N: inspection: external examination), palpation (hands-on examination), auscultation (diagnostic listening), consultation (professional advice).

2) Methodology terms. This category involves complex terms formed according to linguocognitive models, consisting of "method + therapy" or "method + treatment action": complementary therapy (additional therapeutic approaches), natural therapy (treatment utilizing natural methods), substitution therapy (a form of complementary therapy), vitamin therapy (treatment focused on vitamin supplementation) and other practical interventions such as wound cleaning, plastic treatment, medication-based treatment, antiseptic application, and massage.

These findings illustrate the complexity and specificity of the terminology used in laboratory research and treatment methodologies, reflecting the interdisciplinary nature of these fields.

The analysis conducted in this study demonstrates that medical terminology encompasses various categories, including diseases, symptoms, treatments, and medical procedures. A frame modeling approach defines the medical field, identifying essential components such as medical professionals and patients, who share rights and responsibilities within the medical care framework (see **Figure 4**).

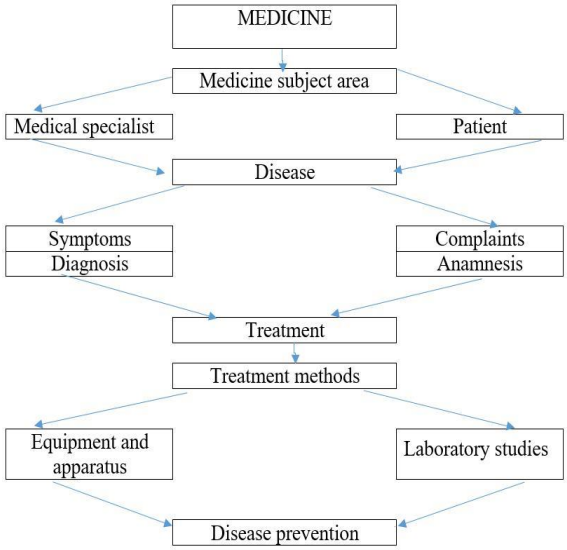

Figure 4. Frame model of medical terminological system.

According to **Figure 4**, the key frames of the medicine subject area include "disease", "treatment', and 'disease prevention", each further divided into subframes. The "disease" frame interacts with "symptoms" and "diagnosis" subframes, which are linked to the "complaints" and "anamnesis" subframes. This framework is supported by the essential elements of "medical specialist/doctor" and "patient". Within the frame model of medical terminological system, the doctor holds specific rights and responsibilities towards the patient, who, in turn, has the right to receive or refuse medical care. Consequently, "disease prevention" frame serves as an integrative element within the overall structure of the medicine subject area.

Additionally, we conducted a corpus-terminological analysis of English and Kazakh medical terminology, observing their contextual usage, including in media. A significant aspect of our study involved defining terms within both languages, acknowledging the influence of linguistic and extralinguistic factors on the development of scientific terminology. These extralinguistic factors include advancements in science and technology, the national language's status, and state language policies.

We found that English medical terms are precise and internationally standardized, often leading to the adaptation of national terms to align with English medical terminology. Despite the structured nature of medical terminology, many terms have multiple designations in different languages, frequently originating from English loan translations. The English language features a dynamic terminological framework, resulting in an increase in hybrid terms. It is crucial to regulate this process to maintain clarity and adhere to linguistic economy principles [4,5,14].

In contemporary Kazakhstan, there is a notable surge in the formation of medical terminology in the Kazakh language. This phenomenon plays a crucial role in the active development and application of the national language within the medical sector. A concerted effort is being made by healthcare personnel, scholars, and industry experts to elevate the Kazakh language – recognized as the state language – to the status of a language of science and technology, with particular emphasis on the medical domain. The historical evolution of Kazakh terminology reflects a systematic language policy aimed at both the creation of new terms and the standardization of existing ones.

Our analysis identified specific subframes within the medical terminology framework. For instance, the subframe "symptoms" comprises slots for "characteristics", "severity", "localization", "confounding or facilitating factors", and "accompanying phenomena". Similarly, the "diagnosis" subframe categorizes conditions into "satisfactory" and "unsatisfactory" states. The frames "complaints" and "anamnesis" relate directly to the patient and serve as foundational elements in the context of the preceding frames.

In the "equipment and apparatus" subframe, we delineate several slots, including "medical instruments", "medical furniture", "medical consumables", and "medical supplies". The subframe dedicated to "laboratory studies" encompasses diagnostic categories such as "sanitary and hygienic diagnostics", "clinical laboratory diagnostics", and "forensic laboratory diagnostics".

The categorization of diseases reveals a range of thematic terminological groups, which are presented in **Table 1** [5].

Table 1. Thematic frame classification of diseases [5].

Category	Subcategory	Disease/Term	Kazakh Translation
Chest Diseases	Respiratory Conditions	Cyanosis Pneumonia Tracheitis	көгеру пневмония кеңірдектің қабынуы, трахеит
Abdominal Cavity Diseases	Digestive Conditions	Anorexia Gastritis	анорексия гастрит
Endocrine System Diseases	Metabolic Disorders	Hypoglycemia	гипогликемия
Urinary System Diseases	Kidney Conditions	Pyelonephritis	пиелонефрит
Skin and Sexually Transmitted Diseases	Infectious Diseases	Syphilis	мерез
Ear, Throat, Nose Diseases	Otolaryngological Conditions	Meniere's Disease Otitis	Меньер ауруы, Меньер синдромы отит
Ophthalmic Diseases	Eye Conditions	Cataract Glaucoma	катаракта су қараңғы, глаукома
Nervous Diseases	Neurological Disorders	Parkinson's Disease	Паркинсон ауруы
Infectious Diseases	Viral Conditions	Coronavirus Disease	коронавирустық инфекция
Cardiovascular System Diseases	Blood Vessel Conditions	Thrombosis	тромбоз
Blood Diseases	Hematological Disorders	Anemia Leukemia	анемия лейкоз, лейкемия
Diagnostic Methods	Clinical Diagnostics	Blood Pressure Case History Biopsy	қан қысымы ауру тарихы биопсия
Treatment Process	Medical Interventions	Probing Heart Failure Bleeding	сүңгілеу жүректің тоқтауы қан кету, қансырау
Medical Equipment	Diagnostic Tools	Defibrillator	дефибриллятор

Table 1. *Cont.*

Category	Subcategory	Disease/Term	Kazakh Translation
Prevention Methods	Health Maintenance	Vaccination	егу, вакцинация
		Screening	скрининг
		Pharmacotherapy	фармакологиялық терапия
Pharmacological Preparations	Medication	Morphine	морфин
Herbal Remedies	Natural Treatments	Calendula	қырмызы гүл
		Hypericum	шайқурай
Drug Forms	Medication Formats	Capsule	капсулалар
		Tablets	таблеткалар

According to **Table 1**, the classification of diseases exposes a variety of thematic terminological categories. Each category includes specific medical conditions. Medical terminology predominantly uses international (Latin-based) terms. Some Kazakh terms are either transliterated or show phonetic adaption.

Furthermore, the "Russian-Kazakh-English Medical Dictionary" compiled by M.A.-T. Akhmetov highlights the presence of synonymous terms during the translation from English to Kazakh in clinical medicine, exemplified by terms like "vaginal" (Kazakh: қынаптық, ішектік), "vein" (Kazakh: вена, көктамыр), "concussion" (Kazakh: шайқалу, сілкіну, шайқалыс), "fertility" (Kazakh: фертильдік, ұрықтылық, тұқымдылық, бала туғыштық, төлдегіштік, жемістілік), "pregnant" (Kazakh: жүкті, екіқабат, аяғыауыр) [15]. This reflects the ongoing efforts to enrich the medical lexicon in the Kazakh language, ensuring that it meets the needs of modern healthcare practice.

The comparative analysis of English and Kazakh terminology through the examination of frame blocks reveals notable differences in their structure and clarity. It is observed that Kazakh terminology shows ambiguity, using multiple terminological units to convey similar concepts. For instance, one term may arise from the adaptation of an English international lexeme, while another may derive from a native Kazakh lexeme. This observation suggests that the terminology within the Kazakh language is less systematically organized compared to its English counterpart. Consequently, it is crucial for Kazakhstan to address the challenges of its national terminology. Prioritizing the development of clear and consistent terminological frameworks will not only enhance communication but also strengthen the linguistic identity of the nation. Moreover, it is important to create original Kazakh lexemes and carefully adapt Latin and English terminology. This process should follow the phonetic, grammatical, and morphological rules of the Kazakh language. By focusing on these areas, Kazakhstan can work towards reducing ambiguity in its terminology and advancing its linguistic development in a global context.

4. Discussion

To sum up, the frame of eye diseases provides a comprehensive approach to organizing the specialized knowledge within this field. A frame is a vital tool for conveying information, shaped by the experiences of medical professionals, which outlines and systematizes terminological knowledge. The definitional frame conveys understanding of the research subject, while the structural frame provides insight into the sources that form the terminology. Additionally, the thematic frame broadens the communicative and informational scope for healthcare practitioners, enhancing their terminological knowledge.

This study successfully identified a frame model for the terminology associated with eye diseases, categorizing them into definitional, structural, and thematic frames. The resulting frame samples, derived from the research, contain terms relevant to Ophthalmology, characterized by intricate and interconnected structures, including frames, subframes, and slots. At each level of the terminological system, a synthesis of cognitive and linguistic knowledge reveals conceptual and semantic relationships. These frame samples not only illustrate the structural organization of medical terminology but also represent the knowledge possessed by professionals, contributing to a broader understanding of their field.

This article explored the terminological processes in medicine through the lens of Kazakh and English linguistic systems. We presented a frame representation of the medical domain, analyzed its key microcategories, and examined the relationships within the medical terminological structure in both languages. Additionally, we identified challenges in defining terminological boundaries and highlighted the functioning of terms within the broader linguistic environment.

The findings of this study hold significant potential for the development of medical terminology, as well as for efforts aimed at the regulation, unification, and systematization of terms. Looking ahead, there is a clear need for cognitive and frame analysis in other areas of medical science to further enhance our understanding and efficiency in these fields.

Author Contributions

Conceptualization, S.I. and B.K.; methodology, S.I.; software, A.I.; validation, S.I., A.T. and A.I.; formal analysis, T.T.; investigation, N.K.; resources, A.K.; data curation, T.T.; writing—original draft preparation, S.I.; writing—review and editing, B.K.; visualization, B.K.; supervision, S.I.; project administration, S.I.; funding acquisition, S.I. All authors have read and agreed to the published version of the manuscript.

Funding

This work received no external funding.

Institutional Review Board Statement

Not applicable.

Informed Consent Statement

Not applicable.

Data Availability Statement

The results of this study will be used within the scientific community by directly referencing the mentioned journal, during the writing of monographs and dissertations. To ensure the research results are publicly accessible, references will be provided and promoted in all scientific inquiries.

Conflicts of Interest

The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript; or in the decision to publish the results.

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