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LINGUISTICS OF MEDICAL TERMINOLOGY
AS APPLIED TO STUDENTS OF THE MEDICAL FIELD

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HONORS PROJECT

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Linguistics of Medical Terminology as Applied to Students of the Medical Field

This project was chosen as a result of several questions regarding the value of the ancient languages Latin and Greek in the current education of students in the medical field and in related health science professions. Further research into the topic provided reason to believe that the question of whether or not in-depth understanding of these languages is not only relevant to modernity, but is applicable on a broader, international level. The question of whether or not familiarity with Latin and Greek is essential in the education of students in the health field is ultimately a question of whether or not it actually provides them with a basis of knowledge that is helpful to their overall education. Learning a language, or even achieving a helpful familiarity with a language can be a time consuming and even financially costly pursuit. It is necessary to gain an understanding of whether or not learning the ancient languages is useful enough to be a valid pursuit for students in the health field.

This study is mainly an evaluation of literature concerned with the subject of medical terminology and translation. It seeks to compile ideas and facts gleaned from these studies in a format that is useful and allows for those interested in the subject to make an evaluation of whether or not they believe a certain level of education in the ancient languages Latin and Greek is beneficial enough to students in health sciences for it to be of value in modern times. This research was conducted with the assumption that a broad, liberal arts foundation in education is always preferable to an education that is limited and confined to the terminology and understanding of one isolated subject area.

The thesis of this paper is that knowledge of Latin and Greek is vital to proficiency in medical terminology and provides a necessary global connection for the health field.

The title of this paper illustrates the focus of this project, which is an analysis of how college students majoring in health sciences and the medical field should best be exposed to the ancient languages tied to the terminology of their field of study. This study only offers a basis for why educators and students may wish to incorporate a stronger understanding of Latin and Greek root words into their science and health field courses, specifically in the college setting.

As a preview of the conclusion, this project concludes with an evaluation of whether or not the thesis is proven or disproven by previous research into the area of study and the analysis of root words, specifically Latin words.

Research into the importance of an understanding of medical terminology has been conducted in various settings and has been carried out by linguists, health professionals, translators, and professors in college settings. This work has been performed on a global scale, a fact which illustrates the scope of this topic and the relevance of it in a universal sense. It also points to the spread of the influence of the ancient Latin and Greek languages throughout the world in countries with a variety of languages and cultural settings.

Examples of linguistic studies of this topic include the paper by F. Burdan, et al. in “Anatomical eponyms—unloved names in medical terminology,” Carlos Herrero-Zorita, et al. in “Medical term formation in English and Japanese: A study of the suffixes *-gram*, *-graph* and *graphy*,” Yuliia V. Lysanets, et al. in “The use of Latin terminology in medical case reports: quantitative, structural, and thematic analysis,” B. Strzelec, et al. in “The Terminologia Anatomica matters: examples from didactic, scientific, and clinical practice,” and Miguel Angel Jimenez-Crespo, et al. in “Lexical variation, register and explicitation in medical translation: A comparable corpus study of medical terminology in US websites translated into Spanish.” All of these works involve an evaluation of the use of Latin root words in medical terminology.

In the paper by Burdan, et al., the importance of Latin and Greek root words is highlighted in contrast to the use of medical terms called eponyms that are used in medical terminology but are not derived from ancient languages. These eponyms cause problems in cross-cultural situations, and provide an example of issues that arise when a universal naming system for terms used in a universal context is lacking. This points to the importance of medical terminology that is directly linked to Latin root words, allowing for shared meaning in cross-cultural situations.

Herrero-Zorita, et al. evaluates a case of translation of Greek and Latin root words that are used as suffixes in English being translated to the Japanese language. The frequencies of the usage of the root words were compared in English and Japanese after translation had taken place, and it was determined that the frequencies were the same. This points to Latin and Greek root words as a type of linguistic bridge between the two languages in this specific case.

Lysanets, et al. discovered in their study that Latin and Greek words occurred in high frequencies in a set of medical case reports written over a decade. They determined that this level of frequency was high enough to justify knowledge of Latin and Greek as fundamental to clear communication in the medical field.

A study by Strzelec, et al. emphasizes the importance of using medical terminology correctly and effectively. The researchers analyzed a medical term list and discovered errors in the list that could impact medical communication and ultimately patient care in a negative way.

Jimenez-Crespo, et al. in their study on Latin and Greek root words in Spanish and English medical writing, noted that Spanish as a romance language is more closely related to Greek and Latin, while English is less related to those ancient languages. This means translation of medical terminology into English requires more linguistic framework and interpretation than

when medical terminology with Latin and Greek root words is translated into Spanish. Although this study indicates that more steps must be taken in translation in some cases, Latin ultimately remains a linguistic bridge between English and other languages, especially the Romance languages.

Studies involving translators and healthcare professionals include those by Bibhava Acharya, et al. in “Translating mental health diagnostic and symptom terminology to train health workers and engage patients in cross-cultural, non-English speaking populations,” Salai Biak Zia Lian Ching in “Medical Terminology rendition techniques employed by paraprofessional Chinese-English interpreters,” Eivind Engebretsen, et al. in “Expanding the knowledge translation metaphor,” and Berkeley Franz, et al. in “Reconsidering the role of language in medicine.”

In the study in Nepal by Acharya, et al., the researchers found that careful use of medical language is vital in providing medical care to native communities whose communication with healthcare personal is limited to translations by interpreters. This highlights the use of English medical terminology as an important player in the field of universal medical language. As most of medical terminology is based on Latin and Greek root words, these ancient languages ultimately play a role, albeit less prominently, in this situation.

The article by Ching illustrates the use of the English language as a reference point in translation from the language of individuals from Myanmar who seek medical treatment in Australia. The study evaluated the integrity of meaning in translations, as a difficulty often faced by translators is the lack of clear-cut comparisons between certain words in different languages.

Engebretsen, et al. point out the loss of meaning in translated medical works that are meant to make medical terminology more accessible to lay people without a scientific

background. The role of translators in preserving the true meaning behind medical terms is highlighted in the study. This points to the reality that although it is important to make medical information as accessible as possible to the public, it is sometimes challenging to convey the true meaning of certain words familiar to the medical community.

The study by Franz, et al. brings to mind another angle of communication between healthcare professionals and patients. In the paper, the researchers evaluate the importance of a well-rounded and thorough assessment of patient history and condition that goes beyond the typical list of terms used to assess an individual's health. This illustrates the fact that healthcare professionals should have an well-rounded educational background so that they are not limited to the language of their field when communicating with patients.

In academic settings, researchers such as Alexandra Vivien Bako in "Capacity to handle complexity—The importance of contextual awareness in healthcare communication in English as a lingua franca," Wenhua Hsu in "Bridging the Vocabulary gap for EFL medical undergraduates: The establishment of a medical word list," Ya-Huei Wang, et al. in "The Relationship of Vocabulary Learning Strategies and Self-Efficacy with Medical English and Terminology," and Hongkui Zhang, et al. in "Reform of the Method of Teaching of Medical Linguistics to Medical Students" conducted studies that illustrate the role of medical terminology in the education of students.

The study by Bako explored the best preparation practices for medical students entering the Hungarian healthcare workforce, where interaction with patients depends on an understanding of the English language, which is not the primary language of Hungarian residents. This research brought to light the challenges of communication in a context where the subtleties and understanding of language can be lost in translation.

Hsu's study involved an analysis of medical terminology knowledge possessed by Taiwanese students preparing for medical school entrance exams. A list of English medical terms was composed as a type of study guide for these students, and the research evaluated the adequacy of this term list as a method of preparation.

In the study by Wang, et al., the researchers studied Taiwanese students taking a course in medical terminology. Through testing the students at various times, the researchers concluded that study skill strategies implemented in the medical terminology course effectively prepared the students for success in exams covering the material.

A study by Zhang, et al. illustrates the relevance of a thorough understanding of medical terminology in global healthcare applications. The research was carried out by evaluating the performance of medical students applying medical terminology to patient care settings.

One of the original questions behind this research was why Latin and Greek are the leading languages in Western medicine, and why they influenced the course of medical terminology in Western medicine while some other ancient cultures were advanced in medical practices and innovation as well. This must be explained by factors of the ancient world that created an obstacle to the sharing of languages and ideas. One of these factors was geography, as the distance of centers of culture and academic influence were far apart from each other, and travel was difficult. Varying languages also posed a difficulty in and of themselves. Cultural differences and even mistrust of other cultures prevented the spread of shared medical knowledge. These factors forced knowledge to stay limited to certain geographical and cultural areas of academic exchange.

Western medicine was influenced by ancient Greek thinkers such as Hippocrates, who lived from 460-370 B. C. According to Susan Wise Bauer in her book *The Story of Science*,

Hippocrates's work *Corpus* is the "first surviving scientific writing" (Bauer, p. 7). As Greco-Roman culture greatly influenced the languages and other aspects of European and Western culture in general, Western medicine inherited Greek and Latin words for medical terminology just as Romance languages are rich in root words from those two ancient languages.

As to the question of whether medical terminology is more heavily based on Latin or Greek words, it is more based on the Latin language. According to Lysanets and Bieliaieva, "95% of English terms are borrowed from or created on a basis of Latin and Latinized Greek" (Lysanets and Bieliaieva, p. 1). More specifically dealing with medical terminology, "Latin occupies the firmest position in the anatomical vocabulary" (Lysanets and Bieliaieva, p. 2). This is the reason the focus of this paper is on the relationship of Latin root words rather than the role of Greek root words in medical terminology. This is an important fact mainly because it allows for prioritization. If college students and professors were to consider incorporating a course load of a language into their studies or class schedule, it might be necessary to choose one language over the other. In that case, it would be helpful to know that learning Latin alone would provide a substantial basis for what they may need to know in regard to medical terminology. Essentially, one thing would be better than nothing. Even though both would be very beneficial, it would likely not be cost or time effective to learn or even take an introductory course in both subjects while completing time-consuming science courses.

In regard to the current state of affairs, and how ancient root words are being used as a universal system for sharing medical information today, Latin and Greek root words used as medical terminology continue to provide a stable and unchanging basis for medical terminology itself. They can be universally used because of their static nature. Modern languages evolve even over short periods of time, but a language that has not been spoken for hundreds of years does

not have new phrases or colloquialisms created by speakers over time and in different places. According to Strzelec, Chmielewski, and Gworys, there is a database of anatomical medical terminology listed in the Terminologia Anatomica, which “contains 7635 items” (Strzelec, Chmielewski, and Gworys, p. 341). The history of the language provides a stability to the use of the root words. They are anchored in so much meaning that people may be familiar with them without even realizing it. In English, for example there are many words unrelated to medical terms that have origins in the ancient languages.

Looking forward, there is a question as to the permanence of the ancient languages in an evolving linguistic world. A central question is whether or not Latin and Greek will maintain their relevance to a world that is evolving linguistically—whether or not it is beneficial to maintain an unchanging, unspoken language base alongside changing modern languages. The answers to this may very well be yes, because speakers of the English language use Latin on a daily basis. Perhaps the language can truly be said to be dead as a whole as it is no longer spoken in its entirety by anyone or used as a primary language, but it is very much a part of the English language, as well as all languages that fall under the category of Romance languages which include French, Italian, and Spanish.

This could be analyzed in terms of how and the extent to which these languages are currently used. For example, if a high percentage of words used in medical terminology are Latin based, then they must make up enough of the medical language that it would be unlikely they would be able to be phased out without totally overturning the terminology as a whole. According to Susan Wise Bauer and Jessie Wise in *The Well Trained Mind*, Latin makes up “about 50 percent of the English vocabulary.” The authors also state that English has a basis of Latin, and English grammar also has its roots in the ancient language (Bauer and Wise, p. 189).

If the argument is to be made that Latin holds a high place in the English language and in medical terminology, then some examples should be given. Using the dictionary incorporated into the textbook *Wheelock's Latin, 6th ed.* by Frederick M. Wheelock, a short list of words can be compiled that directly relate to English counterparts. This book is an example of a text that could be used at the college level in an introductory course. This sample of words is evidence of the presence of Latin in the English language. In a medical terminology course, the words may be related strictly to anatomical terms. In a full language course, the words are less limited, and an understanding of many more aspects of the medical field can be gained by familiarity with them. Any list of Latin words and English words derived from them would be extensive. This simply serves as an example to illustrate the point that a well-rounded understanding and education in the language could contribute to a strong background in words used in the medical field as well as those used on a daily basis. For the purpose of this paper, a Latin word will be given, with a word that it directly translates to along with an accompanying word or phrase that shows how the Latin word morphed into an English word over time. Latin grammar will be left out in this case, and only one part of a declension of a word may be given for clarity's sake.

The Latin words below are a mix of nouns, adjectives, adverbs, and verbs, and the one-word English translations are insufficient to capture the depth the original Latin seeks to convey. The Latin language is more limited than the English language as it has more words, so taking away the context and only leaving a fraction of the meaning in the translation is less than ideal; however, for this purpose, it should prove acceptable. The Latin words or word parts given as well as the English translation in the next column, are taken directly from *Wheelock's Latin*. The column of derived English words is a result of this study. The reasoning behind the derived words column is to illustrate the conclusions that can be made regarding the relationship between

Latin and English. It demonstrates the mental tool that can be used to remember the meaning of words based on their origins, as well as the journey that a word can make in regard to meaning from one language to another over a span of time.

Latin	English	Derived English Words
Adulescens	Young man	Adolescent
Annus	Year	Annual
Audio	Hear	Auditory, audible, audiology
Carpo	Pluck	Carpals, carpal tunnel
Corona	Crown	Coronavirus
Corpus	Body	Corpulent, corpuscle
Externus	Foreign	External
Fatigo	Weary	Fatigue
Fatum	Fate	Fatal
Gestum	Carry	Gestational
Immotus	Unmoved	Immotile
Impedio	Impede	Impediment
Inter	Among	Internal
Lacrima	Tear	Lacrimal
Lingua	Tongue	Lingual
Malus	Bad	Malpractice
Manus	Hand	Manual
Meditor	Reflect	Meditate
Mentis	Mind	Mental

Morbus	Disease	Morbidity
Mortis	Death	Mortality
Nasus	Nose	Nasal
Natalis	Birthday	Natal, prenatal
Natus	Born	Natal
Occulte	Secretly	Occult blood
Oculus	Eye	Ocular
Opera	Work	Operation
Post	After	Postpartum
Potens	Strong	Potentiator
Recedo	Recede	Receding
Relevo	Alleviate	Relief
Salubris	Healthy	Salubrious
Sanitas	Sanity, healthy	Sanitation, sanity
Scabies	Mange	Scabies
Senis	Old man	Senescence
Sensum	Feel	Sense
Sequor	Follow	Sequelae
Somnus	Sleep	Somnolent
Statim	Immediately	STAT
Sub	Under	Subclinical
Suicide	Himself, herself	Suicide
Trans	Across	Translate

Vita	Life	Vital, vitamin
Visus	See	Vision, visual
Vivo	Live	Vivacious, viable
Voco	Call	Vocal cords
Vulnus	Wound	Vulnerable

As can be gathered from the short compilation of words above, understanding of a language and the shift from one language to another is not always completely direct. There may be similarities in the spelling of the Latin precursor to the current English word, but all Latin words have a variety of meanings when interpreted into English. An understanding of the best, truest meaning of a word in context must be understood before attempting to translate. This gives the language depth and the thought process behind it could also contribute to the critical thinking skills. This understanding of the grammar provides an important framework. If a student who had previously taken a Latin course then took a medical terminology course or encountered medical terms in classes, these technical terms might make more sense in the broader context of the intricacies of the Latin language. Spelling skills could also be enhanced by familiarity with Latin words that have been recreated as English words, sayings, or phrases. Long words in the English language that happen to be derived from Latin may be challenging for someone comfortable with Latin. This could be very beneficial especially in medical settings, in which clear communication by health professionals is key to protecting the safety and wellness of patients, and spelling and grammar consequently has the potential to save lives in critical situations.

Regardless of whether or not Latin will be implemented more extensively into college curriculums, it is important to evaluate whether or not knowledge of ancient languages will be perceived as valuable in the future. Even if medical terminology continues to be used along with ancient root words precursors, it is important to know if people will be able to recognize public indebtedness in the medical community to the heritage of ancient languages, and if they will consider them valuable.

The best amount of exposure to the ancient languages for success and proficiency in medical terminology is another valid question. Whether it would be better for a student to take a medical terminology course or a course specifically in the language should be considered. There is a limit to how much of this exposure is practical and possible in a college setting. As a memory and association tool, more exposure and familiarity should translate to better long-term experience in any field associated with use of medical terminology. Someone who has taken Latin may begin to see Latin in everyday speech and in their everyday life. They will be able to figure out a word based on its parts, and will have more confidence in reading about unfamiliar topics simply because their Latin background has taught them to piece together many English words out of Latin puzzle pieces. An interested student could learn the subject on their own, but in a traditional college setting, even an introductory course may take two semesters of a student's academic career. The value of an education with a strong background in Latin and Greek languages should be evaluated. It would be advantageous to know what would be a wise course of action for universities in the future faced with creating core curriculum for students in health science fields.

Academia plays a substantial role in influencing developing healthcare professionals today. The Humanities can influence the medical field through language courses. Coursework in

this area may be a rare opportunity for students in the science field to be reached by new approaches to learning. It may allow them to develop critical thinking skills uniquely associated with certain subjects and topics. This could help them to bring novel approaches to their field. Furthermore, courses in the Humanities allow students majoring in science to develop a well-rounded understanding of their field of study. It provides them with a strong foundation in the background of the health science. This means learning a language such as Latin could actually be directly associated with success in their future areas of expertise. In Bauer and Wise's *Well Trained Mind*, the authors emphasize that the structure of Latin lends itself well to allowing students to grasp other subjects: "Latin trains the mind to think in an orderly fashion" so "the Latin-trained mind becomes accustomed to paying attention to detail, a habit that will pay off especially when studying math and science" (Bauer and Wise, p. 189). Therefore, Latin could be a beneficial and logical choice for a student in a science major.

Regarding effectiveness in relaying a thorough understanding of root words, an analysis of medical terminology courses versus courses in ancient languages could be conducted. It is important to know if it is more valuable to actually understand a language to apply it in different situations, or if memorization of root words, as in a medical terminology course is adequate or even preferable. This would entail an analysis of educational approaches and even a psychological question relating to how students take in and process information, and how long that information usually stays in the mind depending on how it was first learned.

Logistics could also be considered as to the practicality of implementing languages into healthcare majors. Students of health sciences are burdened with intense courses in the sciences that include labs. Their time is consumed in studying for and attending classes, and the amount of credits that they take to fulfill the requirements for their majors is relatively high. If an

introductory course in Latin or Greek were to be required for students, that might qualify for the language requirement in lieu of other languages or be taken as an elective course. This could be a solution as students are typically required to take perspective courses in the humanities. If advisors could suggest Latin or Greek course, then the student could fulfill the typical requirements and also receive an education in a topic that is practically beneficial to their area of study.

As an economic evaluation, it could be considered whether or not the benefit of implementation outweighs the costs of money and time. Students' time could be restricted by a language requirement, but if it could qualify as a type of credit so that it is exchanged for another credit that would usually be required, it might not cause an issue. In the case where it can be implemented into the program as a required course, or used as an elective in the humanities, it could take up about the same amount of time as any other course.

A philosophical defense of the thesis could evaluate a knowledge versus wisdom argument. This could follow the lines of the following thoughts: if actual knowledge of Latin and Greek provides a stronger background for wisdom in using related terminology than knowledge gained in rote memorization, then deeper understanding of Latin and Greek is preferable. In evaluating whether or not it is more beneficial to have an actual understanding of Latin and Greek as opposed to knowledge of the languages, knowledge and wisdom should be compared. Wisdom is typically associated with a deep understanding of how to apply knowledge. Knowledge is typically associated with a base of known facts or understandings. As wisdom applies knowledge, knowledge is a prerequisite to wisdom. Without knowledge, there can be no wisdom, but knowledge can exist apart from wisdom. The question is whether or not wisdom is more desirable than knowledge in the context of learning a language. It may be possible to tour a

foreign country with knowledge of a few phrases and commonly used words, but the territory of language that is available in a conversation with a native speaker is limited. Someone who is fluent in that language understands the language and has a type of wisdom in applying words. They may not be required to use all of their knowledge on a daily basis, but it is available to them when it is needed. The critical thinking skills associated with application of wisdom is also available to them, as learning a language in depth required more brain space than memorization of a handful of phrases and words.

In conclusion, the goal of this research and analysis is to be a benefit to students who would like to stand out in their academic performance by gaining a broad education, while at the same time being able to focus their energies on subjects that are core to their academic programs. It also aspires to be an asset to professors of humanities departments, in giving them a central role in the education of students whose majors are in departments such as Arts and Sciences and Health and Human Services. It could also be a tool for advisors, who are tasked with helping students from all academic backgrounds find the best path to success in their respective fields.

As a summary of the background information of this project, linguists, health professionals, and professors have all contributed to research on the topic of the importance of Latin and Greek root words to medical terminology. The findings of these academic articles show that as long as medical terminology remains in use, it is tied to its roots of the ancient languages. Clarity in medical terminology is key, and clarity in language comes from understanding the basis as well as the details of that language. Familiarity with the languages allows in turn for better fluency in medical terminology itself.

The analysis of this study, which included an evaluation of previous research, a historical analysis, a philosophical question, an evaluation of the Latinate medical terms present in science

books, and an analysis of the science terms present in a Latin textbook, ultimately points to the conclusion that an understanding of Latin is central to an understanding of medical terminology, and the hope is that this thesis will allow for expanded course-work into this field for students in college majors in the medical field.

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