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STRUCTURAL TYPES OF NOUN PHRASE PREMODIFICATION AND THEIR DISTRIBUTION IN MEDICAL ENGLISH

Abstract: *This paper investigates premodification as one of the major noun phrase components in a specific type of written scientific register. The aim is to investigate and describe the structure and distribution of types of premodification in a corpus of medical English and determine if there are some significant differences among different periods in the last twenty years. Since the corpus comprises medical articles, we set up two hypotheses 1 - types of premodification within the noun phrase appearing in these periods are the same and their complexity and distribution can be conditioned by the level of research complexity described in an article, and 2 - there are new premodifying elements in addition to the typical ones, which are related to medical English, i.e. scientific writing. Using analysis, synthesis and comparative method we managed to confirm our hypotheses, which means that premodification of a noun phrase in medical English is specific and different from other written registers to a certain extent.*

Key words: *premodification, medical register, premodifying element, premodifier.*

1. Introduction

The subject of our research is premodification as one of the major noun phrase components in the specific type of written scientific register¹. Our aim is to investigate and describe the structure and distribution of premodification in a corpus of medical English and determine if there are some significant differences among different periods. Since the research has been done in the medical register, the corpus is comprised of articles published in the medical journal *British Medical Journal (BMJ)* in the last twenty years. The articles have been chosen randomly, the only condition being that they were published by authors from Great Britain and that they allowed full access on the website². The corpus comprises articles from five time periods:

period 1 covering 1993-1994, period 2 1998-1999, period 3 2003-2004, period 4 2008-2009 and period 5 2012. 25 research papers (200-250 pages), 5 per period, are included in the analysis. Only articles from the research section have been chosen.

We will test two hypotheses: 1 - types of premodification within the noun phrase appearing in these periods are the same and their complexity can be conditioned by the level of research complexity described in an article, 2 - there are some new premodifying elements apart from the typical ones, which are related to medical English, i.e. scientific writing. Using analysis, synthesis and comparative method the results and conclusions will be discussed and presented. Due to the restriction on the number of pages, the types of head nouns, which are common in medical English such as the fused-head constructions, measure phrases, acronyms and binominals will not be described.

¹ Thus, the term *register* (when it is distinguished from *genre*) has been used to refer to a general kind of language associated with a domain of use, such as a 'legal register', 'scientific register', or 'bureaucratic register' (Biber et al. 2007: 8).

² <http://www.bmj.com/>

2. Premodification of noun phrase

The noun phrase is the most common syntactic unit of an English sentence. It consists of four major components: *determiner, premodifier, head noun and postmodifier*. The head is an obligatory element and it can be realised as a noun, name or pronoun. In both noun-headed and pronoun-headed phrases premodification and postmodification are optional. Pronoun-headed phrases usually cannot include a determiner. Premodifiers include adjectives, participial modifiers and other nouns (Biber *et al.* 1999: 574). Apart from these types of premodifying items Greenbaum&Quirk also mention -s genitive, adverbial and sentence (2003: 383).

2.1 Premodification by adjectives

A premodifying adjective, especially when it is the first item after the determiner, can itself be premodified in the same way as it can in predicative position (Greenbaum&Quirk 2003: 384).

When a head has more than one premodifier or adjective, their order is determined by their semantic properties (Greenbaum&Quirk 2003: 392):

determiners	general	age	colour	participle	provenance	noun	denominal	head
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1. Some (D) intricate (G) old (A) interlocking (P) Chinese (PR) designs (H)

In the premodification structure of the noun phrase, adjectives are placed between the determiners and the head of the noun phrase. There are four zones (Quirk *et al.* 1985:1338-1340):

- I. PRECENTRAL – peripheral, non-gradable adjectives, in particular intensifying adjectives - emphasize: *certain, definite, plain, pure*; amplifiers: *absolute, entire, perfect, total, complete*; downtoners: *feeble, slight*
- II. CENTRAL – central, gradable adjectives: *big, funny*

III. POSTCENTRAL – participles and colour adjectives: *a retired colonel, blue skies*

IV. PREHEAD - the least adjectival and most nominal premodifiers, such as adjectives with a proper noun basis denoting nationality, provenance and style- *American, Gothic*; other denominal adjectives with a relation to nouns often with the meaning ‘consisting of’, ‘involving’ or ‘relating to’- *annual, economic, medical*; and nouns- *tourist* (attraction), *Yorkshire* women

Examples of sequences of premodifiers:

2. Our (Determinative) numerous (Zone I) splendid (Zone II) African tourist (Zone IV) attractions (Head)
3. A (Determinative) certain (Zone I) grey (Zone III) church (Zone IV) tower (Head)

2.2 Premodification by participles

2.2.1 -ING participle

The possibility of modification by a present participle depends on the potentiality of the participle to indicate a permanent or characteristic feature. The indefinite article favours the habitual or permanent (5), the definite article the specific or temporary (4) (Quirk *et al.* 1985: 1326):

4. The *approaching* train is from Liverpool.
5. He was frightened by an *approaching* train.

2.2.2 -ED participle

The -ed participle can be active or passive, but the active is rarely used in premodification (6) However, when an active participle is modified by an adverb, it can be used in premodification (7) (Quirk *et al.* 1985: 1327):

6. The immigrant who has arrived BUT NOT: *the arrived immigrant
7. The newly-arrived immigrant [‘the immigrant who has arrived recently’]

2.3 Premodification by nouns

Noun + noun sequences contain only content words, with no function words to show the logical relations between the two parts. They present information densely, and heavily rely on implicit meaning so the reader must infer the intended logical relationship between the modifying noun and the head noun. Noun + noun sequences are used to express a bewildering array of logical relations, including the following (where the head noun is labeled N2 and the premodifying noun N1) (Biber *et al.* 2002: 273-274):

- Composition: N2 is made from N1; N2 consists of N1 (e.g. *glass windows*).
- Purpose: N2 is for the purpose of N1; N2 is used for N1 (e.g. *pencil case*).
- Identity: N2 has the same referent as N1 but classifies it in terms of different attributes (e.g. *men workers*).
- Content: N2 is about N1; N2 deals with N1 (e.g. *algebra test*).
- Objective: N1 is the object of the process described in N2, or of the action performed by the agent described in N2 (e.g. *egg production*).
- Subjective: N1 is the subject of the process described in N2; N2 is nominalised from an intransitive verb (e.g. *child development*).
- Time: N2 is found at the time given by N1 (e.g. *summer conditions*).
- Location: N2 is found or takes place at the location given by N1 (e.g. *corner cupboard*).
- Institution: N2 identifies an institution for N1 (e.g. *insurance companies*).
- Partitive: N2 identifies parts of N1 (e.g. *cat legs*).
- Specialisation: N1 identifies an area of specialisation for the person or occupation given in N2; N2 is animate (e.g. *finance director*).

Some sequences can belong to more than one category (e.g. *thigh injury*).

2.4 Premodification by genitives

Genitive can have two functions. It functions as a central determiner when the genitive is a phrase incorporating its own determiner (8). Where the genitive is used descriptively, however, it functions not as a determiner but as a modifier with a classifying role (9). Determiners in such noun phrases usually relate not to the genitive but to the noun following it (Greenbaum & Quirk 2003: 105):

8. *My cousin's* new briefcase.
9. They attend a *women's* university in Kyoto.

2.5 Premodification by adverbs

Adverbs modify verbs, adjectives and adverbs and they are rarely used in front of nouns. They are usually hyphenated when they premodify nouns. Of course, the part of that premodifying phrase must be an adverb as in the following example (Quirk *et al.* 1985: 1336):

10. She travelled to many *far-away* places.

2.6 Premodification by sentence

What was said about the premodification by adverb phrases applies also to the premodification by sentences. They are rarely used. Sentence premodifiers are also hyphenated, and they can have a colloquial flavour (Quirk *et al.* 1985: 1337):

11. I visited his *what-do-you-call-it* cottage.

2.7 Noun phrases with multiple premodifiers

Many noun phrases occur with multiple premodifiers especially in written registers. They can have two-word premodification (12), three-word premodification (13) and four-word premodification (14). Multiple premodifiers are very efficient because they pack dense informational content into as few words as possible. On the other hand, the readers are faced with a huge problem since they have to infer the logical relations among the constituents. Multiple premodifiers do not only modify the head noun directly. They usually have embedded relations, which means that some of

them modify other premodifiers rather than the head noun. The meaning relations among the constituents can be ambiguous and different, and the readers must infer the intended meaning (15, 16) (Biber *et al.* 1999: 597-598):

12. *Funny whistling* noises
13. *High sulphur soil* areas
14. *Very finely grained alluvial* material
15. [*Two more*] [*practical*] principles 'two additional principles that are practical'
16. *Two* [[*more*] *practical*] principles 'two principles that are more practical'

2.7.1 Order of multiple premodifiers

The order of multiple premodifiers depends on the intended meaning and structure. The following order of premodifiers is preferred (Biber *et al.* 1999: 598-599):

adverb + adjective + colour adjective +
participle + noun + head noun

Although there are no absolute rules governing the order of words in a premodification sequence, there are a few tendencies (Biber *et al.* 1999: 599-600):

- Adjective + noun + head (*mature rice grain*)
- Participial modifier + noun + head (*increased disease incidence*)

Participial modifiers tend to occur closer to the head noun than adjectives; however this order can be reversed.

- Adjective + participial modifier + head (*rare shopping trips*)

Adverbs usually modify the following adjective or participial modifier

- Adverb + participial modifier + head noun (*these fully grown men*)
- Adverb + adjective + head noun (*a really hot day*)

2.7.2 Coordinated modifiers

Multiple premodifiers or multiple embeddings can represent a lot of different logical rela-

tions and create incorrect interpretation. In order to avoid this and at the same time retain the dense packaging of information it is possible to use *and*-coordinated premodifiers and *or*-coordinated modifiers (Biber *et al.* 1999: 600-601):

17. *Black and white* cat
18. *Familiar or preplanned* activities

Modification can apply to more than one head, which is illustrated in the following examples (19, 20). The multiple head is a subject of premodification and coordination. (Quirk *et al.* 1985: 1345):

19. *The new table and chairs*
20. *The beautiful new table and chairs/ the new (but) ugly table and chairs*

3. A corpus-based analysis

Although modification is a main device for the information packaging especially in scientific (medical) register which tends to explain and elaborate, it is not always used with noun phrases. Whether a noun phrase will include premodification or postmodification depends on the level of complexity of the research, i.e. on the information that has to be conveyed. The articles belonging to period 1, unlike all other periods, deal with simple research including the dangers of sledging accidents for spinal injuries, consultations by letter, the care of poor and refugee children, and diagnosis of colovesical fistula. Some of this research is not carried out by means of some specific equipment, methods, questionnaires and statistical analysis. These articles are more like reports based on the short, concise and clear representation of the results. Thus, there is a high proportion of nouns without premodification (see table 1.2).

1. *Sledging* took place in a social atmosphere and *drink* was used. (BMJ 18-25.12.1993)
2. *Histology* confirmed diverticular disease only. (BMJ 18-25.12.1993)

3.1. Premodification by adjectives

Adjectives and nouns are the most common premodifying elements in written medical

register. Owing to their numerous semantic meanings, either as descriptors or classifiers,

(Biber *et al.* 1999: 508-509) adjectives are present in all five periods belonging to our corpus:

Descriptor denoting time

3. A *recent* study of human papillomavirus as a test of cure in England involved follow-up at six, 12, and 24 months after treatment and concluded that women who were human papillomavirus and cytology negative at six months could be safely returned to routine recall. (BMJ 31.10.2012)

Classifier denoting topic

4. The *emotional* impact of absent fathers is apparent from studies showing that these children have much lower *educational* performances, even after adjustment for differences in income. (BMJ 18-25.12.1993)

Classifier denoting affiliation

5. Our data suggests that matters have improved slightly in *Bangladeshi and Indian* children but not in *Pakistani* children. (BMJ 2.1.1999)

Descriptor denoting miscellaneous characteristics

6. When a *serious* anomaly is suspected prenatally some parents request termination of pregnancy. (BMJ 8.12.2003)

Classifier denoting relation, classification or restriction

7. Our *main* outcome measure was abuse using the validated modified conflict tactics scale, completed by the carer. (BMJ 23.1.2009)

Descriptor denoting extent, size or quantity

8. Our centre receives referrals from a *wide* catchment area and it can be difficult for patients to get to the clinic. (BMJ 18-25.12.1993)

Descriptor denoting evaluation or emotion

9. In our study, iron deficiency was a *significant* risk factor for low vitamin D concentration in all three ethnic groups. (BMJ 2.1.1999)

Since the objectives of any research are becoming more demanding and complex which is coincident with the technological development as well as the appearance, frequency and malignancy of some diseases, it is important to mention an increasing proportion of premodifying adjectives derived from nouns denoting some medical term:

10. Fetus-*fetal* (BMJ 9.1.1999)
11. Laparoscopy- *laparoscopic* (BMJ 7.1.2004)
12. Haemorrhage – *haemorrhagic* (BMJ 2.1.1999)
13. Pelvis – *pelvic* (BMJ 12.12.2012)
14. Thorax- *thoracic* (BMJ 18-25.12.1993)
15. Also, a high proportion of *laparoscopic* procedures used disposable equipment. (BMJ 7.1.2004)

3.2 Premodification by nouns

Similarly, nouns as premodifying elements can express various meanings in conjunction with the head noun. The logical relations between these parts are often not explicit, so the readers must infer the intended meaning by themselves. In addition, noun + noun sequences are condensed and space saving structures that convey information using only two words which is another reason for their frequent use in written registers. We found the following examples in our corpus (We will use N2 for head noun, N1 for premodifying noun in the analysis) (Biber *et al.* 1999: 273-274):

Composition

16. The equipment used was unorthodox and included a *plastic sheet* and a *rubber ring* towed by a vehicle. (BMJ 18-25.12.1993)

Sheet (N2) is made of *plastic* (N1) whereas *ring* (N2) is made of *rubber* (N1).

Content

17. The apparent interaction between *migraine history* and high blood pressure (during or excluding pregnancy) on odds ratios for ischaemic stroke has not previously been reported. (BMJ 2.1.1999)
History (N2) deals with *migraine* (N1).

Location

18. *Hospital consultations* could be conducted by various health professionals including consultant surgeons, consultant oncologists, registrars, more junior doctors, or specialist nurses. (BMJ 11.12.2008)
Consultations (N2) take place in *hospital* (N1).

Purpose

19. However, *speed bumps* may have a useful alternative benefit in the diagnosis of acute appendicitis. (BMJ 17.12.2012)
Bumps (N2) are used for *speed* (N1) reduction.

Objective

20. We also collected details of postoperative complications during admission, including any *blood transfusion* and whether a woman had to be returned to theatre; additional resource use was estimated as for operative complications. (BMJ 7.1.2004)
 The process of *transfusion* (N2) refers to *blood* (N1).

Identity

21. *Refugee children* continue to arrive in countries that are poorly prepared for them. (BMJ 18-25.12.1993)
Children (N2) who are *refugees* (N1); both nouns refer to the same referent.

Time

22. Therefore the *October values* for these children are likely to drop further to those associated with rachitic bone changes in a higher proportion of children. (BMJ 2.1.1999)
Values (N2) are taken in *October* (N1).

Institution

23. *Research ethics committees* are well established, though they have been criticised. (BMJ 17.1.2004)
Committees (N2) are institutions for *research ethics* (N1).

Subjective

24. Therefore the October values for these children are likely to drop further to those associated with rachitic *bone changes* in a higher proportion of children. (BMJ 2.1.1999)
Bone (N1) is the subject of the process described in *changes* (N2), i.e. *bone changes*.

Partitive

25. *Government departments* should therefore have clearly defined policies and designated responsibilities, ideally under one coordinating body. (BMJ 18-25.12.1993)
Departments (N2) are parts of *government* (N1).

Specialisation

26. Some confusion exists among *health-care professionals* about the necessity for vitamin supplementation after the age of 1 year, although the Department of Health recommends supplements for all children up to the age of 5. (BMJ 2.1.1999)
Healthcare (N1) is an area of specialisation for (N2) *professionals*.

Most noun + noun sequences belong to location, objective or subjective, content and purpose category since medical research usually investigates processes happening at a certain place using different means of analysis (*bone scans, autopsy findings, urine sample*).

The following example illustrates how certain sequences can belong to two categories:

27. *Elbow injuries* are common in primary and secondary care, accounting for 2-3% of emergency department attendances. (BMJ 9.12. 2008)

(N2) *injuries* take place at *elbow* (N1), which refers to the location, but also N1 (*elbow*) is the object of the process described in N2 (*injury*).

3.3 Premodification by participles and genitives

In comparison to nouns and adjectives, participles and genitives are rare in medical register, but present in all analysed periods without significant differences.

Additionally, we found no examples of adverbials and sentences functioning as premodifiers.

They have a slightly informal and even colloquial meaning whereas there is a strict selection of linguistic units in scientific style. Since the basic principles of this style require the thoughts to be clear, precise and logical without emotional and subjective flavour, expressive lexemes such as dialect words, vulgarism and jargon are not commonly found in the discourse (Tošović 2002: 349).

Ing-participle can express permanent (29) and temporal (28) characteristics depending on the determiner:

28. The best *performing* local authorities were in London and northeast England. (BMJ 4.12.2012)
29. An *increasing* proportion of women in the workforce exacerbate the shortage, as overall, women contribute fewer working hours than men to the specialty. (BMJ 17.1.2004)

Ed- participles are usually modified by an adverb:

30. Government departments should therefore have *clearly defined* policies and designated responsibilities, ideally under one coordinating body. (BMJ 18-25.12.1993)

Genitives can have different meanings, such as genitive of origin (31) and subjective genitive (32):

31. *Unicef's* report shows clearly how children have been among the biggest losers. (BMJ 18-25.12.1993)
32. Changes to the UK patient invitation letter required by the committee were

resubmitted for *chair's* approval. (BMJ 17.1.2004)

3.4 Multiple premodifiers

Multiple premodifiers are frequent characteristics of a noun phrase in medical register consisting of various types of adjectives and nouns that can be preceded by all kinds of determiners:

33. AC2 uses *transcription mediated amplification* technology, in which ribosomal RNA target regions from *N gonorrhoea* are amplified. (BMJ 12.12.2012)

The head *technology* is modified by noun + *-ed* participle + noun sequence.

34. The 125 *consecutive eligible* papers received by the *BMJ* during the recruitment period were entered into the study. (BMJ 2.1.1999)

Both adjectives *consecutive* and *eligible* modify the head *papers*.

35. Our study shows that 55% of major abnormalities of the heart and great arteries are associated with *increased fetal nuchal translucency* thickness at 1014 weeks of gestation. (BMJ 9.1.1999)

The head noun *thickness* is modified by *-ed* participle + adjective + adjective + noun sequence.

36. An *emergency department* doctor or emergency nurse practitioner then screened and recruited each patient during routine care. (BMJ 9.12.2008)

In this case the head *doctor* is modified by the noun *department*. The premodifier *department* is modified by *emergency*, which means that multiple words in premodification can have embedded relations and do not have to modify the head noun. There is no emergency doctor, but a doctor who works at the emergency department.

The following examples illustrate different orders of multiple premodifiers that do not necessarily follow the preferred pattern suggested by Biber *et al.* (1999: 598-599):

37. The *previously reported* prevalence - adverb + participle (BMJ 9.1.1999)

38. *Infantile polycystic kidney disease* - adjective + adjective + noun (BMJ 2.12.1999)
39. *Cystic renal dysplasia* - adjective + adjective (BMJ 8.12.2003)
40. *Worst case scenario analyses* - adjective + noun + noun (BMJ 10.1.2004)
41. The same *rigorous physically demanding exercise* - adjective + adverb + participle (BMJ 2.1.1999)
42. *Presumed chromosomally normal fetuses* - participle + adverb + adjective (BMJ 9.1.1999)

We found examples of coordinated modifiers too:

43. The *vulvovaginal and endocervical* samples were tested for *N gonorrhoea* using the AC2 assay according to the manufacturer's instructions. (BMJ 12.12.2012)
44. Costs were based on 2002 UK prices and included *direct, indirect, and overhead* costs. (BMJ 10.1.2004)

Both multiple premodifiers and coordinated modifiers are less commonly used in period 1 due to the already mentioned reasons dealing with the complexity of research (see table 1.2).

3.5 Statistical symbols as premodifying elements

Since most medical research is based on statistical data, certain noun phrases contain statistical symbols as premodifying elements. These elements were not present in the early research since the exact methods and tests used in statistical analysis were not described in the research papers. They only presented the results without mentioning how they had been obtained unlike the latest periods which included every aspect of the statistical analysis.

45. Weighted *k* statistics were used to measure interobserver reliability, with a maximum difference of 1 in scores between editors representing agreement. (BMJ 2.1.1999)
46. A two tailed χ^2 test with Yates's correction showed that this difference was highly significant ($\chi^2 = 112.4$, $P < 0.001$). (BMJ 2.1.1999)

47. With the *3/n* rule for zero numerators, 300 adults and 300 children with full elbow extension and no significant fracture would yield a test sensitivity of 100% for each group, with 95% confidence intervals between 99% and 100%. (BMJ 9.12.2008)
48. We calculated test characteristics (sensitivity, specificity, predictive values and likelihood ratios) with 95% confidence intervals, and compared proportions by χ^2 test to obtain *P* values, using StatsDirect version 2.5.6 (StatsDirect, Altrincham, UK). (BMJ 2.1.1999)

Also, there are some examples of mathematical symbols in combination with numbers in the premodifying position:

49. Briefly, we conducted a randomised controlled trial using a *4x2* factorial design, in which participants from 64 general practices were randomised to one of eight groups. (BMJ 11.12.2008)
50. We used a *2:1* randomisation schedule in favour of the laparoscopy. (BMJ 7.1.2004)

In addition, medical register contains specific kinds of words that can be composed of letters and numerals and function as premodifiers. These kinds of premodifiers refer to the latest research that deals with current diseases and disorders.

51. To capture the broader impact of the intervention we measured women's general health using the *SF-12* mental component summary (SFMCS) and physical component summary (SFPCS). (BMJ 15.1.2009)
52. We also considered *HER2* status as routine testing was being introduced at the onset of the study. (BMJ 11.12.2008)

3.6 Proper nouns as premodifying elements

Proper nouns as premodifiers are used when mentioning the names of certain tests (53), approaches (54), hospitals (55), scales (56), questionnaires (57) and techniques (58), which is

more characteristic of recent researches. Only one example was found in period 1.

53. More specific urine tests to confirm the presence of a fistula include the oral administration of charcoal followed by its detection in the urine, with a success rate of 50-100%; the *Bourne* test, in which the urine is subjected to x rays after barium enema to detect the presence of barium in the urine; and simple microscopy to detect cellulose fibres. (BMJ 18-25.12.1993)
54. We developed a mathematical model using a *Markov* approach, with a six-month time step to evaluate the cost effectiveness of alternative options. (BMJ 31.10.2012)
55. Though this decline preceded the adverse publicity surrounding events at *Alder Hey* Hospital, it has accelerated since. (BMJ 8.12.2003)
56. The review quality instrument (version 4) consists of seven items (importance of the research question, originality, method, presentation, constructiveness of comments, substantiation of comments, interpretation of results) each scored on a fivepoint *Likert* scale (1 = poor, 5 = excellent). (BMJ 2.1.1999)
57. We estimated cost to the NHS and patients separately, and conducted a cost effectiveness analysis that compared cost to the NHS with the primary outcome of the *Roland-Morris* disability questionnaire, the number of days in pain, and the QALYgain estimated from the European quality of life instrument EQ-5D. (BMJ 11.12.2008)
58. Previous studies of the effectiveness of *Alexander* technique lessons and massage for patients with chronic back pain have focused on clinical outcomes. (BMJ 11.12.2008)

3.7 Acronyms as premodifying elements

Another notable feature of a noun phrase in medical register is the use of acronyms as pre-

modifiers because certain terms are more often referred to by their acronyms than by real name. They are also a powerful space saving device.

59. An alternative strategy is to use *DNA*³ testing for human papillomavirus as a “test of cure” to discharge women back to routine screening earlier and thus reduce the amount of post-treatment surveillance. (BMJ 31.10.2012)
60. The model simulated a cohort of women who had been treated for *CIN*⁴ grades 1, 2, and 3. (BMJ 31.10.2012)
61. A detailed description of the methods used in the *WHO*⁵ study has been published previously. (BMJ 2.1.1999)
62. All incremental cost effectiveness ratios for maximum cost estimates fell within the *NHS*⁶ cost acceptability threshold. (BMJ 10.1.2004)

Certain acronyms can function as both premodifiers and head nouns:

63. The *EQ-5D* data were used to estimate *QALY* gain per patient over the 12-month period using the published social tariff for *EQ-5D*. (BMJ 11.12.2008)

3.8 Latin terms and Greek letters as head nouns and premodifying elements

Medicine is highly associated with Greek and Latin, so where appropriate, the Latin terms (64) are used for naming certain diseases even nowadays, as well as letters of the Greek alphabet (65) in premodification.

64. *Neisseria gonorrhoea* (and *Chlamydia trachomatis*) can infect either the urethra, the endocervix, or both. Culture of *N gonorrhoea* from urethral and endocervical samples is currently the recommended method of detecting gonorrhoea in women in the UK. (BMJ 12.12.2012)

³ Deoxyribonucleic acid

⁴ Cervical intraepithelial neoplasia

⁵ World Health Organisation

⁶ National Health Service

65. In the early 1990s, in common with most centres, local women were offered α fetoprotein screening for neural tube defects at 15-18 weeks and an anomaly scan at 18-22 weeks of gestation. (BMJ 8.12.2003)

The use of Latin terms was not very common in the early periods. Those articles investigated less medical topics such as refugee and poor children, sledging injuries, vitamin concentrations, which did not necessarily require the use of Latin words.

	adjectives	nouns	participles -ing/ -ed	genitives	acronyms	statistical elements
I	1012	248	62 / 79	28	10	
II	619	435	28 / 41	17	4	4
III	937	298	54/ 36	11	24	10
IV	895	723	49/ 45	5	19	10
V	1222	768	51/ 83	9	29	12

1.1 Distribution of the types of noun phrase premodification

	proper nouns	nouns without premodifier	multiple premodifier	coordinated premodifiers	Latin or Greek	mathematical symbols
I	1	1371	196	23		1
II	2	1212	232	19		
III	6	862	307	34	1	5
IV	6	906	387	75	6	4
V	4	897	538	88	8	

1.1 1.2 Distribution of the types of noun phrase premodification

4. Conclusion

The central focus of our analysis was the structure and distribution of types of premodification of the noun phrase in the medical register. We managed to prove our hypotheses that types of premodification within the noun phrase ap-

pearing in these periods are the same and that their complexity and distribution can be conditioned by the level of research complexity described in an article, and that there are new premodifying elements in addition to the typical ones, which are related to medical English, i.e. scientific writing.

When premodification is concerned, we found that adjectives and nouns are by far the most frequently used premodifiers due to their ability to express a great number of logical relationships. Also, we found that there is a large proportion of adjectives derived from nouns denoting some medical term which are either of Latin or Greek origin.

Another characteristic of premodification in the medical register is the use of statistical symbols, which were not used in period 1 since the articles from that period did not include a detailed description of all parts of the statistical analysis. Proper nouns and mathematical operations with numerals were extremely rare in the first two periods in comparison with the other ones.

Acronyms are frequently used as premodifiers. The use of Latin terms for certain diseases is becoming more popular with the latest research period. Also, premodifiers as well as head nouns can be realised as words consisting of letters and numerals in recent research. In addition to this, multiple premodifiers can be additionally expanded usually with nouns and adjectives.

From our research it is obvious that science development is associated with the choice and complexity of lexis, which means that future investigations may show even more complex phrases and relations.

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TIPOVI STRUKTURA PREMODIFIKACIJE IMENIČKE SINTAGME I NJIHOVA RAŠIRENOST U ENGLESKOM JEZIKU IZ OBLASTI MEDICINE

Rezime

U radu ćemo opisati vrste premodifikatora imeničke fraze i njihovu distribuciju u pisanom naučnom registru. Cilj je ispitati vrste premodifikatora i njihovu distribuciju u korpusu koji čine medicinski članci objavljeni u časopisu *British Medical Journal* u pet vremenskih perioda, u posljednjih dvadeset godina i utvrditi da li postoje neke značajne razlike među različitim periodima. Pošto se radi o medicinskom registru postavili smo dvije hipoteze: 1. vrste premodifikatora su iste u svim periodima i njihova distribucija i složenost može biti uslovljena složenošću konsultovanog članka; 2. postoje 'nove' vrste premodifikatora koje su u vezi sa medicinskim registrom, tj. naučnim stilom. Koristeći analitičko-deskriptivni, sintetički i komparativni metod ustanovili smo da se sve vrste premodifikatora osim priloga i rečenice, javljaju u svim periodima; njihova složenost i distribucija uslovljena je složenošću istraživanja. Takođe smo ustanovili da zbog specifičnosti medicinskog registra, postoje 'novi' elementi u premodifikaciji imeničke fraze kao što su statistički simboli, koji nisu zastupljeni u prvom periodu jer tadašnji članci nisu uključivali statističke obrade podataka, matematičke operacije u kombinaciji sa brojevima, grčka slova, akronime ni lična imena koji ne spadaju u tipične vrste premodifikatora.

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