Original scientific article

Višnja Pavičić Takač*, Evelina Miščin**

Exploring the collocational competence of non-native users of medical English

ABSTRACT

Previous research on collocations has emphasised the significance of collocations as co-occurrence and recurrence. Applied linguists exploring the acquisition of collocations made a significant contribution to the understanding of the notion of collocation. However, only few studies have dealt with the difference between collocations in general English and collocations in scientific English.

The present study deals with verb collocations in medical English. Collocations are observed in the interaction of syntagmatic and paradigmatic relations. The emphasis is on upward collocations (collocate and node). The study aims at analysing the level of collocational competence of non-native users of medical English in order to identify the aspects of verb collocations that require a special approach in teaching medical language.

Key words: collocations, collocational competence, medical English, errors, productive knowledge

Introduction

This paper deals with research into the collocational competence of non-native users of medical English. The term collocation was first used by Firth in the 1950s, but only few linguists have researched this phenomenon in scientific English. Previous research was mostly focused on collocations in general English (cf. Channel 1981,

* Correspondence address: Višnja Pavičić Takač, Faculty of Humanities and Social Sciences in Osijek, 31000 Osijek, Jägerova 9, e-mail: vpavicic@ffos.hr

** Correspondence address: Evelina Miščin, College of Business and Management "Baltazar Adam Krčelić", 10290 Zaprešić, Vladimira Novaka 23, e-mail: evelinamiscin@yahoo.co.uk

Elkhatib 1984, Ghadessy 1989, Aghbar 1990, Aghbar & Tang 1991, Fayez-Hussein 1990, Bahns & Eldaw 1993, Zhang 1993, Arnaud & Savignon 1994, Gitsaki 1999). In scientific English collocations were addressed by Gledhill (2000) and in Croatia Špiranec (2005 – technical English) and Štefić (2010 – dental medical English).

Definition of collocations

The interest in collocations started in the last two decades under different names e.g. phrasemes, idioms, fixed expressions, formulaic language, co-selection of words, phrasal lexemes (Omazić 2003: 113). The term, introduced by J. R. Firth in the 1950s, derives from Latin (*com* together + *locare* locate) and refers to a multi-word construct which occurs in a procedure of locating, i.e. co-occurrence or combination of words on the syntagmatic level. Thus, Firth (1957) tried to explain collocations by a syntagmatic and paradigmatic relation between lexical units which can be shown by two axes – horizontal and vertical. The paradigmatic axis is vertical and includes words which belong to the same class and can be inter-changed. The horizontal axis is syntagmatic and refers to the ability of words to be connected with others. For instance, in a sentence *Mary drank beer, beer* is in a paradigmatic relation to *wine, juice, Coke* and in a syntagmatic relation with *drank* and *Mary*. Previous research on collocations has emphasised the significance of collocations as co-occurrence and recurrence (statistical/textual view, cf. Halliday 1985, Phillips 1985, Hoey 1991). The semantic/syntactic tradition in lexicology defines collocations as the abstract relation between words regardless of their frequency (Benson 1989, Howarth 1996, Cruse 1986). Finally, the discourse/rhetorical model examines collocations with regard to their effect and considers syntactic and semantic limitations of the fixed expression less important than their rhetorical functions (Moon 1987). One of the important contributions was made by Morton Benson, Evelyn Benson and Robert Ilson who published the BBI dictionary of collocations in 1986 and divided collocations into two basic groups: grammatical and lexical. Grammatical collocations contain prepositions, infinitives or sentences, while typical lexical collocations consist of nouns, adjectives, verbs and prepositions. This paper deals with lexical collocations, namely verb and noun combinations.

Collocations and non-native speakers

Collocations usually represent a huge problem to non-native speakers due to interference with their mother tongue. That is why Hill (1999) suggested the creation of a term 'collocational competence' and insisted that acquisition of lexis includes not

just learning the total meaning of a word, but also its collocational span. Collocational competence was also addressed by some other researchers (Nattinger and DeCarrico, Lewis, Woolard as cited in Nattinger & DeCarrico 1992) who claim that it contributes to a better understanding of difficulties encountered by language learners. The importance of acquiring collocations in language teaching has been particularly emphasised in the last two decades. Research studies have also shown that collocational errors are the most frequent mistakes made by non-native speakers (James 1998). Figure 1 illustrates the hierarchy of collocational errors as perceived by McCretton and Rider (in James 1998).

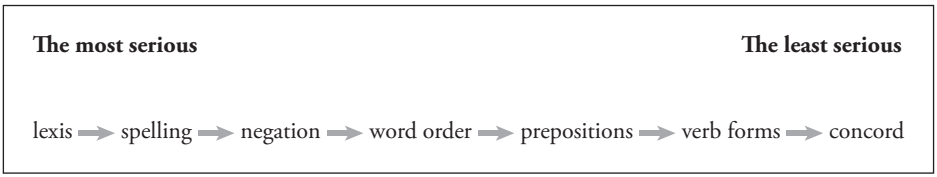

Figure 1. Hierarchy of mistakes according to McCretton and Rider (James 1998)

From the above figure it can be seen that the lexical mistakes are the most serious ones. A speaker can be understood if he/she makes a grammatical mistake. However, if he/she makes a lexical mistake there could be misunderstanding and the same problem occurs with collocational mistakes. The implications for teaching and learning foreign languages are self-evident: learners' awareness of the importance of collocations as well as the problems they might encounter must be raised from the early stages of language learning. Applied linguists exploring the acquisition of collocations (Sinclair 1991, Francis 1993, Moon 1998, Hunston 2002) made a significant contribution to the understanding of the notion of collocation. However, only few studies have dealt with the difference between collocations in general English and collocations in scientific English. In this context, the research on the acquisition of collocations carried out by Gitsaki (1996) must be mentioned. She discussed and reviewed the literature about collocations and also made a contribution to the study of the development of collocational ability.

The present study

The focus of this research are lexical collocations, i.e. word combinations consisting of a verb and a noun and so-called upward collocations (Sinclair 1991: 115/116) where *a* is a collocate and *b* the node. The study aims at exploring the level of collocational competence of non-native users of medical English and investigating whether their collocational competence corresponds to their level of language profi-

ciency. The purpose of the study is to clarify the aspects of verb collocations which require a special approach in teaching medical English.

Research questions

In order to achieve the aims of the study, the following research questions were formulated:

What are the most frequent mistakes in the use of verb collocations?

What is the level of collocational competence of non-native users of medical English?

Are there any differences in the level of collocational competence between beginner users of medical English (1st year students) and more proficient users of medical English (5th year students and doctors)?

Participants

The total number of non-native users of medical English who participated in the research was 127. Out of this number, 50 students were 1st year medical students[1], 51 5th year medical students and 26 doctors. The research was carried out in 2009/2010 for the 1st year students and in 2011/2012 for the 5th year students and doctors.

Instrument

The instrument used for the research was a collocational competence test. It consisted of four groups of exercises: multiple choice, gap-fill, translation from English into Croatian and translation from Croatian into English. Each task had fifteen questions which makes a total of 60 questions (Appendix 1). The first group of sentences tested the receptive level of collocation competence and included multiple choice questions. Two groups of questions tested the productive level and included gap-fill and translation from Croatian into English. The last group of questions probed both the productive and receptive knowledge since the subjects had to recognise the meaning of the collocation in English and offer its translation.

[1] The original number of the 1st year students who participated in the research was 297, but for the purpose of this research, 50 were chosen from that group. Miščin (2012).

Procedure

Students were tested during regular classes at the School of Medicine in Zagreb and Osijek. They were given instructions in Croatian and had 60 minutes to complete the test. Doctors were tested at home and had unlimited time for answers. All tests were done anonymously.

The maximum number of points for each group of questions was 15, which makes a total of 60 points. Each correct answer was given one point. In translations only the target collocations were evaluated. It was not important whether students translated other sentence parts. Also, grammatical competence and spelling were not evaluated. A collocation was marked as correct if it was attested in the corpus (cf. Miščin 2012).

Results and discussion

In order to answer the first research questions, the four tasks were analysed in terms of correct and incorrect answers. The results of the tests can be seen in tables 1., 2., 3. and 4.

The first column in the table shows a target collocation, the second its Croatian translation, while the remaining three the most frequent errors selected by first year students, fifth year students and doctors. As table 1 shows, all doctors selected the correct answer to the first collocation ('respond to treatment'). Also, none of doctors used the collocation 'had a new kidney', while the fifth year students used that collocations more frequently than the first year students (6% compared to 3%). None of the fifth year students used 'impaired knee injury' while the doctors used that collocation less frequently than the first year students (11.5% of doctors compared to 38% of first year students). The fifth year students also did not use the collocation 'exchange the patient's hip', while the doctors and the first year students selected it almost equally frequently (7.7%, i.e. 6.4%). All three groups selected equally frequently the wrong collocation 'grow weight', though it was used the least by the first year students (1.9% compared to 3.9% of the fifth year students and 4% of the doctors). The correct collocation 'contract malaria' was chosen more frequently by first year students than fifth year students, but it was most frequently selected by the doctors. Most of the first year students thought that the correct collocation was 'obtain malaria', whereas the fifth year students thought it was 'receive malaria'. The collocations 'establish the diagnosis' and 'tolerate pain' did not cause problems to any group of participants. Instead of the collocation 'perform physical examination', the first year students (21.5%) used the collocation 'do physical examination', and

Table 1. Results of the multiple choice task

Target collocation	Croatian translation	Most frequent errors		
		1st year students	5th year students	Doctors
Respond to treatment	Reagirati na liječenje	Recover to treatment	Answer/recover to treatment	_____
Receive a kidney	Dobiti bubreg	Obtain a kidney	Obtain a kidney	Obtain a kidney
Aggravate the injury	Pogoršati ozljedu	Deteriorate/ impair the injury	Deteriorate the injury	Deteriorate/ impair the injury
Replace the hip	Zamijeniti kuk	Exchange the hip	Change the hip	Exchange the hip
Gain weight	Dobiti na težini	Get weight	Get weight	Get weight
Contract malaria	Dobiti malariju	Obtain malaria	Receive malaria	Obtain malaria
Establish the diagnosis	Utvrditi dijagnozu	Do the diagnosis	Perform/do the diagnosis	Perform the diagnosis
Tolerate pain	Podnositi bol	Suffer pain	Suffer pain	Experience pain
Perform physical examination	Obaviti/izvršiti fizikalni pregled	Do physical examination	Do physical examination	Make physical examination
Maintain physical fitness	Održavati tjelesnu spremnost	Sustain physical fitness	Sustain physical fitness	Sustain physical fitness
Predict a prognosis	Pretpostaviti prognozu	Determine prognosis	Foresee prognosis	Determine prognosis
Feel the pulse	Opipati puls	Test the pulse	Test the pulse	Test the pulse
Provide relief	Pružiti olakšanje	Give relief	Give relief	Give/offer relief
Pose the risk	Predstavljati rizik	Represent risk	Show risk	Represent risk
Loosen the secretion	Razrijediti izlučevinu	Weaken the secretion	Lessen secretion	Lessen secretion

the same mistake was made by 39.2% of the fifth year students and 7.7% of doctors. The majority of all three groups of participants were familiar with the collocation 'maintain physical fitness' with 84% of doctors, 73% of first and 74% of fifth year students choosing the correct answer. The collocation 'predict a prognosis' caused most problems for the doctors: 50% of them opted for the erroneous collocation 'determine prognosis', compared to 43% of first year students and 9.8% of fifth year students. Interestingly, all three groups made mistakes with the collocation 'feel the pulse' and chose 'test the pulse' more frequently (49% of the first year students, 27.5% of fifth year students, and 40% of doctors). The collocation 'provide relief' did not create any problems for any group. The collocation 'pose risk' proved generally difficult, but it is interesting to note that first year students and doctors more often decided on the wrong collocation 'represent risk', whereas fifth year students selected the collocation 'show risk'. Another collocation that was found difficult by all participants was 'loosen secretion'. Instead of the correct collocation, first year students chose 'weaken secretion' and fifth year students and doctors chose 'lessen secretion' more often.

Table 2 summarises the results of the gap-filling task where participants were required to supply the missing verb. Instead of 'refrain from alcohol consumption' the most frequent collocation used by the first year students and doctors was 'avoid alcohol consumption' (51.8%, i.e. 57.7%), whereas fifth year students used 'stop alcohol consumption' (19.6%). In place of the target collocation 'change the bandage' first year students most frequently used 'replace the bandage' (19.2%), while the fifth year students (31.5%) and the doctors (30.8%) used the correct collocation. First (8.4%) and fifth year students (9.8%) erroneously used 'appear bedsore' instead of the target collocation 'develop bedsore'. All three groups correctly used the collocation 'take blood samples'. The first year students and the doctors most frequently supplied the correct collocation 'relieve pain', but the most frequent collocation suggested by fifth year students was 'lessen pain' (13.7%). Instead of the collocation 'admit to hospital' the first year students most frequently used 'send to hospital' (7.4%), the fifth year students 'receive to hospital' (25.5%) and the doctors most frequently used the correct collocation. Similarly, doctors most frequently used the correct collocation 'treat the infection', while the first and the fifth year students most frequently used the incorrect collocation 'cure the infection' (19.1%, i.e. 23.5%). The collocation 'suffer injury' did not cause problems for any group. The situation was similar with the collocation 'seek medical attention', with the exception of the first year students who used the collocation 'ask for medical attention' to the same extent. The doctors were the only group who mostly used the collocation 'undergo surgery', while the first year students used 'have surgery' (50%) and

Table 2. Results of the gap-fill task

Target collocation	Croatian translation	Most frequent errors		
		1st year students	5th year students	Doctors
Refrain from/ avoid alcohol consumption	izbjegavati uzimanje alkohola	Stop alcohol consumption	Avoid alcohol consumption	Avoid alcohol consumption
Change the bandage	Promijeniti zavoj	Replace the bandage	Put the bandage	Place the bandage
Develop a bedsore	Dobiti dekubitus	Appear a bedsore	Appear a bedsore	Appear a bedsore
Take blood samples	Uzeti krvni uzorak	Send blood samples	Use blood samples	Send blood samples
Relieve pain	Ublažiti bol	Stop pain	Lessen pain	Reduce pain
Treat the infection	Liječiti infekciju	Stop the infection	Cure the infection	Cure the infection
Sustain/ experience the injury	Pretrpjeti ozljedu	Suffer the injury	Get the injury	Have the injury
Seek medical attention	Tražiti liječničku pomoć	Ask for/find medical attention	Need medical attention	Find medical attention
Undergo/have surgery	Podvrgnuti se kirurškom zahvatu	Have surgery	Have/get surgery	Undergo surgery
Administer/ give penicillin	Dati penicilin	Prescribe penicillin	Prescribe penicillin	
Check/take temperature	Provjeriti temperaturu	Measure temperature	Measure temperature	
Carry out/ perform check-ups	Izvršiti pregled	Do the check up	Do the check up	
Catch/pick up the flu bug	Pokupiti virus gripe	Get the flu bug	Get the flu bug	Contract the flu bug

the fifth year students 'have surgery' or 'get surgery' (15.7%). As for the collocation 'administer/give penicillin' the first and the fifth year students mostly used 'give penicillin' (54.1%). Instead of the collocation 'check/take temperature', the majority of the first and fifth year students used 'measure temperature' (57.7%, i.e. 21.6%). Most doctors used the collocation 'perform checkups' ('carry out checkups' was also possible), while the first and the fifth year students used 'do check-ups' (39.7%, i.e. 23.5%). Also, the doctors used the correct collocation 'catch the flu bug' (30.7%) ('pick up the flu bug' was also possible), while most first and fifth year students used 'get the flu bug' (38.4%, i.e. 31.4%).

Table 3. shows the results of the third task in the test of medical English collocations which required translating collocations into participants' first language from English. Generally, translations presented considerable difficulty to participants. The collocations which were translated equally by all three groups are: 'regain consciousness' (translated as '*došla k svijesti*'), 'go into shock' (translated as '*pasti u šok*'), 'produce pain' (translated as '*izazvati bol*'), 'strain back' (translated as '*istegnuo leđa*'), 'undergo dialysis' ('*podvrgnuti su dijalizi*'), 'develop kidney stone' (translated as '*razviti bubrežni kamenac*'), 'detect a lump' (translated as '*otkrila je kvržicu*'), 'abort migraine headaches' (translated as '*prekinuti migrenske bolove*').

The collocations which were translated differently by students and doctors were: 'induce writing' (translated by 35.4% of first year students and 54.9% of fifth year students as '*potaknuti povraćanje*' and the doctors as '*izazvati povraćanje*'), 'extend survival' (translated by students as '*produžiti život*' and by the doctors as '*preživljenje*'), 'impair memory' (translated by 23.5% of first year students and 21.6% of fifth year students as '*oštetiti memoriju*' and by 46.2% doctors as '*oštetiti pamćenje*'), 'relieve nausea' (translated by 18.9% of first year students and 23.5% of fifth year students as '*olakšavati mučninu*'), 'speed the onset' (translated by of 24.6% first year students and 19.6% of fifth year students as '*ubrzati*' and by 23.1% of doctors as '*ubrzati početak*').

Some collocations were translated in the same way by the fifth year students and doctors and completely differently by the first year students. They are as follows: 'suppress inflammation' (translated by the first year students as '*sprečavaju upalu*' (20.9%) and by the fifth year students (33.3%) and the doctors (30.8%) as '*smanjuje upalu*').

The collocation which was the most difficult one and which was translated differently by each group was 'eradicate infections' (translated by 22% of first year students as '*protiv infekcija*', 17.8% of fifth year students as '*za eradikaciju infekcije*' and 38.5% of doctors as '*iskorijenjivanju infekcije*').

Table 3. Translation from English into Croatian

Collocation	Croatian translation	Most frequent translations into croatian		
		1st year students	5th year students	Doctors
regain consciousness	Doći k svijesti/ povratiti svijest	osvijestiti	osvijestiti	Probuditi iz kome
Induce vomiting	Izazvati/inducirati povraćanje	Potaknuti povraćanje	Potaknuti povraćanje	Isprovocirati povraćanje
Go into shock	Pasti u šok	Doživjeti šok	Otići u šok	Upasti u šok
Extend survival	Produžiti život	Produžiti preživljavanje	Produžiti preživljenje	Produžiti preživljenje
Produce pain	Izazvati/ prouzrokovati bol	Proizvesti bol	Potaknuti bol	Producirati bol
Strain the back	Istegnuti leđa	Ozlijediti leđa	Ukočiti leđa	Nategnuti leđa
Eradicate infections	Iskorijeniti/istrijebiti infekcije	Protiv infekcija	Ukloniti infekcije	Eradicirati infekcije
Suppress inflammation	Suzbijati/potiskivati upalu	Sprječavati upalu	Smanjiti upalu	Smanjiti upalu
Undergo dialysis	Podvrgnuti se dijalizi/ići na dijalizu	Podliježu dijalizu	Biti na dijalizi	Dijalizirati se
Develop kidney stone	Dobiti bubrežne kamence/oboljeti od bubrežnih kamenaca	Razviti bubrežene kamence	Razviti bubrežni kamenac	Razviti bubrežni kamenac
Detect a lump	Otkriti/detektirati kvržicu	Osjetiti kvržicu	Napipati kvržicu	Napipati kvržicu
Impair memory	Pogoršati pamćenje/ štetno utjecati na pamćenje	Oštetiti memoriju	Oštetiti memoriju	Oštetiti pamćenje
Abort migraine headaches	Zaustaviti migrenske glavobolje	Prekinuti migrenske bolove	Prekinuti migrenske bolove	Prekinuti migrenske bolove
Relieve nausea	Ublažiti/olakšati mučninu	Oslobađati od mučnine	Smanjiti mučninu	Oslobađati od mučnine
Speed the onset	Ubrzati pojavu/ početak/javljanje	ubrzati	ubrzati	Ubrzati razvoj

Table 4. Translation from Croatian into English

Target collocation	Croatian translation	Most frequent errors		
		1st year students	5th year students	Doctors
Tolerate a drug	Podnositi lijek	Respond well to medicine	Respond well to medication	Have a good drug tolerance
Catch a cold	Prehladiti se	Get cold	Get cold	Get cold
Detect a cancer	Otkriti rak	Discover a cancer	Discover a cancer	Screen cancer
Cleanse/ clean the wound	Očistiti ranu	Disinfect the wound	———	Irrigate/debride the wound
Transmit a disease	Prenositi bolest	Transfer a disease	Transfer a disease	Transfer a disease
Get/develop symptoms	Dobiti simptome	Have symptoms	Have symptoms	Have symptoms
Identify antibodies	Utvrditi antitijela	Determine antibodies	Determine antibodies	Determine antibodies
Ease/relieve anxiety	Ublažiti tjeskobu	Suppress anxiety	Mitigate anxiety	Lessen anxiety
Enhance/ increase the appetite	Povećati apetit	Enlarge the appetite	Boost the appetite	Improve/gain/ induce
Precipitate the attack	Pospješiti napad	Induce the attack	Trigger the attack	Induce the attack
Suppress a cough	Suzbiti kašalj	Stop cough	Sustain cough	Abort cough
Produce/ cause discomfort	Izazvati nelagodu	Cause discomfort/ uncomfortability	Cause discomfort/ uncomfortability	Induce discomfort
Trigger disease	Potaknuti bolesti	Cause diseases	Provoke disease	Induce disease
Admit to hospital	Primiti u bolnicu	Take in the hospital	Administer to hospital	Accept to hospital
Produce / cause improvement	Izazvati poboljšanje	Make improvement	Lead to improvement	Make improvement

The translation into English proved to be the most difficult task. The easiest collocation was 'suppress a cough' which caused no problems with any group. All the groups used the collocation 'get a cold' instead of 'catch a cold' which was familiar to 37.2% of the first year students, 27.5% of the fifth year students and 53.8% of doctors. The first and the fifth year students translated '*očistiti ranu*' using the collocation 'clean the wound' instead of the target collocation 'cleanse the wound'. The doctors also used two collocations that no other group used and these were 'irrigate the wound' and 'debride the wound'. No group used the collocation 'identify antibodies' and they most frequently used the collocation 'determine antibodies'. Also, the collocation 'detect a cancer' was familiar to all the groups, but the most frequent error made by first and fifth year students was 'discover cancer' and by doctors 'screen cancer'. The first year students most frequently translated '*prenositi bolesti*' as 'transfer illness' or 'spread disease' and the expected collocation 'transmit disease' was in the third place. The situation is opposite with the fifth year students and the doctors – the most frequent collocation is 'transmit disease': even 88.5% of the doctors used this collocation. The first and the fifth year students translated the collocation '*dobiti simptome*' as 'get symptoms' while the one expected second, 'develop systems', was in the fifth place. The doctors used both collocations in the same percentage. As for the collocation 'ease/relieve anxiety', only the first year students used the former collocation, but the majority used the latter one. Other groups used only 'relieve anxiety'. The most frequent mistake made by the first year students was 'reduce anxiety' and by the fifth year students and doctors 'mitigate anxiety'. The doctors also frequently used 'lessen anxiety'. Only a small percentage of the doctors used the collocation 'enhance the appetite' while the others, including both student groups, used 'increase the appetite'. Most doctors (23.1%) used the collocation 'produce/cause discomfort', while the first and the fifth year students had problems with the noun and instead of it they used 'unease, illness, stress, problems' and the fifth year students used 'uncomfort' and 'uncomfortability'. A small number of subjects were familiar with the collocation 'trigger disease'. The first year students and the doctors most frequently used 'induce disease/illness' and the fifth year students 'provoke disease' also. The fifth year students and the doctors most frequently used the correct collocation 'admit to hospital', while the first year students most frequently used 'take in hospital' or 'receive in hospital'. None of the groups used the collocation 'produce improvement' which very frequently occurred in the corpus. The first year students and the doctors most frequently used 'cause improvement' or 'make improvement' and the fifth year students 'lead to improvement'.

The most difficult collocations were 'tolerate a drug' and 'precipitate the attack'. The former was familiar to only 10.1% of the first year students and 19.6% of the fifth

year students, but 73.1% of doctors had no problems with it. The first year students most frequently used the wrong collocation 'takes well to medicine' (29%), the fifth year students 'responds well to medication' (13.7%) and the doctors used the collocation variant 'have a good drug tolerance' (7.7%). Instead of 'precipitate the attack' the first year students and the doctors most frequently used 'induce the attack' and the fifth year students 'trigger the attack'. The doctors also used 'generate, potentiate, accentuate the attack'.

As the above analysis of the erroneous use of collocations has shown, non-native users' collocational competence is rather limited. There are two types of strategies that participants in this study recurrently opted for to compensate for that lack of knowledge: the first is the literal translation of the collocations from their first language, and the second is approximation, i.e. the use of a near-synonym (e.g. the literal translation of '*povećati*' as 'enlarge' in the collocation '*povećati apetit*' and a near synonym 'accept' instead of 'admit' in the collocation 'admit to hospital').

The second and third research questions addressed a) participants' level of collocational competence, and b) potential differences in the level of collocational competence between beginner users of medical English (1st year students) and more proficient users of medical English (5th year students and doctors). Table 5 shows the results of the descriptive statistics for overall collocational competence. Since the average score is 27.22 (SD=8.52) for the whole sample, it may be concluded that overall collocational competence is quite low. Compared to students, doctors seem to have a higher level of knowledge (M=34.42, SD=6.98).

Table 5.: Overall collocational competence (descriptive statistics)

	n	min	max	mode	mean	SD
1st year Ss	50	10	40	26	25.94	7.44
5th year Ss	51	9	43	19	24.80	8.35
Doctors	26	21	47	41	34.42	6.98
total	127	9	47	26	27.22	8.52

In the next step, receptive, receptive-productive and productive collocational knowledge was analysed separately. The results in table 6. refer to the receptive knowledge, those in table 7. to the receptive-productive, and those in table 8. to the productive knowledge.

Table 6: Receptive knowledge of collocations (descriptives)

	n	min	max	Mode	mean	SD
1st year Ss	50	5	13	10	9.48	2.05
5th year Ss	51	6	14	10	10.84	1.87
Doctors	26	4	15	8	10.30	2.81
total	127	4	15	10	10.20	2.23

Table 7.: Receptive-productive knowledge (descriptives)

	n	min	max	Mode	mean	SD
1st year Ss	50	2	12	7	6.7	2.28
5th year Ss	51	0	13	9	7.37	3.21
Doctors	26	5	13	9	9.76	1.98
total	127	0	13	7	7.6	2.86

Table 8.: Productive knowledge of collocations (descriptives)

	n	min	max	mode	mean	SD
1st year Ss	50	0.5	9.5	5.5	4.88	2.07
5th year Ss	51	0	9	0	3.29	2.63
Doctors	26	4	11.5	5.5	7.17	2.03
total	127	0	11.5	5.5	4.70	2.70

It is no surprise that participants demonstrated better receptive knowledge and that the lowest level of knowledge was achieved at the productive level. At the level of receptive knowledge, there does not seem to be a great difference between the participant groups. However, at the receptive-productive and productive knowledge, doctors showed higher levels of knowledge than both groups of students. This can be attributed to the fact that doctors' exposure to medical English is much longer and probably more intensive than that of medical students and that reading and writing professional papers in English is part of their professional life.

In order to explore whether the observed differences between the levels of knowledge as well as between the three groups of participants are statistically significant, a one-way analysis of variance with post-hoc comparisons using the Tukey HSD test was carried out. As table 9. shows, there were statistically significant differences at the $p<.01$ level in

test scores for all participants groups. Post-hoc comparisons (cf. table 10.) indicated that the means score for doctors was significantly higher than those of both groups of students at all knowledge levels, except for the receptive. The mean scores for fifth year students were significantly different from 1st year students at the receptive and productive levels of knowledge. Fifth year students outperformed first year students on the receptive task, but the results were the opposite on the productive task.

Table 9.: Differences between levels of knowledge (ANOVA)

		Sum of squares	df	Mean square	F	Sig.
Overall	Between groups	1728.621	2	864.311	14.430	.000
	Within groups	7427.205	124	59.897		
	Total	9155.827	126			
Receptive	Between groups	47.315	2	23.658	5.069	.008
	Within groups	578.764	124	4.667		
	Between groups	626.079	126			
Rec/Prod	Between groups	165.483	2	82.741	11.779	.000
	Within groups	871.037	124	7.024		
	Between groups	1036.520	126			
Productive	Between groups	261.420	2	130.710	24.508	.000
	Within groups	661.339	124	5.333		
	Between groups	922.760	126			

*Table 10.: Post-hoc comparison for levels of knowledge**

Variable			Mean.diff.	St. error	Sig.
Overall competence	Doctor	1st year	8.48308	1.87127	.000
		5th year	9.61916	1.86499	.000
Receptive	5th year	1st year	1.36314	.42996	.005
Receptive/ Productive	doctor	1st year	3.06923	.64083	.000
		5th year	2.39668	.63868	.001
Productive	doctor	1st year	2.29308	.55839	.000
		5th year	3.87896	.55651	.000
	5th year	1st year	-1.58588	.45961	.002

* only significant differences are shown
The mean difference is significant at the 0.05 level

Conclusion

This paper dealt with verb collocations in medical English. Their significance is manifested in the fact that they represent the connection between words on one side and the text on the other. The collocational competence of 127 subjects belonging to three different groups of non-native users of medical English was tested by means of four types of tasks targeting both their receptive and productive knowledge. The results confirmed that collocations are indeed a problematic area for non-native users of medical English. The analysis of erroneous use of collocations showed two major trends: the first is a heavy reliance on the first language and the second is the use of approximation. However, the comparison of collocational competence across the three groups of participants indicates that continuous exposure to and active use of medical English increases the knowledge of collocations.

Finally, the results of the study bear important implications for teaching medical English collocations. Taking into consideration the importance of collocations on the one hand and the fact that they are one of the most difficult areas for non-native users on the other, it seems safe to conclude that the approach to teaching collocations needs to be more systematic as well as anchored in research. The present study, for example, is a contribution towards that end. It pinpointed potential problematic areas, and if it is known which types of collocations are likely to cause problems at a certain level, teachers can introduce such collocations gradually in order to facilitate the development of students' collocational competence. In addition, medical students, doctors, nurses, translators as well as other non-native users of medical English would undoubtedly benefit from a good specialist dictionary or a glossary of medical collocations where such problematic collocations would be highlighted.

REFERENCES

1. Aghbar, A.A. (1990). *Fixed expressions in written texts: Implications for assessing writing sophistication.* Paper presented at a Meeting of the English Association of Pennsylvania State System Universities, October 1990.
2. Aghbar, A.A. & Tang, H. (1991). *Partial credit scoring of cloze-type items.* Paper presented at the 1991 Language Testing Research Colloquium, Educational Testing Service, Princeton, N.J., 1-24.
3. Arnaud, P.J.L. & Savignon, S.S. (1994). 'Rare words, complex lexical units and the advanced learner'. In J. Coady & T. Huckin (eds.), *Second language vocabulary acquisition: A rationale for pedagogy.* Cambridge: Cambridge University Press
4. Bahns, J. & Eldaw, M. (1993). 'Should we teach EFL students collocations?', *System,* 21 (1), 104-114.

5. Benson, M. (1989) "The Collocational Dictionary and the Advanced Learner", in Tickoo, M.L. (ed.) *Learner's Dictionaries: State of the Art* Singapore; SEAMO Regional Language Centre, 84-93
6. Channell, J. (1981). Applying semantic theory to vocabulary teaching. *English Language Teaching Journal,* 35, 115-122.
7. Cruse, D.A. (1986). *Lexical Semantics,* Cambridge: Cambridge University Press.
8. Elkhatib, A.S.A. (1984). *A Classification of the lexical problems of EFL/ESL students.* New York, U.S., Reports – Research/Technical
9. Fayez-Hussein, R. (1990). 'Collocations: The missing link in vocabulary acquisition amongst EFL learners'. In J.Fisiak (Ed.), *Papers and studies in contrastive linguistics: The Polish English contrastive project, 26*, (pp. 123-136). Poznan: Adam Mickiewicz University
10. Firth, J.R. (1957) *Papers in Linguistics 1934-1951.* Oxford: Oxford University Press.
11. Francis, G. (1993). 'A Corpus-Driven Approach to Grammar.' in Baker et al. (eds.) *Text and Technology* Amsterdam: John Benjamins
12. Ghadessy, M. (1989). 'The use of vocabulary and collocations in the writing of primary school students in Singapore'. In P. Nation & R. Carter (Eds.) *Vocabulary acquisition,* (pp. 110-117), *AILA Review,* No.6.
13. Gitsaki, C. (1999). *Second Language Lexical Acquisition. A study of the Development of Collocational Knowledge.* San Francisco: International Scholars Publications.
14. Gledhill, Christopher J. (2000). *Collocations in Science Writing,* Tübingen: Günter Narr Verlag.
15. Halliday, M.A.K. (1985) *Introduction to Functional Grammar*, London: Edward Arnold.
16. Hill, J. (1999). 'Collocational Competence', ETP April 1999 Issue 11, pp. 4-7.
17. Hoey, M. (1991). *Patterns of Lexis in Text* Oxford: Oxford University Press.
18. Howarth, P. (1996). *Phraseology in English Academic Writing. Some Implications for Language Learning and Dictionary Making.* Tübingen: Max Niemeyer Verlag.
19. Hunston, S. (2002) *Corpora in Applied Linguistics.* Cambridge: Cambridge University.
20. James, C. (1998). *Errors in Language Learning and Use: Exploring Error Analysis.* Harlow: Pearson.
21. Lewis, M. (1993). *The Lexical Approach.* London: Language Teaching Publications.
22. Miščin, E. (2012). *Glagolske kolokacije u engleskome jeziku medicinske struke.* Neobjavljena doktorska disertacija. Osijek: Filozofski fakultet.
23. Moon, R. (1987). 'The analysis of meaning' in J. M. Sinclair (ed.) *Looking Up: An Account of the Collins COBUILD Project*, London: Collins ELT.
24. Moon, R. (1998) *Fixed Expressions and Idioms in English*, Oxford: Clarendon Press.
25. Nattinger, James R., & DeCarrico S. Jeanette (1992). *Lexical Phrases and Language Teaching*, Oxford: Oxford University Press.
26. Omazić, Marija (2003). *Modifications of Phraseological Units in English. Unpublished doctoral dissertation,* Zagreb: Filozofski fakultet u Zagrebu.
27. Phillips, M. (1985). *Aspects of Text Structure: An Investigation of the Lexical Organization of Text*. Amsterdam: Elsevier NHL Series.
28. Sinclair, J. (1991). *Corpus, Concordance, Collocation,* Oxford: Oxford University Press.
29. Špiranec I. 'Priroda i upotreba kolokacija: Primjeri iz tehničkoga engleskoga jezika'. *Strani jezici*. 2005; 34(3): 219-27.
30. Štefić, L. et. al. (2010), 'Kolokacije u jeziku stomatologije: primjeri iz oralne medicine' *Acta Stomatologica Croatica,* Zagreb, 2010: 44(3), 176-187.
31. Woolard, G. (2000). Collocation – encouraging learner independence. *Teaching Collocation. Further developments in the lexical approach.* Ed. by M. Lewis, 28-46. Hove: Language Teaching Publications.
32. Zhang, X. (1993), *English collocations and their effect on the writing of native and non-native college freshmen.* Unpublished Ph.D. Thesis, Indiana University of Pennsylvania.

Appendix 1 - Test

Sex:_____ Town you come from: _____

Years of learning English: _____

I Circle the correct answer:

1. She is _____ well to treatment.
a) responding b) answering c) recovering

2. He _____ a new kidney from his brother.
a) had b) received c) obtained

3. Playing football only _____ his knee injury.
a) impaired b) deteriorated c) aggravated

4. The doctors _____ the patient's hip.
a) changed b) replaced c) exchanged

5. Some people want and need to _____ weight.
a) get b) gain c) grow

6. My uncle _____ malaria when he was working in Africa.
a) contracted b) obtained c) received

7. The doctor _____ the diagnosis of heart failure.
a) performed b) did c) established

8. The ability to _____ pain may change with age.
a) suffer b) tolerate c) experience

9. Each doctor will _____ physical examination in different orders.
a) do b) make c) perform

10. The authors recommend a wide range of foods to _____ physical fitness.
a) maintain b) hold c) sustain

11. Similar procedures may be used to _____ a person's prognosis after a heart attack.
a) predict b) foresee c) determine

12. The doctor _____ the pulse in arteries in the neck, beneath the arms…
a) feels c) touches c) tests

13. Antacids _____ relief more quickly than H2 blockers.
a) give b) offer c) provide

14. Respirators can _____ some risk for people with heart or lung ailments.
a) represent b) show b) pose

15. Steam inhalation can effectively _____ secretion.
a) weaken b) loosen c) lessen

II Put the verbs in the gaps:

1. When you are pregnant you should _____ alcohol consumption.
2. The bandage should be _____ regularly.
3. A bedsore can _____ in hours and may take months to heal.
4. Each time you give blood a doctor _____ blood samples for safety tests in the labs.
5. The electrocardiogram (ECG) is an important and sometimes central tool used to _____ the diagnosis of myocardial ischemia.
6. NSAIDs are often used to _____ headache pain.
7. The patient was _____ to hospital due to terrible injury.
8. Antibiotics are used to _____ infection.
9. He has _____ severe head injury.
10. If you experience a severe allergic reaction e.g. with breathing difficulty _____ medical attention urgently.
11. Tony Snow will _____ surgery on Monday to remove a small growth.

12. The doctor will ____ penicillin or other antibiotics by pill or by injection.
13. The task of a nurse is also to _____ a patient's temperature.
14. Health visitors visit families to _____ check-ups on young children.
15. I think I've _____the flu bug that's going round.

III Translate into Croatian. Pay special attention to underlined words:

1. The victim regained consciousness after 2 months of coma.

_____

2. You should induce vomiting.

_____

3. A person can quickly go into shock and die because of internal bleeding.

_____

4. Chemotherapy can sometimes extend survival to 8 months.

_____

5. Deep breathing may produce pain.

_____

6. He strained his back lifting the table.

_____

7. Treatment is directed against eradicating infections.

_____

8. Glucocorticoids suppress inflammation in the human placenta.

_____

9. Over two hundred thousand Americans undergo kidney dialysis.

_____

10. There is a higher percentage for men to develop kidney stone than women.

_____

11. She detected a lump in her left breast.

_____

12. Smoking in midlife may impair memory.

_____

13. Some medications can abort migraine headaches.

_____

14. Vomiting relieves nausea right away.

_____

15. Alcohol can speed the onset of hypothermia.

_____

IV Translate into English. Pay special attention to underlined words:

1. Dobro podnosi lijek.

_____

2. Noge su mi bile mokre, pa sam se prehladila.

_____

3. Mamografija se koristi za otkrivanje raka dojke.

_____

4. Ranu treba dobro očistiti.

_____

5. Komarci mogu prenositi bolesti.

_____

6. Neki ljudi dobiju simptome kao djeca.

_____

7. Krvni testovi utvrđuju određena antitijela.

_____

8. Obično se daje sedativ za ublažavanje tjeskobe.

_____

9. Lijekovi mogu povećati apetit.

_____

10. Emocionalni stress često pospješuje napad.

_____

11. Antitusici suzbijaju kašalj.

_____

12. Dim može izazvati nelagodu respiratornog sustava.

_____

13. Stres može potaknuti različite bolesti.

_____

14. Primljen je u bolnicu zbog ozbiljne ozljede.

_____

15. Ovi lijekovi mogu dovesti do poboljšanja za nekoliko mjeseci.

_____

Višnja Pavičić Takač, Evelina Miščin

Analiza kolokacijske kompetencije neizvornih korisnika engleskog jezika medicine

SAŽETAK

Nalazi dosadašnjih istraživanja kolokacija naglašavaju važnost kolokacija kao supojavljivanja i rekurencije. Značajan doprinos eksplikaciji pojma kolokacija dale su spoznaje primijenjenih lingvista koji su istraživali usvajanje kolokacija kod učenika stranih jezika. Međutim, rijetka su istraživanja kolokacija u prirodnim znanostima.

Naše se istraživanje bavi leksemima engleskoga jezika medicinske struke i njihovim glagolskim kolokatima. Kolokacije se promatraju u uzajamnom djelovanju sintagmatskih i paradigmatskih odnosa koje kolokacijski članovi ostvaruju s drugim dijelovima leksika. Težište je na uzlaznim kolokacijama (kolokat i čvor). Cilj je istraživanja analizirati razinu kolokacijske kompetencije neizvornih korisnika engleskoga jezika medicine kako bi se rasvijetlili aspekti glagolskih kolokacija koji zahtijevaju poseban pristup pri poučavanju jezika medicine.

Ključne riječi: kolokacije, kolokacijska kompetencija, medicinski engleski, greške, produktivno znanje