

Analysis of information on rheumatology from a selected Internet forum in the context of the need for telemedicine solutions

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Abstract

Objectives: The aim of this study was to determine how often patients and undiagnosed people who complain of musculoskeletal system and rheumatic diseases look for knowledge contained on an Internet forum. Content analysis was used to identify the level of Internet users' activity in the rheumatology section, compared to other areas of medicine.

Material and methods: Material included information posted on the Internet forum established at <http://medycza.pl/>. The method employed was a quantitative and qualitative analysis of the content. The method was based on qualitative assessment of the first post in each thread presented on the rheumatologic subforum, by assigning keywords, subjectively determined by the researcher, to such a post. For each keyword a specific definition was established, determining a situation in which a given keyword was used.

Results: The quantitative analysis qualified rheumatology in the last place in terms of Internet users' activity compared to other branches of medicine. The qualitative assessment of the rheumatologic forum indicated that the three most common keywords were *joint pain* (32), *joints swelling* (13), and *schoolage* (13). The three most common intentional keywords (arranged in order of their decreasing number) were *diagnosis based on symptoms* (29), *interpretation of the laboratory test results* (9), and *how to deal with symptoms* (8).

Conclusions: The analysis leads to the conclusion that the rheumatologic subforum, along with other subforums listed above, presents a critically low level of discussion. There is a large disproportion between the number of active and passive forum users, suggesting that numerous individuals search the forum for presented information. Based on the qualitative analysis of the information stocks of the rheumatologic subforum, it was established that most of the questions posted concerned young individuals, who complained of joint pain and swelling, and asked for a possible diagnosis based on the presented symptomatology, interpretation of the laboratory test results and alleviation of disease symptoms.

Key words: internet forum, rheumatology, content analysis, telemedicine.

Introduction

Communication constitutes a key element of achieving success in any field of activity, especially in the field of therapeutic practice – that is, the area of health care, in which an oversight, misunderstanding or delay in the

circulation of the information may lead to catastrophic effects for human health and life [1, 2]. The literature emphasizes the immense potential of telemedicine, which undoubtedly has the ability to strengthen communication in the field of health care [3–6]. Still, such

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solutions raise doubts of an ethical, legal and practical nature [5].

The authors of the present paper performed research aiming to identify whether patients' demand for telemedical solutions, such as Internet counseling, exists. The research employed the content analysis method [7, 8] to the Internet forum, to identify whether potential rheumatologic patients or their relatives search the forum for information related to the state of their health (diagnosis, therapeutic methods, etc.) or they rather employ the forum in the social context (emotional discharge, sharing day-to-day problems, etc.). Obviously, common sense suggests that the information concerning the state of health should be, in the first place, obtained from a health professional and not from an Internet forum, where it is impossible to verify who provides advice. Yet, as the research performed by Gemius and Polskie Badania Internetu [9] reveals, if patients want to learn more on the issues of health, diseases or ailment treatment, most commonly they obtain the information from the Internet. It has to be noted that obtaining reliable, professional advice in this way is not always possible. From the perspective of public health, it would be therefore beneficial to establish a professional replacement in the place of the Internet forum, providing information on health and illness. Instead of utilizing "information noise" prevailing at the Internet forums, resulting in difficulty in selecting reliable and valuable information, it would be better to enable patients to take advantage of telemedicine solutions, provided that a high level of interest from various groups of stakeholders, including patients, exists. Analyzing the activity on the Internet forum and its character, the authors investigated whether present or future rheumatologic patients express, directly or indirectly, a need for virtual access to professional medical information.

Aim of the study

The aim of this study was to determine how often patients and undiagnosed individuals complaining of musculoskeletal system ailments and rheumatic diseases look for the knowledge contained in the internet forum resources. The researchers attempted to determine whether the evidence of such a search for knowledge might indicate a need for professional advice from experts in the field of rheumatology rendered via the Internet. This study was designed to assess the extent to which telemedicine solutions in practice could prove useful in helping patients to proceed further on the diagnostic path. Content analysis was used to: 1) identify the level of Internet users' activity in the rheumatology

section, compared to sections concerning other areas of medicine and 2) establish subjects presented in the rheumatology section of the forum.

Material and methods

The analyzed material included information posted on the Internet forum [10] established at <http://medycza.pl/> as of September 20th, 2014. The method employed was a quantitative and qualitative analysis of the content [7, 8]. The level of interest of Internet users concerning rheumatologic subjects, compared to the subjects concerning other areas of medicine, was evaluated using the number of discussion threads (t) and posts (p) in the sections of the respective sections of the Internet forum. In addition, the number of posts per single thread (p/t) was determined. Introduction of this parameter enabled it to be established whether the number of posts concerning each subject results from the high user activity within the formed threads or from the sheer number of threads that have never been developed (equivalent to a lack of discussion). The determination of the thematic scope of the presented content was achieved by way of a qualitative assessment of the first post in each thread presented on the rheumatologic subforum, by assigning keywords, subjectively determined by the researcher, to such a post. Researchers established for each keyword an interpretation of meaning which determined a situation in which a given keyword was used. Keywords were divided into two categories, based on the subject of the post (subjective keyword) and the probable intention of the post's author (intentional keyword).

The age of individuals publishing posts on the forum was determined whenever it was explicitly specified in the post or the description in the post indicated the age of the person. For a description indicating students, the term *school age* (up to 26 years of age) was assigned. The description *old person* (the age of 65 years or more) was assigned to persons identifying themselves as elderly or – grandfather/grandmother – *old person*. The description *adulthood* was assigned for individuals of age above 26 and below 65. If it was not possible to determine the person's age, no age description was attributed. The creation of the keywords consisted in explorative coding (a categorization formula was formed from the keywords, in the course of the assessment of the study material). The qualitative assessment was initially performed by one researcher, and then by another, who, based on the keywords established by the first researcher, assigned the keywords to the first post in each of the discussion threads. Such a method was used in order to assess the accuracy of the categorization formula. The degree of similarity of the second re-

searcher's qualitative assessment to the one performed by the first researcher was 91%. As it was possible for some of the threads, accidentally or due to the lack of the user's knowledge, to be placed erroneously in the rheumatologic section, in spite of their subject having no connection to rheumatology – the additional qualitative evaluation consisted in classification of each thread as thematically related or not to rheumatology (e.g. type of the illness described in the thread pointed to a condition of "cardiologic nature"). If the qualitative assessment led to the classification of the post as other than "rheumatologic", no keywords were assigned to that post, as the research concentrated on the rheumatologic subjects exclusively. The qualitative analysis was performed using Microsoft Excel 2010. Exclusively descriptive statistics were used.

Results

The qualitative assessment of the rheumatologic forum enabled the creation of the categorization formula consisting of 55 keywords divided into two categories: intentional and subjective keywords (Table I).

The quantitative analysis qualified rheumatology in the last place in terms of Internet users' activity (measured as the number of posts) compared to other areas of medicine. Meanwhile Internet users' activity on the forum, measured as the number of posts on each thread, was comparable to that concerning laryngology, ophthalmology, urology, neurology, surgery, gastrology, psychiatry and dermatology. Five-fold higher activity (measured as the number of posts per thread), compared to the fields described above, was noted in fields such as oncology, cardiology, allergology, pediatrics, and gynecology. Below, the details of the activity of the Internet users (arranged in order of increasing number of posts) in the different areas of the researched forum are presented in Table II.

The quantitative analysis of the content was also applied to the new data emerging in the process of qualitative content analysis – to the keywords themselves. The qualitative analysis concerned the first posts in 70 threads, with keywords assigned to 55, which were assessed as related to rheumatology (Table III).

The number of all keywords assigned to the posts starting a thread was 218. The mean number of keywords per thread was 3.963, that is almost 4 keywords per first post in a thread. Three most common keywords (arranged in order of their decreasing number) were: *joint pain* (32), *joints swelling* (13), and *schoolage* (13). Three most common intentional keywords (arranged in the order of their decreasing number) are: *diagnosis based on symptoms* (29), *interpretation of laboratory tests* (9), and *how to deal with symptoms* (8).

Discussion

The review of the present scientific literature (researched via PubMed) yielded no data on research concerning the subject of our work and methodology employed by us. The only work that we can relate to is our own article [11], which – unlike our present work – did not concern a specific form of information exchange constituted by the Internet forum. The subject of referred paper concerned mass media, making it impossible to make a comparison between the results of the research described in both articles. Therefore the discussion in our present paper takes the form of critical elaboration or authors' commentary on the presented results. Internet users' activity (measured as the number of posts) on the rheumatology subforum (thematic section), compared to other subforums, presents decisively the lowest level and differs profoundly from the activity on the remaining subforums concerning other medical specialties.

Posts of the rheumatologic subforum constitute only 0.03% of the overall number of all posts on the studied forum, with subforums of other specialties constituting respectively from 4.17% to 4.98% of all posts, with the exception of the gynecology subforum, which accounts for 42.05% of all posts. Yet, the analysis of the number of posts separately from other statistical data produces a distorted picture of the real situation. Therefore, it is vital to pay attention to the number of posts on each of the threads. Analysis of this parameter is justified primarily because of the various epidemiology of different diseases. Some conditions are more common in the overall population, yielding diverse interest from patients. In such a situation, the number of posts per thread (p/t) can be very helpful, as it reveals whether a large overall number of posts is a result of the high activity within threads (which points to an intense exchange of views/observations/thoughts) or of a large number of new threads that were never expanded by consecutive users into a discussion. With a discussion being the essence of the forum, in its absence the existence of the forum loses its fundamental value.

Analysis of the number of posts per thread reveals that for rheumatologic, laryngological, ophthalmologic, urologic, neurologic, surgical, gastrological, psychiatric, and dermatologic subforums this parameter shows low values from 1.95 to 2.33. This means that for every started thread, on average two posts are produced, including the one that started the thread. This leads to the conclusion that the rheumatologic subforum, along with other above-listed subforums, presents a critically low level of discussion; each question posted produces, on average, one response. A high level of discussion is observed for the oncologic, endocrinological, cardiologic, allergologi-

Table I. List of keywords with their established meaning

Total number of key-words	Name of keyword	Established meaning of keyword	Name of keyword	Established meaning of keyword	Total number of key-words
32	arthralgias	arthralgia / arthritis regardless of the location and nature of the pain*	hormonal replacement therapy (HRT)	information in the post that replacement therapy could be responsible for the pain relief*	1
29	diagnosis based on symptoms	signs / symptom presented, with a subsequent request for identifying the condition based on those symptoms*	erythema multiforme (EM)	affected person diagnosed or being diagnosed with erythema multiforme*	1
13	joints swelling	a post includes term “swollen”, “edematous”, e.g. fingers, knee – regardless of which joint has been described*	atopic dermatitis	affected person suffering from atopic dermatitis*	1
13	school age	symptoms indicate that the person affected is of broadly defined school age (junior high, high school, college) or the indicated age of such a person does not exceed 26 years*	fibromyalgia	affected person diagnosed or being diagnosed with fibromyalgia*	1
9	interpretation of laboratory tests	the post concerns indirectly/directly the interpretation of laboratory test results*	intervertebral discs and sciatica of the shoulder	terms “discopathy” and/or “sciatica shoulder” used in the context of diagnosis or initial diagnosis*	1
8	muscle pain	the post indicates a person complaining of muscle pain, regardless of the location*	scleroderma	affected person diagnosed or being diagnosed with scleroderma*	1
8	back pain	terms “neck pain” and “back pain” used*	burning bones	term “burning bones” used*	1
7	adulthood	age in the range above 26 years and below 60 years*	warping bones	term “buckling/dial bones” used*	1
6	rheumatoid arthritis	term “RA” or “rheumatoid arthritis” or “rheumatic arthritis” used*	chondromalacia of the patella	term “chondromalacia of patella” used in the context of diagnosis or initial diagnosis*	1
6	rehabilitation	“rehabilitation” used in the context of withdrawal / alleviation of existing pain / swelling*	numbness of the upper limb	term “upper limb numbness” used*	1
6	morning stiffness	the term “morning stiffness” used*	stiffening of joints	term “stiffness” or “numb joints” used*	1
5	gout	gout diagnosed or being diagnosed*	psoriatic arthritis	affected person diagnosed or being diagnosed with psoriatic arthritis*	1
3	interpretation of imaging examination	the post concerns help in the interpretation of imaging examination (X-ray, ultrasound, etc.)*	jumped bones	term “jumped bones” used*	1
3	pregnancy	the person affected by symptoms / diseases is in the period of pregnancy, childbirth, or plans to become pregnant in the near future*	surgery (questions concerning risk of)	a request for a surgery risk assessment, its legitimacy or possible complications*	1

Table I. Cont.

Total number of keywords	Name of keyword	Established meaning of keyword	Name of keyword	Established meaning of keyword	Total number of keywords
2	muscle weakness	In the post the term "muscle weakness" is used*	seronegative arthritis	term "seronegative arthritis", used in context of diagnosis or suspicion*	1
2	osteoarthritis (OA)	information about diagnosed or suspected OA*	rashes and lesions	term "spots" used regardless of the location of the lesion*	1
2	jolting bones	In the post the term "jolting bones" is used*	frequent infections	affected person described as subject to frequent infections*	1
2	lupus erythematosus (SLE)	the term "lupus" is used in the context of the disease diagnosed/being diagnosed*	pharmacological treatment	relation on drugs used in rheumatological disease*	1
2	juvenile idiopathic arthritis (JIA)	the term "juvenile idiopathic arthritis" is used*	how to deal with the symptoms	the post concerns a question of how to deal with stated complaints**	8
2	chlamydia	statement that the person believes that the cause of her ailment is chlamydia and/or is being diagnosed in this direction; or the infection was confirmed*	"seeking good specialist"	a post concerning the search for "good"/"trusted" doctor, a request for the recommendation of a physician/health facility; also posts suggesting indirectly the need to find a "tried and tested" medical doctor**	7
1	stinging pain	in a post the nature of pain is described as "stinging"*	educational materials and information about the disease	first post is to gather information on any disease entity or actions allowed/disallowed in a particular disease entity**	7
1	rheumatoid factor	the post concerns exclusively RF issues*	marijuana	the person declares taking marijuana*	1
1	urethritis	term "urethritis" used*	diagnostics	query about how to diagnose the disease or symptoms of the underlying disease to distinguish from other possible causes**	
1	reactive arthritis (ReA)	term "reactive arthritis" used in the context of affected person diagnosed/being diagnosed for ReA*	doubts concerning the diagnosis	the post contains questions suggesting doubts about the correctness of medical diagnosis or explicitly expresses such doubts**	2
1	cervical myelopathy	affected person diagnosed with cervical myelopathy*	emotional catharsis	the post is of emotional nature, associated with a sense of helplessness, loss, accompanied by despair**	2
1	inflammation of the intercostal cartilage (Tietze disease)	term "inflammation of the intercostal cartilage" used*	online survey	the post asks people with rheumatic diseases to take an online survey**	2
1	spondylopathy	affected person suspected of spondylopathy*	old person	the age of 60 years or more indicated*	1
1	headache	the word "headache" used*			1
Category of keyword: *subjective, ** intentional					

cal, pediatric and gynecological subforums – with an average number of posts per thread numbering from 11.24 to 13.89.

Based on the qualitative analysis, aimed at assigning keywords to the first posts in threads, it was established that questions posted on the forum concerned mainly young individuals. The high activity of young people should not be considered a surprise in the light of the Patient in the Net report [9], in which it was stated that the websites concerning health and medical issues are most popular among users 24–35 years old. The number of views of the rheumatologic subforum shows how disproportionate is the passive use (number of views) to the active use (placing posts) of the forum. Assuming that each view represents a different person, it reveals that more people search for information than are able to provide it.

Conclusions

Based on the qualitative analysis of the information stocks of the rheumatologic subforum, it was found that most of the questions posted concerned young individuals, who complained of joint pain and swelling, and asked for a possible diagnosis based on the presented symptomatology, interpretation of the laboratory test results and alleviation of disease symptoms.

The qualitative analysis of the forum content, including comparing the number of views of particular threads

Table II. Number of threads (t) and posts (p) in particular sections of Internet forum medycza.pl (September 20th, 2014)

Names of sections on internet forum medycza.pl	(t)	(p)	Average number of posts per threads (p) / (t)
Rheumatology	70	163	2.33
Oncology	1588	21 208	13.36
Endocrinology	1872	21 479	11.47
Cardiology	1868	21 686	11.61
Allergology	1640	21 721	13.24
Pediatrics	1948	21 890	11.24
Laryngology	11 112	21 984	1.98
Ophthalmology	11 184	22 565	2.02
Urology	11 614	23 054	1.99
Neurology	11 710	23 123	1.97
Surgery	11 927	23 250	1.95
Gastrology	11 753	23 527	2.00
Psychiatry	11 635	23 909	2.05
Dermatology	12 433	25 331	2.04
Gynecology	15 405	214 022	13.89

Table III. Number of threads views on the rheumatologic subforum (only the threads classified as rheumatological) on the forum medycza.pl (20th September 2014)

Page views	Internet address of thread	Page views	Internet address of thread
352	http://medycza.pl/bole-stopy-i-stawow-skokowych-33627	1065	http://medycza.pl/przewlekle-bole-miesni-stawow-bol-32466
374	http://medycza.pl/dokuczliwe-bole-stawow-w-mlo-dym-35483	1077	http://medycza.pl/bol-w-okolicy-kolana-8610
393	http://medycza.pl/luszczycowe-zapalenie-stawow-i-starania-30233	1126	http://medycza.pl/bole-w-karku-5198
396	http://medycza.pl/postepowanie-fizjoterapeutyczne-w-dnie-moczanowej-28376	1136	http://medycza.pl/bol-karku-10182
457	http://medycza.pl/gozdziec-jak-wyleczyc-32770	1198	http://medycza.pl/bol-miesni-przez-okolo-3-a-34704
481	http://medycza.pl/23-lata-bole-stawow-plecow-33913	1266	http://medycza.pl/reumatologiczne-zapalenie-stawow-leczenie-3868
553	http://medycza.pl/czy-z-mieszana-choroba-tkan-ki-33787	1273	http://medycza.pl/problematyczna-pacjentka-z-bolami-stawow-15268
576	http://medycza.pl/bol-stawow-nadgarstka-i-kostek-33747	1461	http://medycza.pl/twardzina-ukladowa-objawy-3936
609	http://medycza.pl/bole-mostka-podczas-ruchow-i-16780	1468	http://medycza.pl/bole-miesni-i-stawow-3864

Table III. Cont.

Page views	Internet address of thread	Page views	Internet address of thread
615	http://medycza.pl/dyskopatia-i-rwa-barkowa-bardzo-35467	1548	http://medycza.pl/co-oznacza-wynik-badan-th-15004
720	http://medycza.pl/bole-stawow-i-miesni-bez-29507	1571	http://medycza.pl/prosze-o-zinterpretowanie-wynikow-ana2-32173
752	http://medycza.pl/przewlekle-bole-stawow-24-lata-26535	1602	http://medycza.pl/bole-stawow-14272
855	http://medycza.pl/diagnoza-17356	1710	http://medycza.pl/silne-bole-miesni-i-glowy-5265
873	http://medycza.pl/wyniki-badan-rtg-biodra-i-16518	1855	http://medycza.pl/reaktywne-zapalenie-stawow-czy-chlamydia-6646
890	http://medycza.pl/zgrubienie-lewej-nocy-w-okolicy-31750	1899	http://medycza.pl/toczen-rumieniowaty-fizjoterapia-13967
894	http://medycza.pl/rumien-wielopostaciowy-ze-spol-stevensa-johnsona-21831	1964	http://medycza.pl/bole-nadgarstka-3942
915	http://medycza.pl/specjalista-reumatolog-18205	1973	http://medycza.pl/bol-stawow-podczas-tocznia-20572
916	http://medycza.pl/obrzeki-stawow-wyniki-wszystkich-badan-17176	2227	http://medycza.pl/silny-bol-kolan-przyczyna-nieznan-8567
919	http://medycza.pl/ana-o-plamistym-typie-swiece-20063	2297	http://medycza.pl/po-jakim-czasie-dziala-milurit-21512
952	http://medycza.pl/rzs-ciaza-16526	2299	http://medycza.pl/bol-lewej-reki-4477
958	http://medycza.pl/problemy-skorne-i-kostne-18219	2365	http://medycza.pl/nie-rzs-co-9309
962	http://medycza.pl/ankieta-dotyczaca-radzenia-sobie-z-15701	2596	http://medycza.pl/co-oznacza-wynik-czynnikar-33741
994	http://medycza.pl/bieczenie-bol-zaczerwienienie-kostek-wewnetrznych-19408	2639	http://medycza.pl/strzelanie-stawow-8631
1008	http://medycza.pl/wysokie-aso-u-dziecka-16858	3832	http://medycza.pl/bole-stawow-pomocy-4944
1031	http://medycza.pl/bol-biodra-5209	4533	http://medycza.pl/jak-wyglada-wizyta-u-reumatologa-13755
1035	http://medycza.pl/zwyrodnienie-stawow-5196	11 521	http://medycza.pl/bol-kostek-kolan-i-kregoslupa-14196
1049	http://medycza.pl/dna-moczanowa-25473	25 258	http://medycza.pl/dna-moczanowa-12686
1063	http://medycza.pl/bole-kregoslupa-w-ciazy-4511		
Total page views		106 351	

with the average number of posts per thread, led to the conclusion that the discussion on the rheumatologic subforum is conducted at a low level in terms of number of answers/advice – compared to other subforums – and that an information gap exists in the area of patient-health professional communication.

There is a large disproportion between the number of active and passive forum users, suggesting that numerous individuals search the forum for presented information. The observed information gap concerning potential/present/future rheumatologic patients and their families may have different causes – lack of understanding by the patient/lack of time for the phy-

sician to provide full and complete information, disruption in interpersonal communication, and long waiting times for an appointment with a medical specialist. It seems that, regardless of the cause, the problem of this gap should be addressed using methods from the field of telemedicine. If telemedicine – virtual counseling – were employed, this would on numerous occasions help the patient decide to seek the help of a professional, which, in the case of rheumatic diseases, is vital for introducing early therapy and thus improving the prognosis (the “therapeutic window”). In the case of patients already diagnosed, telemedicine can provide for better illness management and psychological help

for patients with limitations in daily life activities or in work or household duties as well as those with the greatest constraints of the musculoskeletal system and who remain at home.

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