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://medyczka.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
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://medyczka.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-
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 analysis – to the keywords themselves. The qualitative assessment 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), joint 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, cardiological, allergologi-
| Total number of keywords | Name of keyword | Established meaning of keyword | Name of keyword | Established meaning of keyword | Total number of keywords |
|-------------------------|----------------|-------------------------------|----------------|-------------------------------|-------------------------|
| 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                       |
| 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                        | spondylarthropathy | affected person suspected of spondylarthropathy* | 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

| Names of sections on internet forum medyczka.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 medyczka.pl (20th September 2014)

| Page views | Internet address of thread                                      | Page views | Internet address of thread                                      |
|------------|----------------------------------------------------------------|------------|----------------------------------------------------------------|
| 352        | http://medyczka.pl/bole-stopy-i-stawow-skokowych-33627           | 1065       | http://medyczka.pl/przewlekle-bole-mieszni-stawow-bol-32466      |
| 374        | http://medyczka.pl/dokuczliwe-bole-stawow-w-mlodym-35483         | 1077       | http://medyczka.pl/bol-w-okolicy-kolana-8610                    |
| 393        | http://medyczka.pl/luszczycowe-zapalenie-stawow-i-starania-30239  | 1126       | http://medyczka.pl/bole-w-karku-5198                           |
| 396        | http://medyczka.pl/postepowanie-fizjoterapeutyczne-w-dnie-moczanej-28376 | 1136       | http://medyczka.pl/bol-karku-10182                             |
| 457        | http://medyczka.pl/gozdziec-jak-wyleczyc-32770                   | 1198       | http://medyczka.pl/bol-miesni-przez-okolo-3-a-34704             |
| 481        | http://medyczka.pl/23-lata-bole-stawow-plecow-33913              | 1266       | http://medyczka.pl/reumatologiczne-zapalenie-stawow-leczenie-3868 |
| 553        | http://medyczka.pl/czy-z-mieszana-choroba-tkaniki-33787           | 1273       | http://medyczka.pl/problematyczna-pacjentka-z-bolami-stawow-15268 |
| 576        | http://medyczka.pl/bole-stawow-nadgarstka-i-kostek-33747          | 1461       | http://medyczka.pl/twardzina-ukladowa-obajawy-3936              |
| 609        | http://medyczka.pl/bole-mostka-podczas-nocuchow-i-16780           | 1468       | http://medyczka.pl/bole-miesni-i-stawow-3864                   |
Table III. Cont.

| Page views | Internet address of thread                                      | Page views | Internet address of thread                                      |
|------------|------------------------------------------------------------------|------------|------------------------------------------------------------------|
| 615        | http://medyczka.pl/dyskopatia-i-rwa-barkowa-bardzo-35467         | 1548       | http://medyczka.pl/co-oznacza-wynik-badan-th-15004               |
| 720        | http://medyczka.pl/bole-stawow-i-miesni-bez-29507                | 1571       | http://medyczka.pl/prosze-o-zinterpretowan-ie-wynikow-ana2-32173 |
| 752        | http://medyczka.pl/przewlekle-bole-stawow-24-lata-26535          | 1602       | http://medyczka.pl/bole-stawow-14272                            |
| 855        | http://medyczka.pl/diagnoza-17356                               | 1710       | http://medyczka.pl/silne-bole-miesni-i-glowy-5265                |
| 873        | http://medyczka.pl/wyniki-badan-rtg-biodra-i-16518               | 1855       | http://medyczka.pl/reactywne-zapalenie-stawow-czy-chlamydia-6646 |
| 890        | http://medyczka.pl/zgrubienie-lewej-nocy-w-okolicy-31750         | 1899       | http://medyczka.pl/toczen-rumieniowaty-fizjoterapia-13967        |
| 894        | http://medyczka.pl/rumien-wielopostaciowy-ze-spol-stevensa-johnsona-21831 | 1964   | http://medyczka.pl/bole-nadgarstka-3942                         |
| 915        | http://medyczka.pl/specjalista-reumatolog-18205                 | 1973       | http://medyczka.pl/bol-stawow-podczas-tocznia-20572             |
| 916        | http://medyczka.pl/obrzeki-stawow-wyniki-wszystkich-badan-17176   | 2227       | http://medyczka.pl/silny-bol-kolan-przyczyna-nieznan-8567        |
| 919        | http://medyczka.pl/ana-o-plamistym-typie-swiecenia-20063         | 2297       | http://medyczka.pl/po-jakim-czasie-dziala-mirurit-21512          |
| 952        | http://medyczka.pl/rzs-ciaza-16526                              | 2299       | http://medyczka.pl/bol-lewej-reki-4477                          |
| 958        | http://medyczka.pl/problemy-skorne-i-kostne-18219               | 2365       | http://medyczka.pl/nie-rzs-co-9309                              |
| 962        | http://medyczka.pl/ankieta-dotyczaca-radzenia-sobie-z-15701      | 2596       | http://medyczka.pl/co-oznaczac-wynik-czynnika-rf-3374           |
| 994        | http://medyczka.pl/bieczenie-bol-zaczerwienienie-kostek-wewnierznych-19408 | 2639   | http://medyczka.pl/strzelanie-stawow-8631                       |
| 1008       | http://medyczka.pl/wysokie-aso-u-dziecka-16858                  | 3832       | http://medyczka.pl/bole-stawow-pomocy-4944                      |
| 1031       | http://medyczka.pl/bol-biodra-5209                              | 4533       | http://medyczka.pl/jak-wyzglada-wizyta-u-reumatologa-13755     |
| 1035       | http://medyczka.pl/zwyrodzenie-stawow-5196                      | 11521      | http://medyczka.pl/bol-kostek-kolan-i-kregoslupa-14196          |
| 1049       | http://medyczka.pl/dna-moczanowa-25473                         | 25258      | http://medyczka.pl/dna-moczanowa-12686                          |
| 1063       | http://medyczka.pl/bole-kregoslupa-w-ciazy-4511                 |            |                                                                  |
|            | Total page views                                                 | 1063 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 physician 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.
Analysis of the information on rheumatology in the context of telemedicine

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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