



Why physicians should publish, how easy it is, and how important it is in clinical work

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The author maintains that a physician must publish because the knowledge is property of the entire mankind, because scientific journals offer the most reliable (medical) information, and because the process of publishing serves also as a final education of true experts. Publishing can become relatively easy if the investigation is properly planned and the report is adequately written. Both should be a joint effort of all authors of the study. It is easier to publish in clinical than in preclinical research field for at least seven reasons: 1) in clinical work the variety of patients stimulate formulation of hypothesis, 2) the spectrum of possible and desirable research themes is rather wide, researchers can make use of hospital routine laboratories, and even individual cases are acceptable as research reports, 3) it is acceptable, even desirable, to repeat already published studies, 4) multicentric studies enable weaker institutions to join strong and more experienced ones and thus participate in high-quality research, 5) imperfection of the studies is tolerated because journal editors are aware of the complexity of clinical work, 6) there is a degree of automatic financing of research, and 7) there is a large number of both general and highly specialized journals which yearn for papers.

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INTRODUCTION

Personally, or by listening to colleagues, we often encounter the question whether it is possible and how difficult it is to publish scientific research reports in medicine. Some dwell on how it is easier to do good research in preclinical than in clinical medicine. These questions become even more significant in the era of fascinating advancements of the science and first signs of application of objective criteria for the academic advancement in our country. Serving for many years as an editor of (clinical) scientific journal (1) I have gained experience, which allows me to discuss briefly these questions. My intention is not to start a discussion but to convey a message. I do not offer answers but facts, and my standpoint does not aim to judge but to report. The issue is the progress, not a victory; the question is on the future, not intellectual contest.

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I maintain that a physician must publish because publishing is a natural part of his or her profession. It is possible to publish and - it is especially easy to publish within the clinical area of medicine.

A. Why a physician must publish scientific reports?

There are many reasons why a physician must publish, and three of them constitute a professional must.

1. Knowledge is the property of the entire mankind

In its heroic effort to treat ill and disabled, the mankind unites all its knowledge. The knowledge must be integrated because in that way it becomes greater, open to comparisons, critique, and improvement, unnecessary research of already known facts is avoided, and it enables the weakest to learn from the most knowledgeable. Medical knowledge cannot be limited, simply because there is no limit to diseases and because for a physician the benefit of the patient is the priority (2).

The medical knowledge of the mankind unites by means of communication, and the greatest part of communication takes place within the network of medical journals (3). The communication requires a common language, which, owing to the non-medical circumstances, has become the English language. A physician who wants to help his or her patients in the most efficacious manner uses the knowledge of all physicians of the world, and a physician who cares for all patients offers his or her knowledge to

all other physicians of the world. It can be inferred that the one who does not read English cannot be a physician, one who does not read medical journals ineffectively treats the patients, and one who does not publish either hides his or her knowledge (experience) or does not have it.

2. The issue of information reliability

Almost everyday experience of the majority of physicians is that a patient is seriously ill, his or her life threatened, and the treatment dangerous or mutilating. The physician must establish the most precise diagnosis (which also means the prognosis) and accordingly decide for the best way of treatment, even if it is life threatening, when it includes opening of the skull, or cutting off a part of the body. If the physician is adequately educated and truly cares for the patient, he or she will, naturally, turn to the most reliable source of information and recommendations for the given disease. That source is, without any doubt or competition, the most prestigious medical journals (4).

This brings us back to the indispensability of continuous consultation of medical journals and the strong need to publish in those journals. We must resist openly those colleagues who maintain about themselves or others "He or she is an excellent physician but just does not care to publish." This is totally wrong, firstly because in most instances this is not a good physician at all, and second, his or her decision not to share the knowledge with other physicians, with physicians of the entire world, thus helping the patients of the whole world, cannot be either comprehended or defended. On what basis and by which right would he or she refuse to help that many patients?

3. Final professional education

Publishing of research article encompasses its peer-review in the journal to which it was submitted for publication (5). The reviewers are experts in the field, which the article covers; better and stricter as the journal in question is more respectable (6). In general, the significance of a journal is reflected in its impact factor, i.e., the average number of citations of its articles received in articles published in it and other journals (7). Apart from some possible limitations of the impact factor criterion (8), and the unintelligible objection that even the most prestigious (indexed) journals occasionally publish reports of questionable quality, the fact is that we are all aware of existence of a number of very respectable journals (*The Lancet*, *New England Journal of Medicine*, *JAMA*, *Annals of Internal Medicine*, *BMJ*, to name only the "big five") which publish rather selected articles and in which it is rather difficult to publish.

The journals which do not use peer-review procedure or which use it only formally, or whose editors do not pay attention, are not worth mentioning, simply because they do not contribute to the growth and sharing of medical knowledge. (Moreover, they actu-

ally adversely affect the quality of research and academic criteria in their environments, Fig. 1). Accordingly, it can be inferred that every author who respects his or her data and conclusions tries to publish the report in as respectable journal as possible.

a) *The value of the peer-review process*

Following what was said in the previous paragraph, it is obvious that all those who have their articles published in respectable journals automatically have a precious, albeit often a painful, experience that their work, ideas, and presentation of data have passed through a merciless but objective scrutiny of the best experts for the given medical field. True experts, who love the field of medicine in which they work, people with high self-respect, review the article. It is sectioned by beetle-browed statisticians (9) who deep down despise amateurs who dare encroach the area understood only by them. The editors, on the other hand, look for messages, which they themselves comprehend swiftly and easily, elegance that will cheer them up, and originality that will serve the image of their journal (10). All of them, in their specific manner, expect a deep understanding of the subject with which the article deals, citing only the most relevant references on the subject in question, originality and topicality of the hypothesis, importance of the findings, power of the methods, strength and clarity of the arguments, and frugality and prudence of data interpretation (11).

Those who succeed here with their knowledge, intelligence, and presentation skills truly prove their professional quality. Well-founded critique teaches the author modesty and honesty, and he or she becomes a different, better person (4). He or she becomes a university professor, a person who has the right to teach students, mentor doctorate theses, review research projects, and be the dean or member of academy of science.

b) *The proof of the work*

The number and quality of scientific publications of a person, an institution, and environment, or state is the only proof of their work (12,13). This is so simply because a scientific publication is a final product of research. Some will maintain that this is not exactly so, but that it is patients cured what counts (14). Sure, but a reliable information on the cure of patients can be sent and received only in the form of a written report, written in the accepted scientific form and as a scientific article in a scientific journal.

c) *The reflection of the work*

The type and quality of the work of a scientist is visible only from the published scientific articles of that very scientist. People can possess different virtues, but one's medical achievements may be objectively assessed only through the number and quality of his/her publications (13). The publications thus become a measure that can be used for validation of the work results and, ultimately, of author's social impact.

4. Multiple gains

The listed characteristics of medical publishing constitute a system, which makes publishing indispensable in both medical (Hippocratic) and social sense. However, publishing brings about additional gains, which do not have strictly medical and scientific features (15). For example, a researcher gets promoted, which brings about financial and social gains and intellectual pleasure. An institution attracts funds and good scientists. An environment or a state demonstrate their culture and know-how and improve the ability of strategic planning and interaction with similar or more developed partners.

B. How to publish

Publishing stems from research, and research encompasses a number of factors about which innumerable books have been written (see refs. in ref. 11). Here, I list only the key facets.

1. Planning of research

Even the best-planned research may fail, but the one poorly planned cannot succeed. Planning includes knowledge, imagination, understanding of methods, statistical way of reasoning, and human resources management skills (4). Regardless of how cumbersome these factors may seem, they can all be harnessed by a single move - team work. All potential authors (preferably backed by a statistician) must at length, intensively, and repetitively discuss the research plan. The consensus achieved after many hours of critical discussion must be written on one page, and then firmly followed. The page mentioned starts with hypothesis to be tested, defines the sample, independent and dependent variables, depicts the flow chart of the study, lists methods, and ends with the list and order of authors of the future publication (4).

a) *Doing own job*

It is of utmost importance that a clinician (as well as others) conducts his or her research at the own workplace, in the medical field in which he or she routinely works, and with own patients. It is exactly the field of medicine that he or she knows the best, has most interests and makes the majority of observations, which may allow the formulation of a working hypothesis. It is equally important that at the own workplace he or she has the best control over patients and materials needed for the research.

The continuous flow of patients offers a powerful and free research model. Inasmuch as his or her hypothesis does not have to aim at "great" discoveries (see below), it suffices that a part of the routine everyday work be wrapped into a witty hypothesis and thus transformed into what I call "meaningful routine" (16).

I maintain that in environments as is a developing country, "meaningful routine" is the key strategic framework of medical research (16).

Within the intellectual framework of the "meaningful routine" concept, the best strategy is to design research studies as prospec-

tive and - steer them to "flow themselves" (16). The times of "retrospective" studies has long gone, whereas the prospective ones are welcome even when they concern small and seemingly unimportant questions. Those who respect themselves - do prospective studies.

"Meaningful routine" yields data, which are relatively easy to publish in the good medical journals.

b) *The hypothesis*

Every study should be formulated as a hypothesis, preferably in a single sentence (17). The hypothesis should relate to a small and simple problem. One should not yearn for a new type of surgical operation or cancer cure. The question to which the hypothesis offers the answer should be small and, above all, clearly formulated. In principle, the hypothesis should be tested by all means, methods, and approaches available to the researcher (4). The formula of the fruitful research therefore reads: small but abundantly tested hypothesis (4).

c) *Testing of hypothesis*

Testing of the hypothesis, i.e., the performance of the research concerns the concrete testing of the conclusions, which can logically be deduced from the hypothesis (4). This is relatively the most demanding part of the research because it actually defines its content. Fortunately, a meticulous teamwork will not let the deductive analysis of the hypothesis miss anything essential or planning remain superficial.

d) *Execution of research*

All collaborators conducting the study should have clearly defined tasks - listed in the previously mentioned one-page research plan. The collaborators should have regular meetings to discuss the developments of the study.

e) *Data analysis*

All data and their characteristics have been envisioned in the research plan, and the planned testing of the deductive implications of the hypothesis has allowed detailed planning of the statistical tests (4). For the one who has planned well, data analysis is an easier part of the work, whereas even the best statistical expert cannot help the one who has planned poorly or has not planned at all.

2. Writing the article

The article is usually written by one of the authors, or by more of them - where every one writes another part of the article, the one that is his or her field of expertise. However, once the article is written, the effort of every coauthor becomes crucial.

a) *What do the authors do?*

Each author must independently and very carefully read the entire report and suggest changes and corrections (11). The next author reads the article after it is corrected in accord to the notes of the previous reader. Albeit surprisingly often non-fulfilled, such a con-

sensus on the final version of the article is one of the obligatory authorship criteria (11). However, the essence is not in the rules but in the gain: as more people read, criticize, and correct the article its chance to be accepted increases.

b) Friendly pre-review

However, it is not yet the time to send the article to a journal. It is extremely useful to ask at least two colleagues to review the version of the article on which all authors consented. It should be reiterated that the article should be first given to one colleague, then corrected and then handed to the other.

c) Technical perfection

The version of the article that is sent to the journal must be "perfect", i.e., the sum of maximal efforts of all authors. Guidelines for authors of the journal selected must be followed to the smallest details (11). There should be no typing errors; figures must be simple yet catchy, and tables meaningful and comprehensible.

3. Collaboration and joint effort

It is extremely important that all authors of the article participate, with all their talents, in all phases of the research, especially in the first one - planning, and the last one - final approval of the article. The authors who try to avoid it in essence cheat on their closest colleagues, whereas those who let it go damage their own interests.

It will be easy to publish if all participants in the research and all authors of the research report invest their maximal efforts.

C. Why it is easy to publish

In a way, I too lightly stated that it was easy to publish. If we take into account the moral and intellectual prerequisites of the good research work and toughness of the review process in all respectable journals, it could also be said that - it is rather difficult to publish (6). However, the purpose of the statement was not the estimation of how difficult is to publish but information that man's publishing solely depends on him/her: there is no discrimination, the number of indexed journals is surprisingly high and all yearn for good articles, and for successful publishing one does not need ingenious inspiration or space technology. The problem (of some) is that this cannot be done through personal connections (18), superficially, cannot be forged, and cannot (owing to Internet) be lied about. Those with this problem still whisper at hospital corridors that publishing is intellectual gymnastics, a fiction of duty less preclinicians, or politically determined pressure from the ministry of science (18). Fortunately, their time has passed away. Today, in the freedom, prosperity, and growing honesty, they should be ridiculed.

D. Why is it particularly easy to publish clinical papers?

The suggestion that it is easier to publish in clinical work than in basic research is not aiming at mocking or challenging, but is offered as a good-willed message and invitation. These are the

features of the clinical work, which make publishing in that area of medicine easier than in other areas.

1. The questions come by themselves

As has been stated, a practicing clinician does not need to "invent hot water". When of decent quality and performed loyally and with care, the practice itself opens the questions, which are easy to transform into hypotheses, hypotheses into (prospective) studies, and studies into research articles. Many good (indexed) journals cover just his or her research area and publish papers just from his/her practice.

In this process there is no "local" or "too specific" knowledge "which is of no interest to the international journals." No! Everything is interesting and important for medicine, whereas misunderstanding takes place with respect to the quality of research. Shortly: any research subject is welcome, and papers get rejected in cases when data submitted for publication insufficiently corroborate the answers offered (6). The weakest do not even go that far but, aware of their inferiority, do not submit their papers to the journals with normal review process, excusing themselves by the international discrimination of their environment (3).

2. Wider range of research opportunities

Inasmuch as the medical science is extremely complicated, and health more important than anything else, it is logical that any new sound medical information is welcome. This fact opens rather a wide spectrum of research possibilities for physicians.

a) The width of clinical themes

Almost for every disease research subjects spread from analysis of genes, which may contribute to that disease (molecular biology), through all classical clinical disciplines, to psychological, social, and economic questions related with the disease in question. This makes the respective research much easier, which is especially important in the environments that do not belong to those with top technological equipment (19).

b) Clinical laboratory

Every decent hospital has a great diagnostic laboratory, with diligent and able workers (16). Physicians, however, utilize this respectable potential merely for acquisition of simple routine tests. Sometimes they drop in with an impossible idea on which they have vaguely heard at a meeting, but rarely they envisage the laboratory as a mighty partner, which can support their research both intellectually and technologically.

Clinical diagnostic laboratories are undiscovered mines of precious clinical investigations.

c) Cases

Publishing of the so-called case reports is considered clinical research achievement, which is true (11). What is less known is that in good journals it is may be more difficult to publish a case

report than some more elaborate research. Poorly investigated and inadequately educative case reports end up in poor quality journals and are widely used as an argument for academic advancement. That is why publications of case reports have become ill famed. However, in knowledgeable hands, such reports may prove rather useful, whereas at the same time they may bridge economic and technological problems, and rightfully make happy their authors who, being devoted clinicians, love to spot unusual clinical cases.

3. Repeated studies are desirable

Due to the complexity of pathophysiology, diagnostics, and particularly treatment of diseases, and value of human health, in clinical medicine it is desirable to repeat studies of other authors and add to the size of the sample, i.e., acceptability of the drawn conclusions. For example, it is of utmost importance whether the new treatment protocol is indeed 5% more effective than the old one, and the unequivocal answer is rather difficult to achieve with one sample (in a single study). Even when a study reveals the same findings, health insurance system, physicians, and patients will all welcome the confirmation of the previous result in additional independent study. If it occurs that one of such studies offers a different result, it will further stimulate the respective investigations. This specificity and importance of clinical reasoning stimulated the preparation of meta-analyses (4), and a great need for multicentric studies.

4. Multicentric studies

Such studies are, in accord to strictly defined criteria, conducted in several hospitals, on patients with the same disease. This is because rarely single hospital admits sufficient number of patients suitable for a convincing study, and because inferring in clinical medicine, in the work with complex systems and research models, is rather difficult and sensitive. Multicentric studies are usually offered by leading hospitals, without discrimination in any parameter but in criteria of quality of the respective field of care. It can be inferred that the hospitals, which do not take part in any multicentric studies, do not adequately treat their patients.

5. Imperfection is acceptable

Pathophysiologically and clinically, a disease is so complex that its deep understanding and treatment are more complex than sending a space ship on Mars. In addition, medical research is limited by medical ethics, human and patient rights and all those imperfections - that are encountered in humans (4). All this is the reason why it is rather difficult to perform a perfect clinical study. Admittedly, there are many (too many) patients, but when one has to assemble a sufficient sample of those who fulfill inclusion criteria for a reliable study, it turns out that there are too few (see multicentric studies). In addition, some of the included drop out; some die, and some never return for a check-up. Shortly, clinical

research is organizationally difficult, but, since it is difficult to all, journal editors are aware that they can rarely get perfect studies for publication. Therefore, they accept also the imperfect ones, provided that they are not either funny or sad. However, this considerably eases publishing.

6. Automatic financing

There is no country in which the scientists do not complain about insufficient financing of science. Indeed, there is never enough money: manpower is ever more precious, devices more complex, chemicals more numerous. There is never enough money for technologically perfect and clinically relevant research. That is true. However, one should recall that the greatest part of clinical work is financed by the state or health insurance system, and rather abundantly: there is almost nothing medically rational that is not covered. This fact opens a vast area of research work. One should simply apply the "meaningful routine" (16) rule, and - maybe - here and there buy a chemical not covered by insurance. Legal, desirable, and welcome wealth: one should only stoop and pick the fruits.

7. Large numbers and great specialization of medical journals

The number of medical journals published in the world is astonishingly great. Actually, nobody knows exactly how many of them exist. The US National Library of Medicine receives 22,400, and in the MEDLINE bibliographic database indexes some 4,300 (3). If we take these 4,300 only, and divide them among all parts of medicine, even the smallest ones, it will become obvious that not the smallest part of medicine remains uncovered, with each medical specialty and sub-specialty having dozens of respective journals.

Current Contents/Clinical Medicine is more selective, with approximately 1,000 best journals (130 general). However, medicine borders with social and life sciences, which are covered with separate Current Contents editions. For example, the majority of psychiatric journals are indexed in CC/Social Sciences, and entire basic medicine, all up to pathology, pathophysiology, and pharmacology, is in CC/Life Sciences. In other words, even at the Current Contents level, there is a great spectrum of medical journals. Anybody with reasonably rational data can easily find his or her indexed journal, which will await the report with warm welcome. For an honorable and learned man, lack of publications in indexed journals is actually like a heavy disease. In university hospitals, it is like a medieval leprosy.

E. Conclusion

Somebody may ask: "Are you actually saying that every physician should not only regularly read certain international medical journals, but also to publish?"

I would wholeheartedly respond: "Sure!"

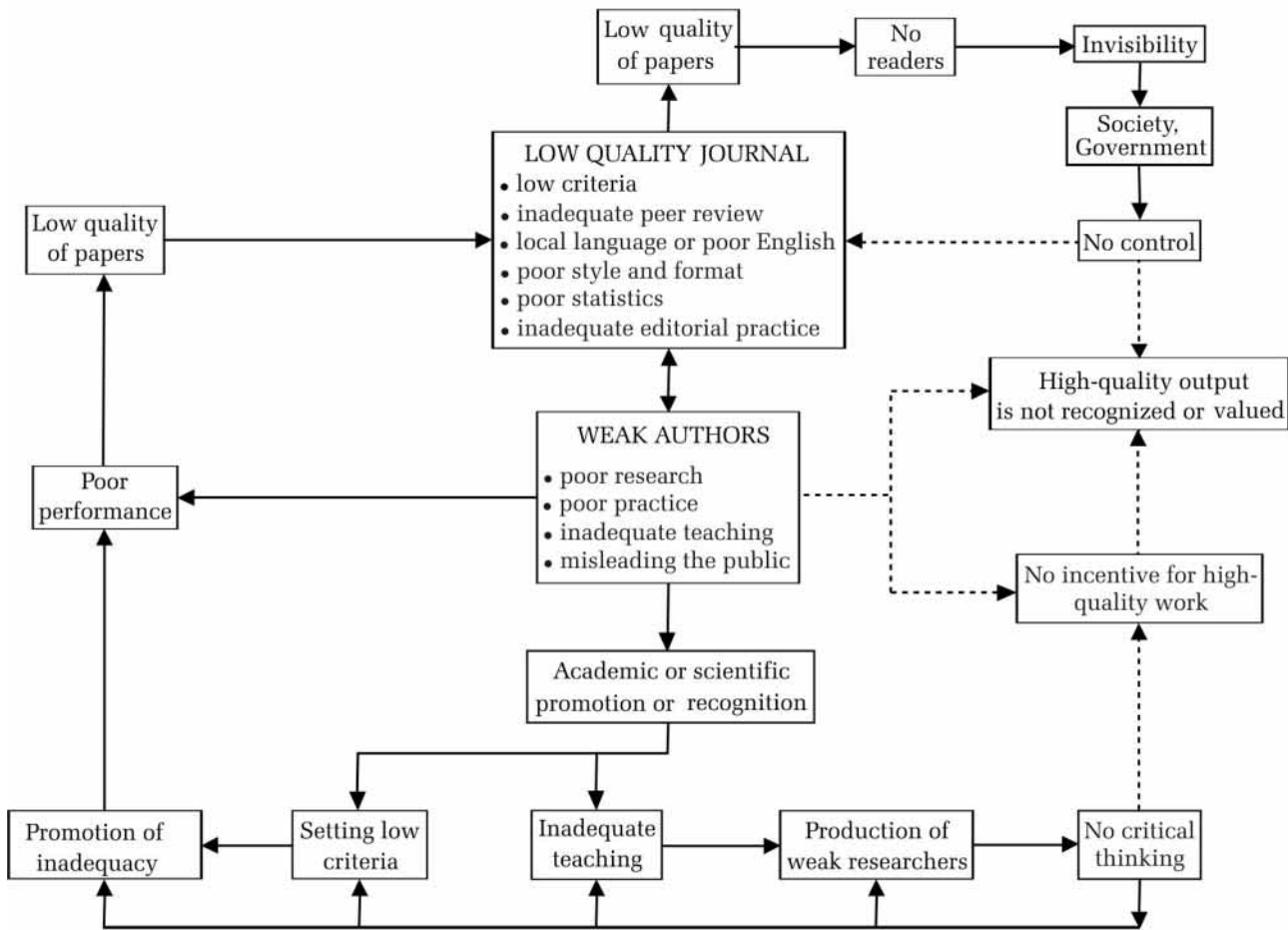


Figure 1. Adverse effects of a weak scientific journal in a less advantaged environment. Scientifically weak authors support weak journal and vice versa, and the impact on all aspects of local scientific community is detrimental. (Reproduced with permission from ref. 3.)

REFERENCES

1. Marušić A, Mišak A, Kljaković-Gašpić M, Marušić M. Educatione ad excelentiam - ten years of the Croatian Medical Journal. *Croat Med J* 2002;43:1-7.
2. Marušić M. Zašto medicina ne može bez znanosti, ili moje otvoreno pismo liječnicima. *Liječ Vjesn* 1988;110:129-32.
3. Marušić M, Marušić A. Good editorial practice: editors as educators. *Croat Med J* 2001;42:113-20.
4. Marušić M, editor. *Uvod u znanstveni rad u medicini*. 3rd edition. Zagreb: Medicinska naklada; 2003.
5. Marušić A, Meštrović T, Petrovečki M, Marušić M. Peer review in the Croatian Medical Journal from 1992 to 1996. *Croatian Med J* 1998;39:3-9.
6. Marušić A, Lukić IK, Marušić M, McNamee D, Sharp D, Horton R. Peer review in a small and big medical journal: case study of the Croatian Medical Journal and The Lancet. *Croat Med J* 2002;43:286-9.
7. Garfield E. Use of Journal Citation Reports and Journal Performance Indicators in measuring short and long term journal impact. *Croat Med J* 2000;41:368-74.
8. Huth EJ. Authors, policy makers, and the impact factor. *Croat Med J* 2001;42:14-7.
9. Lukić IK, Marušić M. Appointment of statistical editor and quality of statistics in a small medical journal. *Croat Med J* 2001;42:500-3.
10. Marušić M. Life of an editor-in-chief: first five years. *Croat Med J* 1997;38:5-8.

11. Anonymous. Guidelines for authors. *Croat Med J* 2003;44:126-33.
12. Jonjić S, Lučin P. The science at Croatian universities: a gloomy view through SCISEARCH and MEDLINE. *Croat Med J* 1996;37:2-6.
13. Klaić B. Analysis of scientific productivity in Croatia according to the Science Citation Index, Social Science Citation Index, and Arts & Humanities Citation Index for the 1980-1995 period. *Croat Med J* 1997;38:88-98.
14. Marušić M. Licemjerni humanizam. *Liječ Vjesn* 1990;112:201.
15. Marušić A, Marušić M. Authorship criteria and academic reward. *Lancet* 1999;353:1713-4.
16. Marušić M. O strategiji kliničkih imunoloških istraživanja. In: Balarin L, editor. *Jugoslavenska pedijatrijska škola, VI seminar, Split April 25-29, 1988*. Split: University Hospital Split; 1988. p. 23-28.
17. Marušić M. Znanstveni način mišljenja. *Med Jad* 1987;17:17-34.
18. Marušić M. Slobodna Hrvatska, znanost i znanstveni kriteriji. In: Polšek D, editor. *Vidljiva i nevidljiva akademija*. Zagreb: Institut društvenih znanosti Ivo Pilar; 1998. p. 47-56.
19. Šlaus I. Political significance of knowledge in Southeast Europe. *Croat Med J* 2003;44:3-19.
20. Marušić M. Kako treba, kako se može i kako je lako publicirati, a napose u klinici. *Liječničke novine* 2002;2:33-7.

Notice

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