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THE INTERRELATION OF PROFESSIONAL UNIVERSALITY AND PROFESSIONAL DEVELOPMENT AMONG BEGINNING FOREIGN LANGUAGE SPECIALISTS

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This paper sets out to examine the potential value of professional universality in relation to professional development among beginning foreign language specialists. The purpose of revealing the interrelation is to prove the importance of professional universality for promoting a better competitiveness, mobility, competence and professional development of future graduates.

I. Introduction

The purpose of this paper is to reveal the essence of the interrelation of professional universality and professional development among beginning foreign language specialists. In today's globalized world educating philologists and linguists, integrated with training for a future profession as translator and/or interpreter and foreign language teacher, constitutes an important challenge to educational systems worldwide. The central concept of universality, which underlines both the theoretical framework and the pedagogical methods seems particularly well suited for the complex approach of training future foreign language specialists, given the fact that the study programme and the curriculum involved concern the education and training of students for professions whose ultimate goal is to enable precisely communication, intercultural dialogue and mediation. On the basis of theoretical analysis of central concepts that underline contemporary professional training for higher education such categories as competence, tolerance, mobility, competitiveness, empathy, understanding should be taken into consideration. It is assumed that the key categories mentioned above can be successfully integrated into the concept of professional universality in training foreign language specialists. Indeed, to address issues like professional universality, and professional development it is necessary to develop several closely related models. The two key concepts differ in many ways, so comparing them is not a matter of changing the value of one or two parameters. The theoretical framework is based upon wide

theoretical underpinnings from Russian and international studies, within areas such as pedagogy, vocational psychology, cross-cultural communication, theory and methodology of professional education, translation studies, sociology, philosophy, and other relevant disciplines.

II. Implications of professional development

It is necessary to reveal the implications of professional development among future foreign language specialists in Russia. The system of higher education in Russia is undergoing a considerable change, where traditional methods of educating foreign language specialists, and training translators and/or interpreters and language teachers will have to give way for more updated methods and technologies, to cater for the needs arising as a consequence of the rapid international development of the roles and characteristics of these professions. The issue of raising the efficiency level of professional development and professional competence among foreign language specialists, language teachers especially, has been addressed quite frequently over the past years. The interest to the topic can be explained by a number of factors influencing modern educational standards in the way to make them capable of meeting the needs conditioned by the rapid development of society in all its spheres. The modern society undergoes social and economical changes which contribute to the extension of relations between countries and their enterprises, for example, popularization of travel and tourism, and diversity of educational opportunities. These needs can be sat-

ified by properly educated, highly professional personnel speaking foreign languages on a certain level, because employers are sure of the connection between language competence and business success.

The contemporary model of foreign language specialist professional development should become more universal, integrative and more constructive than focused just on knowledge of transmission, it treats beginning foreign language teachers, and translators/interpreters as active learners (Lieberman, 1994; McLaughlin and Zarrow, 2001). It sees the long-term process effective if it allows to apply previously acquired knowledge to new experiences. Future specialists should become 'reflective practitioners' (Cochran-Smith & Lytle, 2001; Lieberman, 1994). Professional development in the sphere of foreign language teaching and interpreting should be viewed as a collaborative process as meaningful interactions and mediations have a positive effect on professional development. It is also a multi-dimensional process (Scribner, 1999) though we assume that there should be certain universal professional development models in training foreign language specialists. Educational institutions working on the basis of modern educational standards are more competitive and capable of supplying the market with qualified graduates. They work according to educational standards controlled by the state. The goal of modern education is to match the teaching goals and learning needs. Many researches assume that the quality of professional education is directly linked with the omnifaceted structure of various competences of specialists, as well as with the support of specialists in the course of their professional development (Chernilevsky, 2002: 303). Professional development enables teachers to develop learners proficiency in a foreign language required for meeting learning needs. Professional universality of foreign language specialists could become a key parameter to match principles for teacher competences and qualifications within Russian and common European educational

standards. Students will benefit from combining previously acquired and lately developed foreign language teaching or/and interpreting skills and professional competence with the developed professional universality in the course of their professional development. The education of foreign language specialists is *multidisciplinary*. This ensures that they have extensive subject knowledge, a good knowledge of pedagogy, the skills and competences required to guide and support learners, and an understanding of the social and cultural dimension. They should be encouraged to participate actively in *professional development*, which can include periods of time spent outside their professional sector, and this should be recognized and rewarded within their own systems. *Mobility* should be a central component of initial and continuing education programmes. Foreign language specialists should be encouraged to participate in different projects and spend time working or studying in other countries for professional development purposes. Those who do so should have their status recognized in the host country and their participation recognized and valued in their home country. The concept of universality implies that they should also have the opportunity for mobility between different levels of education and towards different professions within the education sector. Institutions providing teacher education should organize their work collaboratively in *partnership* with schools, local work environments, work-based training providers and other stakeholders. Higher education institutions need to ensure that their teaching benefits from knowledge of current practice. Teacher education partnerships, which have an emphasis on practical skills and an academic and scientific basis, should provide teachers with the competence and confidence to reflect on their own and others' practice. Teacher education, in itself, should be supported and be an object of study and research. Every beginning foreign language specialist should have the opportunity to continue their studies to the highest level in or-

der to develop their professional competences and to increase their opportunities for progression within the profession. Acquiring foreign languages in the course of their curriculum with the specialization either in foreign language teaching or in translation and interpretation studies is just the beginning of professional development, which can be characterized as on-going life-long process, emphasizing that both translators/interpreters and teachers in most cases commit themselves to continuing professional growth. It implies raising their own standards of professionalism, constant updating and self-evaluation. All aspects of foreign language teaching, translating and interpreting are equally important for high-quality achievements. Acquiring the ability to create a learning environment, and/or cultural environment through the process of mediation means keeping up to date linguistically, theoretically, psychologically, methodologically, and technically.

III. Applying the concept of universality

It is assumed that the concept of universality can be successfully applied to professional development among future foreign language specialists. The concept of professional universality has got quite an eternal nature, and it has been the problem of many scientific fields. There have been a number of studies on the continuity and change of individuals' vocational interests and interest development (*Low & Rounds, 2007*), on the universality of vocational interest structure among ethnic minorities (*Day & Rounds, 1998*), on the correlation between career choices and decision-making style (*Burley, Turner, Vitulli, 1999*) with the assumption that personality and decision-making styles have a strong impact on the type of work environment in which people strive. They are all based on J.L. Holland's theory of occupational choice, mainly on the investigation of realistic, investigative, artistic, social, enterprising, and conventional vocational interests (*Holland, 1968*). Thus, J.L. Holland's typological theory of persons and environments is

regarded as the most influential in the field of professional development and career counseling but this has not been carried over to the field of theory and methodology of professional education of foreign language specialists, namely to investigating the possibility of professional universality in such area as vocational behaviour of language specialists in Russia. We assume that the combination of constricted professionalism and universality in the course of professional education of future foreign language specialists implies further consideration of specific processes, which bring over 'trans-border cooperation' between representatives of different cultures in their future professional development. Vocational choice appears to crystallize during adolescence and one's career aspirations begin to take shape later. We base our research on the fact that to happily match vocational aspirations to vocational preference profiles you need not only developed professional competence, but also professional universality in the chosen field. Peter B. Swanson studied individuals seeking to become foreign language teachers, who were assigned a Social, Artistic, Enterprising vocational code (*Swanson, 2008*). However, longitudinal studies were not conducted to verify if these people ever entered the teaching profession. The present study sought to determine a Holland code for in-service foreign language educators. Data analysis confirms a stable Holland profile and his earlier findings as well as highlighting interesting differences among world language educators. This study holds implications for school counselors and recruiters of prospective language teachers during a time of critical shortage. The association between professional activities of future language specialists that share certain qualities is the basis for interest inventories used in career counseling, inventories that assume a certain structure of likenesses and differences among professional activities. According to the reasoning of such inventories, people consider teaching and social work as more alike than pig farming and jet piloting (*Day & Rounds, 1998: 728*). Underlining this

reasoning is a belief that people apprehend similar constellations of activities. But this belief is challenged by multicultural theory, which holds that it is quite possible for subgroups to have quite divergent thought patterns. The common structure of vocational interests is theoretically related to McCrae and Costa's (McCrae & Costa, 1997: 509-516) claim of personality structure as a universal. If vocational preferences are indeed manifestations of personality, then, we can train language specialists to be universal specialists in the sphere of linguistics and intercultural communication. Professional development is inseparably linked with personal development. The principle of self-development is subjacent to both of them and is considered to be extremely important for the foreign language specialist. The combination of the high level of professional competence ability of the language specialist with the targeting impetus to the increasing quality of *universal* professional education will enable to work out new innovative integrative technologies of foreign language teacher training, professional interpreter training, interpreter preparation programs, translation and interpreting courses.

IV. Conclusions

The concept of universality is as urgent for the system of higher education in Russia, as ever. We assume that universality of the foreign language specialist reveals, in the first place, the level of his/her professional competence ability and professional culture, which is the means of creative self-actualization, the highest form of individual performance, in different aspects of professional practices: teaching specialisms, teaching strategies, oral consecutive translation in different professional spheres, simultaneous translation, written translation of texts of various professional mainstreams and special purposes, belles-lettres translation. Professional universality should become an impor-

tant asset in training foreign language specialists. Thus the potential value of professional universality of foreign language specialists reveals its importance for promoting a better competitiveness and professional development of future graduates in general, and is related to a new resultative quality of their professional education.

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RUSSIAN HIGHER SCHOOL: REORGANIZATION OF THE SOVIET INHERITANCE

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Basing on the analysis of the present-day tendencies in the development of Russian higher school and the plans of its reformation, the author of the article dwells upon the perspectives of the merger of higher educational establishments and the foundation of federal and national research universities.

The pros and cons of the reorganization are considered from the point of view of monopolization of regional educational markets and problems arising in controlling and administrating the activities of higher school institutions.

Since 1990s, the system of Russian vocational training has been in permanent transformation resulting from the attempts to adapt to the changing economic relations, as well as from recurring reformations.

What are the main characteristics and transformational vectors of the Russian vocational training nowadays? The most noticeable difference from the Soviet school is quantitative. According to Russian statistics, during the 20 years, between 1985 and 2005, the number of higher school students increased by 2,4. In 2007, there were already 7461 thousand of students in Russia. The number of higher school institutions grew from 502 in 1985 to 1108 in 2007 (including 450 of non-state institutions).

The increase in the number of higher educational establishments in Russia is accompanied by crisis. The list of problems in Russian higher education is endless; among them are degradation of training quality, insufficient attention to the needs of economic and social spheres, the gap between the demand for educational services and the possibilities rendered by the government.

The crisis is recognized not only by scientists but also by Russian officials. Suffice it to say that even in the National Educational Doctrine in the Russian Federation it is stated that “during the last decade many former winnings of national education were lost” [4].

What is the way out of the crisis of higher school? We think that first of all it is necessary to search for the best possible

structural and territorial organization of higher schools.

Global economic trends prompt us the ways to solve this problem. General globalization in business has become one of the main tendencies in economy, resulting from the effect of production scale. It means that the increase in the production scale causes a decrease in its costs and finally increases the production efficiency.

Merger of higher schools is taking place in many countries of the world. This tendency has brought to being a new scientific term “educational hypermarket”. Thus, 50 thousand students study in the University of Toronto, 30 thousand in Helsinki University. One of the largest private colleges in the USA – University of Phoenix – trains 70 thousand students [3, p. 297].

This tendency is most vividly revealed in the developing countries. Thus, 137 thousand students study in the Mexican autonomous University, and there are 183 thousand students in the University of Buenos Aires. Usually the merger takes place through uniting. In China, for example, Peking Medical University became part of Peking Classical University; Shanghais University of “Fudan” was joined to Shanghais Medical University; 5 universities were united in the province of Jedjiang to form a new one [7, p. 11, 22].

The described above tendency is typical of Russia as well. In 2006, an attempt was made to found two federal mega-universities – the South and the Siberian universities.

The South Federal University was founded on the basis of Rostov State Univer-

sity by adding three other higher educational establishments, with the total number of students of 41 thousand [6].

The Siberian Federal University was also founded by uniting four universities. The staff numbered 2500 teachers, and the number of students – over 33 thousand [5].

The positive effects of such globalization are evident. The effect of production scale mentioned above presupposes decrease in administrative expenses, the formation of common educational space and promotion of scientific research.

On adoption of the law “On Federal Universities” by Duma the process of globalization is likely to accelerate after it is approved of by the Council of Federations and the President.

Another promising form of higher school may be national research universities. Just as in case of “federal educational hypermarkets” the process begins with the foundation of two national research universities – on the basis of Moscow Institute of Engineering and Physics and Moscow Institute of steel and alloy materials.

Unfortunately the official documents determining the strategy of education development in our country do not give the number of future “educational” and research universities. In this respect the most reliable information comes from the publications of the scientists of State University – Higher School of Economics, as this university is authorized to provide for the reform with scientific foundation. Thus, in 2007, rector of this university Y. Kousmenov suggested distinguishing two categories of Russian universities – “educational” and “research” ones [2].

At the beginning of 2008, quite definite characteristics of the new architecture of Russian higher education were presented in the report “Russian Education -2020: A model of Education for Innovative Economy”. In many respects the report was based on the ideas of Minister of Education A. Foursenko.

Among the main structural elements of higher vocational education it is possible to

single out “40-50 federal research universities and 100-150 large universities of regional and interregional significance” [1].

Taking into account the fact that most of leading Russian universities are in Moscow and St. Petersburg, the main principle is likely to be – “one region – one university”.

What good will all the above do for Russian higher education? The pros of globalization are clear and meaningful. Nevertheless, cons might also be very significant. The enlargement of educational establishments, especially by uniting them, will lead to the deficiency of competition in the market of educational services. As for local educational markets it will result in monopolization or oligopoly.

Let’s take as an example Kursk region. The educational vocational market is represented by 13 more or less big higher educational establishments, with the number of students more than 1000. All in all 20 educational institutions have license. The number of students in the region is 60 thousand (all forms of education).

To estimate the degree of reflection of competition we use the Herfindal-Hirshman’s index which is the sum of squared market shares of all the participants. Our calculations show that the acquired index = 1400 testifies to the insufficiency of competition in the sphere of higher education. This insufficiency is now mainly reflected in the prevalence of the strategy of “following the leader” in the system of price formation. The consequences of the decrease in higher educational institutions under the pressure of Ministry of Education are well known from economic theory. Local monopolists will set the prices higher than the maximum costs. Taking into account the low elasticity of the demand for education in higher professional training this is sure to lead to the raise in the cost of education and the reduction of its availability.

It is also important to mention a noneconomic consequence of the monopolization of educational markets. If there is only one university in the region it will be very prob-

lematic to control and administrate the process of education and its quality. Even in case the quality goes down the government will be deprived of the possibility to annul the state accreditation of such a “superuniversity”, as it might cause serious social problems. If things go from bad to worse all this will limit the availability of higher education, overprice it and worsen its quality.

Availability and price may be regulated administratively, but quality is something that can't be regulated. Thus, despite the necessity to reform Russian higher education system it is important to preserve the variety of the Russian higher educational landscape. Only on this condition the main thesis of the Conception “Modernization of Russian Education” which runs “The National system of education is an important factor that enables Russia to preserve its leading position among the developed countries of the world, its international prestige as a country with a

high cultural, scientific and educational level” will be not pure speculation.

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*Materials of Conferences***DESIGNING OF THE SOCIAL STATUS IN
CONDITIONS OF THE EDUCATIONAL
ENVIRONMENT OF THE TERTIARY SCHOOL**

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Many social factors influence the formation of an individual as subject of attitudes and conscious activity, among these factors are culture, group experience, unique individual experience. The process of individual formation, acquiring of values, norms and patterns of behaviour accepted in the given society and social group plays a significant role in life of the society and individuals. In this respect theoretical and practical interest lies in the field of diagnostics of the social status as a position of an individual or a group according to social attributes (economic standing, profession, qualification, education) because it is the statuses that define a degree of inclusion of an individual into various groups as well as the position which an individual occupies in them, thus building the static structure of a society. Certain requirements to behaviour and expectations correspond to the social status. Special attention is given to the achieved statuses, i.e. social positions which are fixed through an individual choice and competition. The focus of our sociological research is the projected social status of university youth by means of estimation of their reflection in relation to the problem under consideration.

The research was based on the responses of senior students of a medical university, the technique used in the research is diagnostics of social frustration level developed by L.I.Vasserman (modified by V.V.Bojko). The recorded results reflect different degrees of dissatisfaction of a significant part of students with the situation in the country, their financial position, medical services and everyday consumer services as well as an opportunity to choose place of work.

The average social frustration level of the social group of students in the research is characterized as "lowered" based on the value of a corresponding index. Indexes describing satisfaction with political situation in Russia and medical services belong to the category "moderated", indexes describing satisfaction with financial position and an opportunity to choose place of work are "uncertain".

Priority activators of students' social dissatisfaction are: 1) problems of the Russian society, 2) fundamental institutional changes in the sphere of public health services, 3) low level of financial position of students. In our opinion the dissatisfaction of half of students (51,7 %) and absence of students completely satisfied with Russian political situation positively characterize the civic stand of the future specialists.

Modernization of public health services (existence of the market of medical services, private medical practice, etc.) is ambiguously perceived by students, the evidence of which is dissatisfaction with health services (49,8% of respondents), uncertainty in a real choice of worthy place of work (more than 30%).

Reorganization of the system of professional training also disturbs future doctors: 22,8 % of students cannot estimate the received professional education positively; 19,8 % are not satisfied with their activities; 18,7 % are not satisfied with conditions of study; 19,7 % are dissatisfied with their mode of life in general. Internal structure of the educational environment of a certain university is positively characterized with the absence of respondents unsatisfied with the university administration.

The fact that up to 40,3 % of students are not satisfied with their financial position correlate with the results of social interrogation of students of 4-5 years of study, according to which the fourth part of students has to work at off-hour job.

As a whole the investigated group of students is characterized with low level of reflection in relation to the projected social status - indirect characteristics receive negative estimation, and «their own position in society» is characterized only positively.

The fact that students are satisfied with their family relations (parents, spouses and children for married students), with friends and fellow workers (for working students) characterizes students' social interactions at microlevel positively.

The results of the sociological research allow to estimate the influence of social factors on internal readiness of graduates of medical universities to professional work (to P.Muchinski, 2004). Expectation of negative facts connected with employment, reorganization of social institute of public health, social and economic problems in the society have deforming influence on formation of the social status of the future specialists, reduce its level of autocompetences and self-presentation.

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**SYSTEM APPROACH TO THE LEARNING OF
DRAWING IN UNIVERSITY**

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In the contemporary society, the personality – centered direction has come to be replaced the graphically – centered direction of the education, which finds its expression in the competent approach by the

comprehension by us, as the unity of the theoretical and practical preparedness of the specialist to the labor activity implementation. The competent approach realization demands the contemporary methods of teaching introduction, which formulate the occupational competence of the students, as the future specialists, arm the methods of the knowledge activation, which is often left the quite passive one, that is to say, it doesn't find its practical application. The system approach to the students teaching is one of such methods at the engineering graphics teaching.

Under the system, they usually comprehend the elements totality, having connected between each other by the definite relations, which comes forward, as the total whole in the interactions with the environment. The contemporary presentations on the system permit to distinguish two approaches to the system comprehension:

- a system – some object image, which reflects our presentations on its arrangements, is the method of the information organization on the object and serves to the cognition targets;

- a system – the some construction, which is the tool of the challenges solution and serves to the targets of the social practice.

It is quite possible to distinguish the main sides in the system notion:

1) the system composition – a great number of its elements or the parts. It is so important to show and to give the clear presentation on each element, a division of the discipline at the engineering graphics study;

2) the system structure – the connections or relations totality between the parts. It is necessary to demonstrate the connection between the tasks, having gradually complicated their solution, as far as the engineering graphics mastering;

3) the system itself – is that the whole one, that is being formed, as a result of the parts connection by means of the connections, and it doesn't come to the separate parts;

4) the system interaction, as the whole one with its environment, in which the system attributes are being manifested. The necessity is appeared to show the discipline connection with the real production tasks, the activity result – at the production;

5) the special – purpose system character or its connection for the purpose of the activity: the aim defines the selection principle of the parts and connections, and, therefore, the different systems will correspond to the different aims. For example, the quality of the specialists' preparation influences upon their production activity.

Under the object systemacy, we comprehend its attribute to master all the system indications. As, in principle, every object can be considered, as some system, then the surrounding world systemacy assumes the universal character.

Concerning the thinking, the system approach acts as the organization method of the thinking process, as it demands the definite sequence carrying out of the actions. Increasingly, it is also related to the spatial thinking, without of which it is quite impossible to master the drawing disciplines.

In the process of the system approach realization, all the main operations of the spatial thinking have been started working at the drawing disciplines learning: the analysis (e.g. fragmentation into the parts); the synthesis (e.g. transition from the parts to the whole one); the comparison (e.g. juxtaposition of the whole one and the interaction exposure); the abstracting (e.g. emphasis, substantially, important from point of view of the aim); the generalization (e.g. transition from the specific objects to the system); the concretization (e.g. movement from the general system conception to the particular system). Thus, the development and activation of the thinking takes its place, as a whole.

The system approach acts as a means of the information ordering on the object, because it presents the information in a form of the system, it includes the system into the systems hierarchy as the subsystem and as the over – system. This ordering plays an important role in the learning process.

The system approach is not the end in itself: its application must give the real, but the quite perceptible effect, in every specific case.

It is necessary at the drawing disciplines learning:

- to define, clearly, the aims of every kind of activity (at solution of the tasks and the semester tasks execution);

- in accordance with the aims to define the teaching technologies, which unite the teaching methods, means, and forms (e.g. the application of the applied computer programs and the classical drawing in the drawing rooms);

- to conduct the students' teaching with the observance of the mental development logic and the competences achievement, having developed by every student (e.g. the multilevel test tasks use).

Thus, it is necessary to solve the challenges of the structurization and the hierarchy of the studied discipline, having revealed the regularities and the interconnections with the aim of their more efficient use for the system approach realization at the drawing disciplines learning in the Technical University. The teachers' task – is to learn the students to perceive the cause-and-effect relations, as some threads, having connected everything in the reality surrounding us, then they begin to see not simply the separate parts, but the whole one and interconnected, having formed a habit to the system thinking, they themselves are consciously and purposeful learning to form the circumstances, to define their aims and tasks.

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INFORMATION TECHNOLOGIES IN HIGHER SCHOOL PREPARATION OF PRE-SCHOOLING TEACHER

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The moving of modern informative, political and cultural transformations in Russia has entered into all spheres of human activity including kindergartens. At present new information technologies are used in both managing system and teacher's work.

We have studied and analyzed the work of several Moscow and Moscow region early-education centers which shows that modern computers, multimedia projectors and interactive school boards are either installed or being installed there.

But the work is run by the teachers who have finished courses in the field of information technologies or those who have technical education but not masters in pre-school teaching methods.

We are sure that modern kindergarten requires a teacher who is quite at home at latest achievements in science and culture, informed in modern methods of teaching, familiar with technical equipment and special early educational software.

The teacher must be a master of nowadays information and multimedia technologies as well as pedagogic, psychology and early education teaching methods.

For a period of several years we studied and compared informational environment of the high school and kindergarten, analyzed approaches to the problem of projecting students' professional competence and realizing it in their future professional activity.

We believe that professional preparation must involve comprehensive subjects connected with information technologies, optional courses, special courses and practice. Therefore in Moscow State Humanitarian University named after M.A. Sholokhov

is established a new speciality "Information Technologies in Early Education" in bounds of which the work with early education teachers is held.

We have worked out the new specialty curricular which includes

- modern information technologies
- theory and methods of using information technologies in kindergartens
- computerized testing in pre-school preparation
- information technologies in school managing
- information technologies for early-age children development
- children educating programs and games

This curricular is fulfilled by teachers of Informatics and Mathematics chair and Theory and Methodology of Early Education chair of Moscow State Humanitarian University named after M.A. Sholokhov

On the basis of State Educational Standard for Higher Education, Moscow State Humanitarian University named after M.A. Sholokhov curricula for the following specialties: "Pedagogic", "Pre-schooling Pedagogic and Psychology", "Pedagogic and Methodology of Pre-schooling education", "Special Pre-schooling Pedagogic and Psychology" and "Program of pre-schooling education in kindergarten", we worked out the innovative program on formation of information competence of teachers which satisfies a person's demands to enrich knowledge in the field of information technologies and improve professional preparation of future pre-schooling teachers.

The program consists of introductory and three sections. The aim and tasks of the course are displayed in the introductory. The first section includes the list of technical, program and methodical equipment. It describes the studying process organization, kinds of class activities and requirements to the final testing of students. The second section, which is Theme Planning and Program Content, includes the list of themes to teach and detailed content on each of the themes.

Theme Planning is composed of three parts. The first one is "Computer skills". The third part is "Professional competence of pre-schooling teacher" is devoted to the questions of using computer tests to establish the level of a child's readiness to school studies, psychological and pedagogical bases of computer technologies and computer technologies for school managing.

Also children educational software and computer games are displayed here.

The result must be shown in the final research and annual conference where the listeners share the material they have devised and the experience they've got during the work at kindergartens.

Evidently the work to be carrying out favors the higher school professional preparation and rising of the level of pre-school teacher professional skills.

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REALISATION OF THE PRINCIPLES OF THE BOLOGNA DECLARATION IN RUSSIA

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Attention to the European educational system has deep political and historical roots in Russia. European universities with their long history, used to be a

prototype for the first Russian universities, which were established in the middle of the 18th century. Due to this reason, the Russian higher education system, particularly, the roots, structure, activities and modern development tendencies of its leading universities, are very similar to the European ones. Moreover, the current political developments have raised the interest in the modern practice of the European universities. Russia's striving for joining the European political, economical and cultural area as a full and equal partner, as well as changes in the Russian foreign policy encouraged the apprehension and adaptation of the European experience. Economical reasons speeded up this process considerably: Russia's transition to market economy made it vitally important to commercialize the professional education for the country's and international needs. The Russian higher education faced a problem of gaining a worthy place in the international educational arena.

There is no doubt, that Russia familiarized with the European experience, taking into consideration the Magna Charta Universitatum, signed in Bologna in 1988. This document reflects ideas about social and historical role of universities in the 21st century. It states the main principles of universities' existence: moral and scientific independency from politics and economy (autonomy), inseparability of learning process from research; freedom of teaching, research and learning; crossing political and geographical boundaries and necessity of mutual perception and intercultural interaction.

Just recently, during the last 10 years, Russia made its first direct steps towards Bologna process, i.e. when the main principles have already been formed and the system of cooperation and control have already been established. Behind the interest in Bologna process was understanding of the fact, that it is necessary to develop such an educational system, which would conform with the market mechanisms and could be equally good or even compete with the European one. With this aim in view, it is essential to create conditions and find ways for recognition of the Russian academic qualifications in Europe.

Documents of European Summits (European Council Presidency Conclusions) in Lisbon (23-24 March, 2000) and Santa-Maria da Feira (19-20 June, 2000) stated, that educational systems of the European Union should correspond to reality of the 21st century, and that "continuing education should become a main political program for the civil society, social integrity and employment". This approach has also been fixed in the Concept of development of adult education in the Commonwealth of Independent States (CIS) that was signed during the 8th Conference of the CIS Education Ministers in Moscow (13 May, 2003).

At present, the EU, the CIS and Russia understand, that the strategy of continuing education should be based on cooperation between authorities and non-governmental organizations, the so called «social

partners», because it is them, who have a close contact with the interests and needs of citizens and communities. Besides, a common educational network should strengthen the link between formal and informal educational institutions. All this is being implemented by means of open universities, distance learning and etc; the universities present their educational offers to the population.

Developing politics in the area of continuing education in Russia, pays a growing attention not only to its economical necessity, caused by the changes on the labor market, but also to its social and cultural importance. Education becomes a key factor of both professional and personal success. As education plays the main role for individual's career start, so it will play a decisive role for his social inclusion in the future.

According to paragraph 1.4 of the Conception of modernization of the Russian education, priority task of the educational politics is to provide a high quality of education, conserve its fundamental principles and meet the current and future needs of an individual, society and state. The quality of higher education means more than just aims and values of the educational institutions, though they are regarded as its intellectual and theoretical basis. The quality of higher education and measures for its achievement and improvement mean, that universities should develop towards better understanding and satisfying of communities' and individual needs: social, economical and cultural.

It is important to preserve one the main principles of the Russian higher education – its fundamental character, which has always been based on fundamental science and scientific schools. This contradicts with uncertainty caused by the ongoing discussions in the West, on whether universities need science. One of the most strong aspects of the Russian educational system is, that even freshman students are involved in the scientific work under the guidance of professors. From the very beginning, they become a part of the scientific school and get an opportunity to work with the scientists of different generations and ages. Successful cooperation with the youth starts already in school, where the leading university professors teach talented and clever children, preparing them to become graduates and future students for the Russian universities.

Russia's integration into common educational area should run not only at the level of state and ministries. In order to succeed, it should find support among all Russian educational institutions; it should involve the whole scientific and educational community, including the Russian students, post-graduates, professors and scientists.

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REFLECTIONS ON FURTHER VOCATIONAL TRAINING DEVELOPMENT

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Non-state educational establishment “Bashkirian across-the-board institute of in-service training in the field of labor protection, industrial safety, road accident prevention, fire proof, electrical safe, energy saving”

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The radical reformation of educational system is the problem of vital necessity. This reformation must be started in comprehensive school and have its continuation in higher education and further vocational training. However, it should be launched only after different (not innovative but quite different) educational programmes and standards – the fundamentals of the whole educational system – have been carried out. Moreover, elaboration of educational programmes and standards should be realized not only in fundamental-academic paradigm, but also in research paradigm of all types and levels of education existing in our educational system nowadays.

Vocational training is the top of a mountain, the foot of which is deeply rooted in comprehensive school and even in early childhood. Compensatory training does not lead to the appearance of educational system integrity. Simple addition of new links to the existing ones without qualitative change in forms and content doesn’t bring the features of continuity to the existing educational practice, doesn’t settle the arising contradictions.

The All – Union Congress of educators gathered in Moscow, December, 1988 stated a general task: to recomprehend the target functions of education as a system, to formulate the tasks of its separate stages and links, to revise traditional notions concerning the social essence of education, its correlation with other types and forms of social practice, its role and place in the life of a human being and the society. The educational project named “The Conception Of Continuous Education” was offered to the participants of the Congress. The Conception pointed out that arising

approaches of understanding the essence of continuous education are rather contradictory. In some cases these approaches are identified with mechanical training which is understood as the mechanical unification of all stages of educational process in order to overcome the contradictions and deadlocks in education itself; in other cases it is considered sufficient to add extra links to the existing system. Thus it is necessary to change the direction.

In spite of the fact that twenty years have passed since the introduction of the Conception Of Continuous Education (1989) into practice, it has not lost its urgency, scientific novelty and theoretical significance.

Pedagogical institutes nowadays are teaching students using the information of the end of the XIX – beginning of the XX centuries. Educational institutions of primary, secondary and higher professional education (technical schools, technical colleges, higher educational institutions) train specialists, aware of the new technologies of the XX – XXI centuries. It is clear that most comprehensive school graduates are not able to cope with the sophisticated curricula. That is why higher educational institutions have to hold extra entrance examinations to reveal students’ skills and abilities. It is urgent to eliminate this interruption of youth education in our country. Professors must avoid such words like “Now, forget everything you’ve been taught at school at once. We’ll teach you other things and in the other way” when welcoming the freshers. To begin with, it is necessary to change the teaching staff at comprehensive schools: a researcher in physics should give lectures on physics, a researcher in chemistry should give lectures on chemistry, a philologist should teach literature and a linguist should teach languages. The core subjects should be taught by researchers not by a tutor on the basis of “Physics” or “Chemistry” textbooks. Textbooks are for students, not for teachers.

At the same time vocational training institutions should develop personally-oriented paradigm of teaching using the advanced teaching technique. Mainly highly-qualified specialists having composed their own course of studies should teach students. In this case a technical school graduate could say “I’ve been taught by a Master” and a college graduate could say “I’ve listened to the course of a famous researcher”

Professional skills of vocational training institutions graduates constantly lag behind scientific-technical progress development. In order to avoid this the graduates must be able not only to work on their speciality, but also to learn, to develop in their professional activity, that is not only to possess knowledge – to possess abilities to acquire new knowledge, to maintain more and more sophisticated social and professional functions on the demanded level, to be competent.

The Conception points out that urgent needs of social development demand changes in the approaches to in-service training, vocational training and refreshing courses of specialists engaged in different branches of the national economy as one of the most flexible link in the system of continuous education.

The educators engaged in vocational training are working over the solutions of these tasks. They work hard to meet the demands of labour market teaching the specialists who will be needed not only today but in future, competitive in modern professional qualities.

Further vocational training was born and is developing vocational training not because of the instructions of the authorities, but due to offers and requests of the masses below: from owners, heads of enterprises and organizations or from labourers themselves. As a result, further vocational training through in-service training courses and refreshing courses has provided labourers an opportunity to participate on modern markets of production and service realized according to scientifically-based technologies. Scientifically-based technologies mean, first of all, scientifically-oriented labourers. Thus, it is quite necessary to develop theoretical basis. Unfortunately, Russian researchers do not pay enough attention to further vocational training.

To provide objective components of continuous education and to achieve successful realization of new educational programmes we should develop new educational programmes at comprehensive schools. These educational programmes should have multi-profile trend both in cultural education of future citizens of our society and in strictly specialized educational programmes intended for training specialists for certain branches of national economy. Elaboration of new school educational programmes of general education must be based, in its turn, on the scientific research of general vocational training. Working out the new educational programmes of general vocational training must be based on scientific research on further vocational training educational experience. Elaboration of educational programmes of further vocational training must be based on scientific research on labour market demands in present and in future. In our opinion, realization of educational programmes elaborated in such a way could provide the continuous character of education and the succession of the educational programmes in our country.

Educational programmes of further vocational training (carried out in training centres) in the 1980s were subdivided into several types: intensive courses, refreshing courses, in-service training course, sandwich courses and target-oriented ones.

Intensive training – that is a course in which a lot of material is covered in a short time – was the most demanded because a lot of labourers had neither training at any vocational institution nor a certificate of vocational training. The demand for vocational

training even more increased at the beginning of the 1990s when following the enterprise closedown in textile and agriculture, staff reduction in many industrial branches, staff reduction in the army and navy, appearance of a great number of migrants – gave rise to the motivation to get a certificate of vocational training in the shortest time and to return to work again. For all that, the quality of such education was not up to a mark.

By the end of the 1990s the demand for vocational training (that is, for the simplest and fast receiving a certificate of vocational training) slowed down. For what reasons? First, it turned out that the content of vocational training syllabi did not satisfy the professional level of industrial technologies, for example, fourth-class turner could not work on his speciality because his professional – qualitative characteristics did not correlate to any job. As well as the fourth-class crane operator could not find a crane corresponding to the fourth-class. The same situation had formed in the most specialities and professions. Besides, scientific-technical progress, influenced by the market, improved the level of technological development in our country. Perhaps, only non-state educational institutions of further vocational training got a chance to elaborate, consider, approve and co-ordinate vocational training educational programmes in accordance with modern demands of industrial labour market meant for higher grade (with higher complexity of qualification, machines, equipment, materials and advanced technologies).

As the acceleration of the socio-economical and scientific-technical progress grows the demand for advanced and sophisticated technologies increases as well as the scale and significance of staff retraining; first, on advanced and novel directions of science, technique and technologies development, second, on maintenance, adjustment and repair of new generations of versatile facilities, machines and equipment.

The main centres in the specialists training and retraining system should be as follows:

- a) specialized educational structures (mainly, higher educational institutions and technical colleges), their branches and faculties;
- b) target-oriented training centres;
- c) parallel centres of continuous education;
- d) different extra structures of social, informal, initiative forms of general and vocational training.

The special survey conducted by the Institute of World Economy and International Relationship showed that the present market economy makes new demands to labourers what requires the levelling of the general system of education, raising the level of both teaching and intellectual skills.

On 20 December, 2007 the final session of the Public Chamber Committee devoted to the questions nation's intellectual potential was held in the State University-Higher School of Economics. The members of the Committee submitted the paper "Education

and the society – is Russia eager to invest in its future?” Some of the conclusions were as follows:

- the content of the education is outdated. It lags behind both life requirements and achievements of science and technology;

- the low salary of teachers leads to low motivation;

- the structure of vocational training does not vocational training correlate either with current or prospective labour market demands.

Here we could add: we don't need workers, technicians or engineers training today. There is no division of labour at the present-day manufacture nowadays. All what we need is the continuous training of the whole professional structure of specialists with different levels of professional development, different levels of activity and of personal professionalism, of self-efficiency realization possessing equal rights and responsibilities to work in different spheres of economy as specialist-technologists or specialist-managers.

However, neither comprehensive nor vocational school should influence personal world outlook. The school should assist in obtaining knowledge, developing competence corresponding to the scientific-technical progress level.

These thoughts are not novel. The quotation from Lev Tolstoy's work "Upbringing and Education" can prove it. "School must have one purpose – transmit instructions and knowledge without transition into the moral sphere of convictions, beliefs and character; its purpose is only the science itself, but not the results of its influence on the personality. School mustn't consider any science or even the code of sciences to be necessary, but must transmit the knowledge it possesses giving students the right either to apprehend it or not. The school structure and programme mustn't base on theoretical ideas, or on convictions of necessity of these or those sciences, but on the single possibility science – on teachers' knowledge."

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MODEL OF THE INTEGRATED EDUCATIONAL SYSTEM «SPECIALIST SCHOOL - TECHNICAL COLLEGE»

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One of the top issues for school leavers in Russia is the choice of a future profession and educational institution. According to some researchers (S.S. Kravtsov, A.N. Leibovich et al), the most available form of vocational guidance is a specialist schools program, aimed at differentiation and individualiza-

tion of education. Continuity of education is important at all its stages and levels. Putting an integrated model of a multidisciplinary school based on network learning, into educational practice could help achieve this objective. Schools with technical specialism could follow the example of the «specialist school - technical college» system, used by the Association of the Izhevsk University Complex and the Izhevsk State Technical University (ISTU). The main advantage of this system, compared with normal schools in the network, is an organic link between general education schools and institutions of primary, middle, higher professional and additional education. The principles of the system are:

- *Social orientation* (taking into account social needs and development of scientific ideology);

- *Linking theory to practice* (choosing future profession with due regard for the current demand for labor);

- *upbringing character of education* (career counseling in order to develop a balanced personality, uniting civil, labor, moral, aesthetic and physical education);

- *polytechnical character* (career counseling in cooperation with polytechnical education, acquaintance of students with the basics of modern production);

- *accessibility and informed choice* (school students can familiarize themselves with a wide range of professions, learn the psycho-physiological requirements of different professions, study options, chances for professional growth and etc., in order to make a conscious choice of the profession);

- *systematic character and continuity* (introduction of vocational guidance at school, starting from the 1st grade, under condition of continuity of this work throughout the school years);

- *multidimensionality (complexity)* (career counseling is aimed at preparing a student for a good choice of a profession: in civil, social and economical, psychological and educational, medical and physiological, and professional aspects);

- *taking into account age and individual characteristics* (gradual professional self-determination of schoolchildren, according to their age and personal traits: professional interests, inclinations and abilities);

- *cooperation of school, family, employers and public organizations* (all involved sides have a common approach to vocational guidance);

- *self-determination* (final choice of a profession is made by a schoolchild taking into account advice of school, family, employers and public organizations).

In order to provide an effective management of the «specialist school - technical college» system, an integrated monitoring system for education quality control was developed. It was designed basing on methods of qualimetrics and educational cybernetics. Such a complex approach let standardize and schema-

tize the monitoring procedures and provided objective, qualitatively and quantitatively comparable information about the level of students knowledge.

The suggested qualimetrics technology of a complex monitoring includes four steps: marketing, organization, project and experiment.

The first monitoring step was to conduct a marketing research, in order to estimate real and perspective job opportunities for the graduates of the ISTU, by the example of specialization «Technological education». The aim of the second stage was to set goals and tasks for children education in specialized classes, as well as for the bachelor and master students at the technical college. The third stage related to developing subject thesaurus and creating databases of educational control material and experts, invited for their development and validation. At the experimental stage, an algorithm of the education quality monitoring was developed.

Monitoring of education quality in the framework of the «specialist school-technical college» system, let determine students' individual ratings. For students at the pre-higher education department, it was later used for assessment and admission to university. Results of the monitoring research were obtained, processed and analyzed in the following aspects: meaning of career counseling; advanced knowledge in specialism before entering the technical college; education quality at the ISTU; influence of the students' participation in scientific methodical and scientific practical conferences, on the educational success; importance of practical training for professional development, and other aspects, mentioned in the article. Created information databanks were used for both external and internal evaluation of the technical college.

The monitoring research, conducted at the engineer-pedagogical faculty of the ISTU, has revealed, that it is necessary to intensify the fundamental part of students' education. For this purpose, new courses have been developed and introduced into the bachelor study program, in framework of the following educational aspects: world outlook development, continuing physics-mathematical and technical training, organization and management education, qualilogy and reflexive methodological training. The courses are: «Principal physics in modern technologies», «Modern technical devices and their operation» and «Education quality management».

To sum up, the qualimetric monitoring should be regarded as an integral management part for all integrated educational systems, including the «specialist school – technical college» system.

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PSYCHOLOGICAL AND EDUCATIONAL CONDITIONS FOR DEVELOPING SOCIO-ECOLOGICAL READINESS AT STUDENTS

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One of the most pressing concerns facing humanity today are environmental problems. This requires an adequate education of students, in order to prepare them for a proper interaction with nature (socio-ecological readiness) in the framework of their future professional activities. Training effectiveness depends on a number of factors. We need to determine, what socio-ecological readiness is; and secondly, find educational mechanisms for its development.

Our studies in this area let define the socio-ecological readiness as a personal characteristic that unites knowledge, abilities and skills. These three components help develop an effective environmental policy based on certain norms, limits and methods. Secondly, this notion expresses a certain psychological state of an individual, when he begins to interact with nature. Such a condition arises, while a person anticipates some objects of the socio-ecological reality. Under condition of compliance with the norms and limits, it provides a stable goal-oriented activity, keeping an inter-element environmental balance and creating a possibility for further functioning and development.

Condition of the socio-ecological readiness means, according to A.S. Prangishvili, «...to balance relations between an individual and environment». Its substance is determined by the environmental values that satisfy some personal needs. Our attention is focused on the socio-ecological values, which can be divided into general values (nature, society, human, culture, their interaction) and specific values (natural, psychological, ethnic, social, labor, economic, educational). These values need to be learned; they determine a general plan of subjective orientations and require, that each and everyone adheres to the common norms, limits and methods of rational nature management.

An important question in research of the socio-ecological readiness is to determine relevant psychological mechanisms of its formation. In framework of this study, we have assumed, that personality is a system. Our considerations were based on V.A. Petrovsky's subjective theory, which explains personal subjectivity as means of self-determination of human existence in the world. According to V.A. Petrovsky, personal subjectivity reflects in human activities, which he one uses to reproduce himself and his existence. Being one of the forms of human interaction with nature, this activity requires a certain training. It involves the whole personal potential, which is presented in three subjective spaces, where an individual acts as a personality: intra-individual, inter-individual and meta-individual.

The readiness under study is most likely associated with these spaces; it is being formed using potential of each space and its specific mechanisms. The spaces play a role of original devices that transmit and transform the changes towards the condition of readiness. The main part of socio-ecological readiness' development in the intra-individual space (the first dimension) is motivation, which elements are needs, motives and goals (S.L. Rubinshtein, A.N. Leontiev, M.I. Dyachenko). Each of them lays a basis for a certain aim and its practical form - readiness for an optimal interaction with nature.

The intra-individual personal space acts as an initial stimulus for development of socio-ecological readiness. But its final practical implementation involves not only mentality, but also other personal spaces, for example, an inter-individual space. According to V.A. Petrovsky, this space (the second dimension) is, first of all, an area of interpersonal communication, where relations between several individuals reflect personality of each of them. The fact, that environmental exploitation is impossible without other subjects, communities, societies and relations between them, determines the possible development of the socio-ecological readiness in this space.

Qualities of interpersonal relations (objectivity; subjectivity in form of thoughts and feelings; meaning for the two interacting subjects; a system of aims, orientations, expectations of group members towards each other; common activities and communication; structural properties; role behavior; cohesion and compatibility; leadership and others), act as specific development mechanisms for the socio-ecological readiness. Being an integral structure, the socio-ecological readiness includes other types of preparedness, for example: readiness for interaction with nature; for communication with its elements and the environment in general; readiness to play different roles in the environment; understand its meaning; readiness for apprehension of multilevel environmental relations and inclusion in their structure; cohesion and compatibility with nature.

There is also some development potential in the 3rd personal dimension – meta-individual space. According to V.A. Petrovsky, personality is represented here as otherness in others (as well as in himself as in another), as personalization. Essence of this phenomenon lies in real mental transformations and changes in the intellectual space and affection needs of another person, which are caused by the individual activity and his participation in common activities. This is an extension of the self in another person; it is a kind of getting a second life in other people, causing long-lasting changes by them.

As used here, personality has an ability and possibility of personalization not only in another person and in himself as in another one, but also in nature. Interacting with the surrounding reality, a person sees his presence in the environment via results of

this interaction. This is either an exploitive face, or a wise and common-sensed human, who preserves the living environment for himself, other people and future generations. Earlier, the humanity asked itself, what nature means for people. Today, in conditions of acute ecological crisis, people should ask themselves, what role a human plays in nature, how he is represented there. In response to the first question, people violently exploited natural resources, which is proved by the thousand-year history of ecological crises. At present, the humanity needs to show its intellect in relations with the first and second nature, and focus its activities on preservation and recovery of the remaining natural and human resources for the future generations. In this way, today's generation and its environmental activities will reflect in the consciousness of the future humanity. Thus, people will satisfy their need for higher personalization. In their turn, modern people constantly find traces of their predecessors in the environment. This environmental legacy includes deserted territories, disappeared civilizations, mutations in nature, anthropologically determined climate changes on our planet and etc. According to A.A. Grigoriev, today's human is a powerful environmental transformer whose landscape interventions leave results here, there and everywhere.

Consequences of the current socio-ecological interactions prove not only environmental otherness of society, but also contribute to its own development as "another". Nature pollution, exceeding all standards; cultural vandalism and earthliness are, according to V.A. Petrovsky, a miracle that reflects the humanity, results of its activities and its future. However, people can change their reflection in the «environmental mirror», if they reconsider their relations with nature, and change their consumer attitude towards the environment. People should develop an optimal interaction with nature, based on limits, norms and methods, in order to survive and develop further. That is why, it is important to teach environmental values to everyone and young generation in particular.

So, all main personal spaces: intra-, inter- and meta-individual contain potential for developing socio-ecological readiness at students. The common mechanism for all three spaces is based on needs of interaction with nature that are satisfied by means of motives; inclination to this interaction; clear goals and activities towards their achievement. On the other side, the foregoing arguments let assume, that there are different forms of the socio-ecological readiness at students, for example, socio-eco-cognitive, socio-eco-active, socio-eco-creative and socio-eco-axiological readiness. All these types reflect the main components of the studied readiness. The 1st one – socio-eco-cognitive readiness – means students' preparedness for further perception of natural reality, revealing its features in framework of professional tasks and creation of a familiar environmental image, estimating resource potential that can satisfy some human needs.

The 2nd – socio-eco-active – shows students' readiness for normative activity in the environment according to existing standards and nature preserving technologies. The 3rd – socio-eco-creative – supposes a search for nonstandard solutions in environmental policy and ways of their implementation. They are determined by constantly worsening condition of the environment and concerns about how to preserve natural resources for the current and future generations; as well as by the issue of further optimization of socio-ecological relations. Finally, the 4th socio-eco-axiological readiness is students' preparedness for revealing socio-ecological values in the environment, their estimation and use according to one's needs, social standards and rules.

Existence and functioning of each of the mentioned readiness types can be described with the help of a typical (or average) representative of a group, referable to this type (Dushkov B.A.). For example, the socio-eco-cognitive type is represented by inquisitive, meditative, indifferent personalities; the socio-eco-active – by active, goal-oriented, motivated, interactive people; the socio-eco-creative – by independent, transforming, inert persons; and the socio-eco-axiological – by optimistic-utilitarian, pessimistic and balanced personalities.

To sum up, let us stress, that the use of the described mechanisms can develop the socio-ecological readiness at students more effectively, help harmonize socio-ecological relations today and forecast their stable development in the future.

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EVALUATION OF THE QUALITY OF INFORMED CONSENT IN A VACCINE FIELD TRIAL IN A DEVELOPING COUNTRY SETTING

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Background: Informed consent is an ethical and legal requirement for research involving human participants. However, few studies have evaluated the process, particularly in Africa. Participants in a case control study designed to identify correlates of immune protection against tuberculosis (TB) in South Africa. This study was in turn nested in a large TB vaccine efficacy trial.

The aim of the study was to evaluate the quality of consent in the case control study, and to identify factors that may influence the quality of consent.

Cross-sectional study conducted over a 4 month period.

Methods: Consent was obtained from parents of trial participants. These parents were asked to complete a questionnaire that contained questions about the key elements of informed consent (voluntary participation, confidentiality, the main risks and benefits, etc.). The recall (success in selecting the correct answers) and understanding (correctness of interpretation of statements presented) were measured.

Results: The majority of the 192 subjects interviewed obtained scores greater than 75% for both the recall and understanding sections. The median score for recall was 66%; interquartile range (IQR) = 55%–77% and for understanding 75% (IQR = 50%–87%). Most (79%) were aware of the risks and 64% knew that they participated voluntarily. Participants who had completed Grade 7 at school and higher were more likely (OR = 4.94; 95% CI = 1.57–15.55) to obtain scores greater than 75% for recall than those who did not. Participants who were consented by professional nurses who had worked for more than two years in research were also more likely (OR = 2.62; 95% CI = 1.35–5.07) to obtain such scores for recall than those who were not.

Conclusion: Notwithstanding the constraints in a developing country, in a population with low levels of literacy and education, the quality of informed consent found in this study could be considered as building blocks for establishing acceptable standards for public health research. Education level of respondents and experience of research staff taking the consent were associated with good quality informed consent.

Background

Informed consent is an ethical and legal requirement for research involving human participants [1]. Guidelines as contained in the Declaration of Helsinki, the Nuremberg Code and the Belmont Report [2], and the Council for the International Organizations of Medical Research [3] have become accepted tools used by Institutional Review Boards (IRBs), the bodies responsible for ethical review of research proposals, in approving such research. The International Convention for Harmonization's initiative on Good Clinical Practice (GCP) [4] is considered to be the quality standard for the conduct of clinical trials in humans. Accredited courses for investigators of clinical trials are based on these GCP guidelines. Medical doctors, professional nurses, and other health professionals who conduct research on behalf

of principal investigators frequently do these courses as part of their training.

In most countries research ethics are regulated by statutory bodies [5,6]. IRBs of sponsor organizations and Research Ethics Committees (RECs) of academic institutions are mandated by their stakeholders to protect participants.

However, unethical research practices occur not uncommonly and appear to have been accepted and even perpetuated by IRBs [7-9]. Some authors have reservations about the capabilities of IRBs in developing countries, suggesting that they may be made up by inadequately skilled members [10]. London [11] proposed ways to improve the regulation of ethics practices in developing countries, which included proper research ethics training of IRB members and independent monitoring of research activities.

Studies of the quality of informed consent in medical practice have found this to be poor [12-14]. Similar shortcomings in consent quality in research have been found [15-17], particularly in developing countries, where concepts such as "voluntary participation [18,20]", "randomization [19]" and "benefits and risks [20]" may have variable interpretations. Large scale research projects are increasingly being conducted in these settings. The informed consent process poses several challenges, logistic as well as ethical, since failures of informed consent may result in the violations of participants' human rights. In South Africa, where the rights of the research participant are explicitly protected in the Constitution [6], it is essential that this understanding of participants' rights be tested in the appropriate research environment. Poverty, disease, lack of education, hardship, submissiveness, the effects of war, famine, pandemics, and social insecurity prevalent in developing countries all make participants more vulnerable to research exploitation.

Purpose & objectives

This secondary study, the "consent study", aimed to evaluate the quality of informed consent in a primary case control study (the Immunology Study) of immune correlates of protection against severe childhood TB nested inside a randomized controlled trial vaccine trial [Bacille Calmette-Guerrin (BCG) Study]. A total of 5467 children were enrolled into the Immunology Study from 2001 to 2004. These studies were implemented in Worcester, a rural setting in the Western Cape Province of South Africa. Participants in the primary immunology case control study underwent collection of blood between 8 and 14 weeks of age, after written consent had been obtained from their parents. The consent procedure was concluded by means of signing a consent form.

The objectives of this consent study were:

a. To determine study participants' recall and understanding of items discussed

during the consent procedure for the immunology study;

b. To establish whether certain participant and study-related factors were associated with the quality of informed consent; and

c. To describe the association between the quality of informed consent and participants' knowledge of their health rights.

Methods

The study was a cross-sectional study conducted over four months

Population and sampling

The population for the consent study was drawn from mothers who gave informed consent for the participation of their children in the Immunology Study. Recruitment for the Immunology Study took place from March to June 2004 in the form of a team visiting district health facilities according to a fixed schedule. Enrolment and phlebotomy were preceded by a booking session at which an information pamphlet about the Immunology study was handed out. Informed consent was conducted in the first language of the mother (either Afrikaans or Xhosa) by trained interviewers.

For the consent study, all mothers attending clinics where the language of communication was predominantly Xhosa, and every fourth mother attending Afrikaans-language clinics were approached to participate in the consent study.

Dedicated nursing staff conducted the interview within one hour of mothers' consent to their infant's participation in the Immunology Study.

Measurement and data collection

The quality of informed consent was determined by measuring the recall and understanding of informed consent using a questionnaire specifically designed for this study (see additional file 1). The questionnaire contained nine questions dealing with the basic facts of the Immunology Study. Participants were expected to select the correct answer from a choice of three possible answers for each of the questions. One of the answers was an exact reflection of the information in the consent document, which, if se-

lected, was taken as an indicator of correct recall. For the understanding assessment, participants were expected to select the appropriate interpretations for a total of eight statements offered. This was taken as an indication of the extent to which participants' decisions were based on understanding. Although there is some inevitable overlap between recall and understanding, the type of questions allowed broad categorization into two separate scales for recall and understanding. Participants were requested to complete the questionnaire in writing while consent study staff provided assistance with the interpretation of the questions.

Statistical methods

The results on the data form were captured, processed and analysed using Stata version 6 [21]. Correct scores for recall and understanding were totaled for individual participants and summary statistics were calculated. Total scores for individual recall and health rights questions were also calculated. Logistic regression analyses were performed to model the effect of maternal age, education, access to telephones, language preference and research experience of the professional nurse on the recall and understanding scores.

Ethical considerations

The Research Ethics Committee of the University of Cape Town Health Sciences faculty approved both the Immunology and Consent Studies. Mothers who had consented to participation into the Immunology Study were referred to the nurse for the Consent Study in a separate room. As part of the consent procedure, the nurse handed the mother an information sheet written in simple language explaining the Consent Study, and asked the mother to read it. After verifying that the mother understood the contents of the consent letter, she was then asked to participate. If she accepted, the nurse asked the mother to acknowledge by signing and dating a copy of the letter. This copy was kept for record purposes.

Results

Four hundred and eighty-one participants from 106 clinic visits to 22 primary healthcare facilities (clinics) in the study area were enrolled into the Immunology Study. Of the 32 visits which were selected for the Consent Study, two visits were cancelled. A total of 202 Immunology Study participants were referred to the Consent Study staff. One-hundred-and-ninety-two (192) mothers completed the questionnaires for the Consent Study, resulting in a response rate of 95.0% (Figure 1). The non-responders were made up as follows: three left the clinic before the Consent Study team had started enrollments, four could not be enrolled because of an accidental language mismatch and a further three used spoilt versions of the questionnaire. The demographic characteristics of the sample are listed in Table 1.

Participants obtained a median score of 66.7% (range 11.1% – 100.0%) in the recall and 75.0% (range 37.5% – 100%) in the understanding sections. Both scores were skewed towards the left (Figures 2, 3). Although only 12 (6%) and 25 (13%) of participants respectively had all the answers to the recall and understanding questions correct, the majority of participants obtained scores in the "75% or greater" category. Only 3 (1.6%) obtained a score of less than 25% for the recall test and none had two or fewer correct out of eight understanding questions. As can be seen from Table 2, higher levels of recall scores were positively associated with higher levels of understanding levels scores (Spearman correlation coefficient = 0.37, $p = 0.000$).

Recall of questions: Four out of the nine recall questions elicited more than 75% correct answers (Table 3), and another four elicited between 50% and 75% correct answers. The question used to test whether participants knew the reason for the clinic visit received the highest proportion (85.4%) of correct answers (Figure 4). Notably, only 36.5% of participants knew that there were no immediate benefits. Otherwise, correct responses exceeded 60% for other questions.

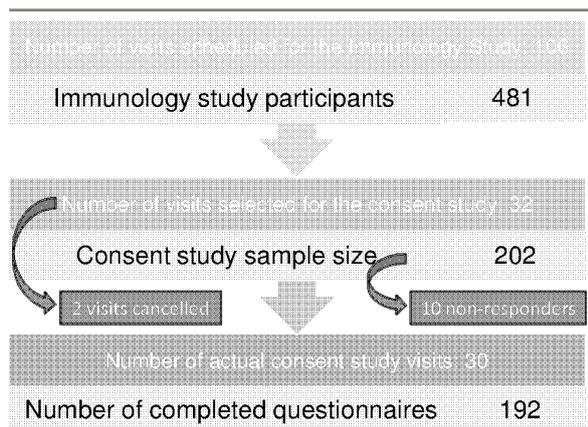


Figure 1. Schema to show how participants were selected for the consent study. Of the 106 Immunology Study visits ("phlebotomy clinics") scheduled for the study period, 32 were selected through systematic sampling. A total of 481 participants enrolled for the Immunology Study during the corresponding period. Of these, 202 were eligible to participate in the consent study. Eventually, 192 participants completed the consent study questionnaire

Table 1. Demographic characteristics (n = 192)

Participant aspect		Consent Study
Age (years):	median (range)	26 (16–44)
Language:	% Afrikaans	56.8
	% Xhosa	43.2
Level of education:	(% Grade 6 or less)	23.4
	(% Grade 7 to 11)	42.8
	(% Grade 12 or higher)	33.9
Access to a telephone:	(%)	57.9
Attendance per clinic:	median (range)	8 (1–15)

The final logistic regression model obtained for recall scores of 75% or greater included experience of research nurse and education level of the participant. Participants who had completed Grade 7 and higher at school were more likely (OR = 4.94, 95% CI = 1.57–15.55) to obtain a minimum of 75% in the recall test compared to participants who did not progress that far in education. Also, consent obtained by nurses with more than two years research experience resulted in an almost three times (OR = 2.62, 95% CI = 1.35 – 5.07) the odds of scoring at least

75% compared to nurses with less than two years of experience.

Understanding of questions: Most participants gave the expected answers (Table 4) for all understanding questions. Although 87.5% of participants understood that the development of a bruise did not warrant a call to the police, a relatively low percentage (66.2%) knew that they could discuss the bruise with the nurse at the clinic. The logistic regression model obtained for understanding scores of 75% and greater indicated that participants who were older than the median ages of 26 years were more likely (95% CI = 1.15 – 4.07) to obtain high scores than those younger than 26 years. Level of education was not associated with understanding in this model.

Knowledge of health rights as contained in the South African Constitution (see figure 5): The majority of participants were aware of their rights regarding access to health care, freedom of choice and freedom from harm. However, confidentiality of information and free health care for all were mistaken as rights by most participants. The overall score for health rights was not linearly correlated with either the recall or the understanding assessment (Spearman's correlation coefficient not greater than |0.10| and $p = 0.96$ and 0.41 , respectively). Individual scores for each of the health rights also had no association with the recall scores, and all but one of the understanding scores. The knowledge of right to freedom of choice was associated with the understanding score (OR = 2.59, 95% CI = 1.06 – 6.34).

Discussion

The finding that most participants obtained scores in excess of 75% for understanding and 66% for recall indicates that the general quality of informed consent was encouraging. Almost all participants felt that they would participate again in a similar study if they were given the choice. These results are similar to both qualitative and quantitative findings in previous studies conducted in developing countries [18,20,22].

Table 2. Relationship between recall and understanding score (n = 192)

Recall n (%)	Understanding n (%)			
	High*	High medium*	Low medium*	Low*
High*	76 (80.0%)	17 (17.9%)	2 (2.1%)	0 (0.0%)
High medium*	39 (57.3%)	25 (36.8%)	4 (5.9%)	0 (0.0%)
Low medium*	14 (53.9%)	11 (42.3%)	1 (3.9%)	0 (0.0%)
Low*	1 (33.3%)	2 (66.7%)	0 (0.0%)	0 (0.0%)

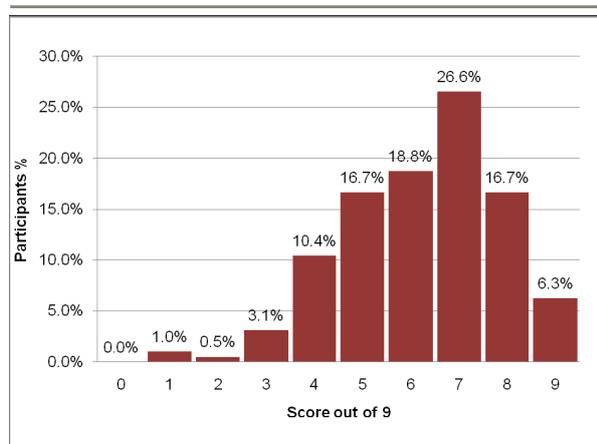


Figure 2. Distribution of the results (scores out of 9) of the recall test

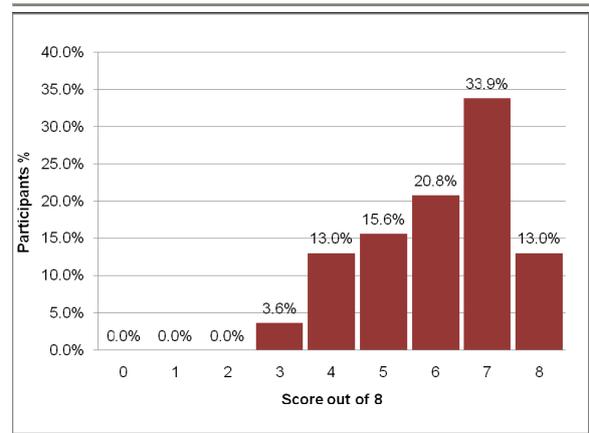


Figure 3. Distribution of the results (scores out of 8) of the understanding test

The proportion of participants with low scores for quality of informed consent was small and lower even than that found in some studies in industrialized countries [16,23]. However, due to differences in methodologies, no specific comparison is attempted. The understanding assessment result supports earlier suggestions [24] that low levels of education need not hinder participants' ability to understand consent concepts.

It is reassuring that the two language groups had similar results, as there had been concerns in the trial that consent quality would be different between the language groups. The two languages broadly represent two different race groups in South Africa, which could be associated with differences in perception of social services such as health

care. Barsdorf & Wassenaar [25] have shown that Black participants, known to have suffered most from the injustices of the apartheid regime, had poorer perception of voluntariness than their White and Indian counterparts. These differences in perceptions of research between race groups were not demonstrated in this study.

Some limitations in the measurement method are evident. The study did not assess the ability of participants to retain information for longer periods of time (i.e. days, weeks or months) after their enrolment into the Immunology Study. Moreover, the questions posed for understanding could not cover all the emotional and intellectual aspects involved when giving consent. Access to a telephone or cell-phone may not be the best proxy for socioeconomic status as it may be too indirect and focuses only on the

Table 3. Results of quality of informed consent assessment: Recall section

1. I have been asked to attend the clinic today so that (n = 192):	
<i>My baby can participate in a research study</i>	164 (85.4%)
My baby can receive expert treatment.	14 (7.3%)
My baby can receive routine health care	14 (7.3%)
2. The purpose of the research study is to (n = 191):	
Test for protection against tuberculosis in my baby's blood.	154 (80.6%)
Test for tuberculosis in my baby's blood	35 (18.3%)
Test for HIV in my baby's blood	2 (1.1%)
3. Research staff wants to enroll my baby into the research study so that (n = 189):	
<i>They can collect blood from my baby</i>	115 (60.9%)
They can inject my baby with BCG	40 (21.1%)
They can test my baby for TB or HIV	34 (18.0%)
4. The total amount of time my baby will be expected to participate in the study is (n = 190):	
<i>1 day</i>	126 (66.3%)
2 to 3 years	45 (23.7%)
8 to 14 weeks	19 (10.0%)
5. The most common risk involved when blood had been collected from my baby is (n = 192):	
<i>My baby may suffer very slight scarring and some oozing</i>	152 (79.2%)
My baby can become infected with TB or HIV	35 (18.2%)
My baby can loose too much blood	5 (2.6%)
6. The benefits available to me and my baby for participating in the study are (n = 191):	
My baby will be protected against TB	98 (51.3%)
<i>There are no immediate benefits</i>	70 (36.7%)
My baby and I will get better treatment at clinics	23 (12.0%)
7. If I didn't want to participate in this study, I could withdraw and (n = 189)	
<i>My baby and I would suffer no loss at all</i>	123 (65.1%)
My baby and I will be treated differently by research and clinic staff	47 (24.9%)
My baby and I would be denied access to health services at this clinic	19 (10.0%)
8. My baby's personal details will never be linked with her blood because (n = 191)	
<i>Numbers with barcodes will be used to keep bloods anonymous</i>	140 (73.3%)
Highly trained research staff will keep information secret	40 (20.9%)
Clinic staff will be sure not to give information to the research staff	11 (11.8%)
9. The blood of my baby that will be frozen and stored will be used (n = 187)	
<i>For other tests concerning protection against TB</i>	155 (82.9%)
For all kinds of research in other countries	29 (15.5%)
For HIV testing	3 (1.6%)

Correct interpretation, according to the information provided during the consent process, in bold type here, but in normal print in the field questionnaire.

"economic" part of status. There is also an unquantifiable overlap between recall and understanding. Nonetheless, despite the recognized difficulties of measuring understanding with informed consent procedures, the findings of this study pointed to the need to

employ methods to enhance informed consent quality in less educated participants, such as the use of audiovisual aids.

The following are required for a good consent quality: a much greater focus on the consent process, the assurance that partici-

pants possess the required level of education (in South Africa Grade 7 is considered minimum), that voluntary participation is encouraged and that confidentiality is secured. In addition, an abridged form of self-assessment by participants, such as the type described in this study, could improve the general understanding of research concepts, such as voluntary participation and confidentiality by prospective research participants. A second and third attempt at explaining some of the more difficult concepts might help to ensure better recall and understanding of information.

We suggest that research ethics committees should insist on periodic reports on consent quality and efforts to improve quality where appropriate as part of their responsibility to protect the public against unethical research practices. The Consent Study focused on the evaluation of the quality of informed consent by using a self-administered questionnaire. Although level of education and experience of the research staff were predictors of good quality of consent in this study, researchers would need to identify the predictors of good quality consent in their studies. Although this study chose to weight recall and understanding equally, consideration could be given to whether specific questions,

such as those pertaining to perceived benefits or ability to withdraw, should have higher weight in deciding whether participant consent is adequate.

The Immunology Study was conducted in a rural district known for its low socio-economic status, high unemployment and high prevalence of diseases of poverty. Our experience is that participants are generally research naive, and because of problems of staff shortage and scarce resources in the health services, frequently confuse research activities with health care delivery, and therefore welcome the attention of better resourced research initiatives. This renders them a particularly vulnerable research population. Given this context, the findings of the Consent Study can be considered encouraging, in particular because it appears as if most participants had made informed choices about their participation in the Immunology Study. Most participants had medium to high understanding of the study. Misunderstanding about perceived benefits is understandable, but it could also mean that participants made the decision to participate in the Immunology Study because of a belief that the benefits were greater than they actually were.

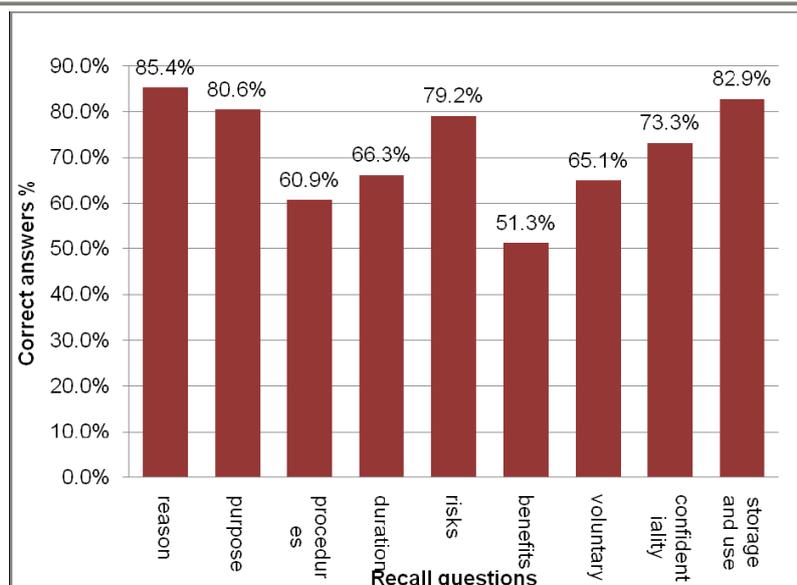


Figure 4. Overall results of the recall test. The percentage of participants who provided the correct answer to each of the recall questions

Table 4. Results of quality of informed consent assessment: Understanding section

I agreed to enrol my child in this study because			
	True	False	Not sure
My child might get better treatment	44.8	52.1	3.1
I want doctors to help learn more about TB	88.5	4.7	6.8
I've decided to enrol my baby in the study			
Even though my baby will receive no extra treatment	73.4	19.3	7.3
Because I knew I would receive a toiletries hamper	13.0	80.7	6.3
If my baby gets a bruise from the blood test, I should			
Contact the police	5.7	87.5	6.8
Speak to the nurse at the clinic	68.2	30.7	1.1
Go to the doctor at his private surgery	22.4	66.2	11.4
If I was given the choice to participate again, I would			
	90.6	3.1	6.3

Correct interpretation, according to the information provided during the consent process, in bold type here, but in normal print in the field questionnaire.

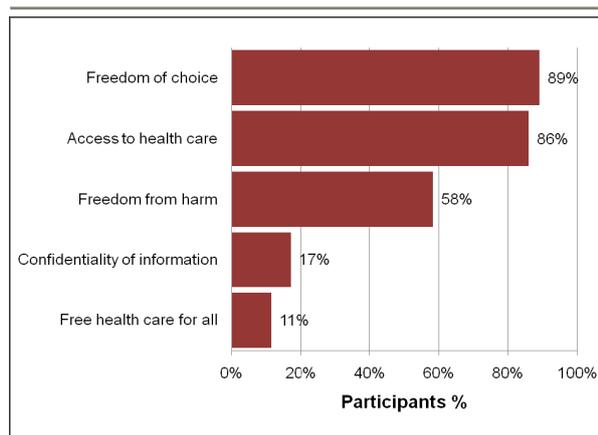


Figure 5. Knowledge of health rights. The percentage of participants who provided the correct answer to each of the health rights questions.

Conclusion

This study should add to the sparse literature dealing with the quantitative evaluation of informed consent in a developing country situation, and encourage commentary and further research in this important area of research ethics, including further exploration into the question of acceptable standards for quality of informed consent.

While developed country-based sponsors are likely to be centrally concerned with the scientific question, and research ethics

committees about the general ethical conduct of proposed research, principal investigators in developing countries should consciously consider attaining good quality informed consent as a key component of their research proposals.

In this study, good quality informed consent was associated with higher levels education of respondents and experience of staff obtaining the consent. Many research studies are conducted in developing countries in similar settings, i.e. where there are language and cultural differences between researchers and participants, low education and socio-economic status and limited resources. There is therefore no reason that the same quality of informed consent should not be achieved in other parts of Southern Africa and abroad.

Additional material

Additional file 1

Questionnaire used as data collection tool in the consent study.

Click here for file

[\[http://www.biomedcentral.com/content/supplementary/14726939-9-15-S1.doc\]](http://www.biomedcentral.com/content/supplementary/14726939-9-15-S1.doc)

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THE CONDITION OF INTRACARDIAC HEMODYNAMICS IN PATIENTS WITH RHEUMATIC FEVER AND CHRONIC RHEUMATIC HEART DISEASE

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Findings of inspection parameters of intracardiac dynamics at 51 patients with rheumatic heart defects in interrelation with activity of inflammatory process and character of a heart defect (25 sick mitral a heart disease, 26 sick aortal a heart defect) are given in this work.

The echocardiography was spent on the device "Toshiba SSH-40" (Japan), with use of recommendations American echocardiography society.

At comparison of parameters echocardiography at I and II degrees of activity at patients with aortal and mitral defects of the heart the most expressed changes are found out at II degree of activity of inflammatory process that confirms the influence of activity degree on parameters of central hemodynamics, and condition improvement - about adequacy of therapy.

Keywords: rheumatic fever; rheumatic heart disease; hemodynamic.

Many researchers consider a rheumatic fever (RF) as unique cardiovascular disease, which has not been enough studied yet [3; 5; 6].

In the last 15-20 years, the clinical picture of RF has undergone major changes. Many authors notice the rarity of severe course of rheumatic carditis, the decrease of fatality and reduction of disease recurrence rate, the tendency of disease to transit into monosyndromic forms, the increase of few symptomatic and latent variants of current and etc [4; 8].

In this connection, it is necessary to emphasize the importance of study instrumental methods (phonocardiography, echocardiography, dopplechocardiography) in early diagnostics of reumocarditis [1].

Carditis is the main sign of rheumatic process activity the expressiveness of which reflects a degree of inflammatory process activity. However, at the minimal activity of an inflammation or its absence by laboratory data, manifestation of carditis persists more often having a permanent current. Against a background of valvular affections rheumatic carditis can aggravate the intracardiac hemodynamics condition which has been connected with a degree of inflammation activity.

The aim of research

To study the parameters of central hemodynamics in patients with rheumatic fe-

ver and chronic rheumatic heart disease against inflammatory process activity.

Material and methods

51 patients with RF and chronic rheumatic heart disease (RHD) have been investigated aged from 23 till 37 years, of 25 have been mitral heart failure, 26 - aortal heart failure.

Randomization made by the character of failure, parity of their components, and remoteness of disease and stage insufficiency blood circulation (IBC), when grouped by degree of activity.

Central hemodynamics was estimated according to echocardiography findings performed on « Toshiba SSH-40 » (Japan), equipped by electronic gauges with frequency of ultrasonic waves of 2,5-3,5 MHz, by a standard technique with use of American echocardiography association recommendations (ASA) [7].

The study made before treatment and after three-month treatment course. There measured the following parameters of heart structure: diameter of an aorta, disclosing of aortic valve, the cross-section size of left atrium at the end of diastole atrium, finite diastolic size of left ventricle (FDSL), finite systolic size of the left ventricle (FSSL), thickness of lateral wall of left ventricle in diastole (ThLWL), thickness of ventricular septum in diastole (ThVSD).

The following parameters were counted against a background of the obtained data: finite- diastolic volume (FDV) and finite- systolic volume (FSV) of LV; Fraction of emission (FE); Fraction of reduction (FR); Shock volume - ShV = FDVLV -FSVLV, ml; Minute volume of blood - MVB = ShV* RHC, l/min. (rate of heart contractions - RHC); myocardium mass of LV (MMLV); Myocardium mass rate of LV (MMRLV).

Results and discussion

Table 1 noted the accurate difference between the parameters of the control and patients with rheumatic heart disease (RDH) and mitral (stenosis and failure) and aortal (stenosis and failure) heart defect. When

grouped the patients with II stage of BF included. However, the change of parameters of central hemodynamics in RHD was established much earlier [2]. We analyzed the influence of inflammation activity on cardio gemodynamics. So, the parameters of the left atrium (LA) in mitral defect with II degree of activity were above 21,4%; FDR - 6,6%; FSS - on 17,3%; FDV - 16,0%; FSV - 48,3%; FE - was less 6%; FR - 8,2%; ThLWLV and ThVS practically did not differ; MMLV was above 9,1%. The parameters systolic arterial pressure (SAP) were above 3,9% at II stage of activity as well; diastolic arterial pressure (DAP) was less than 1,5%; RSC was above 14,7% in II stage of activity.

Table 1. Echocardiography parameters at patients mitral and aortal heart diseases with I and II degree of activity of an inflammation (M±m)

№	Parameters	Control (n=20)	Mitral disease		Aortal disease	
			act I (n=12)	act II (n=13)	act I (n=14)	act II (n=12)
1.	LA (cm)	3,08±0,06	3,45±0,04*	4,19±0,09*^	3,69±0,08*	3,86±0,09*
2.	FDS (cm)	5,02±0,07	5,75±0,05*	6,13±0,10*^	6,13±0,11*	7,18±0,14*^
3.	FSS (cm)	3,31±0,05	3,69±0,08*	4,33±0,12*^	4,10±0,12*	4,26±0,01*
4.	FDV (milliliter)	120,68±4,31	160,16±3,56*	185,82±7,09*^	190,64±6,05*	194,01±8,02*
5.	FSV (milliliter)	45,17±1,28	57,60±2,54*	85,42±6,12*^	78,18±4,36*	79,12±5,02*
6.	FE (%)	62,24±0,91	58,06±1,48*	54,53±1,44*	60,36±1,19	59,12±2,01
7.	FR (%)	33,71±0,68	34,25±0,91	31,45±0,79^	33,10±0,86	31,12±0,75*
8.	ThLWLV (cm)	0,90±0,02	1,14±0,01*	1,13±0,01*	1,21±0,02*	1,25±0,01*
9.	ThVSD (cm)	0,94±0,01	1,04±0,02*	1,05±0,01*	1,11±0,01*	1,16±0,01*^
10.	MMLV (g)	158,72±7,23	253,14±7,02	276,12±10,12*	309,05±8,76*	312,02±6,16*
11.	SAP (millimeter of mercury)	118,26±2,48	120,95±2,66	125,76±3,17	126,66±4,25	128,02±3,12*
12.	DAP (millimeter of mercury)	75,92±1,61	67,18±3,35*	66,20±3,35*	50,05±3,69*	50,01±2,14*
13.	RHC (min)	72,31±1,12	83,10±2,17*	95,31±3,31*^	86,68±2,81*	85,18±1,13*

The note: * P <0,05 - authentic distinction between parameters of the control and compared groups; ^P <0,05 - distinctions between parameters I and II degree of activity are authentic.

At comparison of parameters of Echo- cardiography at I and II stages of activity in patients with aortal heart defect (stenosis and failure) the differences in parameters of central hemodynamics were revealed as well. So in difference from I degree of inflammatory process activity, II degree of activity at aortal defect was characterized by more marked changes from FDS which was above 14,6%; FDV - 1,7%; MMLV - 0,9% whereas FR was

below 5,9%; the other parameters of the big difference were not revealed. This circumstance still indicates the influence of a degree of inflammatory process activity on the parameters of central hemodynamics, the improvement of parameters can also testify the adequacy of therapy, which is important for the forecast of disease as a whole.

Thus, the shift of cardio dynamics parameters is more marked in RHD patients

with II degree of inflammatory process activity than in the ones with I degrees of inflammatory process activity. Therefore, the changes of parameters of central hemodynamics correlate with the activity of inflammation which can aggravate BF. The hypertrophy and dilatation of LV develops at insufficiency of mitral and aortal valves when maintained adequate minute volume of blood. In conditions of a significant volumetric overload dilatation of LV starts to advance the rate of mass myocardium increase. At a microscopic level in this phase it has been observed the increase in distance among cardiomyocytes, development of myocardium sclerosis characterized for pathological simulation of LV [2].

As a rule, the rheumatic affection of mitral valve is marked in its adjusting affection. Prolonged rheumatic endocarditis leads to morphological changes of mitral valve: cusps get thicken, become rigid, grow together on commissures, tendinous fibers change, shorten. Echocardiography displays the dilatation of the left departments of heart, various directed diastolic movements of thickened mitral cusps and the absence of their systolic connection, which leads to mitral regurgitation.

In rheumatic aortal insufficiency, ECG observes destructive changes and incomplete connection of aorta valves accompanied by aortal regurgitation; increase of diastolic size of LV and LA and increase of ascending part and roots of aorta as well.

Thus, in softly marked RF and carditis the diagnostic value of ECG increases and is to carry out in dynamics in RHD, and in BF connection.

The given circumstance specifies once more to the influence of degree of inflammatory process activity on the parameters of central hemodynamics, the improvement of parameters can also testify about adequacy of therapy that is very important for the forecast of disease as a whole.

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ALTERNATIVES TO PROJECT-SPECIFIC CONSENT FOR ACCESS TO PERSONAL INFORMATION FOR HEALTH RESEARCH: INSIGHTS FROM A PUBLIC DIALOGUE

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Background: The role of consent for research use of health information is contentious. Most discussion has focused on when project-specific consent may be waived but, recently, a broader range of consent options has been entertained, including broad opt-in for multiple studies with restrictions and notification with opt-out. We sought to elicit public values in this matter and to work toward an agreement about a common approach to consent for use of personal information for health research through deliberative public dialogues.

Methods: We conducted seven day-long public dialogues, involving 98 participants across Canada. Immediately before and after each dialogue, participants completed a fixed-response questionnaire rating individuals' support for 3 approaches to consent in the abstract and their consent choices for 5 health research scenarios using personal information. They also rated how confident different safeguards made them feel that their information was being used responsibly.

Results: Broad opt-in consent for use of personal information garnered the greatest support in the abstract. When presented with specific research scenarios, no one approach to consent predominated. When profit was introduced into the scenarios, consent choices shifted toward greater control over use. Despite lively and constructive dialogues, and considerable shifting in opinion at the individual level, at the end of the day, there was no substantive aggregate movement in opinion. Personal controls were among the most commonly cited approaches to improving people's confidence in the responsible use of their information for research.

Conclusion: Because no one approach to consent satisfied even a simple majority of dialogue participants and the importance placed on personal controls, a mechanism should be developed for documenting consent choice for different types of research, including ways for individuals to check who has accessed their medical record for purposes other than clinical care. This could be done, for example, through a web-based patient portal to their electronic health record. Researchers and policy makers should continue to engage the public to promote greater public understanding of the research process and to look for feasible alternatives to existing approaches to project-specific consent for observational research.

Background

Internationally, the secondary use of existing personal health information for research purposes is intensifying. While administrative datasets continue to have an important role in a variety of health research, increasingly researchers are turning to clinical records, as they become available in electronic format. These clinical records provide a much richer source of data than is available through administrative records. In addition, registries are being developed in many ac-

ademic healthcare facilities to serve as data sources for a variety of future research needs.

The role of consent in the secondary use of health information for a variety of types of observational research involving the health record has been particularly contentious. Until recently, the policy discussion has focused on the circumstances under which a particular research protocol would be exempted from obtaining individual consent. More recent discussions have acknowl-

edged a broader range of consent options involving: [1]

- opting-in (project-specific or a broad authorization for research use);
- opting-out (usually with some notification process); or
- use without the option of opting out.

The views of the public in this matter have been sought in several different countries and have been summarized in a previous paper [2]. Briefly, public attitudes on the need for and type of consent for research use of their health information are context-specific. Factors that influence consent choice include: the identifiability of the data [3,4]; whether there is any commercial element to the research [2]; the type of information being accessed [5]; and the trust that the information will be kept confidential [6].

In 2005, we surveyed the Canadian public on a spectrum of alternatives to conventional project-specific consent for research use of personal information, including: no use at all, prior individual consent for each use, prior broad authorization for different types of uses, notification with an opportunity to opt-out, and use without consent or notification. Findings indicated that the public values both privacy and health research and would be concerned if either of these impinged upon the other. The majority of the public was open to alternatives to conventional project-specific consent; however, there was no clear preferred approach to consent for use of personal information for health research [2].

Recognizing this is a complex and challenging topic, in the spring of 2005, we conducted a series of structured public dialogues across Canada as an alternative method to elicit public values and to work toward an agreement about a common approach to consent for research use of personal information. Public dialogues differ from focus groups. Focus groups are commonly used to gain richer insight into the reasons behind particular attitudes toward a product, service, or a concept. By contrast, public dialogues seek to find agreement on

fundamental values-based choices and substantial consensus for policy directions [7]. While differences are neither suppressed nor ignored, there is a deliberate choice to build on the common ground rather than focus on differences. This paper presents findings from these dialogues and compares them with the findings from the public opinion survey to draw further insights about the nature of public values surrounding this topic and the ability to seek consensus regarding future policy directions.

Methods

Recruitment for dialogues

We convened seven day-long public dialogues: two in Vancouver, British Columbia, and in Montreal, Quebec, and one each in Hamilton, Ontario, Toronto, Ontario, and Halifax, Nova Scotia. We chose these cities to obtain broad regional representation from across Canada. Five of the dialogues were held in English and two in French. Participants in two of the dialogues were recruited through an invitation at the end of a public opinion survey of 1230 Canadians that we had conducted on the topic of privacy and access to personal information for health research [2]. The remainder were recruited through random-digit dialling within the vicinity of the target cities, by the Institute for Social Research, York University. Dialogue participants were provided an honorarium of \$50. During recruitment, these participants were administered a small subset of questions from the original survey to determine comparability of this sample to the sample that participated in the full survey, with regard to socio-demographics and opinion on general attitudes toward privacy and health research.

Background workbook

One week before the dialogues, participants received a workbook containing background information to facilitate an informed conversation. The workbook presented three general approaches to the role of consent in the use of personal information for health research as a starting point for their discussion:

Approach 1: consent for each research use. This approach maximized individual choice. It also most closely reflects the current default assumption for secondary use of personal information generally: consent obtained in advance for a very specific use of the information.

Approach 2: not requiring consent for research use of their information (called "assumed consent" in the dialogues). This approach maximized efficiency of research and represents the way information from the medical record has been used historically for quality improvement/system management, and for medical education. Participants were told there would be a notification system that one's information was being used for research purposes, with an option to opt-out of research use, but the onus was on the individual to do so.

Approach 3: broad authorization for a range of future research uses, determined by the individual (called "broad consent" during the dialogues). Under approach 3, the individual opted *into* research use of their information, but authorization extended beyond individual projects, and allowed for excluding certain types of uses, and for future changing of one's consent choices in the future or withdrawing permission entirely.

The workbook presented arguments for and against each approach, without reference to any particular disease or application. For all research uses, the operating assumption was that all directly identifying information would be removed prior to use. Participants were advised that this would make it difficult, though not impossible, to reidentify individuals.

The dialogues

The dialogues were carried out by the Canadian Policy Research Networks, using an adaptation of the method of Yankelovich [8]. The dialogues ran approximately six hours on either a Saturday or Sunday. The general approach was to have introductory material in a plenary session, with breakouts into smaller groups to deliberate on specific issues, followed by a plenary where each

group presented a summary of its deliberations. In three dialogues, the number of participants was small enough that they did not break out into smaller groups for deliberations. All plenary sessions were audio recorded digitally and note-takers were assigned for the small group deliberations. At least one study co-investigator attended each of the sessions as a listener and a resource person, in the event there was a need for clarification over technical issues.

The first breakout session examined each of the three consent approaches in the abstract – i.e. independent of any specific disease, type of information, or type of research. Participants voiced what was desirable and any concerns with each approach. In the second, participants discussed their consent preference in three scenarios: (i) linking their health information with non-health information such as education and income levels; (ii) linking their health information with biological material and (iii) using their health information for commercial purposes. This was followed by a plenary discussion of how participant's consent preferences would change with each of the scenarios. Finally, participants broke into triads to discuss several possible safeguards and the impact these would have on their confidence that their information was being used responsibly. They then re-convened to discuss these in the larger group.

Eliciting of consent choices

Prior to and immediately following the dialogues, participants completed a questionnaire (see Additional files 1 and 2) where they rated their level of support for each of the three general approaches to use of personal information for research, using a 7-point rating scale that varied from "dislike very much" to "like very much". They also indicated their consent choice for five different scenarios involving personal information for observational health research:

1. Research that tracks how doctors prescribe medications to give them feedback to help them improve the care they provide;

2. Research that tracks how doctors prescribe medications so drug companies can better target their advertising to doctors;

3. Research that looks at the relationship between health and work, education or income. To do this, information about work, education or income must be combined with information from the health record; and

4. Research that studies leftover tissue following surgery to better understand the cause of the disease – linking age, sex, diagnosis, and other medical conditions with the sample:

4.1. If the researchers have no plans to develop a commercial product, like a lab test, that is sold for profit

4.2. If the goal of the research is to identify a new test that could better diagnose if you had a condition that needed the surgery. The lab test would be sold for profit.

For each of the five scenarios above, consent options expanded on the three general approaches to include:

My information should not be used for this purpose.

My permission is needed each time before my information is used. (Approach 1)

My general permission is needed. This could be for several different research studies. (Approach 3 – broad consent)

My permission is not needed, but I want to know this is being done. (Approach 2 – assumed consent)

There is no need for me to know. Just use it.

The first and last options gave the participants the opportunity to express an opinion that was either more restrictive or more permissive than the alternatives that we presented in the abstract discussion of consent approaches. Thus, response options were comprehensive and unconstrained by the three general approaches presented.

In the questionnaire administered immediately post-dialogue, participants were asked what would be the effect of a range of procedural and technical safeguards on their confidence that their information was being used responsibly. Then, they were asked to

identify their consent choices for the same five scenarios presented in the predialogue survey, assuming their top three safeguards were in place, and any other conditions they felt were necessary.

Analyses

We tabulated participants' attitudes toward the three general consent approaches to using personal information for research. The 7-point scale was transformed, so that "strongly dislike" equalled "-3", a neutral opinion equalled "zero", and "strongly like" equalled "3". We tested the significance of the change in scores between preand post-dialogue using a parametric test (paired ttest) and used a non-parametric test (signed rank) to assess the robustness of the results. The criterion for statistical significance was set at $\alpha = 0.05$ adjusted for multiple analyses using the Bonferroni method. All analyses were performed using SAS 9.1 (Cary, NC). As findings were equivalent, we report only the parametric statistics. We also examined what percent of participants changed their responses in the post-dialogue survey. We tested for any change between the post-dialogue and the pre-dialogue surveys and for a directional change in attitude from positive to negative or from negative to positive. Similarly, we tabulated consent choices across the 5 research scenarios and tested for changes in consent choices using paired t-test with signed rank test used to test the robustness of the results. We tested for differences pre-and post-dialogue between dialogue groups using Analysis of Variance (ANOVA) and Multivariate Analysis of Variance (MANOVA). We also inspected the patterns of responses using graphical techniques. Finally, we tabulated and ranked the proposed safeguards.

Transcripts from the dialogue had been coded for the purposes of writing up a report on the dialogues [9]. For this paper, we sought illustrative quotes that could inform the key findings from our quantitative analyses. To this end, codes related to the key themes derived from the quantitative analysis were reviewed by two members of the team

and quotes were selected to provide more contextual information and insight into the meaning of the key themes regarding consent choices.

Results

In total, 98 people took part in the dialogues. Participants were similar in age to the general population, but had a higher level of education and were more heavily represented by women (59% vs. 51%) than the general population. (Table 1) On ten key survey questions, dialogue participants who were drawn from the full survey (n = 21/ 98) expressed views that were somewhat more research friendly and less privacy concerned than the survey sample from which they were drawn. Attitudes toward privacy and health research were equivalent among source populations – i.e. those who completed the full telephone survey and those who answered the short telephone survey. (See Additional file 3)

Attitudes toward the three consent approaches in the abstract

Figure 1 compares participants' attitudes toward each of the three general approaches to consent for research use of one's personal information. Across the three approaches, broad consent (Approach 3) was regarded the most favourably, both pre and post-dialogue. For Approaches 1 (consent for

each use) and 2 (assumed consent), attitudes were almost evenly distributed across the spectrum – from extremely positive to extremely negative. For Approach 3 (broad consent), attitudes were skewed toward the positive.

Following the dialogue, participants generally rated all three approaches to consent somewhat lower. Only for broad consent did the change in rating approach statistical significance – and only when using the paired t-test prior to adjusting for multiple testing. (Table 2)

While there was shifting in response in approximately 55% of participants, an inflection in opinion (i.e. a change from a positive to a negative sentiment or viceversa) occurred infrequently (8–23%), and was most stable for broad consent (92% no change). Our tests revealed no differences between dialogue groups in changes in ratings pre- and post-dialogue.

Participants generally liked certain aspects of each consent approach and disliked other aspects. From the discussions, the most frequently mentioned desirable feature of

Approach 1 (consent for each use) was the opportunity for knowledge and communication that this approach facilitated – not just for purposes of control but also to better appreciate their contribution to the research.

Table 1. Participant demographics and comparison with general population

Category	Number of Participants (n = 98)	Participants (%)*	General Population+ (%)*
Sex			
Female	58	59	51
Age			
20–39	37	38	37
40–59	35	36	39
≥ 60	26	27	23
Highest Level of Education			
High school or less	26	26	44
Some post-secondary	18	18.7	10
Completed post-secondary	42	42.7	41
Post graduate or professional degree	12	12.5	5
Other Categories			
Visible Minority	14	14	13
Aboriginal	2	2	4
Disabled	11	11	5

* Percentages may not add up to 100, due to rounding

+ Total population demographic data: 2001 Census, Statistics Canada.

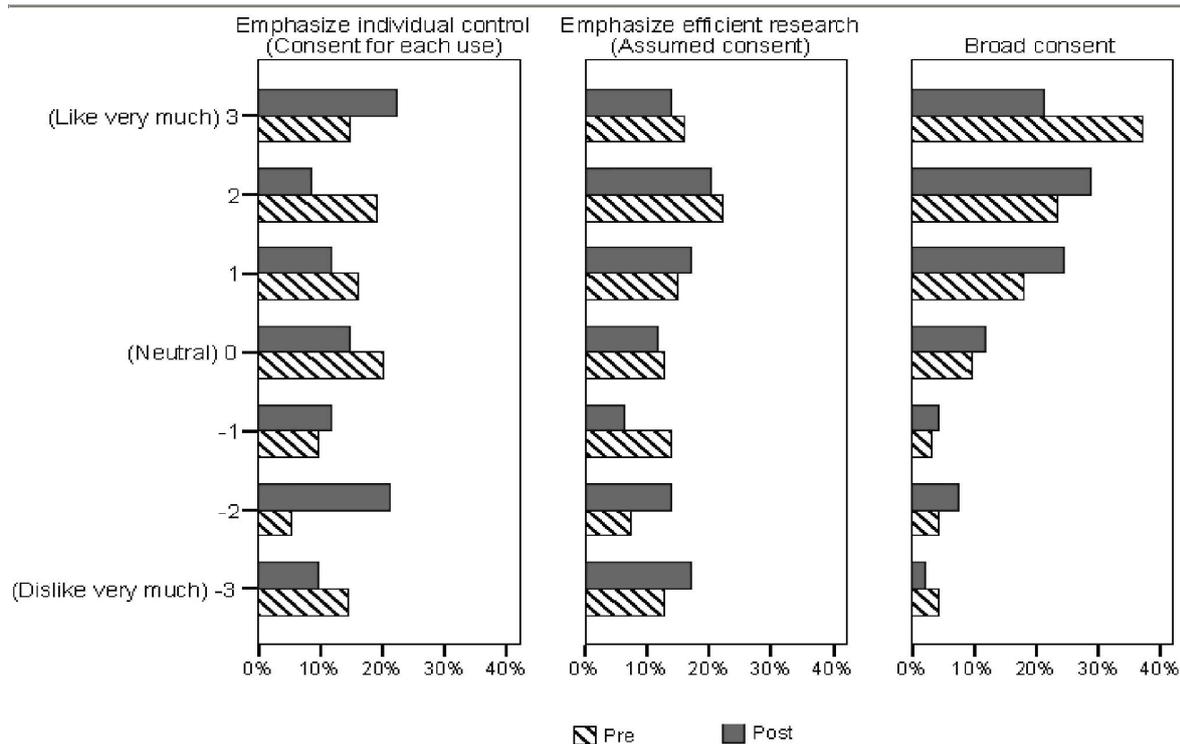


Figure 1. Comparison of Pre-Post Dialogue Ratings of Different Approaches to Consent.

Table 2. Testing post-pre difference of approaches

Approach	Mean (SD)	Pre*	Post*	Post minus Pre	P-value for difference (paired t-test)**
1. Consent for each use	Mean (SD)	0.34 (1.95)	0.14 (2.07)	-0.21 (2.02)	0.315 (df = 95***)
2. Assumed consent	Mean (SD)	0.44 (1.99)	0.18 (2.10)	-0.29 (1.82)	0.122 (df = 96)
3. Broad Consent	Mean (SD)	1.55 (1.64)	1.21 (1.55)	-0.32 (1.54)	0.048 (df = 94)

* 7 Point scale where 3 = strongly like, 0 = neutral, & -3 = strongly dislike

** Bonferroni correction: Alpha = 0.017 (0.05/3)

*** df: Degree of freedom;

"I like the idea that you would be given information about the specific research project because that gives you a sense of contributing to the community and what is needed for health care and it gives you a sense of, of being part of the picture without sacrificing your individual privacy." (Female, Toronto)

Participants also found Approach 1 to be particularly respectful of individuals.

"[It] was respectful I heard in two ways: One is because there's more awareness, but also it's the one that respects privacy the most was, was what several people said. So respectful of the information and in terms of knowing more how it would be

used, but also respectful of the person's privacy." (Female, Vancouver)

At the same time, participants recognized that this approach is particularly burdensome for both researchers and for those whose data were to be used. They also recognized the increased potential for sampling biases using this approach.

Approach 2 (assumed consent) was recognized by participants as the most efficient approach and the least likely to produce biased results.

"There's a lot more incentive to do research, whereas the first approach would be very cost intensive and labour intensive." (Male, Toronto)

"I should think the research would be more, could be more accurate because they would have a wide group of people and most people aren't going to opt out." (Female, Toronto)

They also recognized the considerably reduced burden on the individuals whose consent would otherwise be

sought. However, participants expressed concern over the onus placed on individuals if they wished *not* to participate.

"I think the, the less well or sicker individuals in the population just don't have the time or energy to consider becoming aware of things like opting out." (Female, Toronto)

They also expressed concern over the relative lack of individual knowledge or control under this approach, and the high potential for abuse.

"Is it really OK to just broadly take people's information without them being aware of it? And because of that, there is definitely room for abuse. I mean one would hope that that wouldn't happen but, you know, unfortunately there are abuse situations that do happen." (Female, Vancouver)

Approach 3 (broad consent) was seen by many to be a compromise between Approach 1 and Approach 2. It was seen to be less burdensome than Approach 1 but, as an *opt in* approach, it offered greater control than did Approach 2, and periodic renewal of their boundary setting.

"We liked this because we can change and set our own boundaries... and that can happen presumably at any stage in the, in the process." (Female, Vancouver)

The chief concern was how such a system of broad authorization might work.

The ability for individuals to maintain control was an important theme. Particularly in Approach 2 (assumed consent), participants emphasized the importance of having the opportunity to opt-out. However, regardless of the approach or the stated ability to opt-out at some future point, participants expressed concern over what might become of the data once released to the researcher.

[Approach 1 – consent for each use]

"I don't think it's workable for the common good. You see, and the other issue raised with a central information gathering agency, you see it's open to anybody in the end. If you have enough money, if you throw enough money on it anybody can get your information once it is assembled in that type of fashion." (Male, Vancouver)

[Approach 2 – assumed consent]

"Not being able to effectively opt out 'cause once you're in, how do you get the information back, it's already out the door? Like getting the cows back after they've left the barn." (Male, Vancouver)

[Approach 3 – broad consent]

"... once you jot down, you check in this corner that it's OK to view your medical records or whatever it is, that broad consent, I mean I worked in a hospital with medical records, they, that can go all over the place and all the researchers do is they say 'Oh look, he checked that so we can do whatever we want.' and that's exactly what they do because they want to make it easier for themselves, understandably. We always want to get the, the red tape out of the way, and once that one consent is given then they can do this, this and this and this and nobody can stop them." (Male, Toronto)

Consent choices for specific scenarios

Figure 2 and Table 3 summarize participants' consent choices for each of the five scenarios. Across all scenarios, the response profile, in aggregate, was not substantively or statistically different prevs. post-dialogue. Consequently, we quote post-dialogue numbers in the following paragraphs. At the individual level, for all but one scenario, close to half of participants shifted their consent choice between the preand post-dialogue surveys. (Table 4) Shifting of response occurred approximately equally in both directions. The one exception was use of prescribing information for market research. Here, fewer individuals altered their response in the post-dialogue survey. Again, our tests revealed no differences between dialogue groups in changes in ratings prevs. post-dialogue.

Use of prescribing information for quality improvement yielded the most permissive response profile. Almost half of all participants opted for a passive process of either using the data without notification (21%) or notification with opt-out (27%). One-fifth opted for a broad consent and about 1/4 preferred their permission be sought for each use.

Use of prescribing information for marketing research yielded the most restrictive response profile. Almost 60% of respondents felt their information should not be used for this purpose at all. Another 14% felt their permission should be sought every time. Only 18% opted for a passive process of use without notification (5%) or notification with opt-out (13%).

Linking work, education, or income with people's health information. Opinions

here covered the full spectrum of consent alternatives. About 10% felt this information should not be linked at all. About 1/4 preferred their permission be sought for each use. About 1/3 opted for broad consent and another 1/3 for a passive process of use without notification or notification and opt-out (17% each).

Linking individuals' health information with leftover tissue for non-commercial purposes showed a very similar response profile to the linkage with work, education, or income data. When linkage with leftover tissue involved development of a product for profit, consent choices became more restrictive, with the majority of people calling for either permission for each use (45%) or no such linkage at all (18%) with their information.

Table 3. Testing post-pre dialogue change in consent choices across the five scenarios*

Scenario		Pre-Dialogue**	Post-Dialogue**	Difference	P-value for difference (paired t-test), df = 78 ***
A) Prescribing information for improving care	Mean (SD)	3.49 (1.08)	3.29 (1.25)	-0.21 (1.07)	0.096
B) Prescribing information for marketing research	Mean (SD)	1.99 (1.20)	1.94 (1.29)	-0.03 (0.88)	0.798
C) Linking work, education or income to individual's health record	Mean (SD)	2.79 (1.36)	3.03 (1.24)	0.19 (1.03)	0.104
D1) Linking individual's information with leftover tissue with no commercial use	Mean (SD)	3.18 (1.23)	3.06 (1.25)	-0.17 (1.27)	0.251
D2) Linking individual's information with leftover tissue with possible commercial use	Mean (SD)	2.31 (1.10)	2.40 (1.05)	0.06 (1.06)	0.595

* Due to an error in the Hamilton survey, the full consent scale was not offered. The option "Do not use" was not offered.

** Scores: 1 = do not use; 2 = consent for each use; 3 = broad authorization; 4 = notification with opt-out; 5 = use without notification;

*** Bonferroni correction: Alpha = 0.01 (0.05/5)

Table 4. Percentage of Participants who changed their responses to the five scenarios

Scenario	Change		
	More restrictive [x/n (%)]	No change [x/n (%)]	More permissive [x/n (%)]
A) Prescribing information for improving care	22/78 (28.21)	42/78 (53.85)	14/78 (17.95)
B) Prescribing information for marketing research	13/78 (16.78)	52/78 (66.67)	13/78 (16.78)
C) Linking work, education or income to individual's health record	16/78 (20.51)	39/78 (50.00)	23/78 (29.49)
D1) Linking individual's information with leftover tissue for non commercial product development	23/78 (29.49)	37/78 (47.44)	18/78 (23.08)
D2) Linking individual's information with leftover tissue for profitable product development	15/78 (19.23)	39/78 (50.00)	24/78 (30.77)

* Excluding Hamilton survey, for which the full consent scale was not offered.

Safeguards and Controls on Disclosure

Most of the 9 safeguards and controls identified in the post-dialogue survey either moderately or greatly increased people's confidence that their information would be used responsibly for research. When asked to identify the top three safeguards or controls, four stood out above the others: (1) fines and penalties for breaking rules; (2) the ability to say 'No' to use for certain types of research; (3) the ability to check who has used your health information; and (4) safeguards like passwords. (Figure 3)

Four of the five safeguards less often identified in the top three choices consisted of third-party controls over use of the information, including the existence of a provin-

cial privacy commissioner, an institutional privacy officer, review of the proposed research by a research ethics board (REB), and review by a group of people who may be affected by the research. There was considerable discussion of REBs in particular, as they figured prominently in the workbook under each of the three general approaches to consent. Prior to the dialogues, most participants were unaware of the existence of REBs. While there were generally positive sentiments toward REBs, in several of the dialogues, concern was raised by some individuals that the REBs may over-ride their wishes to maintain control over use of their information.

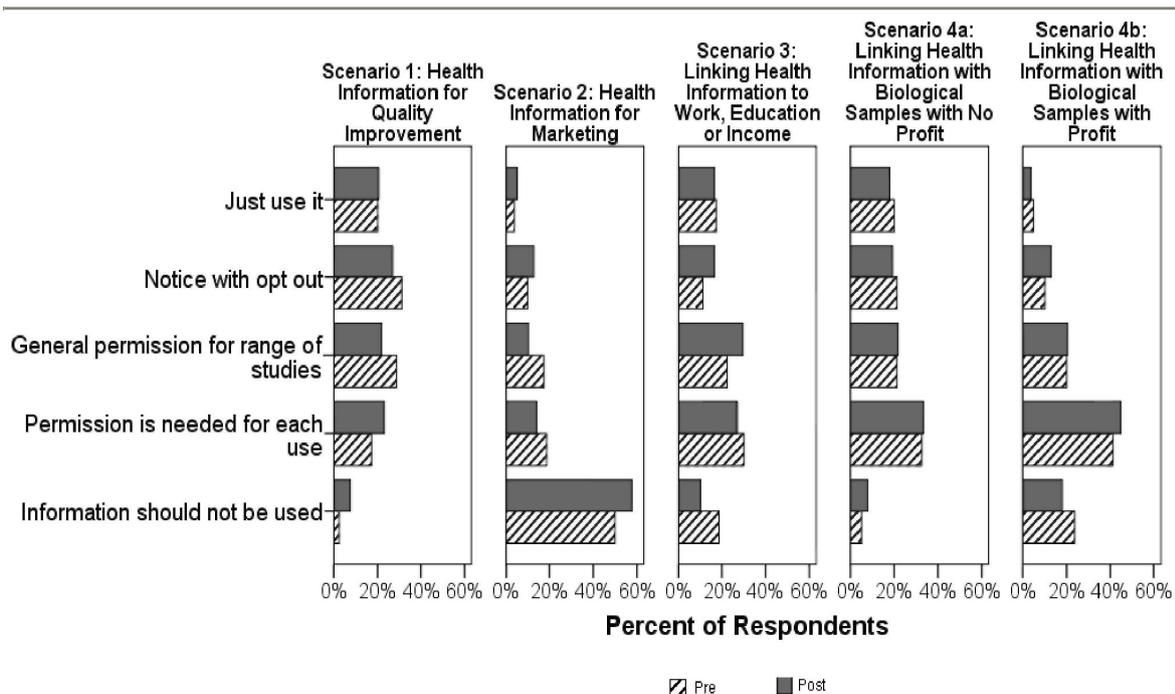


Figure 2. Pre and post-dialogue consent choices across research scenarios

There should be well-defined policies that guide the, the REB – especially if, if they're going to overturn what the individual consent, I mean the person who says "Well, we don't consent." and the REB says "Well, you know, go ahead anyways." There should be specific policies. (Male, Halifax)

But I think the way he put it was that there's a really big hole in, in the process.

And that's the override that, in some situations, the researchers could simply – well, I shouldn't say "simply" 'cause they'd have to go through an REB – but they could decide to use information without, without actually having us as individuals give permission for it. (Female, Toronto)

Question: "From the list below, what are the top three things that would increase your confidence that your information was being used responsibly for health research?"

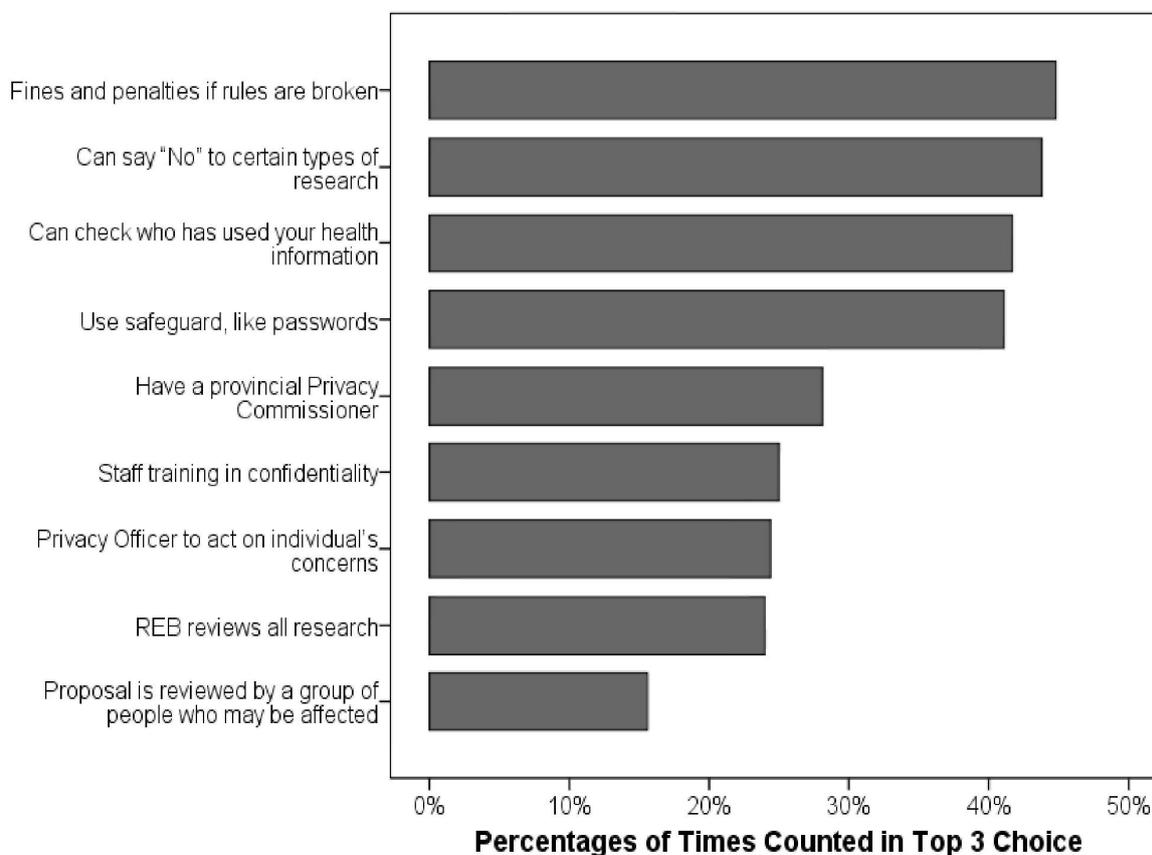


Figure 3. Top-ranked safeguards and controls

These sentiments may have arisen in response to a statement in the workbook explaining that, under Approach 1 (consent for each project), an REB can permit the researcher to use personal health information without individual consent, so long as certain established conditions were met.

Discussion and conclusion

Dialogue participants were supportive but not passive

Overall, dialogue participants were very supportive of their de-identified health information being used for research. However, most do not wish to entirely let go of their ability to control use of their personal health information for research, even if direct identifiers are removed.

This is consistent with our earlier survey of the Canadian population and survey

and focus group work in other countries [2,6,10-13]. In addition, we learned from the dialogues that members of the public are sensitive to the practical implications of requiring consent – including the additional costs and the biases that can be introduced through an opt-in consent regime – and would not want to see this impede research. Some also see the consent process as more than an issue of control, viewing it also as an opportunity to see how their information was contributing to the public benefits that may ensue from research. This certainly reinforces the concept of consent as a transaction [14].

No dominant consent choice emerged... with the exception of market research

We examined three general approaches to consent for research use of de-identified

health information in the abstract and then considered specific scenarios with a full range of consent options. In the abstract, broad consent to a range of research was clearly preferred over project-specific consent or assumed consent. Based on this, one might have expected broad authorization to be a clear favourite when specific scenarios were presented. However, no more than 30% of dialogue participants chose this option under any of the five scenarios presented.

Indeed, no dominant consent choice emerged across the scenarios presented with one exception. Over half of dialogue participants (57%) felt their de-identified health information should not be used *at all* for marketing research (Scenario 2). This contrasts with laws in most jurisdictions internationally that permit commercial use of "anonymous" information and the common practice, globally, of compiling de-identified prescription data to ascertain physician prescribing patterns for marketing purposes [15].

Even in the presence of a clear public benefit (Figure 2, Scenarios 4a and 4b), the presence of some element of profit, resulted in a shift toward greater control over use of that information. When profit was introduced into the scenario, the percent of participants supporting use of the information without notification dropped substantially from 18% to 4% and the percent requiring project-specific consent grew from 32% to 44%. Further, those saying this information should not be used at all increased from 8% to 18%. While the response profile for this scenario was less restrictive than that observed for the pure marketing scenario, it still presents a challenge for research policy. It has been recognized that conventional project-specific consent for research using DNA databanks would render such research impracticable [16]. Much of this research is funded by the private sector and commercialization of discoveries made in the course of publicly funded research is strongly encouraged [17-19]. A more nuanced discussion over commercial interests in health research is warranted in future dialogues.

Participants preferred personal controls

As for safeguards and controls, we note with interest that personal controls – consent and the ability to audit who has accessed one's information – were among the most commonly cited approaches that improved people's confidence in the responsible use of their information for research. Third-party controls – e.g. research ethics boards, privacy officers, privacy commissioners, and panels of affected individuals – were nominated less often. In part, this may be due to lack of familiarity with these mechanisms. Yet, these mechanisms are key safeguards in our current system. In particular, research ethics boards have wide discretionary power to exempt specific research activities from requiring consent and the conditions under which this may occur. We note as well, regardless of consent regime, the high level of concern that was voiced over what happens to one's personal information once it is released to researchers.

Limitations

We recruited our dialogue participants through randomdigit dialling by an academically based polling firm. Twenty-one participants were recruited after completing a comprehensive attitude survey. The other 75 were asked a few general questions about health information privacy and about research use of their information. Our intention was to see if the dialogue process would be any different in groups that had an opportunity for prior consideration of this issue through the survey. Unfortunately, we were unable to recruit enough people from among those who participated in the full survey to allow this comparison. Indeed, participation rates in the dialogues were very low (approximately 2% of those completing the long survey and 4% of those completing the short survey). This raises the question of selection bias among dialogue participants. We noted earlier that participants had a higher level of education and were more heavily represented by women than the general population. Based on the common questions asked in both surveys,

we were able to ascertain that dialogue participants were somewhat more research friendly and less privacy concerned than the population from which they were drawn. However, these differences were small.

Most public dialogues are associated with movement in position on the issue at hand by end of day [7,20]. In our dialogues, we saw little movement in opinion in aggregate. One may question whether this represents some failure of the dialogue process. We think not. Across all seven dialogue sessions, discussions were lively and constructive, displaying a spirit of mutual understanding. In addition, there was substantial movement in opinion at the individual level be-

tween the beginning and the end of the day-long dialogues (Tables 4 and 5). It seems the same evidence moved some individuals toward a more restrictive approach to use of their information for research and others toward a more permissive use. Based on this, we feel it is reasonable to conclude that we succeeded in being even-handed in the presentation of the issues at hand – or that our dialogue participants were sufficiently independent thinkers. In addition, our observation of little movement in aggregate is, in large part, consistent with findings from a recent public dialogue on the topic of biobanks in British Columbia [21].

Table 5. Percentage of Participants who changed their responses to the three general approaches to consent

Approach	Change	Any change [x/n (%)]	Infection [x/n (%)]
1. Consent for each use	Less favourable	36/96 (37%)	11/96 (11%)
	No change	39/96 (41%)	77/96 (80%)
	More favourable	21/96 (22%)	8/96 (8%)
2. Assumed consent	Less favourable	29/97 (30%)	9/97 (9%)
	No change	42/97 (43%)	84/97 (87%)
	More favourable	26/97 (27%)	4/97 (4%)
3. Broad consent	Less favourable	32/95 (34%)	7/95 (7%)
	No change	42/95 (44%)	87/95 (92%)
	More favourable	21/95 (22%)	1/95 (1%)

Policy implications

No one approach to consent satisfied even a simple majority of dialogue participants. Given this, as Canada moves toward developing a common inter-operable health record, consideration needs to be given to developing a system for a mechanism for documenting individuals' consent choices for research and other secondary uses of their personal health information, embracing a broader array of consent options than the current dichotomous alternatives of project-specific consent or exemption from consent. Given the high importance participants placed on being able to check who has accessed their medical record for purposes other than clinical care, this should also be considered. Both of these could be accommodated through a secure web-based portal that patients can use to access their health re-

cord, a technology that is gaining considerable attention [22-24].

We noted earlier that dialogue participants expressed concern over what happens to one's personal information once it is released to researchers – regardless of whether initial consent for the release of the information to the researcher was required. This highlights the importance of having trustworthy accountable systems for managing data. In part, this is a matter of ensuring that adequate access and security controls are in place in research facilities. Recent reports of lost or stolen health information involving negligence with regard to basic safeguards can readily undermine public confidence [25-28]. Regarding external accountability, in Canada, provincial information and privacy commissioners/ombudsmen currently have the authority to audit the practices of institutions that manage personal data. For practical

reasons, this is usually a complaint-driven system. For larger data institutes, it is common practice to apprise these commissioners' offices of their data management practices in the absence of any complaint. Ideally, similar reporting systems should be in place for universities with smaller, more heterogeneous, data holdings. A practicable and meaningful reporting system remains an outstanding challenge for the research community.

Participants in our dialogues were largely unaware of the research process – particularly the ethic review process. For some, this raised concerns over the process. They also generally had difficulty articulating what it was about the commercial element to research that would cause them to desire greater control over use of their personal information when there was a profit element. Researchers and policy makers should continue to engage the public to promote greater public understanding of the research process – in particular, the public-private interface and the role of research ethics boards – and to better understand themselves how to best to respond to any concerns they may have. We should also continue to look for feasible alternatives to existing approaches to consent for observational research, when some form of consent is required.

Additional material

Additional File 1

Pre-dialogue survey. Questionnaire given to participants prior to the dialogues where they rated their level of support for each of the three general approaches to use of personal information for research and the 5 specific research scenarios. Click here for file

[\[http://www.biomedcentral.com/content/supplementary/14726939-9-18-S1.doc\]](http://www.biomedcentral.com/content/supplementary/14726939-9-18-S1.doc)

Additional File 2

Post-dialogue survey. Questionnaire given to participants following the dialogues where they rated their level of support for each of the three general approaches to use of personal information for research and the

5 specific research scenarios. Click here for file

[\[http://www.biomedcentral.com/content/supplementary/14726939-9-18-S2.doc\]](http://www.biomedcentral.com/content/supplementary/14726939-9-18-S2.doc)

Additional File 3

Comparison of attitudes toward privacy and health research of dialogue participants recruited through the full and short surveys. Comparison of attitudes toward privacy and health research of dialogue participants recruited through the full and short surveys. The purpose of this is to compare for selection biases. Click here for file

[\[http://www.biomedcentral.com/content/supplementary/14726939-9-18-S3.doc\]](http://www.biomedcentral.com/content/supplementary/14726939-9-18-S3.doc)

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Short Report

CHARACTERISTIC TETANUS INFECTION IN DISASTER-AFFECTED AREAS: CASE STUDY OF THE YOGYAKARTA EARTHQUAKES IN INDONESIA

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Background

Tetanus is a devastating disease involving muscle spasms and autonomic instability and associated with a high incidence of mortality. Despite being easily preventable, with a highly effective vaccine, tetanus remains a significant source of morbidity and mortality worldwide [1,2]. The majority of tetanus cases occur in third-world countries.

Tetanus is caused by *Clostridium Tetani* [3,4], a bacterium that infects open wounds commonly occurring in disaster-affected areas. Open wounds, such as lacerations, abrasions, and punctures, are a significant source of bacterial infection [3]. Earthquakes can strike quickly and without warning, forcing the evacuation of those who are injury-prone. On the other hand, increasing cases of tetanus observed in the elderly population are attributable to immune systems that decline with advancing age [5]. Elderly people, women and children are susceptible to injury, and consequently *Clostridium tetani* may enter the body through dirty open wounds (Figure 1). Occasionally, tetanus affects only the part of the body where the infection originates, but in almost all reported cases, the infection spreads to the entire body. The incubation period from the time of injury until the appearance of the first symptoms ranges from 2 to 50 days. Symptoms usually occur within 5 to 10 days. The early appearance of symptoms is associated with an increased chance of death and the overall mortality rate is approximately 10%–50% [6,7]. Whether the socio-demography and geographical conditions may influence the tetanus treatment outcome on the circumstances around earthquakes in Yogyakarta, Indonesia has not been investigated.

Methods

In this study, we examined twenty six tetanus patients who had been admitted to eight hospitals as part of the post-disaster responses in Bantul County, Yogyakarta province, Indonesia, eight of whom were dead. On June 14, 2006 (19 days after the earthquakes) data were collected from Sardjito General Hospital, Wates Hospital, Muhammadiyah Yogyakarta Hospital, Muhammadiyah Bantul Hospital, Harjo Lukito Hospital, Ludira Husada Hospital, Panembahan Senopati Hospital, and Walubi Field

Hospital (run by the Indonesian Buddhist Society) through the Bantul County local health office.



Figure 1. Open wound on disaster is susceptible for *Clostridium tetani*

Using the MapInfo professional 7.8 geospatial tool, the patient's location origin and the hospital's coordinates for latitude and longitude were used to determine the distance from the patient's position origin to the hospital. The hospital coordinates were obtained from Wikimapia: Indonesia/Yogyakarta <http://www.wikimapia.org>, supported by Google Earth. The residences of the individual patients were geocoded using MapInfo Professional 7.8. based on their address. The distance was measured from the patient's origin to the hospital location by tracking the road map and geographical contours on the digital map via Global Mapper 7 (Figure 2). The distance was classified in 2 groups (under 15 km and 15 km or more). The distance classification was related to the response time from the patient's origin to the hospital, since the ambulance service in Yogyakarta was considered to be good.

Admission means the length in terms of the number of days from the initial injuries and open wound contaminated by *Chlostridium tetani* until they were admitted to hospital and was classified into below 7 days and 7 days or more. Thereafter the hospitalization referred to the length of stay in the hospital, which was also classified into below 7 days and 7 days or more.

The hospital type was classified based on the Ministry of Health of Indonesia (MOH) standard. There are 4 levels of hospital in Indonesia, specifically, types A, B, C and D (A representing the highest level and D the lowest). The hospital type is classified based on the standard of health services provided and the patient facilities for patients. The Sardjito Hospital is the top academic referral hospital in Yogyakarta and

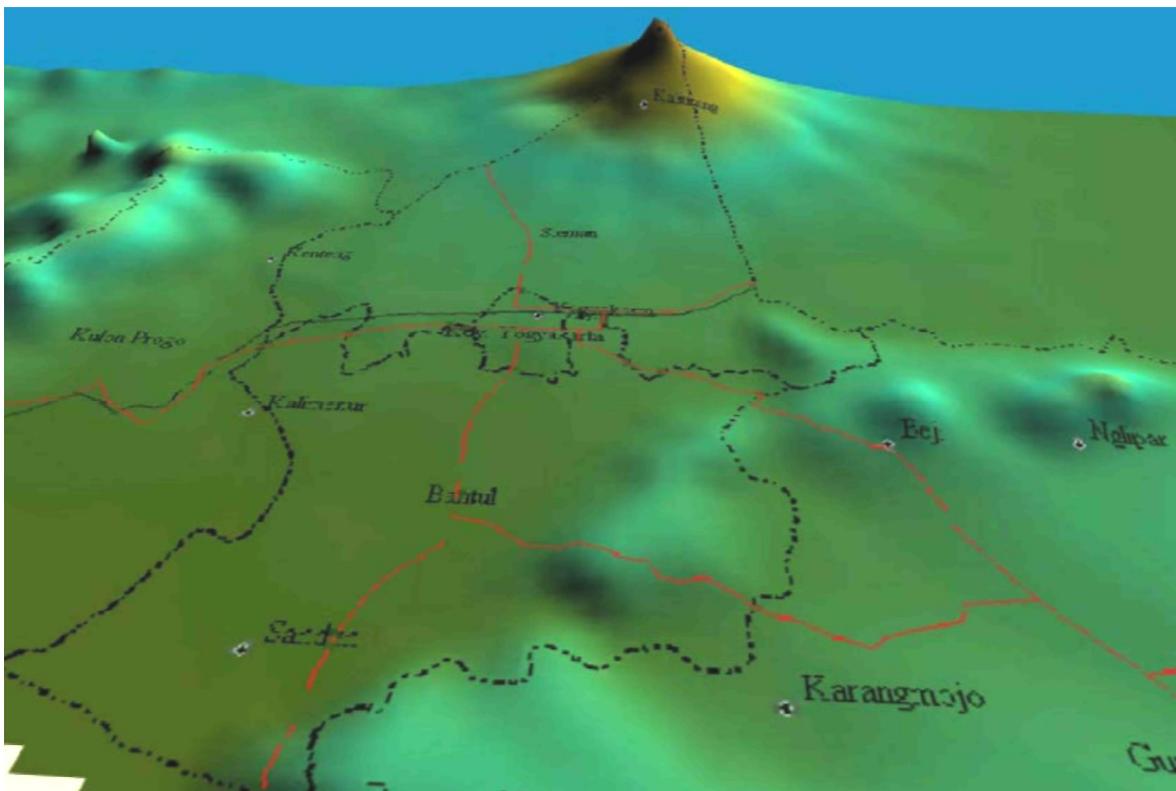
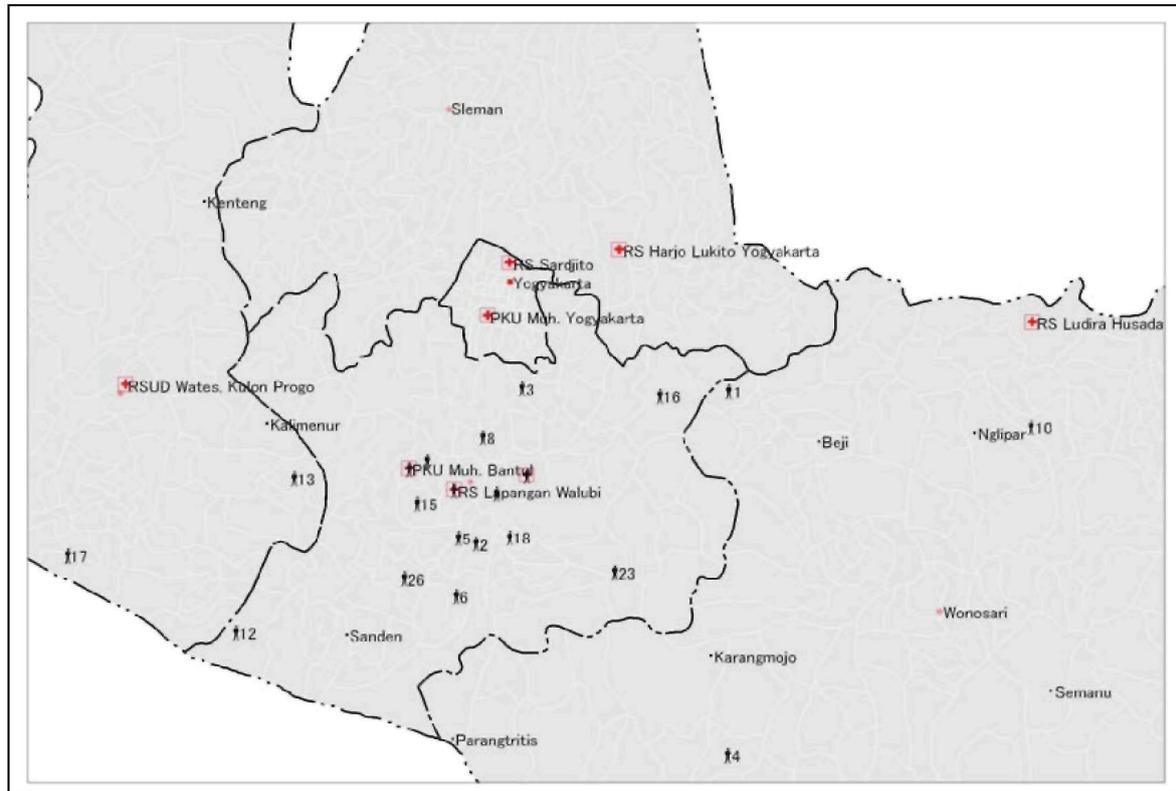


Figure 2. Tetanus patient's origin, hospitals location and geographical 3D landscape on the earthquakes in Yogyakarta Indonesia. Geospatial view by using MapInfo Professional 7.8. SCP. Geospatial view by using Global Mapper 7. road = red line. county border = dots and dashes.

Table 1. Characteristic 26 tetanus patients on the earthquakes in Yogyakarta Indonesia

Variables	Category	Number of patients	Percentage
Age (20–89 years old) Range 69	< 60 years old	11	42.3
	≥ 60 years old	15	57.7
Gender	Male	20	76.9
	Female	6	23.1
Distance	< 15 km	18	69.2
	≥ 15 km	8	30.8
Admissions	< 7 days	17	65.4
	≥ 7 days	9	34.6
Hospitalization	< 7 days	8	30.8
	≥ 7 days	18	69.2
Type hospital	Type B	13	50.0
	Type C	11	42.3
	Type D	2	7.7
Live-die	Live	18	69.2
	Die	8	30.8

categorized as type B. Six of the remaining hospitals were categorized as type C, and one (Walubi field hospital) as type D. The characteristics of those eight hospitals were collected from the Indonesian hospital association, in the form of a data information website <http://www.pdpersi.co.id>.

SPSS 17.0 was applied by using the binary logistic regression analyses method. Logistic regression is particularly relevant, since the survival output as the dependent variable is binary, with the output coded as 1 = death and 0 = survival. Socio-demographic and geographical information data were also employed as independent variables, namely in the form of age, gender, distance, admission, hospitalization, and type of hospital. Age was classified into two groups, those under 60 and those of 60 years or more respectively, since immune systems decline in individuals aged over 60 years [5]. There was also gender separation as well.

Results

The characteristics of tetanus patients are shown in Table 1. The age classification of those 60 years or more included 15 patients (57.7%), ranging in age from 20 to 89 years. The total was predominantly male (n = 20, 76.9%), relative to female (n = 6, 23.1%). Distance was classified into two groups, with 69.2% of patients (n = 18) located under 15 km away and the remaining 30.8% patients (n = 8) located 15 km or more from their location to the hospital. In the early stages of tetanus, the majority of patients were admitted to the hospital for under 7 days (n = 17, 65.4%), with 9 patients (34.6%) admitted for 7 days or more. In most cases, the hospitalization periods were 7

days or more, for 69.2% n = 18. Thirteen patients (50%) were treated in the type B hospital, eleven patients (42.3%) in the type C hospital and two patients (7.7%) in the type D hospital.

The patient's distribution graph based on live and die in each hospital is described on figure 3. Most of patients were admitted to the Sardjito hospital. The death cases had been reported in Wates hospital, Sardjito hospital, Panembahan Senopati hospital, Ludira Husada hospital, Walubi field hospital, Muhammadiyah Yogyakarta hospital and Muhammadiyah Bantul hospital after admission and there was no dead case in Harjo Lukito hospital.

In Table 2, the mean age of patients who died was 74.62 ± 13.43 years old; a figure which differed significantly (p = 0.013, significant level p < 0.05) from the mean age of the surviving patients, namely 54.94 ± 18.72 years old. The other mean values for those patients dying also differ significantly to those surviving, namely in terms of distance 29.83 ± 6.74 Km (p < 0.0001), admission 18.12 ± 3.44 days (p < 0.0001), hospitalization 3.12 ± 1.64 days (p < 0.0001), and type of hospital 2.25 ± 0.46 (p < 0.0001).

Statistical analysis using the binary logistic regression method showed that the variables of distance and type of hospital were significant (at level P < 0.05) on P = 0.026 (OR = 1.740, 95% CI = 1.068–2.835) and P = 0.018 (OR = 0.067, 95% CI = 0.001–3.520) respectively. Meanwhile age, gender, admission and hospitalization were not statistically significant for tetanus cases during the earthquakes in Yogyakarta (Table 3).

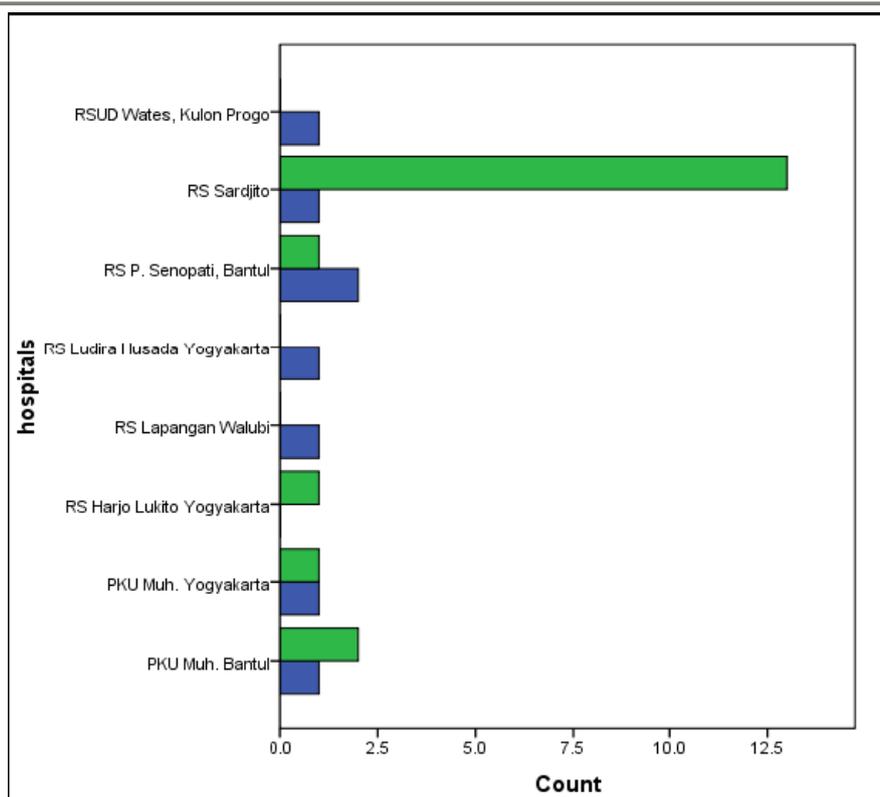


Figure 3. Tetanus patient's distribution by hospitals on the earthquakes in Yogyakarta Indonesia. Blue = die. Green = live.

Table 2. Mean value by death-live outcome of tetanus patients on the earthquakes in Yogyakarta Indonesia

Variables	Patient outcome	Means	SD	P-value
Age (years old)	Death	74.62	13.43	*0.013
	Live	54.94	18.72	
Distance (Km)	Death	29.83	6.74	** < 0.0001
	Live	6.50	2.26	
Admission (days)	Death	18.12	3.44	** < 0.0001
	Live	3.33	1.64	
Hospitalization (days)	Death	3.12	1.64	** < 0.0001
	Live	16.83	4.33	
Type hospital	Death	2.25	0.46	** < 0.0001
	Live	1.28	0.46	

*Significant at level $p < 0.05$ **Significant at level $p < 0.01$

The characteristic of hospital are different based on the type B, C and D in term of human resources and facilities. The Sardjito hospital is the biggest hospital with 631 beds, 24 general practitioners (GP), 198 medical specialist, 564 residents, 799 nurses

and many facilities such as X-ray, CT scan, USG, ECG, EEG, EMG, emergency room, operating room and ICU (intensive care unit) are also available in comparison to the other hospital <http://www.pdpersi.co.id>.

Table 3. Multivariate analysis tetanus cases by logistic regression on the earthquakes in Yogyakarta Indonesia

Variables	OR	95% Confidence Interval		P-value
		Lower Bound	Upper Bound	
Age	0.995	0.866	1.142	0.939
Gender	0.422	0.002	93.369	0.754
Distance	1.740	1.068	2.835	*0.026
Admission	0.981	0.411	2.343	0.966
Hospitalization	1.316	0.284	6.091	0.726
Type hospital	0.067	0.001	3.520	*0.018

*Significant at level $p < 0.05$

Discussion

Tetanus is an infectious disease caused by a toxin produced by *Clostridium tetani*, which is found in soil, human feces, and objects lying on the ground. Tetanus infections are common in disaster-affected areas. Tetanus cases were also reported by Australian humanitarian assistance 13 days after the tsunami of 26 December, 2006 [8]. Open wounds are the general entry points for bacteria. In developing countries, where there is normally a lack of facilities, tetanus can be fatal by paralyzing the breathing muscles, causing sudden death in disaster-affected areas. In this study, 26 tetanus cases after the Yogyakarta earthquakes were examined in order to establish the associated factors, with a view to minimizing mortality due to the disease. In 26 tetanus patients, 8 were dead and binary logistic regression analysis by SPSS 17.0 and GIS geospatial tools were applied to analyze the socio-demography and geographical information. We restricted the analysis to cover solely the disaster-affected areas, socio-demography and GIS.

The characteristic findings showed that most patients were male (76.9% $n = 20$), aged 60 years or more (57.7%, $n = 15$), while in a previous study, gender and age were applied as standard demographic variables. Following the tsunami in Banda Aceh, Jeremijenko *et al.* reported 106 tetanus cases, 79% of whom came in individuals over 25 years (median age of 40 years) and 62% of whom were male [9]. However, no tetanus studies were performed in relation to socio-demography and geographical variables, such as distance to the health facilities, admission, hospitalization and hospital type [9]. During natural disasters, a history of injury is recorded in more than 70% of patients presenting with tetanus [10]. The majority of patients are inadequately immunized against tetanus [11], particularly the elderly population. Tetanus toxoid immunization is believed to be nearly 100% ef-

fective in preventing tetanus infections [12,13]. Some individuals may be protected for life, but most people have antitoxin levels that approach the minimal protective level 10 years after the previous dose. Since patients were predominantly 60 years or more (57.7%), their immune systems were in decline and a booster was essential to prevent tetanus. The previous study in the United States reported 3.8% of tetanus cases treated by the disaster medical assistance team after earthquakes [14]. There was no report of deaths attributable to the treatment administered, including tetanus boosters [15]. Concerning gender, males seemed to be more active during the disaster, during which they had to evacuate their relatives, meaning they (76.9%) were more susceptible to infection than females (23.1%).

In our findings, the distance and type of hospital are significant risk factors when considering the survival of tetanus patients following an earthquake scenario. The greater the distance or time involved (OR = 1.740, 95% CI = 1.068–2.835), the greater the risk of mortality for tetanus cases. This is related to the ambulance service in Yogyakarta province, which has a good reputation. We assumed that average ambulance speed of 50 km/hour, the time required to transport patients from their residence to the nearest hospital within a radius of under 15 km is approximately 18 minutes. It is still reasonable to consider whether the paramedics should perform CPR (cardiopulmonary resuscitation) during the evacuation while the consideration to stop times taken to try CPR is as simple as an isolated time interval (around 30 minutes). Nevertheless the clinical judgment and respect for human dignity must also enter for this decision [16]. Meanwhile, upgrading the type (level) of hospital will significantly (OR = 0.067, 95% CI = 0.001–3.520) decrease the mortality risk for tetanus patients. The characteristics of the hospital differ completely depending on its type B, C or D in terms of human resources and facilities. Sardjito hospital is the biggest of those covered, with 631 beds, 24 general practitioners (GPs), 198 medical specialists, 564 residents, 799 nurses and many facilities such as X-rays, CT scans, USG, ECG, EEG, EMG, emergency room, operating room and ICU (intensive care unit) in comparison to the other hospitals <http://www.pdpersi.co.id>.

Nevertheless successful treatment also depends on numerous other factors. Based on an analysis of tetanus cases after the Yogyakarta earthquakes, proposed referral systems for critically ill tetanus patients should be considered as well as the ambulance systems, which have been effective in Yogyakarta. GIS was significant in logistic regression, and will hence be useful for distance analysis on this study. We realize that analysis of other independent variables must be lacking due to the limited variables in this study. For those reasons we restricted this study to the circumstances of the earthquakes, socio-demography and geographical data setting.

Conclusion

Our findings show that in order to reduce the mortality rates, performing triage systems based on the distance and type of hospital priority for internally displaced persons could be proposed as well as making provisions for the generally old population in order to prevent an outbreak of tetanus following earthquakes in Yogyakarta, Indonesia.

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*Materials of Conferences***STUDY OF WHITE RATS SKIN ACCORDING TO THEIR SEX**

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The problem of cover skin affects researches of scientists in many generations. But the experimental works haven't discover yet the molecular mechanisms, the dynamics sexual and age changes of collagenic derma skin. The skin is the organism's protective barrier from the outside influence. Besides this, it connects organism with the environment, participating in process of metabolic. The skin affects condition of organism's environment - homeostasis. A lot of scientists devote their publications to skin's construction and functions (Kalantaevskaja K.A., 1965; Chernukha A.M. with co-authors, 1982). The constant cellular components of epidermis are keratinocytes, melanocytes, langerhans cells, Merkel's cells, Grenstein's cells. Besides this, in epithelial layer of skin there are migratory cells, in particular lymphocytes (S., et al., 1993).

The purpose of our research is the study of skins features depending on sex organism. The subject of research are the sterile white rats masculine and female sex with average bulk of 250 gr. In the capacity of the subject was the back's skin of interscapular area with the area of 2 cm². The rats were killed by dislocation cervical vertebrae. The material for the research took 12 days later after cutting off the scalp in examined area. Such procedure was made 2 days later, in order to avoid stress from skin irritation because of scissors and razor. The histological working of skin's cuts began from preserving in 10 % formaline later on, according to the used method, "conduct" in alcohols with different concentrations of 70-100 covered and coloured with hemotoxylin and eosin. Reading of preparations put into practice with the help of light microscope.

The apparatus "Morpholog" (Russia) determined the epithelium's thickness (to corneous layer); the measures conducted with increasing *20 in all fields of vision of each animal skin; the total number of measuring in the group was 50. The histological study of skins models of interscapular part of white rats bodies at male and female discovered the line appropriatenesses. Males epidermis has larger thickness than female's, and the corneous layer developed very good. The hypoderm developed less than the weaker sex. Back's skin has few growth papilla epidermis. The models of studied skins fragments offered by epidermis (Ep) and derma with hypoderm and skeletal muscle. Ep. consists of 4 layers. The height of Malpighian layer consist of 1-3 cells; in separate parts reaches to 10; the form of ceratinocytes basal mainly cubical.

The granular layer is well-expressed and as a rule counts 3-4 rows of cell; keratinocytes of granular layer sometimes overloaded with keratogialin. The corneous layer is notable for polymorphism. So, the parts of compact keratin with thin layer alternate with friable arrangements of keratins layers. The dystrophic of modification cells Ep. become in the form of vacuolization and meet rarely. The dermoepidermal interface is clear.

So, after the example of back's interscapular part was studied the sex difference of skin. The researches showed that the females Malpighian thickness is smaller for sure than male's.

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PROVIDING EMERGENCY ANGIO-TRAUMA CARE TO PATIENTS WITH CONCOMITANT ARM INJURY

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The beginning of the 21st century has been marked by a rapid economic growth, triggered, in the first place, by strong technological changes. This was inevitably followed by growing number of injuries at work, which often cause temporary and permanent disabilities.

As a result, the number of concomitant arm injuries has increased considerably, reaching 34% of all multiple traumatic injuries treated at the surgical hospitals. Moreover, the injuries caused by new technological equipment, are often more severe and complex.

Questions of restorative surgery of all injured anatomical structures can be answered with the help of precise surgical techniques. But the organizational problems still need to be solved; many of them are caused by a large number of mistakes and complications made by the primary care.

Emergency angio-trauma aid to patients with concomitant arm injuries is currently developing in the clinical practice in two interrelated directions: creation of specialized hospital departments and providing multi-specialty surgery hospitals with qualified medical personnel.

In Astana, the department of microsurgery and hand injuries of the Research Institute of Traumatology and Orthopedics (headed by professor N.D. Batpenov) introduced in 2001, and has been providing since then, an emergency surgical care to patients with concomitant arm injuries, on the 24-hour basis.

In order to improve the treatment results, we have analyzed the common treatment schemes offered to patients with concomitant arm injuries, and revealed serious mistakes and complications that make the actions of the secondary aid considerably longer and complicated. The main concern causes late diagnostics of acute arterial blood flow disturbance in an injured arm.

With this view in mind, we developed and introduced into clinical practice a new scheme of emergency angio-trauma aid to patients with concomitant arm injuries. According to this scheme, the medical procedure should be clearly regulated, while taking into account the opinions of all specialists, who provide medical care to the patient and determine further treatment steps.

The proposed innovation has considerably reduced the time period between the first visit to a doctor and the operation. It allows not to miss the best time for the surgery, and considerably reduces the number of the possible complications that appear during the postoperative period and can affect the total result of treatment.

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IMPLEMENTATION OF AN EXPERIMENTAL MODEL OF SECONDARY AID TO PATIENTS WITH CONCOMITANT ARM INJURY

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Problem of secondary surgical care of patients with concomitant arm injuries is regarded in modern surgery as solvable, thanks to use of microsurgery methods.

But many complications caused by a large number of mistakes at the stage of primary care, call for new organization and management technologies in form of a tactical algorithm scheme, which would let reduce their quantity considerably, or in some cases completely avoid them.

The aim of our study was to develop a model of secondary medical care for patients with concomitant arm injuries, and implement it into clinical practice of a multi-specialty hospital.

A conceptually new algorithm scheme of secondary care for patients with concomitant arm injuries was developed and introduced at the department of microsurgery and hand injuries of the Research Institute of Traumatology and Orthopedics, Astana (headed by professor N.D. Batpenov) during the period from 2001 till 2008.

Our study bases on a multi factorial analysis of qualified medical aid provided to 84 patients with concomitant arm injuries, treated at the department of microsurgery and hand injuries of the Research Institute of Traumatology and Orthopedics, Astana, during this time.

The conducted analysis revealed the most typical mistakes, made by the primary care. The main mistake was late diagnostics of acute limb ischemia provoked by a concomitant injury. Revascularization, followed by reperfusion syndrome, considerably complicated further actions of secondary care providers.

Basing on the obtained data, we have developed and introduced a new algorithm scheme of qualified medical aid to patients with concomitant arm injuries, at all stages of medical evacuation. According to this scheme, all tactical and diagnostic steps should follow each other in a clear order; at each stage, the information of the previous one is to be considered.

Newly implemented organization and management algorithm scheme resulted in better surgical results at patients with the above mentioned injuries; the number of mistakes and complications in primary care reduced twofold.

We suppose, that managerial problems of aid to patients with concomitant arm injuries could be solved, if diagnostic and tactical approaches would be clearly scheduled for primary care providers, by means of new organization and management technologies, implemented into clinical practice in form of the algorithm scheme.

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IMPROVING DIAGNOSTICS OF SPINAL STENOSIS CAUSED BY INJURIES

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Despite widely used spinal computer tomography with sagittal reconstruction (CT) and spinal magnetic resonance imaging (MRI) in the clinical practice, myelography (MG) using nonionic contrast agents remains an important diagnostic tool during operation.

The aim of this study was to analyze the results of intraoperative control by means of MG, during the surgeries for the injury-caused spinal stenosis.

Materials and methods

Results of surgical treatment in 17 patients with thoracic and lumbar spine injuries were analyzed. 12 patients had a complex closed spinal cord injuries after falling from a great height, 5 were injured in a car accident. All the patients were operated within one till 3,5 months after the accident.

Results and conclusions

Intraoperative MG let develop differentiated surgical tactics. Myelography conducted during operation, let diagnose the reversal of spinal stenosis and spinal subarachnoid space.

The analysis of the intraoperative control provided to patients with spinal injuries showed, that myelography let diagnose the state of spinal subarachnoid space during operation, as well as after the correction of a strong kyphotic spinal deformity. It also let diagnose the reversal of spinal stenosis, which is needed to determine further tactics and extent of operative interference.

The obtained results on the use of intraoperative MG proved its higher effectiveness, which let reduce operative interference and avoid excessive laminectomy in 82,4% of patients.

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TREATMENT OF UNSTABLE VERTEBRAL COMPRESSION FRACTURES

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Surgical treatment of unstable compression fractures of thoracic and lumbar spine, with the purpose of restoring anatomical axis of the damaged spinal part and its functions, remains an important and often unsolvable issue. And at the same time, it is essential not only to diagnose a compression of the vertebral body, but also to determine its severity level, which is of a great importance for revealing the nature of static disorders of the vertebral column. Mistakes in treatment of simple fractures of the vertebral body are caused, in the first place, by unclear differentiation between spine stability and instability that come as a consequence of vertebral column injury.

The aim of the current research was to study the treatment results in patients with unstable fractures of thoracic and lumbar spine in acute and early stages.

Materials and methods

We examined 251 patients with spinal injuries aged between 16 and 59 years. The most common type of injury were the traumas received in car accidents; among mechanisms of injury prevailed falls from a great height. The majority of the patients (57,8%) had fractures of lumbar spine; fractures of thoracic spine were diagnosed in 23,4%; both vertebral parts were damaged in 8% of all cases. Using different methods, 80,7% of patients were operated. Spinal fractures without cranial and caudal end-plate collapse and cranial disk injury were treated using posterior spinal fusion using shape memory instrumenta-

tion; spinal fractures accompanied by collapse of cranial end-plate and cranial disk injury were treated using anterior transpedicular fixation.

Results

Surgical treatment of unstable compression fractures of thoracic and lumbar spine let achieve stabilization and spinal axis extension in 80,8% of the operated patients.

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STUDYING OF THE MECHANISM OF SECRETION ACETYLCHOLINE IN NERVOUS-MUSCULAR JUNCTION

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One of the main problems of contemporary bioinformatics consists in revealing physical-chemical nature of neural signal generation, as well as some principles of information transmission from neural cell to muscular one. It may be seen as a necessary step to understanding molecular mechanisms of neural system activity.

Neural cells transmit informations by signals that represent electric currents generated by neuron surface membrane. These currents arise due to transferring charges which belong to the ions of sodium, potassium, calcium and chloride. The information transmission process in neuromuscular synapses may be divided into two basic phases: (a) a mediator release from nervous endings caused by neural impulse, and (b) a mediator interaction with postsynaptic membrane that implies the miniature end-plate potentials (MEPP).

The hypothesis on a quantum secretion nature underlies modern views on the mediator release mechanism. Under normal conditions a spontaneous release of bubbles charged with mediator into synaptic fissure takes place. These bubbles are seen as quanta containing intermolecular portions of about acetylcholine molecules. Here the Ca^{2+} ions which enter into nervous endings during the action potential are the activators of release system. Then some mediator quanta attain the postsynaptic membranes surface that leads to local depolarization registered as membrane potential. In the course of depolarization caused by action potential diffusion across the neurons the quanta release is rapidly increased, and the degree of depolarization in postsynaptic membrane grows. These changes in membrane potential are registered as MEPP values. While attaining a critical value MEPP is transformed into regenerative depolarization process in postsynap-

tic membrane which is registered as an upward phase of action potential. Nevertheless, due to holinesterathic influences, the acetylcholine destruction takes place. It leads to restoring membrane potential on its initial level. As an alternative to quantum-vesicular hypothesis, a possibility to release acetylcholine via specific canals of presynaptic membrane is discussed.

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SURGICAL TACTICS WITH PLURAL ATHEROSCLEROSIS OF VESSELS OF THE NECK

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As known, 95% of ischemic insult and transient ischemic attacks are connected with atherosclerosis paths, which in the most cases (76,6%) are located in the main vessels of the neck. The cause of ischemic insult in 80% cases is multifocal damage of vessels. Carotid—vertebrobasilar stenosis form in the common structure vessels damages 27,8%.

The results of surgical treatment of 82 patients with hemodynamic significant atherosclerosis damage of more than one extra cranial artery nourishing brain were analyzed. From 2002 to 2009 93 reconstructive operations were made. On the background of universal neurological symptom all patients had the signs of hypo perfusion in vertebral basilar bath (VBB). More often (63,4%) patients had chronic discirculation, 25 (30,5%) of patients had transient ischemic attacks, in other cases ischemic insult is verified.

All patients were examined by angiosurgent, neurologist, cardiologist, otoneurologist, neuroophthalmologist.

Instrumental diagnosis included triplex scanning of vessels of the neck, transcranial Doppler investigation (TDI) with the samples of squeezing of carotid artery and head turning in different directions. Computed tomography of brain, radioopaque or MR-angiography, the widen laboratory research of blood were also made.

During the research 65 patients had bilateral hemodynamic significant stenosis of internal carotid arteries (ICA), and the «carotid steal-syndrome» took place. In 14 cases was defined stenosis of ICA and occlusions of vertebral artery in the first segment. Three patients had bilateral stenosis of carotid and occlusions of one of vertebral artery and it lead to infarct of cerebellum.

In all cases to the patients was made carotid endarterectomy from the general and internal carotid arteries with the plasty of arteriotomy stoma by syn-

thetic patch. In 11 cases endarterectomy was made on contra lateral side. Preferable method of interoperation patronage of brain was the usage of intraluminal temporary bypass. In all cases the constant interoperation monitoring of cerebral blood flow with the help of TDI, control of arterial tension, electrocardiogram and blood saturation was made. After closing the arteriotomy stoma the volumetric blood flow in ICA was measured by method of laser Doppler ultrasounds.

The operation was made on the side of hemodynamic more significant stenosis of ICA with homogeneous atherosclerosis paths or on the vessels, damaged by heterogeneous path. In the case of combination of bilateral stenosis and the damage of vertebral artery the reconstructions was made on the side of occlusion of the latter.

Post operation complications were connected with the light paresis of motor nerves in the field of neck, were reduction to the moment of discharge. The improvement of well-being, psycho neurologic status, full reduction or reducing the symptoms of discirculation in vertebral basilar bath after operation had 56 (68,3%) patients. 10 patients had reducing the frequency and expression of headache, sleep reappeared, but moderate vertigo and swaying while walking were kept. In 5 cases (patients with infarct in vertebral basilar bath) were kept the signs of vestibulocochlear and/or cerebellar syndromes. Repeated or primary insults in the time of supervision from 2 month to 7 years were not registered.

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AUTOGENIC AND HETEROGENE BIO- RECEPTIVE REFLEXES AS A BASIS FOR SELF-REGULATION IN ANIMAL AND PLANT ORGANISMS

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In the recent decades, development of the cytogenetics was marked by a significant success. With the help of the morphologic methods, were found genomes of many plants and animals; it also let localize some genes in chromosomes that are responsible for different functions in the organism - at the level of a cell, tissue or organ. However, physiological self-regulatory mechanisms of an organism, regarded as a bio-ecological system, and its interaction with the environment, are yet to be researched.

Long-time studies on the inter-reception in blood vessels and tissues, let us offer a concept of a bio-reception (1980), that can be defined as a genetically determined interactive reflex process aimed at

homeokinesis (homeostasis) of a bio-ecologic system. This involves bio-ecological and bio-receptive reflexes, which are reciprocal.

As a material for our study, we used larval *Echinococcus* with the contiguous organ tissues of domestic animals (usually liver and lungs, as the most common areas of cysticercus location in the body of an intermediate host). The material was obtained from meat plants in the Volgograd region and city (slaughter material); from patients operated for echinococcosis at the Volgograd hospitals, and also from wild animals, during a scientific expedition to Baikal Amur railway (1979) that was undertaken to study the helminth fauna of the region. We used classic histological, as well as modern histochemical and electromicroscopic research methods. Larval *Echinococcus* turned out to be a practical and universal model to prove, that our suppositions are also true in other bio-ecological systems. Thus, bio-receptors can be defined as genetically determined structures, which are the main functional element of the sensor activity of bio-ecological systems.

Later, basing on the concept of bio-reception, we determined the reciprocal bio-reception of cells and tissues, as well as formulated a bio-ecological law (1995). It was also determined, that bio-receptors and bio-ecological reflexes, involved in the just mentioned process, are reciprocal in onto- and phylogenesis of intercellular and inter-tissue interactions. So, one should not ignore bio-receptive and bio-ecological reflexes,

the related reciprocal bio-reception and bio-ecological law, as well as the bio-reception and the bio-ecology in other bio-ecosystems, because all of them – an organism, a cell, biologic membranes, a family, a country, zoo-geocenosis, global biosphere – live in accordance with the universal bio-ecological law: «Interaction between bio-ecological systems, one of which is a habitat for another or is related to it, involves reciprocal bio-receptive or bio-ecological reflexes, which determine the genesis of these bio-ecosystems». If the bio-ecological law and reciprocal bio-reception are related to ecology, then one can assert, that this discovery also affects some important socio-economic issues. It can be successfully used in preventive medicine, biology and ecology, as well as in life, politics and economy, could be helpful by developing anti-crisis measures in different countries and normal relations between them. To sum up, bio-receptive and biological reflexes should be regarded as reflexes of Life and Universe. And with reference to our planet, they could be called reflexes of the Earth and Peace, if people around the globe have a positive approach to this. That is why our country is historically a remaining stronghold of common peace, fair democracy and good.

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*Materials of Conferences***A THYRISTOR CONVERTER WITH METERING CAPACITORS IN A POWER CIRCUIT**

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Thyristor converters with metering capacitors in a power circuit were widely used in electrical installations demanding a continuity of energy metering when a load was changed [1]. Transistor capacitor converters of half-bridge and bridge types are used usually in installations under 10-15 kilowatts in power. If a power of installation was greater [2] then thyristor capacitor converter was more preferable. Ion nitriding furnaces, arc metal spraying pistols, and such like can served as examples of such loads.

Thyristor-capacitor converters for dc loads are executed of bridge circuit and for ac loads are executed of half-bridge circuit.

Unreliability of an overload protection was the general disadvantage of aforementioned thyristor capacitor converters when a thyristor commutation was failure. A pulse-width selector [2] was part of a protection circuit of common devices that accounted for a lag post triggering of protection and operable reliability of protection was reduced.

The proposed protection system [3] is shown in figure 1 and it are comprised of the three-winding transformer. The first winding of this transformer is connected between the side and the thyristor bridge common anode. The second winding was connected between a cathode one of thyristor bridges and an anode another thyristor bridge so that the midpoint of the second winding formed one of leads of the alternating current thyristor bridge diagonal. The second winding has twice number of loops than the first winding. It has an opposite connection with the first winding. And the third winding of the mentioned transformer is connected with the turn-off pulse former; output of it is connected with the driving point of the thyristor circuit-breaker.

That makes to exclude the comparator and, above all, the pulse-width selector from circuits of type devices. That permits to provide a performance and a high reliability of the protection system. Indeed, the preventive type of the protection system was provided in the proposed device, i.e. a current was not increased practically when the thyristor bridge commutation was break off.

The vital difference of the proposed solution consists in the following. A load current flowed, for example, through the first winding 12 and the half-winding of the second winding 13, i.e. through opposite connection windings having an equal number of

loops and formative a bifilar when the thyristor bridge operated normally. Thus sum of ampere-turns is vanishing. Accordingly, inductance of these windings is vanishing too. An analogous picture was occurred when the diagonal of thyristors 3 and 4 was activated. The resistance can be neglected, i.e. the proposed device operates analogous type devices on an operation mode. The current induced by the supply U_n must flowed through the first winding 12 and through the whole second winding 13 of the three-winding transformer 11 when a disruption of commutation was occurred, for example, when an activations of thyristors 1, 3 were occurred synchronous. This current had not surpassed the magnetizing current until the three-winding transformer is saturating, i.e. the short circuit being closed practically. Characteristics of the three-winding transformer choose sufficiently that its saturation time would equal the interrupting time of the thyristor circuit-breaker. A disconnect signal enter to this circuit-breaker 7 through the pulse former 15 from the third winding 14 in emergency state. An analogous picture would occurred too when thyristors 2 and 4 had been connected. In this case the magnetizing current flowing through the first winding 12 of the three-winding transformer 11 only. Note that since an interrupting time of the thyristor circuit-breaker 7 is less (tens of microseconds) than three-winding transformer gabarits are less too and connection of this with the power circuit of the thyristor capacitor converter is not a disadvantage. The demagnetizing of the three-winding transformer 11 would occurred when every disconnection of thyristor circuit-breaker was occurred. I.e. the three-winding transformer 11 is used according to total hysteresis curve and the proposed protection system is in ertialless and is restricted the current to a trifling load.

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AN OPTIMIZATION OF HALF-BRIDGE INVERTERS WITH A TRANSFORMER LOAD

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Half-bridge inverters with transformer loads in an alternating current (ac) diagonal are widely used in various electrical installations. Classic variant of such inverters is corresponded the half-bridge of two transistors shunted by two reverse diodes and the half-bridge of two capacitors in-series. A load of the ac diagonal is usually a transformer and the direct current (dc) diagonal is connected to the power source. Main advantages of such inverters are simplicity of the circuit and a default of the constant component in the ac diagonal. The replacement of transistors by thyristors in the half-bridge has own deficiencies: a thyristor half-bridge inverter is operable in restricted load range and his regulation is probable by pulse-frequency method only. Using of the additional switching unit permitting to perform the recharge of the metering capacitor is part of that unit are one of removal variants of that's disadvantages. Thus a half-bridge inverter control is realized over a wide load range by the instrumentality of the standard time-proportional control system closed on a load current. The hardware form of a realization of the described control system is given in [1] and the up-to-date form microcontroller-based is given in [2]. But a range extension of regulation of an inverter load is attended by definite problems: 1) the preliminary recharge circuit of metering capacitor contains the circuit composed of thyristors, inductances and the metering capacitor in-series, that increased additional energy losses; 2) transformer windings voltage amplitude and load voltage were vary from zero to supply voltage when the control process is occurred. When voltage amplitude is reduced that an ionization is complicated and an arc excitation is complicated if, for example, electrical arc was a load [3]; 3) the circuit of the additional switching unit is more difficult.

The solution permitting to eliminate above-listed disadvantages is proposed in [4]. The new respective circuit of the thyristor half-bridge inverter is shown on figure 1.

The device contains the thyristor half-bridge inverter compressed of capacitors 1, 2, thyristors 3, 4, and the additional switching unit. This unit is corresponded the additional thyristor half-bridge inverter compressed of thyristors 7, 8 and capacitors 5, 6 which capacities are far less than capacities of capacitors 1, 2. The dc diagonal of this additional inverter is connected in-parallel with the thyristor half-bridge inverter 1, 2, 3, 4. The primary winding of the transformer 9 is connected with the ac diagonal of the half-bridge inverter 1, 2, 3, 4. And the secondary winding

of this transformer is connected to the direct current load 13, which is connected in-parallel with the current sensor 14. In addition, the transformer 9 contains the additional winding 15 that is connected to the ac diagonal of the additional thyristor half-bridge inverter 5, 6, 7, 8 and having the number of loops are less than the number of loops of the primary winding 10. The control system is corresponded the standard system of a pulse-frequency regulation. This system consists of the surge injector unit 16 connected with the one of outputs of pulse-length modulator 17. In addition, the feedback controller is compressed of standard system of a pulse length regulation and the mentioned standard system is closed on a load current by an output signal of the current sensor 14 connected with one of outputs of the feedback controller 18. The secondary input of this controller is connected with the signal of source current U_3 and the output of this controller 18 is connected with the secondary input of the pulse-length modulator 17. The output of the mentioned surge injector unit 16 is connected with respective driving points of thyristors 3, 4 and the output of the pulse-length modulator is connected with respective driving points of thyristors 7, 8 included in the additional thyristor half-bridge inverter 5, 6, 7, 8.

The new device permits to exclude the circuit of a preliminary recharge of the metering capacitor together the metering capacitor. Capacitors of the thyristor half-bridge inverter are performed the duties of the metering capacitor thus losses were decreased and circuit was more simplify. In addition, voltage amplitude of the load was not changed and was some more than voltage supply when half-period average voltage of the load was changed in the mentioned device. That made considerably easier the "firing" and the arc stability if arc space was a device load.

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THE POWER EFFICIENCY RISE OF HEAT TECHNOLOGICAL SCHEME OF THE ETHYLENE PRODUCTION

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The ethylene production is the large consumer of the fuel and energy resources that is conditioned by the considerable fuel and energy consumptions at the multi – staged hydrocarbon raw materials processing. The system organization of the complex utilization of the repeated energy resources (RER) is the perspective direction of the fuel and energy cost cutting in the considered production.

The heat technological scheme of the ethylene production is included in itself several thousands elements of the polytypic equipment. To estimate the work efficiency of such complex system and to reveal the organization version of the RER utilization system are suggested on the basis of the system analysis, having included the structure analysis of the internal and external connections of the considered object, and also the thermal and thermodynamic efficiency analysis. Its calculated model has been obtained, as a result of the system analysis carrying out, in particular, in the issue of the dependences exposure between the scheme's elements, the separation of the elements' open – ended and closed sequences of the considered scheme. The thermodynamic efficiency analysis of the heat technological scheme has been conducted, that permitted to estimate the rate of the system thermodynamic perfection, to expose the losses from the irreversibility, to make the estimate of the elements efficiency in the system composition, to determine the technically well – behaved energy value, to estimate the energy conservation reserves.

The circuit solutions on the organization of the RER utilization system have been suggested, having provided the technological production and the energy resources working out in a view of the steam, hot water and cold of the required parameters on the basis of the steam – jet compressors and the absorptive refrigerating machines use.

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PROBLEMS OF THIRD-GENERATION STATE EDUCATIONAL STANDARDS IN HIGHER PROFESSIONAL EDUCATION FOR QUALIFICATION “EQUIPMENT AND INSTRUMENTS IN CHEMICAL INDUSTRIES”

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Third-generation state educational standards in higher professional education (SES HPE) are aimed at forming a regulatory system for a better quality of the Russian education in the nearest future. A Ministry, responsible for developing this regulatory system of state educational standards, think, that the main distinctions of the SES HPE will be the following:

- strong competent character of the standards;
- development of standards for different professions. The corresponding degree is received after completing a bachelor, specialist or master educational program, which are united by a common fundamental basis;
- well-grounded requirements to learning results in the main educational programs (educational results) in form of competencies, divided into general (broad-based) and professional (subject disciplines);
- absence of component structure (federal, regional, institutional), and at the same time significant enlargement of academic freedom for higher educational institutions in questions of basic educational program development;
- establish new ways of labor intensity calculation in form of credit points instead of hours.

So, the third-generation SES HPE, according to the Ministry, will become a federal quality standard system for higher education. The norms should minimize their contradictory interpretation in the Russian regions and universities. Besides, these standards should simplify integration of the Russian educational system into the European one, and help the university graduates find employment in every country, that signed the Bologna Declaration.

So far, the Russian Ministry of Education and Science has not yet developed a clear strategy regarding deadlines and stages of transition to the new SES HPE; number of professions; differences between specialized secondary qualifications and university degrees; number of graduates with a specialized secondary qualification and university graduates in the labor market. But, without having solved all these questions, the Ministry has issued a decree that, starting from 2009, introduces a two-level degree structure - bachelor and master.

Such a tearing hurry in a serious matter of transition to new educational standards is absolutely incomprehensible. According to the «List of professions» on the official website of the Russian Ministry of Education and Science, there is practically no

course, which offers a technical specialist's degree, i.e. engineer. Russian universities are virtually forced to follow the western scheme of education in line with Bologna process model. Nevertheless, the universities have received a letter from Deputy Minister of Education and Science I. Kalina, dated 17.12.08, № IK-2112/03, that outlines a project list of professions, which allow obtaining a technical specialist degree. There are only 30(!!!) of those, instead of the existing 440. Our country does not have enough material resources and procedural framework for a such rush transition. Obviously, Russian higher technical school should base on their own methods and resources, and use European educational innovations, adapting them to the Russian reality.

A short look in the history shows it quite obviously, that our higher technical school has always had its own traditions and methods, and thanks to that, achieved excellent results in engineer training. The last two centuries of the Russian history prove, that our education is one of the best in the world. For example, our country and the army were technically well equipped during the First World War, which destroyed the plans of Kaiser's Germany for a blitzkrieg in the western front, and that despite a political weakness of Russia; prewar industrialization in the Soviet Union and its status of an industrially developed country; without any doubt, the victory in the Second World War, which is said to be won not by a soldier, but a school teacher. Postwar recovery of the national economy and creation of the nuclear shield, which let us exist until now as an independent state, is also an achievement of our good education. Another merit of our education is a postwar success of our country in space exploration. There are enough examples today as well – more than half of departments of theoretical and experimental physics or applied mathematics in many American and European universities are headed by the graduates from the Russian universities. This proves a high level of science and education in our country.

The soviet higher education provided the students with wide fundamental general knowledge, as well as modern scientific discoveries, technical and cultural achievements for a deeper learning of subjects. The higher education enabled the students to develop the integral worldview, creative skills, ability to analyze and generalize knowledge independently, carry out observations and experiments.

University graduates received good practical skills, as they had a chance to practice at the leading companies, research institutes and design engineering bureaus. The state supported the higher education, obliging employer to remunerate professionals for their work with trainees. It took 5 – 5,5 years to complete a study course at engineer department. Taking into account the high level of responsibility that engineers bear for their work, and according to the state rules, a graduate had a status of young specialist dur-

ing the first three years of employment. During these three years, the graduate continued to learn specific skills and get knowledge, typical for this industry, company or organization. In fact, it took 18 years to teach a professional (10 years of school, 5 years at the university and 3 years as a young specialist).

At present, higher engineering school in the USA and most European countries also includes 18 years of learning: 12 years in school, 4 years of bachelor study and 2 years of master study, in order to become an engineer or a scientist in this field.

Russian educational authorities offer to teach a professional in 14 years: 10 years in school and 4 years of bachelor study. The students have to pay for master's studies themselves. Isn't it an utopia for Russia's poor population? This utopia was supported by the majority in the lower house of the Russian parliament. Unfortunately, most of university presidents also gave up supporting rational principles of the Russian engineering education. For some reason, everybody stands for Bologna process model.

Why are we being forced to doubt the high level of the Russian education? Just because it remains the single fundamental stronghold, that has not been destroyed during the so called democratic reforms. Though we have to give credit to the adept reformers, they managed to damage this stronghold noticeably.

During the so called transformation and democratic reforms our industry was nearly destroyed. Even some Western analysts agree, that these reforms caused damages, which considerably exceed the losses after the Great Patriotic War. More or less undamaged remained natural resources sector and transport. This is simple to explain: the West needs raw materials and facilities for its transportation. Moreover, half of the natural resources have already become private, i.e. they are out of the state control. That is why petrol in Russia, with its huge distances, is more expensive than in the USA and some European countries, although the oil is produced in our country.

Natural reaction of the population against suffocating measures of the West made a part of our country leaders understand, that we are on the edge of a complete collapse. Then, came a hard statement of the Russian President at the summit in Germany, and his address to the upper house of the Russian parliament. These were landmark signals. Of course, wise and far-seeing as our current Prime Minister is, he is unlikely to implement his ideas without social support. Inland and foreign opposition is strongly against his patriotic steps.

The government can only rely on the army that remains to be a real sector of economy controlled by the state, military industrial complex and, of course, patriots among country's intellectuals. Most of them work in the above mentioned sectors of economy as well as in education, especially, in the higher engineering education. It is long clear, that the so called

artistic intellectuals switched camps and dance to someone's pipe.

These are the reasons of active reforms in the higher education. "Carthage must be destroyed!" The easiest way to do it, is under a mask of "progressive reforms", explaining to people, that our education falls behind the advanced West. There is nothing new in these attempts, compared with the Gaidar shock therapy and Chubais-style "voucherization".

Our higher education is being dragged and forced to accept Bologna process model. All of a sudden, the top educational authorities see the light and push, with a train speed, a transition to the two-level educational system. The nation has been told, that the country needs urgently a Bachelor's degree, which is to be completed within 4 years, and in future, in only 3 years. They have not asked taxpayers, employers and specialists, whether they need this ugly system? Taking into account the state of technical equipment at our universities, humiliatingly low salaries of the teaching staff, this threatens to destroy the Russian educational system completely, especially its higher technical school.

We will never believe, that these ideas have been proposed and pushed by fools or someone who does not understand the problems of education. Again, behind all this trumpery, money issue pops out. Via this reform, the state can save up to 20% of the budget allocated for education. At the same time, it can divide the universities into perspective and not perspective. As experts, some European educational community is being defined by Bologna Declarations. That means, a stranger will decide, which of the Russian universities should exist or disappear. And of course, under a mask of foreign experts, many our countrymen would work for a good remuneration.

Business, state politicians and authorities, which are often involved in business, also like this idea about perspective and not perspective universities. Soon, a huge amount of «free» real estate will appear in the best locations of our big cities.

At present, a top priority for the state (not for moneymakers in education, politics and business) is a problem of rapid growing financing needs for the country's education. Many Russian qualified specialists are highly rated in the West, and are even being afraid of, because they can restore Russia's might. The majority of them studied at the state universities. Only state enterprises and organizations should be able to employ these graduates for free, private business should fully compensate the education costs to the educational institution. For this purpose, amendments to the Education law regarding compensation of education costs to the higher educational institutions, should be urgently introduced, and the Russian government should develop a simple and clear mechanism for its implementation. The mechanism should be very strong. A company, which employs a graduate of a state university without letting it know, should pay a

high fine. These measures will quickly determine a real rating of the universities, and the state will not need to pay expensive and deeply corrupted bureaucrats, responsible for quality control in education. And the most important is, that universities become money for new equipment and laboratories, and can better pay professors for their hard work.

Due to a number of specific features, chemical industry takes a special place in the production sector. These peculiarities are caused by the following: diversity and focused specialization of equipment and instruments; wide range of raw material sources; high material insensitivity, energy consumption and level of automation. They determine high effectiveness of the chemical industry, its flexibility and ability to switch fast to a new production. Chemical, petrochemical and oil refining industry are equipped with diverse machines and devices, standard, nonstandard and special equipment. Using different types of energy, they process raw materials and products of a different aggregation state, aggressive and corrosive agents.

Development and technical improvement of chemical production require better equipment and technologies, as well as creation of new equipment types, in order to meet the higher requirements to its design.

Among the reasons restraining a stable functioning of the chemical industry, a high level of equipment's physical depreciation should be mentioned in the first place. In general, equipment in the chemical industry is deteriorated up to 67,2%, in some productions - up to 80 %, in, for example, polystyrol and styrene copolymer production – even 100%. Technical, technological and economical level of the chemical industry can be compared with the levels in the industrially developed countries about 10-20 years ago.

Heat exchangers, columnar mass-transfer apparatus and pumps in chemical and petrochemical industry account for over 70% of all costs for technological equipment. Fluid pumps and gas compressors take a dominant position among them. In production of methanol, rubber and artificial liquid fuel, gases are used with pressure of dozens and hundreds MPa. More than any other production, the chemical industry consumes artificial cold, produced by refrigerating equipment. Widely used in chemical and oil-chemical industry are dryers, crushing and classifying equipment, stoves and different reaction equipment.

The above mentioned machinery is also necessary for a successful functioning of fuel and energy sector, including atomic energy; military industrial sector; food industry, agriculture and others. Their development also depends on qualifications and skills of specialists for chemical production and general industrial production.

For development, installation, repair and maintenance of the equipment the employers do not need

half-educated self-made specialists, but well-educated constructors, designers, qualified operators, maintenance technicians and adjustors.

High level science and research are also a must for development of high-tech equipment. Earlier, the majority of the research work was conducted at the universities, for example, at the compressor building department of the Leningrad Polytechnical Institute (currently, St. Petersburg State Polytechnical University, Department of compressor, vacuum and refrigerator engineering), where one of the co-authors of this article completed a postgraduate program. As a result of intensive cooperation with the production sector and its support, activities of the compressor building research laboratory financed by the government, the department was one of the leading scientific centers of chemical engineering since the 1960s.

Active scientific work let increase the qualification level of engineers, created conditions for postgraduate studies. By the beginning of the 1990s the department of compressor building enrolled yearly 50 students, and more than 15 students undertook a postgraduate study. At the time of reforms in the beginning of the 1990s, the compressor building research laboratory of the Leningrad Polytechnical Institute ceased to exist, admission of students majoring in compressor building, reduced twofold. Postgraduate studies were no longer available, due to falling pres-

tige of scientific and teaching work, and because the scholarships were absolutely not enough for a living. Such examples apply to many specialized departments at technical universities. And for good reason, some representatives of the academic community mention, that transition to the two-level educational system will gradually make highly specialized departments come down [1].

To sum up, this are the content and consequences of the third-generation SES for profession «Equipment and instruments in chemical production» [2].

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*Materials of Conferences***STRATEGIC AUDITING OF COMMERCIAL ORGANIZATIONS GAPS ACTUAL QUESTIONS**

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The pace of constant changes in the complicated and hostile external environment constantly growing, all economic entities have to react permanently to these changes. Due to the opportunity to choose purposes and strategies independently, one can form the environment directly influencing the performance of any economic entity in such a way that it is possible to solve most optimally both problems of situation management, and problems of efficient adaptation to constantly changing factors of the external environment.

The information basis for conduct of gaps strategic audit is strategic audit system. The model of strategic audit is the total of main stages, set in the plan and specified in the program and methodical instrument, used by the auditor to perform the audit engagement. The model includes the following stages: strategic audit of the environment, strategic audit of the company development business strategy; strategic audit of gaps; development of solutions on gaps elimination. The details of these stages are provided in the strategic audit program in correspondence with the instrument used.

The information got as a result of such research will allow to formulate and substantiate the main trends of the forthcoming audit, as well as methodical approaches to detailed research process covering the whole audit cycle.

A strategy is overcoming of the gap between the current position of the company and the position it would like to have. Once the problem of strategic gap is comprehended, the company starts analyzing it, developing strategic programs, intensifying cash management, preparing mergers and takeovers etc.

While doing strategic audit, the auditor often comes across strategic gaps, so knowledge of the gaps theory is quite necessary.

“Strategic gap” is a gap between the desired financial and strategic development and the fixed policy estimation” [5, p. 266]. Strategic gap is quite real and is present in most companies. Being often unobservable, this gap is a clear threat not only to the future success, but just to the survival of the company; it affects management and personnel performance efficiency as well. The auditor tries to reduce the gap between the strategy and real business-processes, which can be decreased if unified comprehension of the strategy at all levels is provided and unified approaches to the personal performance estimation are created when it is realized. An auditor can give rec-

ommendations on business-processes management, if the degree of their correspondence to the strategic objectives is regularly estimated. For this purpose the early stage disharmony indicators and the external environment potential threats should be developed when the strategy is worked out.

All the gaps appear as a result of the fact that the company wasn't able to realize its strategic plans and can be classified according to the following views of Michael Coveney, Brian Hartlen, Dennis Ganster, Dave King:

1. Gaps caused by management. The reasons of such gaps are: inability to provide the plan support, inability to explain the strategy to others, inability to follow the plan, inability to adjust to changes.

2. Gaps caused by business-processes. The reasons of such gaps are: absence of strategic focus, particular reference to calendar terms, financial trend, self-orientation, lack of realistic forecast, etc.

3. Gaps caused by techniques applied. The reasons of such gaps are: separated systems, false dependency on company resources management system (erp-систем).

While developing the strategy auditors should be guided by the ability to make forecasts for the future. It will enable them to help managers and work out recommendations on strategic decision-making: recommendations on development direction, focusing and allocation of company resources, which affect the company as a whole, have long-term consequences and require significant investment. They are hard to reverse and can influence the survival of the company directly.

Here is the classification of strategic gaps according to Eccles Robert J., Hertz Robert H., Keegan A. Mary:

- Information gap. A gap between the indicator value given by analysts and investors and their satisfaction with the information about this indicator given by companies.

- Accounting gap. A gap between the indicator value given by managers and degree of their activity in revealing this indicator.

- Quality gap. A gap between the indicator value given by managers and information reliability of this indicator provided by internal systems. The quality gap clearly points out what should be done by the company.

- Comprehension gap. A gap between the value given to the indicator by managers and by analysts and investors.

- Perception gap. A gap between the estimate of the indicator reporting given by managers and the adequacy of this reporting considered by analysts and investors.

The best way for auditors to start gap elimination with all the ensuing benefits is to accept their ex-

istence. When auditors do not include appropriate information on this or that indicator, a great information gap appears, especially if it is considered to be important by analysts and investors. When quality gap results in accounting gap, companies start improving their internal estimate systems. In spite of the enthusiasm the appearance of balanced cost sheet was met with, there is still a great deal of work to be done to work out the appropriate estimate methodologies of some most relevant value factors.

We think that strategic gaps can be classified according to the degree of influence of internal and external factors of macro- and micro-environment, taking into account risk and uncertainty. To sum up the following kinds of strategic gaps can be singled out:

- external strategic gaps – gaps, caused by external factors of macro-environment. Here belong such gaps as gaps caused by business-processes. The essence of this type of strategic gaps is that business-processes singled out at the enterprise don't correspond to business-processes used at enterprises-analogues due to the change of process technology. External strategic gaps can also be classified into controlled and uncontrolled. External strategic gaps can emerge under risk and uncertainty conditions. External strategic gaps under risk conditions "are defined as such position of the manager, when he knows one or several outcomes in every alternative, as well as realization probability of each one" [6, c. 381]. External strategic gaps under uncertainty conditions are reflected when there are "several alternatives and possible outcomes, but actualization probability of this or that outcome is unknown or doesn't make sense" [6, c. 415].

- internal strategic gaps – gaps, caused by internal factors of micro-environment. Here belong the following gaps singled out by other scientists: information gap, accounting gap, quality gap, comprehension gap, perception gap, as well as gaps that emerge through management fault. All these types of gaps can be defined as controlled ones, as they are controllable by management body. Internal strategic gaps can also emerge under risk and emergency conditions at micro level.

- mixed strategic gaps – gaps formed by mixed factors (internal and external). Here belong gaps, caused by applied technologies. These ones can be defined as partially controlled, as they can be controlled by management body in a segmental way. Mixed strategic gaps can also emerge under risk and uncertainty conditions at macro and micro levels.

To our point of view knowledge of modern theories of strategic gaps classifications will help auditors to reduce the breach between strategy and results for most organizations. And as a result there will be growth of key indicators and efficiency. Those organizations that managed to build strong connections between their strategies plans and results will have a

synergetic effect. In course of time as they turn their strategies into results, heads of these organizations will become more confident in their abilities.

As a result there appears necessity to exceed the planned results constantly. Investors begin to trust management when the matter concerns risky operations. As a result shares value grows. The reputation of the organization among potential employees rises, a virtual cycle, when talents provide results, results provide worthy compensation which in its turn attracts other talents, is created. Indication and design of gap reduction measures by the auditor is not only the source of immediate results improvement, but also the catalyst of changes that have a serious long-term effect on organization's abilities, strategy and competitiveness.

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OBSTACLES FOR PROMOTING INNOVATIONS IN RUSSIAN MANUFACTURING INDUSTRY AND THE ROLE OF PUBLIC-PRIVATE PARTNERSHIP UNDER CURRENT FINANCIAL MARKETS CONDITION

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Specific weight of innovative products in the total amount of shipped goods in Russian manufacturing industry is equal to 5% over the past 20 years, it

has reached the lowest point in 1996, 1998 and 1999 years [1]. The fall in 1998 and preservation of this level in 1999 was caused by the financial crises that was the deepest in the history of Russia. The number of research institutes has decreased by 20% for the past 15 years; the number of design and survey organizations has declined from 495 in 1992 to 58 in 2006. Russia has inherited the strong innovation system, the science of our country made inestimable contribution towards the progress of society, but the strength of Russian innovation system has not been reinforced or kept the same level, it has even aggravated its positions. The command economy converted into the transition economy in one moment, at the same time there was a replacement of the centralized control system into the system of free market forces. The Russian scientific system has lost its position of budgetary assignments recipient, time of drastic recession has begun. The tendency of sharp fall in the State expenditure on R&D was typical for all countries with transition economy, f.i. in Hungary state expenditures on R&D has decreased from 1 % of GDP in 1990 to 0, 5 % of GDP in 1994-1996. There are several the most critical factors impeding the fostering high –tech innovations in Russian manufacturing industry revealed by Russian scientist [2]. According to the results of the research [2] these factors can be listed as follows: №1 high economic risk, № 2 high cost of innovations, №3 lack of internal sources of finance and authorities support, № 4 immunity of the organizations to innovations, № 5 lack of highly skilled staff, № 6 lack of the information on new technologies, № 7 lack marketing research, № 8 discrepancy in law and regulations, № 9 innovative products are not popular among customers and are in low demand.

We analyzed available statistics [2] and revealed that the most crucial factors for delaying innovations in manufacturing industry are № 2 and № 3, other factors are not far in terms of their significance, the least important factor is № 4. In Western Europe countries the picture slightly differs: in Austria, Belgium, Germany, Greece, Iceland, Spain and Italy one of the major factors interfering to innovations is the lack of highly –skilled staff, this factor holds the second – the third place in a rating of factors, unlike in Russia where this indicator is at the sixth place out of nine in a rating. It typically that for all listed countries the least considerable factor is the factor № 4, probably, it is due to the fact that owners of manufacturing companies are often private entrepreneurs. Traditionally the representatives of public sector are the least susceptible to innovations. In contemporary Russia the significant part of R&D activity occurs in a private sector, as well as fifteen years ago. Government's share in R&D expenses has remained at the same level since 1996 and is equal to 25%, the share of private sector is accordingly 66%. Basically the enterprises of private sector are involved in the manufacturing process of goods and services for making profit, such en-

terprises also include the unitary entities. Despite the fact that two thirds of researches is conducted in a private sector and only a quarter – in the public sector, 70 % of full professors and 50 % of philosophy doctors are occupied in public sector. Relative density of researchers with a scientific degree has been rising every year and is approximately 25 % in 2006. The level of innovations utilization in Russia is quite modest, considering the accumulated human capital resources, namely people inclined to scientific and research activity. The Russian innovation system comprises of blocks and segments of promising R&D activities, but this system does not function in a productive manner due to inadequate stimulus and adverse external conditions [3]. The structural misbalance lies in the fact that the essential number of R&D is financed by budgetary tools, so since 1995 till 2006 according to Goskomstat the share of budgetary funds made up to 60 % in R&D finance while the share of private sector was nearly 17-19 %. Low level of interaction between science and business interferes the achievement of the possible outcome from the human capital utilization. There is no mechanism on a technological transfer of knowledge to business, interaction between public and private sector in a science has unsystematic character. There is a serious problem of uncertainty related to the property rights to assets, such uncertainty complicates interaction with private entities and impedes a technological transfer, leads to arising conflicts of interests between institutes and can push the conflict between the targets of researchers and aims of organizations. There is a problem of institutional frameworks as well. Three basic mechanisms of effective and fast distribution of resources do not work properly in Russia: (1) the corporate governance policy of investing future income, (2) a financial system, capable to operate with risks of the investments connected with innovations, (3) and an active state policy of royalty distribution from oil and gas export for knowledge economy financing [3]. Last years there were serious disputes on carrying out of a uniform policy and introduction of government programs on promoting innovations in industry. The state is one of the most effective actor forming living conditions and practical application of a science in manufacturing process and in other spheres of economy [4]. Government may and should play a key role in realization of transition from raw material economy to the knowledge-based economy, especially it's important at the time of the significant turbulence in financial markets. First PPP (public-private partnerships) projects have been initiated in Russia at the beginning of XXI century, first Russian Venture fund was founded in 2003. Financial crises of 2008 became a catalyst for emerging new forms of PPP in innovations such as cluster researches, this tool assist to SME in competing with multinational companies. PPP is not an instrument of providing interest free finance or even subsidies to business, it's a tool which can form a base for devel-

opment high-tech SME and large organizations with a mission for orientation R&D to finding solutions of overcoming financial crises consequences.

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*Materials of Conferences***SOCIO-ECOLOGICAL VALUES IN CONTENT OF PROFESSIONAL EDUCATION**

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The content of professional education remains to be an important issue nowadays. Moreover, contradictory life aspects in Russia call for appropriate steps of the controlling organizations and the educational system. The socio-ecological contradictions between the society and nature require special attention and an adequate professional training, due to their growingly acute status, and are in the center of our attention.

In other words, harmonization of the current and future relations between people and nature, is only possible if every citizen accepts the socio-ecological values, which should be included in the number of professional skills. It should be mentioned, that the value problem has always raised a question of their source. It is established, that human needs are a primary reason for the development of potential environmental values (S.L. Rubenstein, A.N. Leontiev, V.N. Myasishev et al). The complex nature of human needs requires a similar variety of environmental values to satisfy them (N.F. Reimers). The values include natural, psychological, ethnic, labor, social and economical ones, and, to our opinion, should also contain educational and environmental aspects.

Each value group has its specific determinants and forms. For example, the natural (biological) values stand for the environment's ability to satisfy human needs of physical existence; warmth, radiation and magnetic wave supplies and their preservation; healthy and clean air, water and soil; balanced food and relaxation; protection against overpopulation and etc. Specific natural values that can satisfy the above mentioned needs are the biological resources: a full range of the biosphere components, directly consumed natural resources, as well as food, recreation, energy, territory and etc.

Another environmental value – psychological – satisfies human needs of feelings and realization of ethologo-behavioral potential. This value is represented by the so called «ethological landscape» (combination of environment with the second and third nature, which help create a favorable «behavioral climate»). Moreover, the psychological value reflects the beauty and perfection of the surrounding reality and determines the esthetic value. This property let satisfy and develop human senses, in particular, the esthetic senses that appear during the perception of the real objects in nature, their forms, sizes and colors. Esthetic perception of the surrounding fulfills cognitive, social and communicational functions of the environment through nonverbal information. This influences human's behavior, his self concept and interpretation of

his surroundings. Psychological and esthetic values of the environment are presented by the biological resources, Earth spheres (lithosphere, hydrosphere, atmosphere, biosphere), recreational, touristic, historical, cultural and natural significant sites, and other objects.

Ethnic value of the environment can satisfy human needs to reproduce ethnic (national) individuality. Life of an ethnos and its development depend on how effective it satisfies its need to reproduce, for example, homeland landscape, national history and ethnic heritage; the ethnic second and third nature enshrined in the folk-memory; necessary cultural environment kept in the ethnic consciousness; social living conditions to save national face (N.F. Reimers). These needs could be satisfied by some specific resources: environmental, anthropo-ecological, genetic, informational, material, immaterial and labor.

Defining social values of the environment, scientists pay attention to their indirect nature and to the fact, that they are an important condition for satisfying social (socio-economical) needs. The latter include, for example, providing civil freedoms and guarantees; communication; freedom of cognition and self-actualization; need to be needed by the society and self; availability of education to different social groups; understanding own sex and age and following the related social rules; creation of a family as a social unit and etc. The most important indirect social values of the environment are the natural conditions and resources of a society; different elements of social field (law, economy, psychology and etc); cultural heritage. Closely related to social are the labor values of the environment, which satisfy human needs of work and orientation in the surrounding environment, temporal changing of this surroundings, organization of job as a process between the nature and society. The labor need can be satisfied by means of resource, territorial, anthropo-ecological, ethnic, informational and other potentials of the environment, used for the purposes of human activities.

Economical value of the environment is a basis for development and successful functioning of the society. It meets social needs of satisfying other society's necessities. That is why, many scientists see economical needs as the most important, as they determine the whole life of the society. Another point of view shares N.F. Reimers, who thinks, that economical needs have an auxiliary character, and appear only then, when a person tries to satisfy his other needs. Obviously, this position opens the way for managing the growing number of different needs. So, social goals should not be determined by economical needs, but rather by the other. Not the economy should be the final goal, but people, their wellbeing and health. And economy is only a mean to achieve it. Economical value of the human environment is revealed in the

availability of and one's access to food, housing, clothes, household articles, tools, recreation, information, self-expression, family as an economic pattern; as well as industry and household waste recycling in order to preserve and restore the environment.

The educational value of the environment, to our opinion, plays a special role in this process. Some of its elements are to be found in the other types of values. And the history of education shows, that scientists have always been interested in this problem. The fact, that nature influences the personality development, was discovered as far back as in ancient times. It should be cleared up, that nature at that time and context was regarded as the biological disposition of a child that via upbringing could be transformed into personality traits. Later in the middle age, despite the fact, that the antique cultural heritage was neglected and religion ruled all life spheres, study materials in educational institutions contained some ideas about the environment. They were aimed though at human feelings and spirit, rather than explained the world. Modern history proves, that it is necessary to continue

to study the educational potential of the environment, and use it for the training of the growing generations.

To sum up, the socio-ecological values have an integral character; they unite biological, psychological, ethnic, labor, social and economical and, to our opinion, educational components; each of them has its specific form. This potential should find its place in the socio-ecological education, in order to value the environment, form reasonable needs and satisfy them following social standards.

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Materials of Conferences

**A CITY OF STAVROPOL'S
BIOGEOCHEMICAL INDICATION OF THE
ECOLOGICAL STATE**

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The urban regions and its areas are being experienced the various influence level of the anthropogenic flows of matter, depending on their functional and proper purposes, and per consequent, they have the different scales of the environmental pollution, in comparison with the natural pollution and the background contamination. The biogeochemical indication is one of the most reliable methods of the cities' and towns' ecological state evaluation. The plants (as the accumulating and depositing objects) by their chemical composition are sufficient precisely being indicated the prolonged pollution and contamination, and they are being permitted to consider the main tendencies of the cities' and towns' ecological changes.

The plants' geochemical sampling (e.g. more, than 50 tests) for the purpose of the levels setting of the heavy metals (HM) content in the vegetable cover has been conducted on the territory of the functional zones in the city of Stavropol. The vegetable cultures' selection has been carried out at the private plots of a land, attached to the houses. The representatives of the various life forms and biological spectra have been studied among the plants. So, the plants' tests have been analyzed by the atomic – absorptive method. The similar plants' species on the territory of the "Tatarskoe Gorodishche" (e.g. the Tatar site of the ancient

settlement and a very large city with its ruins) culture preserve have been taken, as the background urban standards.

The studied vegetable patterns (e.g. foliage, branches of the wood and shrub species (or in one word decidulignosa), and the hay crops of the lawn's cereals) have shown the level rise of the HM concentration in them. Zinc and lead have the highest levels of the contents, in comparison with the background. The final results analysis of the plants' chemical composition is being carried out by us by the functional zones, taking into consideration the environmental conditions homogeneity and the anthropogenic loadings uniformity.

The industrial zone plants are usually characterized by the biggest levels of the HM concentration (see Table No.1). Zinc is being achieved its the maximum concentrations (e.g. 86,7 mg/kg), the following values are being registered for the other metals: lead – 33,2 mg/kg, cadmium – 0,8 mg/kg, copper – 83,8 mg/kg. The given values are being exceeded more, than in 2 – 10 times the background levels, which are typical for all these plants, having grown at the considerable distance from the industrial waste sources.

In the residential zone, it has been registered the zinc and lead content rise in the lawn's cereals and the wood species (see Table No.2). Copper has the reduced values in the herbage along the streets of the city's central part. It is characteristic, that copper is being accumulated by the plantain (e.g. 12,1 mg/kg). The cadmium concentration in the plants of the residential zone is being varied in the range of 0,19 – 0,3 mg/kg.

Table 1. The Microelements Content in the Herbaceous Plants of the Various Functional Zones in the City's of Stavropol, mg/kg oven – dry matters

Plants Species	Functional zone	cadmium	copper	zinc	lead
couch – grass	background	0,17	4,0	14,6	1,1
	woodland park	0,16	4,3	27,9	1,2
	residential	0,19	3,0	19,4	1,5
	historical centre	0,19	3,3	23,1	2,9
	industrial	0,29	4,5	22,1	3,1
plantain	residential	0,3	12,1	23,8	3,8
	industrial	0,9	10,5	22,3	3,6
milfoil	residential	0,3	6,4	22,3	2,9
	industrial	0,4	5,8	24,2	4,5
moss	background	0,4	8,2	23,1	1,8
	woodland park	1,5	8,5	46,6	12,6
	residential	0,3	7,3	34,3	30,7
	historical centre	0,4	8,3	40,6	15,3
	industrial	0,8	83,8	86,7	33,2

Table 2. The Background and Maximum Heavy Metals Content in the Lignosa and Shrub Vegetation in the City's of Stavropol, mg/kg oven – dry matters

element	background	oak	maple	pear	hawthorn	elder
cadmium	0,2	0,18	0,25	0,16	0,37	0,35
copper	3,9	6,0	8,8	4,6	6,1	5,8
zinc	20,4	76,4	23,1	10,6	19,0	30,7
lead	2,3	3,1	3,1	2,4	1,4	1,2

The city of Stavropol historical centre by the contamination level by cadmium (e.g. 0,4 mg/kg), copper (e.g. 8,2 mg/kg), and zinc (e.g. 40,6 mg/kg) is quite comparable with these metals content in the residential zone. However, the large transport loading of the city's central part is resulting in the considerable accumulation of lead in the lawn's cereals (e.g. in 2 times higher, than the background), and in the mosses (e.g. in 7 times higher, than the background). Not high accumulation level of lead, copper, cadmium is quite typical for the plants of the woodland park (see Table No.1), and the zinc concentrations, – in average, 30 mg/kg, – are being observed rather high, in comparison with the background in the parks and public gardens plants.

The HM content is strongly being varied, depending from the plant's species. The heavy metals (HM) increased levels are usually observed at the mosses and plantain that is said on the definite species biochemical specialization of the plants. The HM accumulation is quite typical for the maple and oak from the arboreal species. The microelements content levels in the plants, to a large extent on, are being assigned of their belonging to the various functional zones. The highest metals content has been determined along the large superhighways, and traffic interchanges of the industrial zones.

By data of N.C. Kasimov (1995), there is the enough steady connection between the elements – pollutants accumulation and the functional zones. For all this, the anthropogenic pollutants' delivery is playing the largest role in the vegetable cultures contamination. The city of Stavropol data fully confirm this conformity to the natural laws. The highest values of the HM concentrations in the vegetables are being observed in the residential region of the Tashly river's valley. Here, the growing vegetables have their MPC maximum established exceedings (by cadmium – in 4 times, by zinc – in 1,5 times, by lead – in 5 times). The trans – eluvial, super – aqueous, and aqueous landscapes, having the subordinated and accumulating values, have been developed on this territory. For all this, the anthropogenic pollutants' delivery is being carried out by the prevailing western winds from the western industrial zone (Prokuronov et al., 1992).

The prolonged influence of the numerous household pollution sources in the old (central) residential city's part has been resulted in to the considerable zinc content in the vegetables. The average mi-

croelements content in the vegetable cultures of the suburban plots, having situated directly within the precincts of the city, are not being exceeded MPC. On the background garden and vegetable plots, having situated in 50 km off the city (e.g. the Izobilnensky region), the growing vegetables are being contained in 2 times less cadmium, and lead, in 3 times less copper, and zinc, in comparison with the most contaminated vegetable crops in the city of Stavropol.

In the total of the received results, it is quite possible to make the following conclusions:

1. The city of Stavropol is being experienced rather considerable anthropogenic impact, that has been resulted to the total pollution level rise of the urban environment by the various enterprises' wastes, and the motor transport's emissions etc.

2. The industrial zones' vegetable cover, the city's historical centre are the most contaminated by the heavy metals (HM).

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PUPILS' KEY SKILLS FOR SURVIVAL IN A MEGA POLIS

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In successful solving of often unpredictable, current and future environmental problems of a megapolis, human key competencies play a decisive role. Development of these skills stays on national curriculum in many European countries. In Russia, a new federal educational standard is being prepared, which would also target an active approach. Its basics were developed by Russian teachers and psychologists: L. Vygotsky, S. Rubinstein, V. Davydov et al. However,

there are still a lot of unsolved questions in its theoretical part. That is why educational experiments are of a great importance in proving the methods to raise pupils' key skills. The problem that we are working on is, why the key skills (general academic performance, according to Russian standards) developed at school, are hardly applicable in real life situations? In 2002 we offered a hypothesis, that child's experience of applying his key skills in arrangement of a personal educational environment with desired parameters, can help solve the problem. This process is both cognitive and practical for a child, causing real changes in his immediate surroundings. A solution to this problem let a child regulate his space-temporal learning conditions, communicate with other students, and choose the best individual learning methods. Such experience help develop an effective individual study style, and is an educational practice of using key skills in school-life situations. To prove our hypothesis, we developed an educational program «Ecology of study process», which was tested in the six Russian regions. The program is a *pilot project* aimed at framing ecological content of school programs, and is based on the *general academic performance system, mentioned in the draft federal standards for general education*.

It was shown, that practical use of key skills for developing an educational microenvironment, increases child's mental task performance, study motivation and psychological health. It also motivates to actively control the environmental conditions outside school walls. We have applied for a patent.

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POLLUTION OF ATMOSPHERIC AIR AND THE FORM OF RESPONSE OF THE HUMAN ORGANISM IN THE LARGE CITY

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The health care maintenance for everybody in the XXI century – is the WHO's main task and the Russian Federation's priority direction. In this respect, «The Health» national project is successfully being realized, the different forms of the medical service, the early detection, and the patients' rehabilitation are being improved. The formation reasons exposure of the different pathology and the human organism's response forms is the most significant task of the medicine.

The atmospheric air designated pollutants, on action of which the mucous membrane of the upper section of the respiratory tracts is sensitively reacted to, take a considerable place in the health rates forma-

tion by data of the numerous scientists – hygienists' researches [2, 3].

More than 100 designated pollutants, having the different limiting harmful indices (e.g. the reflex, resorptive, reflex-resorptive action, and, even, the sanitary and hygienic nature), are being discovered in the atmospheric air of the city of Kazan.

The total designated pollutants emission into the city's atmosphere makes up 114,766 tonnes per a year, and only 28,739 tonnes of the non-detected particles are being ejected into the atmosphere, and 86,027 tonnes of the pollution are being detected, owing to the nature conservation arrangements realization. All this is being distributed in the air within the city's territory limits, and by 26 grams of the designated pollutants are fallen for the every citizen. Such pollution amount in a year is quite insignificantly low, but not for the citizens of Kazan.

The low wind velocities and the calm are made up almost 45% days in a year on the territory of Kazan that creates the definite difficulties of the designated pollutants dispersal and formulates their accumulations conditions in the bottom layer of the air. The given negative factor is being intensified in many times, at the expense of the considerable number increase of the transport units and, in addition to many gas-and-dust detecting installations aren't working in full power, and they often go out of service, that results in the considerable pollution increase in the air basin.

The maximum number of the trials with the exceeding hygienic regulations is found out by the content of 4,9% carbon oxide, 1,4% nitrogen dioxide, 2,6% sulphur dioxide in the average annual calculation for 2007 year, by our researches data and the degree analysis of the city's atmospheric air pollution with due regard for the supervisory bodies results.

The comparative analysis of the actual designated pollutants concentrations with the maximum once-only limiting concentration in the air along the transport thoroughfares in the rush hours of the transport traffic is fluctuated: carbon oxide from 5,6 up to 14,3 mg/m³, nitrogen dioxide from 0,05 up to 0,21 mg/m³, sulphur dioxide from 0,15 up to 0,6 mg/m³, the suspended materials from 0,19 up to 0,58 mg/m³. The designated pollutants concentration in the atmosphere is depended on the transport units' number, the year season, twenty-four hours period and many other factors. Besides the above-mentioned substances, hydrogen sulfide, phenol, benzene, toluene, ammonia, formaldehyde, hydrocarbons, nitrogen oxides, and a great number of transformation products, including the same formaldehyde, acetaldehydes, aldehydes, ketones and the others are defined in the air.

The human organism response on the factors complex influence, having conditioned by the atmospheric air pollution, is begun from the upper sections of the respiratory tracts, that it is revealed in the frequency increase of the respiratory organs diseases,

which are the most expressed among the population, where the high degree of the air pollution is observed. The lowered city's areas are the most polluted territories, where the considerable rates of the designated pollutants are concentrated. By the results of the statistical parameters generalization, the primary sick rate frequency by the respiratory organs diseases of Kazan for 22,2% is more, than, in average, by the Republic of Tatarstan, and this magnitude is, approximately, constant for the last 10 years of the observation. For all this, the districts with the high degree of the atmospheric air pollution (e.g. the Moskovsky, Novo-Savinovsky, Sovetsky, Kirovsky ones) are distinguished by, where there are the large transport thoroughfares and the lowered landforms areas. The difference by the sick rate frequency is considerably expressed among the children (e.g. 34,3%). In comparison the respiratory organs diseases spreading of the whole city's population with the republican ones, the exceeding portion is made up 36,3%, but it is 33,8% among the children population. The sick rate frequency of the children is more, for certain, on the territory of the Moskovsky district (e.g. 460,8 cases) against 358,7 cases for 1,000 children [1].

We have taken the character and structure study of the frequency changes of the sick rate with the temporary loss of the ability of work (SRTLAW) from the otorhinolaryngologic pathology (ORLP) among the economically active population (EAP) in the Republic of Tatarstan (RT). The official data have been appeared as the researches object on ORLP in RT for 1996-2006-es by the 16 – TI form «The Data on the Temporary Invalidity Reasons».

ORLP has been presented by three groups in the SRTLAW structure: the ear diseases (ED), the acute respiratory infections (ARI), and the acute pharyngitis and tonsillitis (APT).

The temporary series analysis with the changes intensity estimate in the dynamics by means of the corresponding parameters has been used as the epidemiological research methods. The tendency of many years calculation by means of the leveling by the method of the least squares has permitted to eliminate from the periodical and random vibrations, however, the peak values (e.g. the maximum and minimum ones) of the SRTLAW frequency have been studied separately for the whole period, and the changes have been estimated in the separate sexual and age-related groups.

By the final results for 2006, ORLP is made up almost a quarter (24,3%) of all the registered SRTLAW cases in RT. For the part of the first group – ED is found only 1,3% SRTLAW, but the rise frequency of the given diseases among EAP is fixed at the level of $0,70 \pm 0,12$ cases (here and further – the arithmetical mean value \pm the error of mean) for 100 working people. For the part of the second group of ORLP – ARI is practically fallen up to 20% in the SRTLAW structure, but in calculation for 100 work-

ing people, in average, is made up $9,23 \pm 0,90$ cases. It has been mentioned the total SRTLAW frequency decrease on ARI for the registered period, in spite of the dynamics undulation, when the rise periods (e.g. 1997, 1999-2000-es, 2002) have been changed by the decrease periods (e.g. 1998, 2001, 2003-2006-es). At the leveled dynamical series, the descent velocity of the intensive indicator for 11 years was quite small – in average, 0,8% per a year. The most descent is found for 1998 (e.g. – 12,1%), but the increase – for 2002 (e.g. + 8,6%) at the year-on-year rate of changes of the ED indicator. The last, the third group, the diseases – APT is made up to 3% SRTLAW, but by the frequency level – $1,40 \pm 0,17$ cases for 100 working people.

Thus, the frequency and the spreading of the respiratory organs diseases, especially of the upper sections, are found in the direct dependence from the designated pollutants concentration in the atmospheric air of the urban and rural populations. The highest levels of the designated pollutants are observed on the highways and the lowering sections of the territory, where the high frequency and the diseases spreading are observed. The upper respiratory tracts pathology is mentioned by the significant group of the EAP diseases, as it is made up 23% of all the registered SRTLAW cases.

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AgNORs IN THE KUZBASS INHABITANTS (THE WESTERN SIBERIA)

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The nucleolar organizer regions (NORs) – these are the chromosomes' sites, having contained the ribosomal genes. The NORs are able to be visual-

ized, having used the staining by the silver nitrate. The silver ions are capable to be connected with the non-histone proteins, having presented in the NORs. The AgNORs – proteins are being detected, as the clearly outlined black zones, which are localized inside the nuclei in the light microscope [1]. The interest to the AgNORs – proteins investigation has been increased, having begun since the 80 – es of the XX century, when the facts of the sharply increase of their sizes have become known in the cancer cells in comparison with the normal ones [2]. The blood donors with the Alzheimer's disease [3], the Down's syndrome [4], and the patients with the human immunodeficiency virus [5] have been further investigated. It has been determined, that the AgNOR size is the rate marker of the cellular cycle [6], and it is reflected the degree of activity of the ribosomal genes. The AgNORs changes under the exposure of the unfavorable chemical factors and the radiation are actively being investigated [7, 8]. The significant role of the NORs, as the adaptive element has been shown, and it also has been determined, that the biggest degree of development of the nucleolar organizer system of species has been connected with the extreme conditions of its existence [9].

In this connection, the AgNORs study in the blood lymphocytes of the indigenous and newly come population of the Western Siberian industrial region has been become the aim of our investigation.

Materials & Methods

290 inhabitants of the Kemerovo region, having lived in the Tashtagolsky (121 people), the Belovsky (79 people) regions, and in the city of Kemerovo (90 people) have been examined. The Tashtagolsky region – this is a place, where the representatives of the indigenous and smaller Siberian people – shorczes are compactly living. The inhabitants of the Bekovo village – are the representatives of the other smaller people – teleuts have been examined in the Belovsky region. The Siberian newly come population is predominated among the city's inhabitants of Kemerovo, in connection with this, the Caucasoids have been examined. The blood lymphocytes cultivation, the handling of the specimens, their staining, and the AgNORs sizes analysis have been conducted, in accordance with the earlier – described methods by us [10]. And, at last, the AgNOR area/Total Nuclear area (NORa/ TNa) in 50 cells from each blood donor have been estimated.

Results & Discussion

The NORa/TNa average size in the lymphocytes, having stimulated PHA has been made up $17,61 \pm 0,34\%$ at the inhabitants of the Tashtagolsky region, $13,33 \pm 0,27\%$ – at the inhabitants of the Belovsky region, but at the city's population of Kemerovo – $11,83 \pm 0,18\%$. It is quite known, that the studied value is depended, in the first place, on the stimulation level one or another type of the cells in the cellular culture. The nucleus diameter of the stimulated cells, in accor-

dance with the literary data, is being varied from 7 up to 30 microns [11]. In our investigation, the cells' nucleus diameter has been made up, in average, at the inhabitants of the Tashtagolsky region – 14 microns, at the city's inhabitants of Kemerovo – 12,8 microns, at the inhabitants of the Belovsky region – 13,1 microns. All these differences are, statistically, reliable (e.g. $p < 0,01$). Then, the NORa/TNa comparison in the cells with same nucleus diameter has been conducted. In the big cells, with the nucleus diameter 14 and more microns, the NORa/TNa has been made up 16,56% in the group of shorczes, and 10,57% – in the group of Caucasians. In the small cells, with the nucleus diameter less, than 10 microns, the NORa/TNa has been made up 19,2% at shorczes, and 11,78% – at Caucasoids. Thus, the differences in NORa/TNa could be observed, even in the comparison with the cells, having the similar size.

This parameter may be changed also by the other factors, such as the measured cells number, cases number and ages of the studied individuals. As you know, this parameter (NORa/TNa) is related directly to the metabolic state (e.g. mostly, anabolism) of the cells, and, not or less, it is related with the ethnicity; per consequent, it is largely used in the *in vivo* evaluation of the cancerous cells [12].

So, it is quite impossible to exclude also, that the discovered difference in the NOR expression at the inhabitants of the Kuzbass different regions is connected with the adaptation peculiarities to the unfavorable conditions of the inhabitation, as, it is quite known, that the shorczes' residence territory (e.g. the Tashtagolsky region) is characterized by the unfavorable radio – ecological situation (e.g. the high level content of radon in the living accommodation).

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THE WOMEN’S INHIBIN – A LEVEL WORKING AT THE ASTRAKHAN AS CONDENSATE COMPLEX

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The environmental factors are capable to exert various and often unfavorable influence upon the human organism’s health state [Isaev, 1997, Evdokimov V.V., 1998, Kurilo L.F., 2003]. And this is clearly being observed also in the Astrakhan region [Ushakov M.V. 2002]. In the Lower Volga, the «Astrakhan-GasProm» LTD is one of the main sources of the anthropogenic impact upon the human organism, having included in itself the enterprises’ complex, which are making the reservoir engineering of the Astrakhan gas condensate deposit and the produced gas condensate processing.

The natural gas of the Astrakhan gas condensate deposit (AGCD), its different components, and

their derivatives occupy ones of the central positions in the aggressive ecological factors complex and exert reliable influence upon the peculiarities of the morbidity structure in the Astrakhan region [Nikolayev A. A., 1999].

Therefore, the systematic influence study of the natural gas upon the various organs and the human organism’s functional systems, and also the experimental animals is being carried out. At the same time, the natural gas impact upon the reproductive function has not sufficiently been studied.

It is quite known, that the premature ovaries’ insufficiency (POI) is one of the least studied and the predictable ones in an aspect of the diagnostics and the medical treatment among the infertility reasons. So, the POI’s nature is not quite clear in the majority of the cases [Marchenko L.A., Alexandrova N.V., 2006]. The supply depletion of the primordial follicles up to its complete exhaustion and the atfollicular type of the POI’s formation, which is not peculiar to this age – related period, is the POI’s basis, independently from the aetiological factor. At present, it has been determined, that the methods, having based on the peptide level definition, and having generated in the ovary (e.g. the inhibin – A), possess the high level definition of the ovarian reserve. It is supposed, that the difference in the expression of the inhibin’s isoforms is depended from the follicle’s size.

The aim of our work has been the investigation of the women’s inhibin – A level, having worked at the AGCD, as the ovarian reserve indicator, depending on the length of working service at the given enterprise.

The ovarian reserve state has been estimated at 168 women from at the age of 22 up to 40 years (e.g. the average age has been $34,8 \pm 3,25$ years). 22 healthy women have made the control group of the analogous age – related structure with the preserved menstruations period, at whom the blood samples have been taken on the third day of the menstrual cycle. The ovarian reserve estimation (e.g. the inhibin – A level definition) has been carried out by means of the two – centered immune – enzyme test – system of the DSL firm (the USA).

The statistical data processing has been made at the PC IBM computer by means of the Microsoft Excel electronic worksheets and the application package of the Statistica for Windows v. 7.0, StatSoft Inc. (the USA). The connection between the studied indications has been estimated by the results of the correlation analysis with the calculation of the Pearson correlation coefficient (r) or the Spearman correlation coefficient (R) with the following definition of its significance by the t criterion.

The average inhibin – A level in the blood serum on the 3-rd – 5-th day of the menstrual cycle has been made up $15,2 \pm 2,4$ pg/ml ($10,8 – 19,2$ pg/ml) in the control group of the healthy fertile women.

The women, having worked at the AGCD, have been divided into 4 groups, depending on the length of working service at this enterprise. The women, having had the length of working service less, than 1 year (e.g. 45 persons) have been entered into the first group. The average inhibin – A level in the blood serum on the 3-rd – 5-th day of the menstrual cycle has been made up $17,6 \pm 6,1$ pg/ml (e.g. 8,8 – 22,2 pg/ml) in this group. The women with the length of working service at the AGCD from 1 year up to 2,5 years (e.g. 43 persons) have been entered into the second group. The average inhibin – A level in the blood serum on the 3-rd – 5-th day of the menstrual cycle has been made up $13,5 \pm 4,3$ pg/ml (e.g. 8,4 – 18,2 pg/ml) in this group. The women with the length of working service at the AGCD from 2,5 years up to 5 years (e.g. 49 persons) have been entered into the third group. The average inhibin – A level in the blood serum on the 3-rd – 5-th day of the menstrual cycle has been made up $9,8 \pm 6,1$ pg/ml (6,8 – 17,5 pg/ml) in this group. And, at last, the women with the length of working service at the AGCD more, than 5 years (e.g. 28 persons) have been entered into the fourth group. The average inhibin – A level in the blood serum on the 3-rd – 5-th day of the menstrual cycle has been made up $7,3 \pm 3,9$ pg/ml (5,3 – 15,5 pg/ml) in this group.

The statistical analysis has shown, that the reliable change of the serum inhibin – A level is not being registered at the women with the length of working service at the AGCD up to 2,5 years. The reliable ($p \leq 0,05$) decrease of the inhibin – A level in the blood serum is being registered at the more prolonged length of working service at the gas processing enterprise and the productions, which have been connected with it.

Thus, the received data testify, that the oxidation stress (Trizno N.N., 1996, Rezaev A.A., 2002) exerts the negative influence upon the women's endocrine system, and it causes the factors imbalance, having regulated the ovulation processes, and, having caused by the natural gas of the Astrakhan gas condensate deposit (AGCD), but more exactly, by the hydrogen sulfide, having contained in it. The sufficiently prolonged lag period presence between the contact beginning with the gas and the registered violations is permitted to hope, that the organized prophylactic arrangements in a right way will help to avoid the fertility violations.

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INFLUENCE OF DRINKING WATER QUALITY ON BLOOD PARAMETERS

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One of the global problems in the 21st century is to provide population with good-quality drinking water. The problem is especially acute in big cities.

The aim of our research was to study, how the quality of drinking water influences the hematological blood properties.

As a biological test object in our experiment, we used white outbred mature female rats (body weight 180-200 g). The experiment lasted 1 month. The animals were divided in two groups. The first (control) group included 15 female rats, which received bottled still water «Aqua Minerale» that has a balanced macro- and microelement content, according to the Russian sanitary standards. The second (experimental) group also contained 15 female rats, which drank the tap water provided by the city water facilities of Saransk in the Republic of Mordovia. The analysis of tap water's mineral content revealed, that a number of parameters exceed the maximal permissible concentration (MPC), for example: water hardness (8,22 mg/l; MPC – 7 mg/l), fluorine (1,85 mg/l; MPC – 1,5 mg/l), iron (0,34 mg/l; MPC – 0,3 mg/l), magnesium (72,9 mg/l; MPC – 40 mg/l), sodium and potassium (201,45 mg/l; MPC – 200 mg/l).

As a result, it was stated, that the animals from the experimental group showed no significant difference in appearance compared with the control group. However, we have observed a slightly higher agility of the animals that consumed the water with a higher level of macro- and microelements. Hematological blood analysis showed, that the erythrocyte content of blood in the experimental group was 11,7% higher than in control, leucocytes - 54,2% higher, hemoglobin - 4,2 % higher, erythrocyte sedimentation rate - 70 % higher, total protein - 19,4% higher, urea - 4,3% higher, creatinine - 113% higher ($p \leq 0,05$).

To sum up, the study results prove, that higher content of macro- and microelements in drinking water influences the hematological properties of blood and general health condition.

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