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Research Article

Contemporary Condition of Innovative Activity in the field of Health Care of the Kazakhstan

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Abstract

Aims: to study the factors constraining the introduction of new medical technologies in the health care system of Kazakhstan, and to find ways of improving innovation activity in Kazakhstan.
Methods and Material: Prospective review of online poll of health workers about development of innovations in sector of health care of the Republic of Kazakhstan is submitted. We made questionnaire for medical experts. Results of poll were analyzed with use of the statistical SPSS 16 program. In the analysis we used descriptive statistics, the factor analysis, correlation and the multidimensional dispersive analysis.
Results: It was found that in the majority of cases (62.4%), innovations were borrowed (imported from abroad), and they have mostly (63.3%) been introduced into clinical medicine by health care practitioners (66.9%), while the lowest percentage of innovative activity in the country (22.8%) among the experts having scientific and academic degrees.
Conclusions: The factor analysis or principal components analysis suggests that the main reasons for the low innovation activity in the Republic of Kazakhstan is a lack of awareness of experts about the latest achievements of science, lack of trained personnel and insufficient target financing of innovation in health care. As development of innovations depends on activity of that professional category of the scientific researchers participating in creation of new drugs, methods of treatment and diagnostics of patients it is necessary to attract actively this professional category to innovative activity in health care.
Keywords:implementation, development, innovation, technology, medical organization.

1.Introduction

One of the major conditions for dynamic population growth and health improvement is the development of medical science and innovation implementation in health care organizations[1-3]. Under these conditions innovative focus of the national health care system at all levels and new approaches to encourage innovation in medical organizations, taking into account the characteristics of their activities and needs of the population, become the urgent tasks[4-9].

Increasing innovation activity requires special attention to both improve regulations that accelerate introduction of technology, and deepen ties between the developers and users of technology, as well as establish and support auxiliary systems and infrastructure to transfer and diffuse technology[10-19]. It is important to remember that demand for innovations depend on population income level and the rate of development of the innovation economy. At the same time, namely in health care as one of the most socially important spheres of human activity, innovation gives a fairly significant effect. Amid the global economic crisis, innovative approaches in the work of health care organizations become particularly important [20-30].

Improving mechanisms for the transfer of innovative technologies in the field of health care in the Republic of Kazakhstan (the RK) should be based on improving the efficiency of procedures of search, selection and evaluation of medical technologies, and reducing the timing of the introduction of new medical technologies in health care organizations.

In order to clarify reasons restricting the introduction of new medical technologies in the health care system of Kazakhstan, we have developed a questionnaire to assess the level of innovation activity and innovation potential of scientific research institutes (SRI), scientific centers (SC), universities, health care organizations (the questionnaire is meant for heads of organizations, departments and officials responsible for the introduction of new medical technologies). It is commonly known that the process of innovation in health care includes elements of research, evaluation, analysis, planning, development and implementation of new medical technologies. Within this framework we have proposed 25 questions for online questionnaires, for further analysis and generalization of the survey results.

Since the main activities of health care organizations are medical, scientific, and educational components, these data were included in the developed questionnaire. Important factors that determine the composition and content of a set of measures in the organization of innovative activity, act organizational structure, innovation profile health care, and the position of the employee category, age, experience, qualification category, the presence of an academic degree. Important issues, in our opinion, to determine an estimate of the level of innovative capacity of staff research institutes, universities and medical organizations are awareness, knowledge of existing mechanisms for innovation. Experience in research and innovation projects provides an opportunity to assess the respondent's opinion on the effectiveness of introducing innovation in organizations, their demand deposit in Kazakhstan, as well as the degree of involvement of employees in the development and / or innovation. It should also consider the issue of the availability for the implementation and development of innovative activity of workers, obstacles to development and measures to overcome them.

Research objective is to study the factors constraining the introduction of new medical technologies in the health care system of Kazakhstan, and to find ways of improving innovation activity in Kazakhstan.

2. Methods and Material

In total participated in poll online of 849 health workers. The questionnaire according to the level of innovative activity and innovative capacity of scientific research institute, SC, universities, the medical organizations was developed for studying of the reasons constraining introduction of new medical technologies in health system of RK. Target audience for carrying out questioning were the heads of the organizations, divisions and officials who are responsible for introduction of new medical technologies. The questionnaire included 25 questions which estimated medical, scientific, the educational organizations of health care making in work of the expert. For an assessment of level of innovative activity (number of the scientific projects implemented technologies, realized) estimated such factors as organizational structure, a profile of innovative activity of the organization of health care, category and the worker's position, his age, length of service, qualification category, existence of the academic degree. Questioning was carried out to online the mode. The method of continuous analytical research was used. The statistical analysis was carried out with application of the SPSS 16 program. In the analysis were used descriptive (descriptive statistics), the factor analysis and correlation and multidimensional dispersive analysis.Descriptive analysis defined whether there was a significant difference between the different types of innovation. Studying of risk factors by their importance for development of innovative activity in health care was carried out with use of the factor analysis.By Log-linear regression analysis made forecast of innovation activity in healthcare organizations in the regions of Kazakhstan.

Important issues, in our opinion, to determine an estimate the level of innovative capacity of workers in SRI, SC, universities, health care organizations are their awareness and knowledge of existing mechanisms for innovation. Experience in research and innovation projects provides an opportunity to assess the respondent's opinion on the effectiveness of introducing innovation in organizations, its demand in Kazakhstan, as well as the degree of involvement of employees in the development and / or implementation of innovation. It is also necessary to consider the issues of availability of the department responsible for the implementation and development of innovative activity of workers, and obstacles to development and innovation, measures to overcome them.

3. Results

It was found that in the majority of cases (62.4%), innovations were borrowed (imported from abroad), and they have mostly (63.3%) been introduced into clinical medicine by health care practitioners (66.9%), while the lowest percentage of innovative activity in the country (22.8%) among the experts having scientific and academic degrees.

4. Discussion

As of May 25, 2014, 849 respondents participated in the survey. Majority of the respondents involved in the survey, represent organizations on the city level (33.2%); 30.6% of the respondents work on the national level, 20.7% on the regional level, and 15.5% of cases represent the district level health care organizations. Majority of the respondents work in in-patient (29.5%) and outpatient (25.1%) health care organizations. Employees of educational institutions in health care consist 13.3% of respondents, research institutions - 8.8%, and somewhat less involved in the survey were organizations in the field of sanitary and epidemiological control - 7.5%. 3.9% of respondents involved work in central / local public health departments. Almost equally participated specialists from organizations operating in the field of blood transfusion and HIV / AIDS (2.7% and 2.8%, respectively). All the rest, including the organization of practical health care, including organizations engaged in pharmaceutical activities and health promotion, National Medical Holding, organizations of ambulance and air ambulance, disaster medicine, restorative treatment and medical rehabilitation, palliative care and nursing care, accounted for only 6.5% of the total number of respondents (less than 1.0% of respondents).

Regionally, 26.4% of respondents come from Almaty, 17.6% - the West Kazakhstan region, 9.1% - Karaganda, 8.7% - the South Kazakhstan region, and 7.1% - the Kostanay region. Specialists from Astana account for only 6.8% of respondents, and even less (6.1%) come from Aktobe region - 6.1%, even though the higher medical educational institutions and research centers are located in these areas. Almost an equal number of experts represent East (5.2%) and North Kazakhstan regions (4.2%). Less than 3% of the survey participants come from the remaining areas of Kazakhstan.

The age of survey participants ranged from 20 to 75 years and older (Figure 1). About a third of respondents are people aged 40 to 49 (29.9%), this matches an average age of physicians in Kazakhstan. Respondents at the age of 50 to 59 years accounted for 26.7% of cases. Health workers aged 30 to 39 years accounted for 20% of respondents. The share of the age group - older than 60 years, accounted for 7.9%.

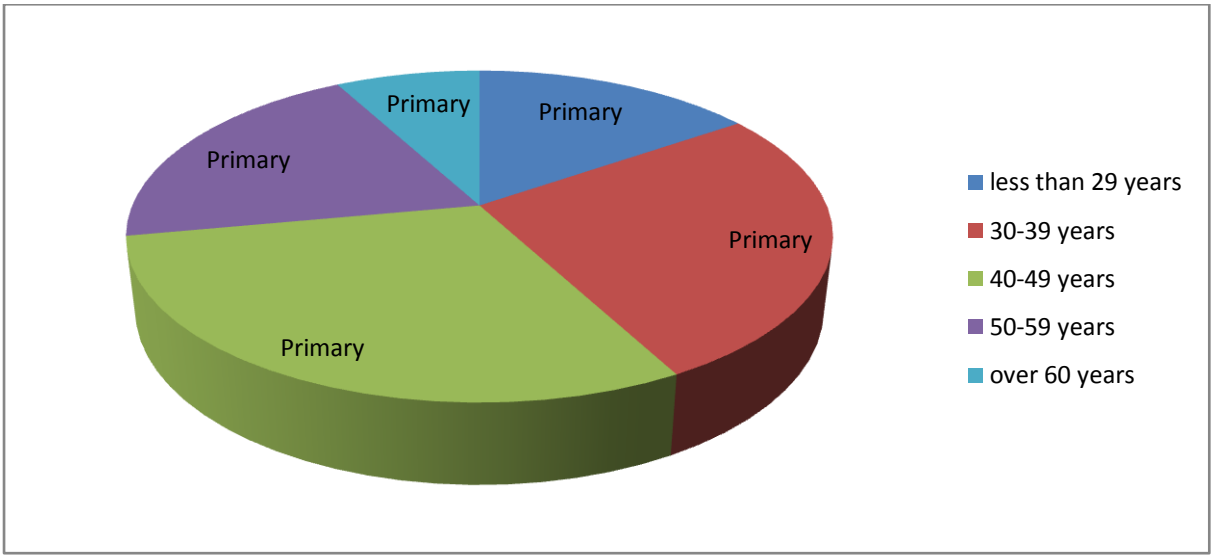

Figure 1: Distribution of respondents on age.

Distribution on qualifying categories of workers and occupied positions (Figure 2) showed that the share of AMS (administrative and managerial staff) was 42.1% of the respondents, clinical staff - 35.6%, faculty - 14.4 %, scientists - 7.9%. In terms of categories we have determined that 36.7% of scientists and 30.0% of faculty did not have a scientific/academic degree.

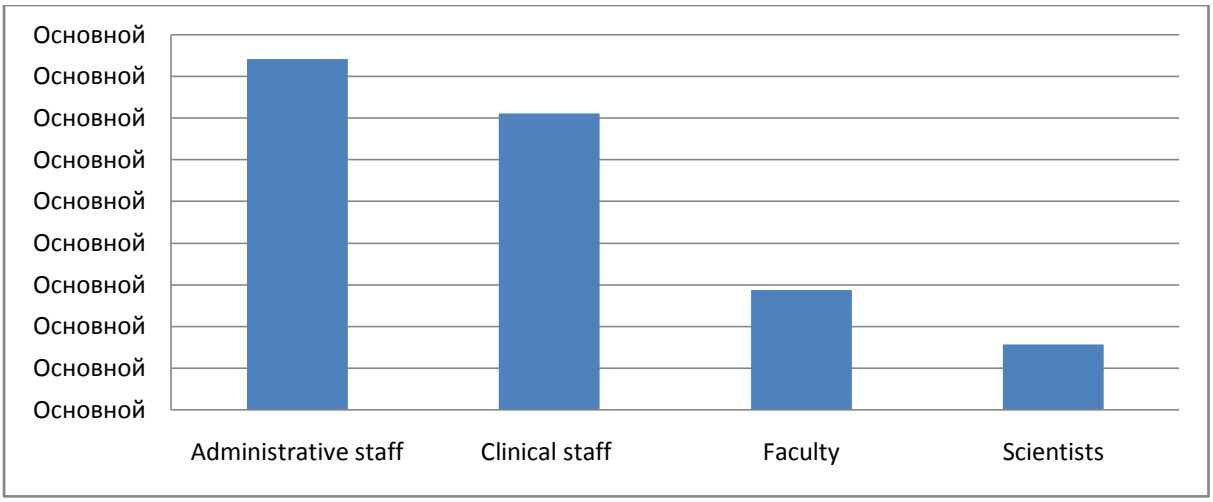

Figure 2: Distribution of respondents on categories of workers

Based on occupied positions, majority of respondents occupied administrative positions - 46.7%, heads of clinical departments - 20.6%, CEO's associates - 15.3%, CEOs - 7.9%, heads of departments - 3.9%, heads of department/faculty - 3.5%, and heads of sectors represent only 2.0% of cases.

That is, in Kazakhstan health professionals actively involved in innovation are mainly represented by experts from the metropolitan regions and cities, occupying administrative and managerial positions, in the age group over 40 years.

Distribution of respondents working in medical science organizations and universities based on length of employment is shown in Figure 3. 29.1% of respondents show a time record of over 26 years, employment for 1 to 5 years - 15.5% of respondents, 16 to 20 years -14.6%, 21 to 25 years, 13.9%, 11 to 15 years - 13.1%, 6 to 10 years - 9.6%, and least share represent professionals with the working experience of 1 year.

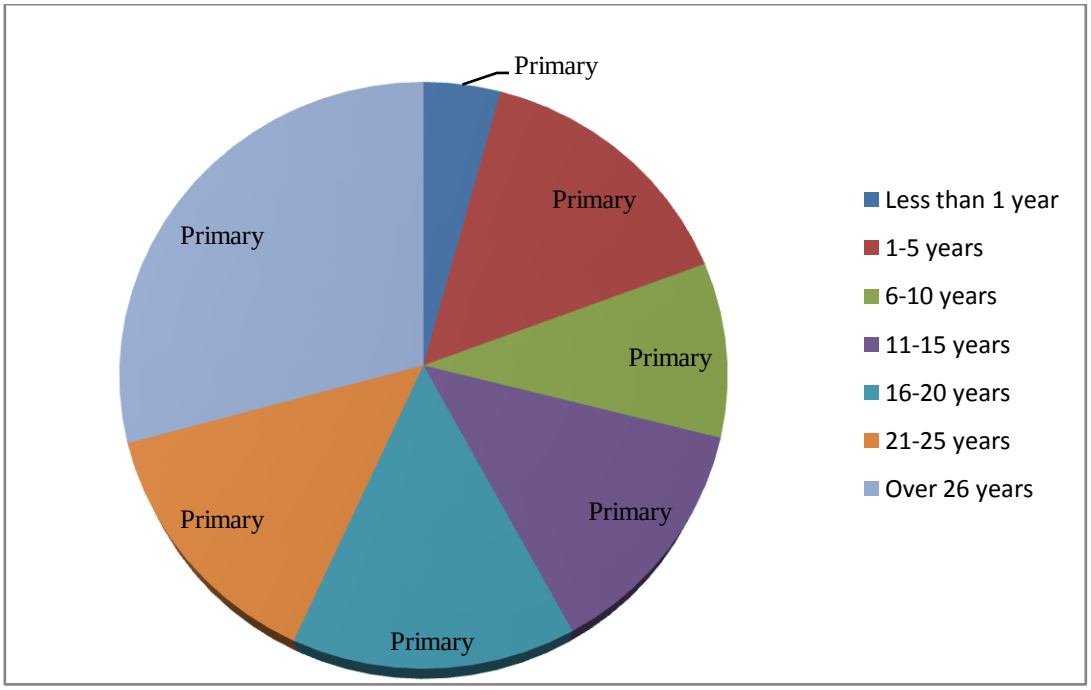

Figure 3: Distribution of respondents on length of employment

Overall categorization (presence of qualification category) of the respondents was 62.8%, while 32.4% of the respondents have had the highest qualification category, 21.9% - the first category, and 8.5% - the second category. In terms of the categories, it was established that 54.5% of scientists, 55.7% of faculty and 37.2% of clinical staff have had no qualification category.

22.8% of respondents have had a scientific degree. The academic degrees of Doctor of Medical Sciences and Master of Medical Sciences both belong to 5.5% of respondents, respectively. 11.8% of respondents hold a degree of Candidate of medical sciences, and only 0.9% are holders of the PhD.

Thus, respondents of the survey were mostly medical specialists on a city level, of the older generation, who have been working for more than 26 years, having a qualification category in 62.8% and academic research degree in 22.8% of cases.

As the analysis of the questionnaire shows, the major part of innovations implemented in health care organizations accounts for practice medicine - 38.6%, education - 9.1%, organizational and management technology - 8.7%, and science – 5.3%.

The major source of innovation in the health care system is research. In this regard, the question "Did you participate in scientific, research and innovation projects?" was sufficiently representative. We have found out that 39.6% of respondents participated in scientific, research and innovation projects. 16.2% of respondents participated in research programs, 12.6% -in innovative/grant projects, 8.3% - in clinical trials of drugs and/or other medical technology, and 3.13% of respondents participated in preclinical studies of drugs and/or other medical technology. 20.4% of respondents did not participate in the organization of innovative activity, although the organization implements innovative technologies. And 12.7% of organizations did not innovate, so that the respondents were not able to participate in their implementation. We may also add that 20.0% of scientists, 28.1% of faculty and 53.7% of clinical staff were not involved in scientific, research and innovation projects; this explains low innovation activity among specialists, especially among holders of scientific degrees.

An important indicator of the level of innovation activity is the presence of patents and inventor's certificates of the respondents involved their participation in the development of clinical protocols and guidelines. It should be noted that the main share of developed and introduced innovations is accounted for by the national level organizations (research institutes, scientific centers, universities). However, the survey results showed that 26.4% of respondents participated in the development of practical guidelines, 24.6% - received acts of innovation from different regions of the country, 17.7% - had innovative patents in Kazakhstan, 17% - participated in the development of clinical protocols, and only 11.4% - had inventor's certificates for innovation.

Most respondents (62.4%) indicate that innovations introduced in health care organization are borrowed (imported from abroad). In 26.6% of introduced innovations were developed in Kazakhstan's organizations and by the organization where respondents work. This fact indicates that the degree of technology transfer activity at inner Kazakhstan innovation market in health care is growing steadily. Only 3.3% of respondents indicated that their organizations did not introduce innovations and 4.6% did not know anything about the implemented technologies.

Unfortunately, it must be noted that only 13.7% of respondents used the of evidence-based databases to obtain information about innovations in medicine, somewhat more - 14.7%, used clinical protocols and guidelines - i.e. those sources that are of the highest level of evidence. Publications in journals used as a source of information by 16.4% of respondents, the opinion of colleagues - 17.0%, and majority used internet publication (forums, social networks) - 22.8%. Less attractive for the survey participants were pharmaceutical companies' advertisement - 5.2%, and conference proceedings - 4.8%; 5.4% of respondents did not use any one of the sources, and did not participate in the process of development and innovation.

Great importance for effective and timely transfer of innovation in health care has the presence in the organization of unit responsible for the innovation and innovative activity of employees. About half of the respondents (46.2%) gave an affirmative answer, more than a third (36.3%) – negative, and 17.2% of survey participants did not know of the existence of such units. 14.2% of respondents commended the work of the above units as high, 38.0% - as average, and 47.9% of respondents - as low.

Hence, even the existence of departments responsible for implementing of innovations in the organization does not guarantee an effective innovation. Active health professionals, prepared for the development and introduction of new technologies, are required.

As revealed the analysis of questionnaire, in 64.6% of cases, the decision to implement

innovations in the organization took an advisory body (a review board, etc.), where implemented innovations were discussed. In 7.5% of cases the decision was taken by the leaders of organization on their own without discussion; in 4.0% - each division and staff introduced innovations without the consent of management or other structures, and in 6.8% of cases organizations did not implement innovations at all. 17% of respondents did not know about the reforms taken in their organizations.

According to 38.2% of respondents, health care system should first of all innovate to improve the efficiency of diagnosis, treatment and rehabilitation of patients. 37.1% of respondents think innovations are needed to improve the working conditions of employees, 15.4% - for improving the quality of life of the population, 8.8% - for the prevention of various diseases in the population, and only 0.5% of respondents believe that innovation - a waste of money.

As 32.1% of the respondents think, currently the most demanding field for innovation in health care in Kazakhstan is primary health care. Almost equally (12.1% and 12.3%, respectively), participants indicated the areas of oncology and maternal and child health. Maintaining healthy lifestyle organizations were indicated by 11.1% of respondents, reproductive health - 10.7% of respondents, and 6.2% and 6.7% of respondents indicated innovative activity in cellular and information technology, respectively. 8.6% of survey participants believe that all above health care sectors are in need for innovation.

When considering incentives to facilitate innovations in medical institutions of Kazakhstan, respondents indicated new methods of treatment, competent management, as well as new approaches of administration (13.9% and 13.1%, respectively). Important directions of the transfer process to stimulate innovation, respondents consider the introduction of information technologies, and receiving training in foreign clinics, conducting master classes at the premises of their organizations (12.1% and 12.0%, respectively). Developments in the field of laboratory diagnostics and implementation of international standards, 6.5% and 6.4% respectively, also affect the process of innovation.

Fewer respondents believed that the development of a local network or preventive direction of innovation can stimulate innovation in the health sector (5.4% and 4.1%, respectively). The very few (2.6% of respondents) find that collaboration with other health organizations and availability of modern equipment will promote innovation in Kazakhstan. Finally, 21.6% of respondents did not know the answer to this question.

According to 18.6% of the respondents, the main obstacle in the development and/or implementation of innovations is the complexity of the procedures for obtaining permission to use the new technologies. At the same time, the vast majority of respondents (688 - 81.5%) said they had a positive attitude towards planning and implementation procedures HTA authorization expert commission as a mandatory condition precedent to the application of new technologies in the health care system of Kazakhstan.

12.5% of respondents believe that significant obstacles to the development and/or implementation of innovation are excessive workload of health care professionals and low physical assets of medical institutions. Another 12.0% of respondents believe that the absence or inefficiency of structures, developing and implementing innovation, is also a factor hindering the transfer of new technologies. Meanwhile, 22.6% of respondents noted a lack of health care specialists' necessary knowledge and poor awareness of advances in medical science and practice. The most significant factor hindering the development and/or implementation of innovation, according to 17.5% of the respondents, is the lack of motivation and incentive for specialists of healthcare organizations to innovate, poor financing of the health care system in Kazakhstan.

The analysis of coefficients determined that the lack of specialists of healthcare organizations the necessary knowledge and low awareness of the achievements of medical science and practice are associated with the first principal component. Variables such as lack of health professionals' necessary knowledge (r = 0,89) and lack of awareness about the achievements of medical science and practice (r = 0,88) had the highest value of the coefficient. That is, the higher the awareness of professionals about the achievements of medical science and knowledge about the development and introduction of innovative technologies, the more intense is innovation activity in Kazakhstan. Thus, these figures reflect the impact of these factors on the level of innovation activity in Kazakhstan.

The second factor affecting innovation - a lack of motivation and incentive for specialists of healthcare organizations to innovate and poor financing of the health system in the country;

There is an interesting close relation between a highly significant factor - lack of motivation and incentive for specialists of healthcare organizations to innovation (r = 0,94) and a low health system financing in Kazakhstan (r = 0,71) and obstacles to

the development and/or innovation. Based on the received data, we can conclude that an important impediment to the promotion of innovation, are insufficient targeted financing for innovation in health care.

The maximum values of the third principal component is associated with excessive workload for specialists of health care organizations (r = -0,75) and low physical assets in medical institutions (r = 0,73). That is, there we have defined a direct negative relationship of specialist with his/her innovation activity, as well as the low physical assets in health facilities, has some effect on innovation in the country.

Thus, knowing the degree of correlation between the indicators within the factors, we can properly regulate the implementation of organizational measures to stimulate innovation and thus to influence the situation in the country.

Study of the dynamics of the first three principal components confirms that the main reasons for low innovation activity in Kazakhstan are poor awareness of specialists about the latest achievements of science, lack of trained personnel and insufficient target financing of innovation in health care.

Meanwhile, respondents think that experts occupying appropriate positions should regularly publish scientific articles (1.4%), participate in research and development (5.2%), attend scientific conferences on international and national levels (12.7%), regularly introduce innovative technologies (13.8%), be informed about the scientific achievements and innovations in their field (15.9%). About half of respondents (47.3%) believe that all of these activities can affect the development and transfer of innovative technologies in the field of medicine.

The most widespread mechanism of innovation in organizations, according to respondents, is conducting master classes on the basis of the organization (31.2%). Respondents also consider the possible ways to stimulate the transfer of technology in health care are sending experts for training to improve the skills in other organizations (16.2%), involving employees in the process of scientific (preclinical, clinical) research and development of new technologies (16.4%), as well as providing the organization's staff access to resources of research and scientific information (14.0%).

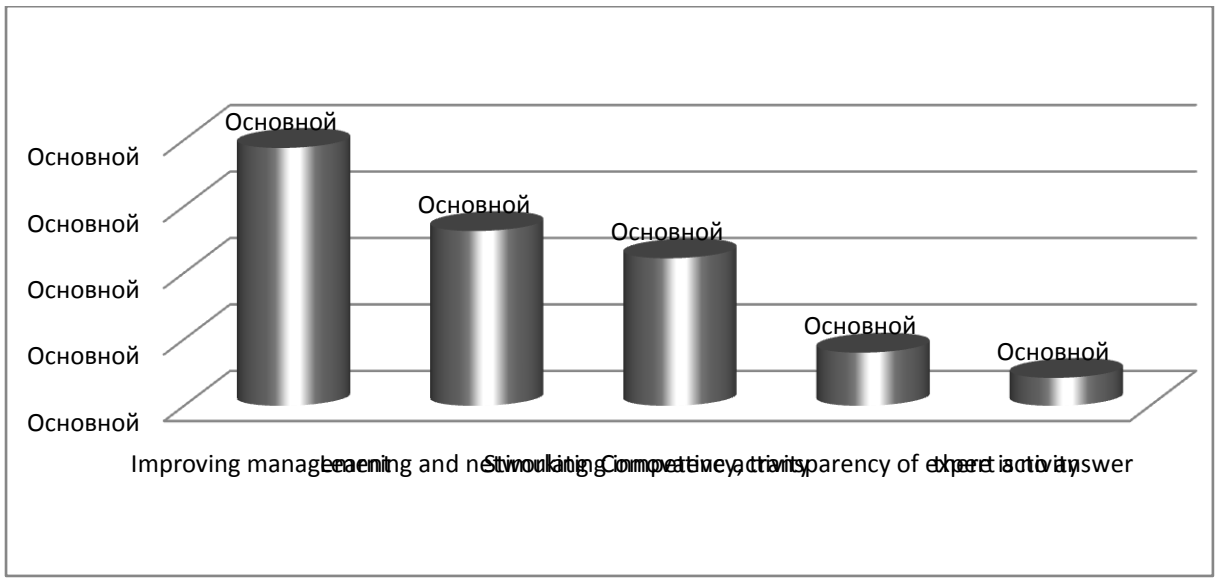

Figure 4: Proposals of respondents on development of the market of innovative technologies and stimulation of inflow of innovations in RK healthcare system

Respondents offered a variety of ways for development of innovative technologies market and encouragement of the innovation inflow to the healthcare system of Kazakhstan. Suggestions were combined in order to facilitate the process of understanding and presented as figure 4. As can be seen from the figure, the majority (38.8%) of the respondents voted in favor of strengthening the management of new technologies' transfer and diffusion process, the creating algorithm of innovation transfer mechanism (from application to commercialization of a product), with the involvement of business organizations for creating a demand for scientific innovation and their implementation in manufacture.

According to respondents, the process of innovation in health care needs to be strengthened by control over the quality and completeness of

innovations to appeal to the potential buyer. Hence the need to improve regulations, fixing phased mechanisms of development, transfer and commercialization of technology, in the form of a government program. They have also agreed that innovation activity cannot and should not be forced; otherwise it creates the appearance of unwanted, valueless technologies. Valid is the view of the respondents, that mainly the Ministry of Health provides financial, methodological, and other support for national health care organizations; that is not the case for private health care organizations. Often, these institutions work "over" and "stew in their own juice", not being able to conduct their development and implementation.

Some respondents believed that it was necessary to create a separate structural unit for innovative technologies, with the involvement of experts from both the Ministry of Health and Republican Centre for Healthcare Development (RCHD), as well as experts from the regional departments of healthcare administration, including the creation of a separate budget program or subcomponent within the medically necessary health care services. These units will choose which organizations shall fully develop scientific advances and then distribute to the experience of advanced technologies in the regions.

According to respondents, introducing innovative technologies should be simple and accessible to local health organizations, and bring benefit to both patients and healthcare workers. We need the simplest rules of introducing innovation in the health care system of Kazakhstan, simplified procedure of obtaining a permit for the introduction of innovative technologies, with clear regulation of the timing of passage application for the use of new medical technology across all instances. Deep integration of SRI, SC, universities' activities in practical public health requires meetings, round tables, etc. with the participation of specialists of practical health care, education (faculty) and management (specialists of regional departments health care administration, RCHD, MofH).

Many survey participants, clinical workers, have stressed the need to reduce the burden on the doctor, reduce documentation and accountability, using modern technologies, improving physical facilities in health care organizations. Respondents see the introduction of health insurance as a possible solution. This requires the establishment of real prices on medical services, especially tertiary care, decent wages, health professionals and the creation of conditions for the formulation and implementation of innovative technologies. Demand for the scientific achievements and publication of articles with the results of innovation in peer-reviewed journals, require appropriate laboratory equipment and the possibility of paying for publications by the organizations, where work was conducted, due to the high cost of the publication process.

About one-third (26.3%) of the respondents voted in favor of teaching specialists the mechanisms of development, implementation, innovation commercialization pathways, as well as direct use of innovation. Great importance from the point of view of the respondents, has control and increasing the level and quality of knowledge in the field of education, particularly university graduates, and issues of training specialists remotely and engaging students in scientific research. Some respondents offered to share their experiences of development and innovation with universities and medical organizations of the CIS countries and internationally, which introduce new technologies, access to and regularly hold exhibitions of innovative technologies, and initially, the use of the achievements of foreign experts, introducing "ready" innovations for the diagnosis and treatment of diseases. Respondents noted the need for full access to information databases of available and introduced innovations. More than half (58.7%) of the respondents pointed out the weak access of members of the organization to the resources of scientific and technical information, and half of the staff (50.0%) identified the lack of incentives for the involvement of experts in the scientific process (pre-clinical, clinical) research and development of new technologies .

Respondents consider important issues of training of the teaching staff (faculty) in universities, in the purpose of graduating competitive doctors, MDs, PhDs, strict monitoring of their qualifications, and to provide financial allocation for these needs. According to respondents' opinion, faculty should actively participate in research and publications, extensive coverage of the achievements of modern science among their students.

It has been observed, that 78.7% the respondents working in the practice medicine, including 70.3% of health managers, prioritize sending employees for training in other organizations ($F = 5,701$, $df = 4$). 83.4% of researchers and 76.9% of specialists of educational organizations prefer master-classes on the basis of organizations ($F = 7,516$, $df = 4$).

Therefore, at the present stage in order to promote the development and transfer of translational technologies in Kazakhstan, there remains a need for training professionals, conducting master classes and

motivating professionals actively involved in conducting translational research.

Also, the method of discriminative analysis have determined the correlation between two variables - the scope of use of innovations in health care organizations and the mechanism of their implementation in the organization (r = 0,830), but the average values of the discriminant function of these indicators were not reliably significant (r≥0,05).

In favor of stimulating the processes of innovation in the form of increased funding of medical science, strengthening the physical facilities, possibly with the involvement of foreign investors, subject to strict control over the efficiency of spent resources, bearing in mind that the innovative technologies lead to an increase in the cost of medical services. 22.2% of respondents voted for the direct stimulation of professionals involved in the process of developing and implementing new technologies, commercialization of health care and the introduction of health insurance.

Some respondents noted the important role of the expert evaluation of introduced technologies - 8.0%, the need for competent, highly specialized experts, including faculty members, with the presence of clinical experience and research, knowledge of the market of innovative technologies.

There were suggestions to compile a list of negative medical technologies, make it available for review on the RCHD web site and develop mechanisms for reimbursement for the introduction of innovative technologies based on cost, make it more accessible (economically) the process of approval of normative legal acts. There were also suggestions to provide in the regulations of the Commission of Experts of the statement of expenditure and reimbursement for the introduction of innovative technologies. Unfortunately, 4.7% of respondents did not give any suggestions for change to stimulate the development and transfer of innovative technologies.

Correlation analysis confirmed a direct link between age of the respondent and his/her length of employment (r = 0,850), as well as position and length of employment (r = 0,536), that is, the longer work experience is, the higher the position held and the age of the respondent (r≤0,01). In national level organizations these factors moderately correlated with the presence of degrees (r = 0,418) ($p \leq 0.05$). There was also noted a strong correlation between productivity of respondent, issuing patents, teaching and clinical practice guidelines, and his/her qualification category and age (r = 0,670). Factor and correlation analysis confirmed that most experts of national level organizations holding scientific degrees are involved in the implementation of scientific programs (r = 0,665) (r≥0,01). Based on the profile of organization, particularly for primary health care, the close direct connection is noted with the introduction of innovations in clinical practice (r = 0,794) (r≤0,001), and for oncology services and maternal and child health, with the introduction of innovations in science (r = 0.610) (r≤0,01).

In determining the scope of innovation implementation, for the respondents who have a degree and those who do not, it turned out that the new technology is mainly used in clinical practice (63.3%), with only 17.3% of doctors and candidates of medical sciences participating in the implementation, 66.9% of innovations were implemented by health care practitioners. This suggests a low innovation activity among degree holders. 81.6% of respondents working in the field of scientific activity and 78.1% of respondents holding academic degrees participated in the implementation of research programs. 50.0% of respondents implemented research programs directly in the educational process, of which 55.8% have had a scientific degree.

We were interested in the question of mechanisms to promote the process of development and innovation in the country. Depending on the age of respondents, the answers were distributed as follows. Unfortunately, the respondents under the age of 24 years were the least active - only 3.3% of cases, older respondents, from 50-54 years, were more active -16.0%, and 45-49 years - 15.5% of cases ($p \leq 0.05$). Basically they have offered ways to stimulate innovation in the form of master classes on the basis of organizations in 44.7% and sending specialists for training in 35.9% of cases. Almost similar results were obtained from doctors (9.9% and 7.5%, respectively) and candidates of medical sciences (19.6% and 13.8%, respectively).

Of course, increasing work experience leads to increase in innovation activity of respondents. A significant factor, contributing to the activation of the process of transfer of innovation, is the position of experts in relation to the assessment procedures of innovative technologies. Therefore, we analyzed the position of experts in relation to the planned implementation of medical technology assessment procedure by the MofH, and the authorization of the Expert Commission, as an obligatory condition prior to the application of new technologies in the health care system of Kazakhstan. Conducted analysis of variance (One-Way ANOVA) of length of employment and qualification category, found that almost all respondents were significantly more frequently (86.7%) positive about this innovation,

rather than negative (13,3%) (f = 384,104, df = 6), with the caveat that it is necessary to clearly regulate and minimize the time required for an application for the use of new medical technology across all instances (r≤0,001). However, it should be noted that senior respondents of 50 years and older, who have been working for more than 26 years, in 33.0% of cases reacted negatively to the proposal, arguing that it will strengthen the bureaucratic processes, and there will be additional ways for corruption (r≥0,05).

Descriptive analysis defined whether there was a significant difference between the different types of innovation, which gave a significant contribution to the development of science in Kazakhstan. It was found that there is no significant differences between types of innovative technologies introduced in Kazakhstan (F = 0,776, df = 4) (p≥0,05). That is, in Kazakhstan, innovations aimed to improve the working conditions of health workers, improve the diagnosis, treatment and rehabilitation of patients, prevent diseases in the population and improve the quality of life of the population are all universally relevant.

Conducted multiple regression analysis presented respondents' answers and the alleged prediction of innovation in terms of regions of Kazakhstan, and level and type of organization. The analysis showed an association between the dependent variable (Proposals for the development of market of innovative technologies and encouraging innovation inflow in the health system of Kazakhstan) and other independent variables, including the level of organization where the respondent works, position, type of organization, region.

As shown by Log-linear regression analysis, forecast of innovation activity in healthcare organizations correlates with the amount of research (including the number of patents issued, guidelines, copyright certificates, etc.) in the regions of Kazakhstan. Therefore, more active experts participation in the research will stimulate the development of more intense innovative activity in the republic (r = 0,645) (r≤0,01)

Respondents' offers on the development of market of innovative technologies and encouraging inflow of innovation in the healthcare system of the RK, in terms of regions, were presented as follows. Representatives of the republican cities (Almaty and Astana) believe that one should implement an effective system of motivation and incentives for workers, as well as government support in the form of Government program (Odds = 20). Regions, where higher medical schools are allocated (Aktobe, East Kazakhstan, Karaganda and Astana and Almaty), offer maximum integration of the research institutes, national centers, and universities in practical health, as well as attracting students to scientific research (Odds = 18).

Representatives of West Kazakhstan and Mangistau region offered to focus on the introduction of foreign "ready" innovative technologies for diagnosis and treatment (Odds = 17).

Respondents from Zhambyl, Kostanai regions believe that the first thing to do is to increase the staff potential through training, workshops, and seminars (Odds = 30).Respondents from the Kyzylorda and South Kazakhstan regions believe that innovative technologies should be simple and accessible for every healthcare organization (Odds = 14). Representatives of Pavlodar region offer introduction of health insurance for the stimulation of innovation (Odds = 4).

Respondents on the national level believe that activation of the process of development and transfer of new technologies requires an effective system of motivation and incentive, as well as the need for trained, professional personnel. At the same time, they note that these issues should not be strictly planned, as it is a creative process (Odds = 25).

Respondents from the regional centers believe that it is necessary to raise the requirements for experts, denoting primarily their competence, narrow focus on the issues, experience in clinical and research activity and strengthening physical facilities (Odds = 16).

Moreover, cities' representatives basically offer the organization of regular exhibitions of innovative technologies, to increase funding in the health care system, and the creation of a separate institution for innovative technologies, and professionals working in this area (Odds = 31).

Representatives of district level health services organizations consider that it is necessary to support the promotion of innovation is the Kazakh researchers, facilitate the procedure for obtaining a permit for the introduction of innovative technologies, and reduce the burden on doctors, reduce documentation and reporting, and use the modern technologies (Odds = 11).

5. Conclusion

We have conducted the sociological analysis of the questionnaire on innovative activity for 849 survey participants. The analysis identified main problems and solutions, and a areas of work, to stimulate the development and transfer of translational technologies in the Republic of Kazakhstan. Analysis of the questionnaires showed that mainly experts with experience of 15 years and

more, the older age group (40 years) working in public health practice currently carry out the innovation activities. As it turned out, only one-third of respondents are actively involved in the innovation process in the country. In most cases (62.4%), innovation borrowed (imported from abroad), and mostly (63.3%) being introduced into clinical medicine, health care practitioners (66.9%). There is a weak innovation activity of the respondents having a scientific / academic degree (22.8%).

A significant factor contributing to the activation of the process of transfer of innovation is the position of experts to the assessment procedures of innovative technologies. Analysis of the position of experts on the implementation of the planned procedure of health technology assessment of the MofH, and the authorization of the Expert Commission as a condition prior to the application of new technologies in the system of Health, found that almost all respondents had a positive attitude to this innovation, emphasizing clear regulation and maximum shortening the passage of an application for the use of new medical technology across all instances. At the present stage, to promote the development and transfer of translational technologies in Kazakhstan, there remains a need for training professionals, conducting master classes and opportunities to promote professionals who are actively involved in conducting translational research.

Evaluating the effectiveness of innovation, more than half of respondents (56.2%) have a positive effect on innovation. At the same time, to obtain economic benefits (increased profitability organization) indicates only 8.8% of respondents, and impact on the entire health care system - 19.9% of respondents, 14.9% of the specialists of medical organizations believe that innovation has no appreciable effect . However, for the national health system is just the most in demand innovations that may have an impact on the entire health care system.

The factor analysis or principal components analysis suggests that the main reasons for the low innovation activity in the Republic of Kazakhstan is a lack of awareness of experts about the latest achievements of science, lack of trained personnel and insufficient target financing of innovation in health care. As development of innovations depends on activity of that professional category of the scientific researchers participating in creation of new drugs, methods of treatment and diagnostics of patients it is necessary to attract actively this professional category to innovative activity in health care.

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