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ADOPTING NEW MEDICAL TECHNOLOGIES IN RUSSIAN PUBLIC HOSPITALS: WHAT CAUSES INEFFICIENCY?[3]

The adoption of new medical technologies in Russian public hospitals is an important part of healthcare modernization and thus is a subject for public finance and regulation. Here we examine the decision-making process on adoption of new technologies in Russian hospitals, and the institutional environment in which they are made. We find that public hospitals operate within a strategic-institutional model of decision making and tend to adopt technologies that bring indirect benefits to their heads/physicians. Unlike Western clinics, the interests of Russian hospital heads and physicians are driven by the possibilities to obtain income from a part of hospital activities: the provision of chargeable medical services to the population, as well as receiving informal payments from patients. The specifically Russian feature of the decision-making process is that hospitals are strongly dependent on health authorities' decisions about new equipment acquisition. The inefficiency problems arise from the contradiction between hospitals' and authorities' financial motivation for acquiring new technologies: hospitals tend to adopt technologies that bring benefits to their heads/physicians and minimize maintenance and servicing costs, while authorities' main concern is initial cost of technology. The main reason for inefficiency of medical technology adoption arises from centralization of procurement of medical equipment for hospitals that creates the preconditions for rent-seeking behaviour of persons making such decisions.

JEL Classification: I10

Key terms: medical technology, adoption, public hospital, Russia, causes of inefficiency

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1. Introduction

There are the strong arguments that new technologies have been responsible for rapid medical spending growth and associated budgetary pressures in last decades (Funch, 1986; Newhouse, 1992; Gelinjns & Rosenberg, 1994; Cutler & McClellan, 2001). The pace of innovation in medicine has escalated; technological advances are extending lives, but driving up costs of health care (Economist Intelligence Unit, 2011). This makes it imperative that the diffusion of new technologies in the health care systems becomes more efficient. The adoption of new medical technologies is a complex process with many actors making it difficult for public regulation. Hence, this process often generates losses in efficiency associated with excess, or vice versa, insufficient acquisition of new technologies, inadequate choice (in terms of economic and clinical parameters) of medical equipment, and its poor use, etc. All of these problems may be seen in countries with different levels of economic development, but in Russia the problem of ineffective adoption of new medical technologies is particularly acute. Spending on health care in Russia is growing steadily: public expenditure on health grew by 1.75 times in real terms from 2001-2010 (Shishkin, 2013). The National Project ”Health”, implemented from 2006[4], and the regional programs of health care modernization started in 2011-2013[5] have included massive public investment in new equipment for medical institutions. But there is a lot of evidence of inefficient use of these funds. For example, considerable violations were committed in the purchase of CT scanners for public facilities. Typically, purchases were made at prices from two to three times higher than the manufacturer's price (The President of Russia, 2010). Government procurement of new equipment under the National Project "Health" was not aligned in many cases with the needs of medical institutions, and with their ability to make effective use of the new complex equipment. By the end of 2007 more than 7% of medical equipment (by entities, and more than 5% by cost) purchased during first two years of implementation of the Project were not used in medical facilities due to absence of appropriate specialists, lack of expendables, inability to prepare premises and facilities properly, etc (Urgel, Nikonov, 2007). According to estimates of the International providers of medical equipment Association (IMEDA), between 30-40% of high-tech medical equipment purchased for federal programs is underused or even not used at all (HSE, RANEPA, 2013). Following a slow expansion of economic activity in 2013,

[4] The funding of the Project from the federal budget added 10 percent to public healthcare funds (Shishkin, 2013)
[5] The public funding of the programs was 14 percent from public funding of health care in 2011 and 2012 (Golikova, 2012).

the Russian government has toughened budget policy in all social sectors including healthcare. Under the new circumstances, a policy challenge for efficient allocation of public health expenditures provides an opportunity for reflection and research on the causes of inefficiency in medical technology diffusion in the Russian healthcare system. Our main hypothesis is that the key reason for inefficiency is the way the decision-making process on medical technology adoption is regulated.

We focus on hospitals and do not consider polyclinics in this study because the former are the main recipients of public investments in new medical equipment. Using primary data based on in-depth interviews collected in Kaluga region and St. Petersburg, we find answers to the following questions: Who are the prominent actors involved in the decision-making process? What is their motivation for new technologies uptake? How is the decision-making process organized on the adoption of new technologies in Russian health care facilities? Does it differ from that in other countries (Western and BRICS)?

Although these questions have been discussed in a number of economic studies, this paper will be among the first to shed light on the decision making process on technology adoption in Russian public hospitals.

The paper proceeds as follows. In section 2, we review the relevant background literature as it pertains to technology adoption. Section 3 briefly describes the Russian hospital system in the light of questions to be explored in this paper. Section 4 outlines the methodological approach and data. In the results section (5) we analyse the main pillars affecting the decision-making process before section 6 concludes.

2. Background and related literature

Policymakers and researchers have long been interested in the process of medical technology adoption and acquisition. A number of excellent reviews and meta-analyses develop different classifications of theories, describing diffusion of innovations in healthcare (e.g. Greenhalgh et al., 2004; Grol et al., 2007; Rye and Kimberly, 2007). According to the research literature, a broad range of factors may affect the new medical technology adoption. Organizational attributes are identified as one of the main pillars together with environmental influence, connectedness and innovation characteristics (Rye and Kimberly, 2007). Although some authors (Grol et al., 2007) give theories that focus on individuals and social interaction in separate groups, following Rye and Kimberly (2007) we consider organizational strategy, individuals and groups within an organizational context.

Recent papers that study actors, their beliefs and interests, as well as power distribution in organizations, often go back to Greer's (1985) decision systems concept (Lamboioij, Hummel, 2013; Silva, Viana, 2011; Tepletsky et al., 1995). Greer (1985) identifies three different rationales motivating adoption of new technologies in hospitals: (i) economic efficiency rationale, (ii) indirect benefits rationale, and (iii) clinical efficiency rationale. Even where these rationales may appear to contradict each other, existing research (Tepletsky et al., 1995; Greenberg et al., 2005) tends to show the ways in which they are complementary.

Economic efficiency rationale

The view from economic efficiency is that hospitals are motivated by marginal returns on investments and so acquire new technology only if it is economically efficient to do so. This means that hospitals evaluate the demand for new medical services, calculate the net present value of costs and revenues associated with technology adoption, apply a cost-benefit analysis, carefully analyze the alternatives (the 'opportunity cost') and adopt the new technology if the marginal benefits of doing so dictate accordingly.

In this spirit, Feldstein (1979) describes the profit-maximizing hospital, and Anderson and Steinberg (1994) develop a price competition model. These models correspond to Greer's (1985) fiscal-managerial decision system, in which key decision-makers include chief executives and fiscal officers. Under this decision system, hospitals often introduce technology assessment and acquisition protocols in an attempt to standardize the decision-making process. Greer cites rationality, predictability, financial viability, and profitability among the main values dictating hospital actions within this fiscal-managerial decision system. While private hospitals are traditionally seen as fiscally oriented, some authors suggest that public and not-for-profit companies can also act as if they aimed to maximize profits in the 'economic efficiency' sense described above (Danzon, 1982).

Indirect benefits rationale

The second view contends that hospitals adopt new capital-intensive medical technologies in order to enhance associated but indirect benefits. These can include improving the hospital's image and so helping to attract well-known physicians as well as new patients. Within this understanding, one strand of literature argues that hospitals tend to maximize their sales, not profits (Finkler, 1983). Specifically, according to Finkler, not-for-profit hospitals want to increase their capacity because chief executives' benefits depend on the hospital's sales and volume of services. While demand for each specific medical service is limited, hospitals face incentives to introduce new medical technologies in order to increase the total number of patient visits and services delivered.

The other explanation, corresponding to Lee's (1971) theory of demonstrative behaviour, is that hospitals acquire new technology (no matter how costly) in order to signal that they are technological leaders. More specifically, hospitals invest in technically advanced equipment because they believe patients would associate this investment with better quality of medical care (Duncan, et al., 1995). In addition, new technologies can help hospitals compete for physician loyalty (Coile, 1990; Renshaw, et al., 1990). Some authors (Luft et al., 1986) even view technology as a form of non-price competition for patients and physicians, and show that in more competitive markets, hospitals tend to overinvest in technology. Similarly, Pauly and Redisch (1973) claim that not-for-profit hospitals operate as a physician's cooperative maximizing their earnings (distinct from profits). The physicians thus want to offer the latest tools so they can provide patients with the most current medical treatment and increase sales.

All these perspectives, emphasizing the indirect benefits of new technology adoption, correspond to Greer's (1985) strategic-institutional decision system. Strategic planning is often managed with the use of forecasting, SWOT analysis, alternative scenarios development and other managerial tools making governing boards and chief executives key decision-makers. Following this strategy, executive bodies work on the positive image of a hospital, carefully formulating and promoting the hospital's 'mission', and targeting the hospital's position in the "market" by signalling to the desired patient groups. According to this view, areas targeted as strategically important are financed no matter how costly it will be to adopt new technology and convey the desired image. Financial and managerial calculations inform, but may be secondary to, strategic planning to the extent that financial reasoning can be ignored in favour of developing the hospital's image.

Clinical efficiency rationale

The third rationale stresses clinical efficiency. The basic hypothesis underlying this perspective is that physicians act as agents on behalf of their patients – they decide to adopt new technologies based solely on treatment considerations. However, budget constraints are an important limiting factor. The theoretical basis for this perspective is discussed by Feldstein (1971) in the patients' utility maximization model. The physician's desire to acquire the latest and most comprehensive technologies is explained by the fact that he focuses on the medical needs of his private patients, without considering the needs of the hospital's other patients. These decisions result in inappropriate adoptions and even equipment duplication. The professional dominance theory explains that inefficient acquisition and misuse of technologies could be due to the physicians' ability to influence other hospital workers by effectively controlling the production function (Pauly and Redisch, 1973; Greer, 1984).

Greer (1985) notes that under this medical-individualistic model, physicians and primary specialists are the prominent actors, pursuing stated goals based on maximizing the patients' welfare and avoiding risk. This view presumes that hospitals, acting on physician requests, will not adopt new technology solely for competitive or image considerations. The adoption of new technology is achieved by discussing new technologies on medical staff committees, and by assessing clinical effects consensually, tempered by norms of professional deference.

Greer's empirical analysis, exploring these various motives in the US, failed to reveal a dominant hospital decision system. Greer thus concluded that the rationales underpinning the decision-making process are complex and depend on many factors, including the cost and the type of the technology (incremental or radical). A number of subsequent studies adopted Greer's criteria to determine country-specific dominant strategies: prominent decision-makers, motivation for technology adoption, information gathering and utilization, decision processes, etc. Thus, Rakich et al. (1992) showed that hospital management and the governing board have more influence in the decision process than physicians, implying more frequent use of cost-benefit analysis and strategic planning. Friedman and Jorgenson (1994) suggest that the decision-making process is a function of physician influence and cost-benefit trade-offs.

Teplensky et al. (1995) used econometric tools to study three motivations (profit maximization, technological pre-eminence, and clinical excellence) and organizational strategies to explain MRI adoption in the USA. They used a survey of 507 hospitals to demonstrate that factors attributed to technological pre-eminence were most important in driving acquisition, and explained more of the variance than clinical excellence or profit maximization. However, they also found evidence to support the influence of all three motivations (although less important than technological pre-eminence motivation). Greenberg et al. (2005) examined relevant considerations in Israeli hospitals using a questionnaire for hospital executives. While decision-making responsibility varied among technologies, they suggest that decisions were frequently made within a medical-individualistic decision system. The medical director was a key decision-maker for or against technology adoption and clinical efficiency (medical efficacy, cost-effectiveness, complication rates and side effects) was an important criterion. Silva and Vianna (2011) using a case-study strategy to investigate the process of CT scans diffusion in Brazil found that the adoption of CT was mainly determined by administrators of private hospitals, who were influenced by physicians and sales representatives. Expected profitability and patient needs were relevant rationales for decision-making, but were not the major determinants for acquiring new medical devices. Instead, the institutional strategy of each health care organization based on technological leadership was revealed as the strongest determinant for adoption of CT scanners.

It is clear from this brief review of the literature that just as with the US, Israel and Brazil, Greer's description of decision systems offers a useful framework for considering technology adoption in the Russian context. Before describing how we implement this analysis, we will first provide a brief overview of the Russian hospital sector.

3. Russian Hospital Sector

Russian healthcare system inherited a wide network of public hospitals from the USSR. Although a limited number of medical facilities were closed before 2010, about 6,000 public hospitals (94% of total) are still functioning all over the country (Rosstat, 2011). The private hospital sector is very weak forming only 2% of all Russian hospitals. The other 4% are formed by quasi-public hospitals that belong to different public agencies (ministries, administrations etc.) or corporations with public shares (Gazprom, Russian Railways, etc).

Historically, the Russian hospital sector has consisted mainly of public hospitals with a prevalence of those with local status (fig. 1). Depending of its status, each public hospital is subordinated to some healthcare authority: federal, regional, or local. Traditionally, federal hospitals are better equipped than regional and local; however, this is not always the case as a number of better-developed regions now have the capacity to invest in medical facilities.

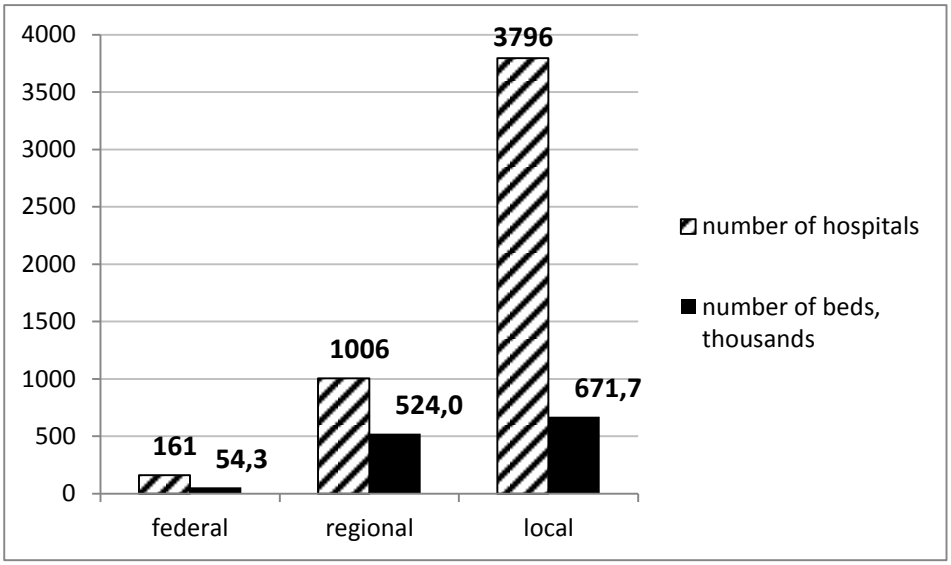

Figure 1. Public hospitals in Russian Federation, by status 2010.

Source: MoHSD, 2011

In the late Soviet period, healthcare was not a priority, resulting in underinvestment. But after the collapse of the Soviet Union, public funds available for health care have been severely restricted even compared to the Soviet period. In the 1990s, government expenditures for health

care declined by one-third (Shishkin, 2013). Some secondary and rural facilities were closed, but instead of further reducing the network, the government spread scarce public funds over the existing medical facilities. Funds from taxes and Compulsory Health Insurance (CHI)[6] were insufficient to cover the necessary expenses of public hospitals and to provide guaranteed medical services to the citizens. For many years different types of hospital expenses were financed partly or not financed at all, forcing hospitals to introduce more charged services and shift the economic burden to patients.

Although the Russian Constitution declares healthcare and medical assistance free of charge a citizen's right[7], there is a growing body of evidence to show that a large proportion of private expenditures on healthcare in Russia reflects the out-of-pocket payments for formal and informal charges in health facilities (Gaal P. et al., 2010; Shishkin, 2003). The payments made formally at the cash desk to public hospitals are often payments for extra comfort or for avoiding a wait in the queue, but also for medical services that, according to the Constitution, should be free of charge for Russian citizens. It is important to note that rough estimates based on official data demonstrate that private health insurance is responsible for only 3-5% of total healthcare financing.

New equipment and devices can be purchased from budget resources (state, regional, local) or from hospitals' chargeable services (mainly for inexpensive devices). In previous years, the CHI funds were sometimes used to buy equipment, but this was never widely adopted.

Medical services delivered to patients are usually reimbursed either from the budget or from the CHI funds. However, the majority of tariffs for medical services are very low. Besides, patients may pay hospitals officially out of pocket (OoP) or through private health insurance. At the moment, private insurance is not very popular - only 5% of the population has it. Instead, patients often pay their physicians informally.

4. Data and Methods

Hence, for analysing technology adoption in Russian hospitals, the main challenge of the present study was to identify common features in the decision-making processes of Russian public hospitals in acquiring new technologies and to reveal any dominant system, if one exists.

To obtain data for similar tasks, Teplensky et al. (1995) used a survey with a formalized questionnaire and econometric tools, while Silva and Vianna (2011) used in-depth semi-structured interviews. We preferred the same way to any type of survey because decisions about

[6] The Russian Federation adopted a nation-wide system of compulsory health insurance in 1993 in order to earmark a targeted source of funding for health care and to reverse a steep decline in health outcomes.
[7] This guarantee does not include some services such as dental prosthetics, plastic surgery, etc.

medical technology adoption in Russian public hospitals are not overt, health technology assessment is not used, and priority-setting processes are very unclear. Under these circumstances anonymous in-depth interviews were the most appropriate tool to shed light on the process of new medical technologies adoption. For the same reasons, we preferred semi-structured to structured interviews to allow the interviews to give us new information instead of simply verifying our own ideas.

As a first step, to select our sample, we chose two quite distinct geographical locations for analysis – the Kaluga region and Saint-Petersburg city. Saint Petersburg is the second-largest city in Russia and an important medical centre, with 111 public hospitals located in the city, while the Kaluga region has 48 hospitals located in different towns, including Kaluga-city (the capital of the region). The population of Saint Petersburg is approximately five million, while that of Kaluga slightly exceeds 330,000. Saint Petersburg is among the most prosperous Russian regions with an average personal income of about 25,995 roubles (approx. $812 USD) per month in 2011 compared to 17,557 roubles (approx. $548 USD) per month in the Kaluga region (Rosstat, 2012).

As a second step, we selected nine hospitals to represent the typical medical institutions operating in Russian regions. The hospitals included in this study varied by status (local, regional, central), clinical specialty (general, cardiac, paediatric, emergency) and size.

The study was based on 19 personal interviews in the two chosen regions. Calling on Greer's framework of decision systems (1985) we conducted interviews with nine public hospital executives (they all have medical backgrounds and most of them continue clinical practice as physicians) and seven heads of medical divisions. Similar to Silva and Viana (2011) and Lambooij and Hummel (2013), we interviewed three regional authority heads. We needed to interview regional authority heads because hospitals strongly depend on public policy to finance, purchase, and regulate new technologies. All interviews were conducted in June 2009.

We have developed two different guides based on Greer's framework of decision systems (1985) – one for hospital executives and heads of medical divisions (Annex 1) and the other for regional healthcare authority heads (Annex 2). In these guides, we have prepared a number of themes and questions to be discussed.

Following the guide we asked hospital executives and heads of medical divisions to respond to questions about information sources, motivations to adopt technology, assessment criteria, factors influencing decision-making, the decision process, and prominent actors. We asked authority heads about the new medical technologies adoption process, priority setting and assessment of new technologies use. In addition, all respondents were asked to describe a recent

new technology acquired at their hospitals and discuss any problems that arose from that acquisition. ("New" technologies included both recent tools, but also well-known technologies and devices if they were described as "new" by the particular interviewee — even if they were widely used abroad or in other Russian hospitals.)

All interviews were conducted face-to-face at the interviewees' worksites. Each lasted about one hour. The interviews were recorded and then transcribed.

After all interviews were taken and transcribed, we studied the transcripts to identify common problems and dominant strategies of new medical technologies adoption. We also examined regional specific features that affected the hospital decision-making process. We compared the interpretation of the main drawbacks in medical technologies acquisition given by authority heads and hospitals executives to summarize main causes of inefficiency in the medical technology adoption process.

5. Decision-making process

This section reports our main findings based on the analysis of interviews. We start with the identification of the main actors and the role they play in the decision-making process. After that, we identify what sources of information hospitals use to select new medical technologies and describe how their assessment is organized. Then we discuss the three rationales explained in section 2 (economic efficiency, indirect benefits, and clinical efficiency) and the main criteria for technologies adoption.

Prominent actors involved in decision-making

The decision-making process in Russian hospitals usually involves a number of participants. These are (a) healthcare authorities (federal, regional, and local), (b) hospital executives, (c) chiefs of medical divisions (senior physicians), and (d) staff physicians. Since each group has different incentives and motivations, the technology acquisition process is highly political and variable, with all actors vying for influence over technology adoption.

(a) Regional healthcare authorities are the main actors in the decision-making process in the regions because they determine which hospital(s) to include in the federal and regional programs. Most local authorities depend on regional budget subsidies, and are not able to make investment decisions themselves. Regional authorities allocate the main resources for medical equipment and devices, analyze hospitals' requests, and organize tenders. They can ban the purchase of equipment even if a hospital plans to buy it from its own sources. '*If I need to buy a medical device, I should ask the authority for permission…even if I have earned money myself*"[8].

[8] Here and further in italics we cite sayings from the interviews

Hospital executives in both regions reported that they have to justify and reconcile with regional authorities about 80% of their expenditures on equipment, devices, materials, and pharmaceuticals.

Regional authorities evaluate the regional state of health indicators and the general level of medical care. Ideally, (not taking corruption into consideration) their principle motivations correspond to the needs of the regional healthcare system. The main criteria for technology adoption therefore are hospital specialization, ability to acquire technology (e.g. environment, staff), and future outcomes. However, regional authority heads mentioned that they have to consider the informal status of hospitals. Privileged hospitals (used by the governmental officials and deputies) have priorities in receiving new technologies over other hospitals: "*If we ban the purchase of equipment to hospital "N" – we'll have problems as our government and deputies receive treatment there.*"

It is important that regional healthcare authorities are the most prominent, but not the final actor in the decision-making process. Their decisions can be cancelled by financial authorities: "*they either 100% finance our claims for technology adoption or decline it… they have their own criteria and they don't care about our estimates if we don't fit with their "control numbers"*- an authority head complains.

(b) Hospital executives, driven mostly by indirect benefits and image considerations, endeavour to receive from the state budget the best possible equipment. They often request technologies that contribute to a positive image of a hospital (like MRI), even if there are no financial and medical reasons for its adoption. The main rationales for new equipment adoption are: old (or outdated) equipment/devices replacement, new (additional) services introduction and new divisions development, technological process improvement in terms of better timing and quality. As the process of equipment purchasing is highly variable and often unpredictable over long periods of time, executives tend to overstate their real needs and to request "*as a reserve"* because they are not sure about getting new devices in future.

(c) Chiefs of medical divisions (senior physicians) concentrate on the needs of their own divisions, and thus try to persuade hospital executives to invest in technologies needed for their practice. As all hospital executives have a medical background and sometimes maintain a medical practice, they are usually more aware of technologies used in their specialty. Therefore, they must rely on senior physicians' opinions to decide about technologies used in other fields. They agreed that priority is usually given to chiefs who are ready and capable to develop their divisions and who have enough energy and talent to acquire new technologies.

(d) Regarding staff physicians, our analysis showed a difference in the two regions studied. For example, in Kaluga region there is a lack of specialists, particularly the young and ambitious. "*When a physician wants to adopt new technology, we support this person. I go to the authority head and ask for money. I do that only if I have a person who will cope with the technology*", said the head of a hospital in Kaluga region. Unfortunately for the Kaluga region, quite often those interested in new methods of treatment and self-development seek positions in other locations, mainly in neighbouring Moscow. Hence, for those rare specialists who keep working in local hospitals, the executives and senior physicians try to meet all their requirements.

By contrast, in Saint Petersburg executives rarely have any problems with finding a specialist for a hospital. "*I have never had a problem finding a specialist to work on new equipment",* said a head of a specialized hospital in Saint Petersburg. They focus mainly on strategic development and invite specialists capable of using the technologies and equipment the executives have acquired for their institutions.

Overall, there is strong evidence that financial staff does not participate in decision-making process. The key decision-makers are regional authority leaders and hospitals executives, with senior physicians and staff physicians having a limited influence on other actors.

Sources of information

Most of the interviewees agreed that analyzing information about new medical technologies, medications, etc., is crucial for physicians. Moreover, they understand that nowadays physicians and primary specialists have access to many different sources of information, including Internet resources. "*The Internet now is available in every hospital division*", said a respondent in Saint Petersburg. However, all interviewees pointed out that in their hospitals, physicians use only a limited number of sources: publications in medical journals (mainly domestic) and on the Internet, as well as seminars and conferences (more frequently mentioned in Saint-Petersburg than in the Kaluga-region). Also, many respondents reported professional communication to be an important source of information.

Some respondents said that contacts with drug and equipment salesmen used to be a source of information about new technologies. Physicians were used to relying on sales representatives for information about the most notable and relevant new technologies. However, the role of sales representatives has strongly diminished in the last few years. *"Salesmen are not interested in us. We don't have direct contacts with them any longer… In earlier times, we had regular consultations with sales representatives; participated in educational and training programs, clinical tests … We could at least talk to them, ask questions",* said an interviewee

from a paediatric hospital. One reason is that sales representatives changed the focus of their interest to regional or federal authorities, responsible for tenders. The other reason is that they prefer to deal with "thought leaders" – well-known specialists, doctors, and medical scientists — rather than frontline physicians.

Unfortunately, neither hospital executives nor physicians mentioned the use of international databases, health technology assessment reports, US Food and Drug Administration clearance documents, opinions of international experts, etc. The large majority of respondents did not report professional development programs. Moreover, those who did characterized training programs organized by the Ministry of Health and Social Development as a "*waste of time*." Also, very few specialists attend specialty meetings regularly to obtain additional training.

In both regions, respondents reported there was no regular analysis of new technologies, and that they obtained most information about new technology simply by chance. "*It's often a number of fortuities: a doctor comes to a conference, meets somebody, gets an invitation and then a proposal. It's not due to screening or monitoring, no… He (the doctor) thinks OK, let's try this technology, because I have personal contacts…"* Quite often, hospital heads explained the appearance of a new technology after attending a seminar or receiving information from colleagues or participating in an international program. One example of how education happens by chance is the "Heart to Heart" program, which has inspired some hospitals to adopt American technologies and equipment just because administrators were lucky to learn about new approaches during the program.

The large majority of respondents agreed that most physicians have limited knowledge about recent developments in medical technology. This is partly because doctors and nurses have problems with foreign languages ("*our physicians rarely speak English, especially middle-aged*") and reading specialty journals[9]. It is also because they are overloaded with everyday practice, leaving no time to keep up with technological developments. "*Our physicians are working without rest*", "*they are working in two shifts*", "*in my hospital 17 physicians work almost round the clock*" – these are typical quotes when hospital heads justify their doctors. Whether they are exaggerating or not, the lack of time and energy led most respondents to report that physicians are unable to keep up with publications concerning potentially relevant technological developments. Since physicians are not using effective sources of information they do not assess data about the safety and efficacy of new technologies.

[9] Vlasov and Danishevskiy (2008) state that 95% of Russian physicians can't read in English, other 5% often don't have access to international publications.

Decision-making procedure

Technology acquisition may be initiated either (a) by an authority (federal or regional) or (b) by a hospital.

(a) If it is initiated "from above," then the equipment usually is delivered within a federal or a regional program. Authorities are supposed to aggregate hospitals' requests and take hospitals' preferences into consideration. However, hospital executives in both regions described dozens of situations in which they were forced to adopt equipment they did not need.

Quite often they received equipment and devices that were incompatible because the various producers used different technical standards. Often they received only the very basic versions of equipment, so they could not deliver all of the services needed. Sometimes hospitals were forced to take the equipment that they cannot use because they lacked the appropriate specialists or encountered technological gaps or infrastructure problems. To illustrate this situation, an executive in a Kaluga regional hospital described what ambulances received within the national "Health" project. These new vehicles were equipped with the latest features, but they could not handle the rough rural roads in the region. As a result, the hospitals had to curtail the use of these vehicles and go back to their original ambulances instead. The respondents noted that when they receive equipment "from above," they value it as a "gift", even though these presents are often useless. The hospital is obliged to decide simply "to take it or leave it"; it cannot change the type of equipment received or apply for another producer/specification.

(b) If a hospital is going to initiate a technology acquisition, the decision-making process has two steps. First, a hospital itself decides what technologies it needs to adopt. There are two primary decision-makers: Senior physicians advise, and medical directors (executives) have the final say. Other specialists are occasionally invited to the discussion if their opinion is needed. There are no standard procedures, and no objective measures or quality comparisons or cost-benefit analyses, formal or informal, making the decision-making process very vague.

Second, when a hospital has set its priorities, it has to decide who will finance the technology adoption and organize tenders. Usually the response depends on the price of equipment. Both regions have special rules for costly equipment acquisition. For example, in the Kaluga region, all purchases above 2 million roubles (approx. $66,000 USD) must be approved by the deputy governor of the region, no matter who pays. Hence, the second step often starts with negotiations between the hospital and the authority. Typically, the hospital applies to the regional authority for financing and the authority examines the need and ability to satisfy the request. The negotiation with authorities is a complex process, involving bargaining and

compromises, unclear and non-transparent decision-making, and informal relations. This is less true in the Kaluga region because overall competition for technologies is less fierce.

Hospital executives mention that they have to prove the need for a new technology acquisition and often struggle to comply with their requests. They also underline the importance of the "human factor" and personal relations with authority leaders.

Neither hospitals nor authorities use health technology assessment procedures in a priority setting; information gathering about particular technologies is poorly organized; authorities often don't estimate hospitals' ability to adopt and use properly new technologies.

If the authority decides to finance the technology, it is usually responsible for tenders. In Saint Petersburg, hospitals have the right to purchase devices and equipment themselves without organizing tenders if the cost of equipment does not exceed 5 million roubles (approx. $167,000 USD). This cap corresponds to federal acquisition regulations. Quite often the authority examines different requests from all hospitals and announces one tender for all of them, and thus ignores the specific needs of each hospital.

The hospital representatives may be invited to tender commissions or maybe not. It depends on the hospital relations with the authority and on many other factors, including corruption. "*They (the authorities) don't let us go to the committee meetings…they say they can decide everything themselves*…" Complained a head of a hospital in Saint Petersburg. His colleague from Kaluga region said: "…*in the hospital we better know our needs. Let me give you an example. Long ago, before these rules were introduced I'd bought a monitor from "General Electric" for 10 thousand euro and it had worked perfectly for 10 years. We asked the authorities for a new GE monitor, but instead, after the tender, we received three monitors for the same price, but none worked for more than a year*".

The executives complained that quite often they received equipment from unwilling producers because authorities considered only price criteria, or they received the right equipment, but with inconvenient warrantee terms.

Motivations and criteria for technology adoption

Respondents from hospitals in both regions were asked to rank the importance of motivations for technology adoption from three possible choices: (1) financial (economic) efficiency, (2) image and indirect benefits, and (3) clinical efficacy.

Economic rational. Most interviewees noted that financial considerations are crucial to technology acquisition: "*The main motivation to acquire new technologies is connected to an increase in the demand for services, and hospitals of course want to earn money for their doctors"; "obviously new equipment is an important source for increasing physicians' revenues.*

A physician is human – he needs food, theatres and something to buy. This is the most important thing at the moment", etc. So when respondents were asked to specify economic motivations for adopting new technologies, they named new services, more patients, and personal income increase (formal or informal). (Physicians in public hospitals are paid salaries according to their qualifications, labour, experience, etc. If a hospital delivers certain services to patients for a fixed charge, physicians receive additional income, depending on the number of services and patients visits. Both basic salary and additional income (if any) are low, and many physicians implied that their income is supplemented by informal payments and "presents".) Surprisingly, nobody (including hospital executives) mentioned any economic and financial assessments, cost-benefits analysis, or profit maximization models.

To understand why no financial and managerial calculations are used to evaluate technologies, we should go to the table. Respondents indicated that different combinations of financing technology adoption and services delivered with the use of this technology exist and the economic motivation for acquiring new technology is different in each case.

Table. Financial sources to reimburse medical treatment and technology adoption

Technology acquisition financing from	Treatment financing from:		
	Budget full coverage	Budget/CHI partial coverage	Hospital charge (OoP or insurance)
Budget (federal, regional, local)	(1)	(2)	(3)
Hospital charge	(4)	(5)	(6)

When a hospital receives new equipment and introduces technologies out of the budget (federal, regional, local), it does not consider the initial costs of the equipment and may request for the most expensive technology (situations 1, 2, 3).

If all the maintenance and servicing costs are fully charged to a budget or CHI fund (situation 1), the hospital evaluates only the benefits associated with the new equipment (i.e., the formal and informal payments received for using this equipment). The hospital doesn't consider post-guarantee servicing and materials prices.

If a hospital bears maintenance and servicing costs (situation 2), it has to take a saving-cost strategy into account. All respondents indicated that this is a very typical situation, causing problems: "*When equipment depreciates (both physically and morally) it needs renovation/repair. And each time we are in trouble - these expenses (for renewal, repair)… they*

are huge. Nobody thinks about that"; "we can't afford materials and servicing costs – we have to look for cheaper analogues and often it's not good for equipment".

Most equipment received under the National "Health" Project or under special federal programs for cardiology, tuberculosis, etc. do not imply full post-purchasing expenditures coverage. The tariffs for medical services delivered with the use of the new equipment often do not include maintenance costs, forcing hospitals to search for additional sources of financing, usually from chargeable services (situation 3). This finding suggests that contradictions between the hospitals and the authorities responsible for equipment tenders are inevitable: Those who organize tenders are interested in low equipment prices and do not take other considerations into account, while hospitals are likely to acquire technologies that do not need expensive materials and repairs, regardless of the initial price.

When public hospitals acquire new technologies using their own sources, mainly from chargeable services (situation 6), they evaluate benefits and total costs, including technology, materials, maintenance, etc. In less widespread situations 4 and 5 when hospitals purchase new medical devices for their own account and then use them to deliver free of charge medical services and cover maintenance costs fully or partly from the budget and CHI funds they take into consideration future benefits, initial price of technology and partly maintenance and servicing costs (situation 5). However, incomes from chargeable services are limited, so hospitals cannot buy expensive equipment.

The respondents reported that hospitals (no matter their status and specialization) are usually in situation 1, 2 or 3, making a financial analysis of acquiring technologies useless. In general, hospitals are motivated to introduce technologies that are cheap in maintenance, the other criteria being compatibility with the hospitals' equipment and infrastructure facilities and physician efforts-saving. However, hospitals are not interested in adopting technologies that decrease the period of hospital stays. Furthermore, the respondents reported that since hospitals are reimbursed according to the number of days that a patient stays, they have a financial incentive to maintain less efficient treatments. Most interviewees agreed that in some cases they could discharge their patients earlier but they would lose money: "*if we discharge a patient on his 5th day we'll get only 5 thousand roubles instead of 20…We know it's typical - we could have discharged patients much earlier – in surgery division, in gynaecology, in urology… but it's unprofitable because of the reimbursement tariffs."*

Indirect benefits. A number of respondents reported image as most important motivation or at least equally important as financial efficiency. They want to be perceived as cutting-edge. They also said that the desire to have the best possible equipment is common for most physicians

and executives. "*A lot is driven by prestige*," said the head of an authority. "…*A desire to have MRI in a hospital is often just a matter of prestige and has nothing to do with rationality*."

Among indirect benefits, four main motivations drive hospitals to acquire new technologies even when there are no economic and financial rationales: (a) attracting patients, (b) attracting physicians, (c) the satisfaction of chief doctors, and (d) privileges for the hospital.

(a) Attracting patients is a dominant motivation. Respondents understand that patients are often aware of new technologies, creating a sort of pressure for physicians. Patients evaluate not only medical equipment and devices but also the design and ergonomic quality of the furniture and the facilities of rooms and wards, motivating hospitals to invest in a comfortable and patient-friendly environment. The focus on environmental investment signals to patients that the hospital cares about all aspects of treatment. This situation is explained by Lee's (1971) demonstrative behaviour theory, already discussed in section two. The interviewees explained that well-equipped hospitals therefore attract more patients, and more importantly, upper-class patients with higher incomes: "*it's very important that patients see, that we are well-equipped*", "*with new technologies they (hospitals) attract a certain class of well-off patients, which is obviously profitable for physicians."*

(b) Positive image attracts qualified physicians. For some specialists, the quality of medical devices and equipment is crucial (e.g. in surgery, dentistry, ophthalmology, etc.), because they save time and energy while decreasing risks. The majority of respondents agreed that highly qualified physicians are rare in Russia. According to estimates by a Johnson & Johnson representative in Moscow, only 5,000 of 600,000 Russian medical specialists are aware of and regularly use the latest and most efficient technologies. While hospital executives are not that pessimistic, they also reported that acquiring new technologies helps them to get better physicians and primary specialists: "*Technology and equipment helped me to gather a good team…I have invited one physician from Novosibirsk… good specialists easily join our hospital*."

(c) A large majority of interviewees mentioned personal satisfaction as additional, though not key, motivation. This is how an authority head described it: "…*they (hospital heads) want to get an MRI to feel proud of possessing it…they also want it to be able to boast.*" The executives appreciate when their colleagues and patients admire their hospitals and the technical opportunities available: "*I'm happy that everybody admires our centre.*" Respondents also reported that the physicians who use new technologies and procedures express delight and satisfaction, and have high self-esteem. Nevertheless, executives admit that not all physicians want to change their well-established practice and position themselves at the leading edge of medical care.

(d) Finally, we'll address reputation and privileges. A hospital that has a leading and prestigious position builds a good reputation and receives strong support from local (sometimes even regional and federal) authorities. Some executives explained that hospitals with strong reputations often had special relations with prominent citizens and authorities, and these relations helped them to solve different problems. Those respondents who could not boast about having close relations with the local governmental administration indicated that they are often left out of the decision-making process; at the same time, their "competitors" are involved in political life through participation in healthcare commissions and committees. As a result, a leading hospital has more opportunities to influence the priority-setting process and to receive new medical equipment. *"Our physicians have privileges in the city…our hospital is special because we are at the leading edge of care."*

Clinical efficacy. Although clinical efficacy was last among motivations, all interviewees cited it as an important rational, explaining that hospitals tend to acquire only clinically efficient technologies, but not always the best in class: *"We need new technologies as it means better quality of care"*; *"We put patient's interests first"* ; "*patient's interests are very important.*"

A large majority of respondents said it is impossible to adopt the most prominent technologies in Russian hospitals because of technological gaps, including quality of other hospital facilities, education/skills gaps, quality of infrastructure (buildings, water supply, electricity etc.) and sometimes outdated clinical standards. Besides, most technologies need appropriate supporting facilities that are very expensive. Therefore, clinical efficiency *a priori* cannot be a dominant motivation in most Russian hospitals. *"We can't yet demand the best in class technologies as the level of overall development is not the same as in developed countries. It's impossible. We therefore choose those technologies that can be adopted here over technologies that decrease our losses and facilitate our job."*

Overall, while all three motivations exist, there is strong evidence that neither clinical efficiency nor financial efficiency can be viewed as a dominant motivation. Instead, the indirect benefits associated with image and technological leadership drive hospitals to adopt new technologies.

6. Discussion

This study has examined how new technologies are adopted by public hospitals in Russia. We used Greer's three decision-making systems (models) framework to determine a dominant strategy in Russia.

Previous studies of medical technology adoption motivation as well as our research show that none of Greer's three models are completely comprehensive; factors underlying each of them may be dominant depending on the circumstances. The fiscal-managerial model is most appropriate to describe cases when hospitals replace or purchase additional units of medical equipment. The strategic institutional model based on the criterion of prestige and indirect benefits for the hospital and its personnel can explain the uptake of technologies that have a significant impact on the clinic's development. In cases where the medical organization is faced with a choice between quality and quantity of services provided (the volume of services and the intensity of treatment) under given financial constraints, the behaviour of clinics is well described by the medical-individualistic model, as clinical effects of technologies are put in the forefront.

Although the hospitals studied vary in specialties offered, size, reputation etc., we did not reveal any important variations in decision-making processes that could be attributed to a hospital's characteristics. The acquisition process is similar for all public hospitals, no matter what dimension is studied (information sources, motivations, key decision-makers, or bargaining procedures) . No matter the hospitals type/status, the main obstacles to new technology adoption are the same: technological and environmental gaps, physicians' qualifications, reimbursement policy, motivating for old technologies use and the negotiation process with authorities. We observed only two regional specific features. The first is that technology acquisition is more likely to be driven by competition for desired patient groups in Saint Petersburg, whereas hospitals in the Kaluga region are more likely to be driven by competition for physicians. The second is that in Saint Petersburg regional authorities were more likely to reject hospitals' requests, seeking to avoid equipment duplication.

As our study was limited to 19 interviews, taken in two of the 83 Russian regions, we cannot state that our findings reflect the decision-making process in all Russian hospitals. Moreover, we assume that some regional variety may exist. However, even with a limited number of interviews, we can deduce that the decision-making process adopted by Russian hospitals and authorities is very inefficient.

We find that the new technologies adoption process has a number of drawbacks that can be observed during each step of decision-making - poor information gathering, ambiguous procedures of technology assessment, authoritarian in-hospital priority setting mechanisms, and informal, non-transparent bargaining between hospitals and authorities.

A specific feature of all Russian public hospitals is that they are strongly dependent on health authorities' decisions about new technologies acquisition. Meanwhile, the criteria for

adoption of medical technologies are different for health authorities and hospitals. When making decisions about equipment purchases, the declared priorities of regional health authorities mainly reflect the setting to the population's health care needs and purchasing of the most cost-effective equipment, but usually without taking into account the potential cost of consumables, maintenance, etc.

Although Russian hospital leaders and authority heads do not use advanced managerial tools to make decisions about technology uptake, other criteria that correspond to strategic-institutional decision system can be easily identified from the interviews. Thus, at the organizational level, prominent actors are usually executives and senior physicians motivated mainly by image and indirect benefits (technological leadership in order to attract patients and physicians). While Greer's three decision-making systems are all important in explaining hospital adoption behaviour, factors of profit maximization and clinical excellence are usually given less consideration then strategic development. Our findings on the motivations of hospitals are similar to those that Teplensky et al. (1995) obtained to explain MRI adoption in the USA, and Silva and Viana (2011) discovered for CT adoption in Brazilian hospitals.

Inefficiency problems arise from a contradiction between the financial motivations for acquiring new technologies of hospitals and authorities: hospitals tend to adopt technologies that bring benefits to their heads/physicians and minimize maintenance and servicing costs, while authorities' main concern is initial cost of technology. When selecting technologies and preparing applications for the acquisition of new equipment, hospital executives are guided by an interest to obtain expensive equipment that improves the image of the facility and is expected to be used largely to provide chargeable services. By acquiring new medical technologies, a hospital generates additional revenues by expanding medical services to its patients. The hospital therefore behaves as a cooperative business venture for physicians who benefit financially. This strongly corresponds to Pauly and Redisch (1973) idea of a physician's cooperative, maximizing their earnings. We also find evidence to support Lee's (1971) theory of demonstrative behaviour and idea of non-price competition for physicians and desired patient groups (Coile, 1990; Renshaw, et al., 1990, Luft et al., 1986). But unlike Western clinics, the interests of Russian hospital executives and doctors focus on the possibilities to obtain income not from all hospital activities, but only from a part of them: from the provision of chargeable medical services to the population, as well as receiving informal payments from patients.

In cases where the hospitals are buying new equipment themselves at the expense of their revenues from chargeable medical services, their behaviour often corresponds to Greer's fiscal-managerial model. But, unlike Western clinics, Russian hospital executives consider a narrow

range of economic effects (enhancement of services, attraction of additional patients, increase of paid services) and do not take into account such indicators as returns on investment, payback period, price potential, or the size of the market.

However, the main reason for inefficiency of medical technology adoption arises from the central procurement of medical equipment for hospitals that creates the preconditions for rent-seeking behaviour of persons responsible for tenders. This evidently leads to replacing efficiency criteria with personal interests. The leading interest in this case is the size of "rolling back" due to the purchase of the equipment that makes cost-effectiveness analysis of new technologies an inappropriate tool for decision-makers. This is the reason the decision-making process does not imply comparison of alternatives by price of equipment and its maintenance costs regarding the expected clinical outcomes. For the same reason, health authorities often inadequately evaluate the needs of different medical services and the possibility of health care facilities to use equipment procured for them effectively. This results in a consistently reproduced situation where equipment is purchased over-capacity, and thus, underused.

To increase the efficiency of decision-making around medical technology adoption, the Russian government needs to shift the responsibilities of the main actors. The right to select and purchase medical equipment should be delegated to hospitals, while health authorities should be in charge of approval of the hospitals' development program. The decision-making process in Russian public hospitals must become more transparent and also take into account the growing body of international research on the relative efficiency of treatments and new technologies. Decisions should be based on the clinical need for technology, forcing hospitals and authorities to question whether a particular new technology is necessary and whether the resulting increase in clinical efficacy is worth the increased cost.

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Annex 1. Guide for interviews with hospital executives and heads of medical divisions

Information about the hospital/medical center (5-10 minutes)

How old is the hospital/medical center? What is its status (local, regional, federal, other)? What is its main clinical specialty? Do you know any other hospitals/centers in the region (in the country) that offer the same medical treatment? Do you have any academic departments or educational centers within the hospital?

How many physicians work in the hospital? What are main financial sources - state budget, regional, local? What is dominant? Do you participate in any federal programs or the National Project "Health"? Do you get any funding from private insurance companies, charities, or hospitals' chargeable services?

Opinion about new medical technologies (5-10 minutes)

Do you agree that your hospital needs new medical technologies? If yes, what kind of technologies do you need most? Cost-saving technologies? Improving quality of medical care? Attracting more patients? Adding new services? Facilitating physicians' work ? Other?

Information gathering (5-10 minutes)

What sources of information do you usually use to learn about new medical technologies? Medical journals (national, international)? Conferences and seminars? Producers? Patients? Insurance companies? Your employees? Your colleagues from other hospitals/medical centers? Authorities? International organizations and associations? Do you know what HTA (health technology assessment) is? If yes, do you use HTA reports? Do you have access to medical databases? Do you cooperate with any medical research laboratories/medical universities? Are you aware of the Federal Research Program for 2007 - 2012?

What activities do you have that help physicians learn about new medical technologies? Regular staff meetings and seminars? If yes, how often? Are they formal or informal? Any training/retraining/courses? How often physicians attend conferences, seminars and professional exhibitions outside the hospital?

How would you describe an ideal process of information gathering in a hospital? How it should be organized? What sources of information do you need?

Decision-making process (15-20 minutes)

How is the process of decision-making about new technology adoption organized in your hospital? Who usually participates in the decision-making process? Do you have a formal application procedure for medical divisions? Do you have any formal or informal discussions of new medical technologies? Do you have any formal criteria for technology assessment? If yes,

specify. Do you have any committee or other bodies that are responsible for technology selection. If yes, how they are formed? Who is in charge for final decision?

Can you test new technology before you decide to adopt it?

To what extent does the decision-making process depend on the costs of new technology adoption? On its popularity?

How often do you have to make decisions about new technologies adoption? Do you have any sort of a plan or a strategy of technical renovation of the hospital? If yes, do you have to coordinate it with the authority? If yes, in what way (budget, characteristics of technology, other)?

How would you describe an ideal process of decision-making a hospital? How it should be organized?

Funding (5-10 minutes)

How can you describe the level of medical technologies that are used in your hospital comparing to average in your region/ county/developed countries?

What kind of technologies do you adopt more often (new equipment/devices and materials, new treatment methods, information and communication technologies, other)?

How often is new medical adoption associated with high financial costs? What sources do you use to adopt new medical technologies (budget, OMI fund, Federal Project "Health", charity funds, chargeable services)? Can you pool different sources to purchase one technology? Do you have a budget for medical technologies? If yes, how is it formed?

Example of recent technology adoption (5-10 minutes)

Can you name any changes in medical technology that happened in the hospital within last 3-5 years. If yes, when was it? What was the main purpose of this technology adoption? Did you have to organize any training for medical stuff? How do those who work with new technology assess it?

Why did you choose this technology? How did you learn about it? Did you use any additional sources of information to learn more about this technology before its adoption? What criteria did you use to evaluate it (price, maintenance and servicing costs, reputation, expert opinions, clinical efficacy, cost-saving, image, technological leadership)? Who participated in decision-making process? Who took the final decision? How new technology purchase was funded? How long did it take you to launch the technology? Did you have to coordinate your actions with authorities/get permission for adoption? If yes, please name all the authorities you had to contact. Did you have to apply for new license or certificates? If yes, did it cost you anything?

Did you have to buy new equipment to support new technology? If yes, did you/authority organize a tender?

Obstacles for technology adoption (5-10 minutes)

What are main obstacles for new technologies adoption in your hospital? Lack of financing? Lack of information? Lack of confidence? Low qualification of physicians and other staff? Overregulation and bureaucratic pressure? Other?

What policy measures could help you improve the process of new medical technologies adoption?

Annex 2. Guide for interviews with regional healthcare authority heads

Information about authority (5-10 minutes)

Name of authority, responsibilities and powers towards hospitals/medical centers (regulation, licensing, financing, control, consulting, other).

Involvement in new medical technologies adoption process (20-30 minutes)

How can you describe the level of medical technologies that are currently in use in the hospitals under your jurisdiction? Comparing to other RF regions? Comparing to developed countries?

Are you heavily involved in the process of hospitals' medical technology adoption? In what form? When is your active participation mandatory? When do hospitals adopt technologies independently?

How do you set priorities with respect to medical technologies? What criteria do you use to choose new medical technologies? What factors have major impact on your decision? Budget constraints? Regional mortality and morbidity data? HTA reports? Economic estimates? Clinical evidence from other regions/countries? Recommendations from higher (federal) authority? Russian opinion leaders' recommendations?

Do you examine technical characteristics of a new technology?

How do you set priorities with respect to different hospitals?

Do national producers of medical equipment and devices have any advantage?

Are you aware of Federal Research Program for 2007 - 2012?

Do you have a fixed budget for new technologies acquisition/equipment purchase? If yes, how is it formed?

What other types of assistance (in addition to financing) can you offer to public hospitals to assist them with medical technology adoption (information, consultancy, expertise, communication platforms, juridical support, education and training, other?)

Do you assist private hospitals? If yes, in what form?

New technologies use (20-30 minutes)

Do you control how newly adopted technologies are used in the hospitals? If yes, please specify, what indicators do you look at? Do you pay attention to these indicators when take decisions about future cases of new technologies adoption?

Can you name any crucial (incremental) changes in medical technologies that happened in hospitals of your region within last 10 years? Can you give example of successful medical technology acquisition that has significantly improved medical care in hospitals in your region?

Do you have examples of poor technology adoption? What was wrong with it and why?

Are hospitals always excited about new medical technologies adoption? Do you have examples of its resistance to new medical technology adoption? If yes, what are main reasons for such resistance? (lack of information, low qualification of physicians and other stuff, rigidity, lower quality of new technology/equipment compared to those in use, increasing efforts, other)? What obstacles for new technologies adoption do hospital heads translate to you?

What policy measures could help you improve the process of new medical technologies adoption?

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