



## Conference Paper

# Evolution of Military Hospitals Architecture in Russia from 1707 Year Till Nowadays

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## Abstract

In article authors show the history of evolution of military hospitals in Russia from 1707. More than 300 years are presented in a short to draw a picture of development of this type of buildings. Special attention is devoted to the modern projects and their characteristics. Also authors consider field and mobile hospitals, their constructive peculiar properties and predictable future of this sphere.

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## 1. Introduction

The medical support for soldiers is an integral part of care for the safety of the army. As history shows, each leader has solved this problem in a different way, but it is impossible to ignore this issue.

The topicality of the research is caused by the organizational and technological changes taking place in health care and the lack of the developed research regarding the features of the evolution of the architecture of military hospitals.

## 2. Four classes of evolution of military hospitals in Russia

The analysis of the archival materials related to the history of the development of military hospitals architecture in Russia and abroad shows that the evolutionary development started with the initial point of the organization of the first state hospital in Lefortovo by the order of Peter the Great in 1707 (Figure 1) [1].

That military hospital became not only the first public medical institution, but also the first clinic that provided training for future physicians [2].

According to Peter the Great's decree, during that period 10 hospitals and 500 infirmaries were built in big cities (St. Petersburg, Kronstadt, Kazan, Revel). And according



to Budko A and Zhuravlev M “..the main component of the initial stage was a formation of army medicine - a key element for all subsequent development of state health care” [3]. The system of first hospitals became a prototype of the modern system of providing health care in Russia. From that time begins the history of Russian state medicine, not only for the military sphere, but also for all citizens.

These first hospitals can be attributed to the first class, that we named “ancestry”.

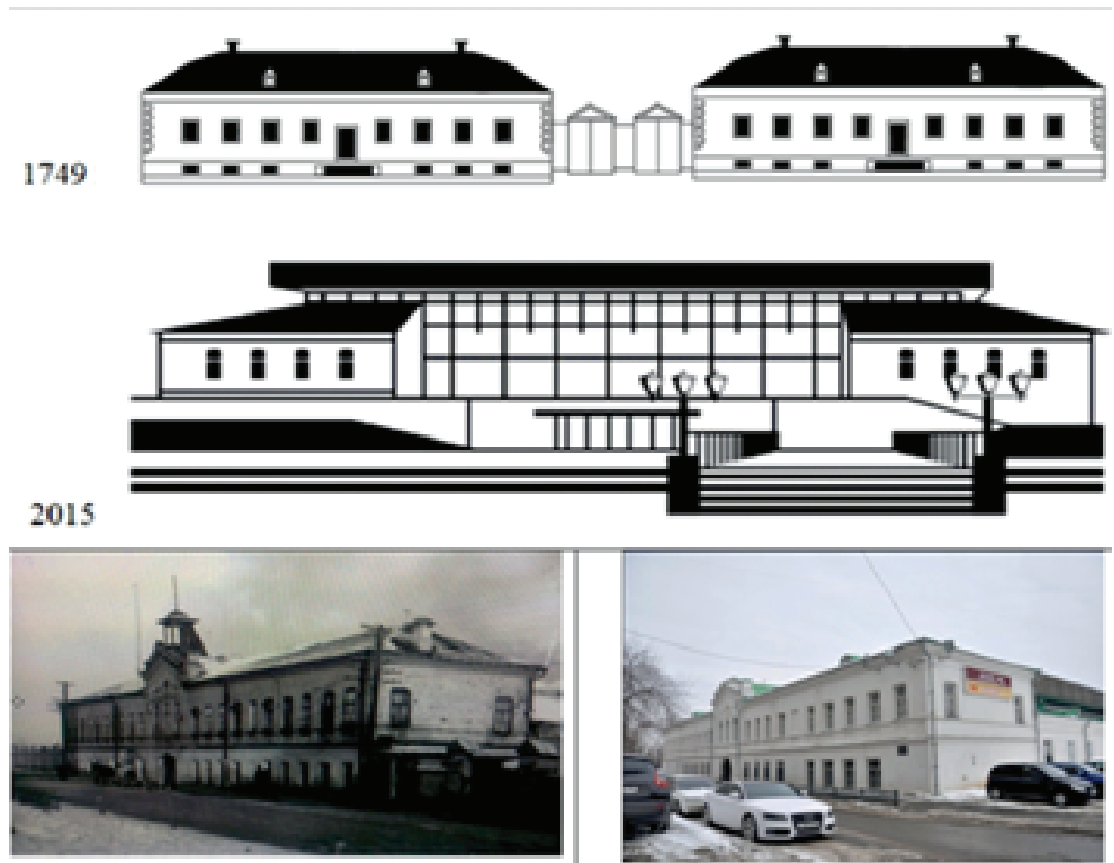
The distinctive feature of these examples is that they served as the initial point in a long history of the development of medical care in the cities where they had been built. They underwent a number of changes, but their functional purpose remained invariable. Now the most efficient military medical centers in Russia with centuries-old history are situated in the place of the first wooden constructions.



**Figure 1:** Main military clinical hospital named after the academician N. N. Burdenko. Hospital was constructed in 1707. The main building (that is shown on the photo) was constructed in 1802 by the architect I.V. Egotov.

Following the introduction of the first projects, the next step comprised the organization of factory hospitals, where workers could get first medical aid. These buildings were also designed according to the standards of military hospitals, so we could consider them in the evolution process (Figure 2).

Most of the structures that were built in this period are nowadays damaged or in ruins. The remaining buildings are mostly not used in an initial mission, for example as a museum or a polyclinic. But the construction of these hospitals determined the subsequent vector of the development of the territory adjacent to them, thereby having given an impulse to the development of modern infirmaries and medical institutions.



**Figure 2:** The changes that have happened in the building of a first Ekaterinburg factory hospital after 266 years of exploitation (upside the scheme of a facade, lower photos of object). Nowadays this building is used as a museum of a modern art[4].

The next stage of the development could be named as “the growth of quantity of military hospitals” because of the use of typical projects. So every military unit and big city nowadays has its own hospital, which serves only servicemen and their families.

The last stage starts in the 21st century, the new hospital type is not just a typical project; it is a machine for rapid cure. The prevalence of difficult planning solutions is visible in projects, comprising the division into “pure” and “dirty” zones, streams and the introduction of the advanced engineering systems. The ascetic simplicity of the facades of modern hospitals is compensated by the most difficult technological stuffing and competent functional zoning. As a rule, they have 6-7 floors, a full set of offices and opportunities for ensuring rehabilitation. The architecture and facade decisions concerning such hospitals are very simple and laconic, the main work of the architect consists of competent creation and the placing of parts of functional structure.

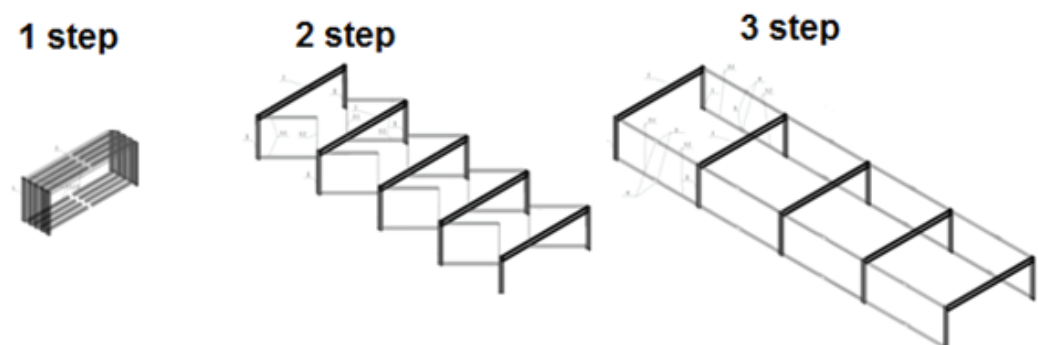
### 3. Fieldhospitals and a project of hospital of a new type

Another interesting type of military hospital is a field hospital or its modern form – a mobile hospital. There are two constructive types of space-planning decisions that are used today – a pneumoframe and a block. The advantages of the pneumoframe type include simplicity and the minimum time for expansion, easy transportation, small weight; the disadvantages are low durability and the low level of comfort. Block modules are used because of their high bearing capacity, but at the same time they have no ample opportunities regarding blocking, have big dimensions in comparison with the pneumoframe hospital in time of transporting.

In any execution of a field hospital we see a separate structure which doesn't provide uniform medical sanitary space. In all projects, in order to insure modularity, the hospital appears as a set of separate elements without the use of elements joints between separate blocks or zones.

So, as a suggestion the authors offer a project of the mobile hospital "Resuscitation Center". The hospital of the new type is designed for the most rapid sorting of the incoming flow of patients and the wounded, built-in medical capacities allow providing help to the badly wounded. The transportability of the hospital is ensured by the use of the transformed framework which allows developing hospital on any platform in the shortest possible time and providing conditions which are brought closer to the conditions of the inpatient facility.

Square of 1 module in laid out position (step 3) reaches 270 m<sup>2</sup> of undivided free place that could be transformed for any purposes (Figure 3). In a packed position (step 1) this framework is easy to transport.



**Figure 3:** Stages of transformation of a mobile framework, patent No. 154890 [5].

The proposed solution of the Resuscitation center is new type of military mobile hospitals, designed not for loading, but for a distribution of the coming streams that

allows to provide help even to the heaviest patients in the shortest time. Use of modular system allows moving hospital from place to place, providing at the same time comfortable conditions for work of doctors.

## 4. Conclusion

More than 70 projects of hospitals have been considered to make the subsequent chronological chain which has shown the true picture of evolution process in the planning and faced decisions.

The general conclusions and results of a research are focused on optimization of process of design of military hospitals. The tendencies of development show transition from stationary objects to mobile, with a possibility of rapid adaptation under new requirements.

The research has shown that hospital system organized by Peter the Great became a prototype and a basis of all modern health system, the first buildings of hospitals today have turned into the leading medical centers, keeping the initial mission. Having given an impulse for development of civil medicine, military hospital remained special type of medical institution, with their history of development and evolution.

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