Hell J Surg. 2024 Jan-Mar;94(1):20–23
doi: 10.59869/23024

Introducing a robotic surgery program in the Greek National Healthcare System: Obstacles we need to overcome

Panagiotis Dorovinis, Nikolaos Machairas, Dimitrios Dimitroulis

2nd Department of Propaedeutic Surgery, National and Kapodistrian University of Athens, Greece

ABSTRACT

A National Healthcare Systems' primary objective is to ensure equal access to its members. Every advancement in medicine, which has proven to be safe and efficient, must be provided to every patient regardless of their socioeconomic background or financial status. However, the systems' nonprofit guiding principle results in inadequate financial support, which generates a vicious cycle of disproportionate access to its resources. A recent technological breakthrough in surgery, with several bestowed advantages, is the robotic surgical platform. However, its implementation in the Greek National Healthcare System, for the common good, is associated with several obstacles. The purpose of this article is to outline these obstacles and to suggest potential solutions, in order to eliminate any disparities between patients operated in public or private sector hospitals.

Key Words: *Greek national healthcare system, robotic surgery, financial obstacles*

The principal factor for the development of a robotic surgical platform has been the constant need to undertake surgical tasks requiring tremendous manual dexterity and technical skills, whilst minimising human error and improving patient outcomes [1]. The adoption of a robotic assisted surgery (RAS) program, within a wide spectrum of surgical specialties including gynaecology, urology and general surgery, has several bestowed advantages. These include the minimisation of surgical trauma, earlier mobilisation, decreased postoperative morbidity rates and a shorter length of hospital stay (LOS) [2,3,4,5,6]. Multiple national and international reports have shown a notable increase in the use of RAS across multiple surgical specialties and subspecialties over the past decade. In a previous report, we had highlighted a similar increase in the number of robotic surgical procedures performed in Greece between 2007 and 2017. Currently, there are seventeen robotic surgical systems in operation in Greece. Out of them 13 are located in Athens and four in Thessaloniki. Nonetheless, only two are purchased by the Greek National Healthcare System and operate in public hospitals, while the rest operate in private hospitals. This highlights the major issues associated with the funding of a robotic surgical program, on the one hand, and on the other hand the disparities in the quality of healthcare services between the public and private sector. Hence, it is important to understand that setting up a cutting-edge robotic surgery platform for general surgery procedures in a public hospital poses numerous obstacles that must be overcome [7]. The overall success of such a program lies within the implementation of a long-term business plan and setting a strict timeline which aim to overcome all the associated obstacles [8].

To date, the greatest disadvantage of robotic surgery remains its significant per capita cost [7]. A national network of patient referrals to expert centers, which is of

Corresponding author:
Panagiotis Dorovinis
2nd Department of Propaedeutic Surgery, National and Kapodistrian University of Athens, Greece
e-mail: pdorovinis@gmail.com

Submission: 02.04.2024, Acceptance: 08.02.2024

cardinal importance in the field of surgical oncology for example, could act as a springboard for the establishment of a robotic surgery program. Greece is one of the four countries in Europe where a policy in the centralisation of surgery is absent. However, it is indicated from the literature, that referral for complex conditions in expert centers improves the quality and lowers the cost of the treatment provided [9]. Furthermore, the utilisation of the same robotic surgical platform by several surgical specialties and the ability to reuse the equipment, are the key elements of its sustainability. These strategic approaches might facilitate tackling the considerable per capita cost of obtaining and operating such a system [10].

Before starting a RAS program, it is crucial to establish a long term business development plan, of at least three years, with projected cost balances. This should include the direct (related to the robotic platform) and indirect (associated material, staff training) costs. The starting point of an efficient business plan, would be the foundation of a dedicated robotics committee within a hospital. Ideally, the committee should be composed of several individuals originating from the hospital staff, who can contribute to different lines of work: a hospital administrator, an anaesthesiologist, a surgeon, and a trained nurse. The composition of the robotics team, by various staff members with distinct roles, will eventually lead to an increased probability of success and provide a sounder transition once the program starts. Furthermore, establishing a national registry or even an institutional database is essential for the quality assessment of the program. Data analysts along with administrative staff could become valuable assets, guaranteeing the independent collection of data and its evaluation.

Initially, in order to have a robotic system operating at its full potential, it is necessary to construct a dedicated operating room (OR) with adequate space, equipped with specialised infrastructure including robotic consoles, instruments, and a three-dimensional imaging system. On the contrary, an existing OR has to be modified accordingly, in order to accommodate the surgeons' console, the robotic arms, anaesthesia equipment, operating table, instruments and auxiliary equipment while maintaining safe spaces for the circulating staff. However, modifying an existing operating room accordingly or even constructing a new one, poses a substantial logistical and financial challenge for a public hospital, adding to the cost of purchasing a robot [11].

Acquisition and maintenance of robotic surgical systems entail considerable expenses for a public hospital in Greece. Meticulous evaluation of the cost prior to the initial purchase, installation, maintenance, and ongoing instrument expenditures is of cardinal importance to ensure the preservation of a robotic surgery program. Public hospitals rely solely on funds derived from the national budget to operate. Given the fact that Greece's health expenditure per capita is less than half the average in the European Union (EU) [12], the task to secure funding for such a capital-intensive project is challenging.

Operating a robotic surgical system necessitates specialised training for the involved personnel. In the early years, surgeon training relied upon the companies manufacturing the robots. However, surgical organisations like the European Hernia Society and the European Society of Coloproctology for example, have realised the deficit in a structured training program for robotic surgery, and have established collaborative robotic training courses. This resulted in a formulated and scientifically validated training program, addressing the significant cost of training as well. In Greece there is absence of an established fellowship program in robotic surgery that could lead to a relevant certification. A handful of non-profit training centers provide young surgeons with simulation training. However, this is not established as part of a structured national training program. On the contrary, surgeons, surgical and nursing teams, as well as supporting staff, need to obtain continuous formal training, to ensure adequate operation and longevity of a robotic system. Ensuring a sufficient number of surgeons are trained in robotic colorectal, hepatobiliary, upper gastrointestinal and general surgery, as well as gynaecology and urology, is challenging. It requires additional funding from the hospitals' tight budget, and many man-hours subtracting from the hospitals' schedule. Furthermore, since there is a uniform pay scale among every physician of the same level working in Greece's National Health System, attracting skilled surgeons to work in a public hospital, by providing competitive financial income and career opportunities, may also prove daunting, if not absurd [13].

Avoidance of interruption of surgical waiting lists, resulting in delays in delivering safe and efficient surgery to patients, remains of cardinal importance. Thus, incorporating robotic surgery into the existing surgical workflow of a public hospital may be a multifaceted endeavour, which may require adjustments to scheduling, patient selection criteria, pre-operative preparation, post-operative care protocols and seamless coordination among different departments. Patient selection is one of the most crucial considerations in starting a successful robotics program. The properly selected patient should be someone who (a) can withstand a prolonged operative time, (b) presents with benign pathology and/or absence of significant inflammation (e.g., a large polyp of the rectosigmoid or

rectal prolapse), (c) has favourable anatomy (e.g. female pelvic anatomy provides a broad and wide pelvis versus the deep, narrow pelvis of a male), and (d) has no previous surgery (abdominal compartment free of adhesions). On the other hand, setting a predefined number of robotic operations on a weekly basis is also mandatory; hence a continuous flow of cases results in the improvement of the teams' experience.

Eliminating potential disparities and ensuring equal access to robotic surgery for all patients, regardless of their socioeconomic background, is another fundamental consideration associated with the moral structure of the national healthcare system. Providing equivalent distribution of resources and mitigating potential disparities in access, remains challenging, associated with the non-profit character of public hospitals. The necessity for regular maintenance, calibration, and software updates, as well as adequate technical support are indispensable to minimise downtime and ensure the longevity of the robotic platform. Thus, emanant resource limitations leading to inadequate maintenance and poor technical support, may undermine the longevity of the program.

Thoroughly evaluating the cost-effectiveness and clinical outcomes of establishing a robotic surgical program for colon and rectal procedures, initially, is imperative. Public hospitals must carefully assess whether the benefits offered by robotic surgery truly justify the initial investment. A potential solution would be to divide the significant per capita cost among different surgical specialties. Tertiary hospitals with multiple surgical specialties (e.g. urology, gynaecology, transplantation), where a wide variety of robotic procedures could be undertaken, would benefit the most. That distribution would eventually minimise the cost per procedure, and lead to a higher number of patients benefiting from the robotic approach. Moreover, there are several robotic platforms currently available on the market, developed by competitive firms. This, along with a careful evaluation of their distinct characteristics, is a key aspect in decreasing the cost of the initial purchase.

Addressing the aforementioned challenges effectively, necessitates a comprehensive approach involving collaboration among hospital administrators, surgeons, engineers and financial departments. A robotic surgery program is highly unlikely to be cost effective within the first year of operation and most probably will generate high costs within that period. Seeking external funding sources and forging partnerships with industry, academic institutions, or other healthcare organisations may contribute to overcoming the obstacles associated with establishing a robotic surgery platform in a public hospital. Perseverance, close collaboration between surgical teams and hospital management and a continuous

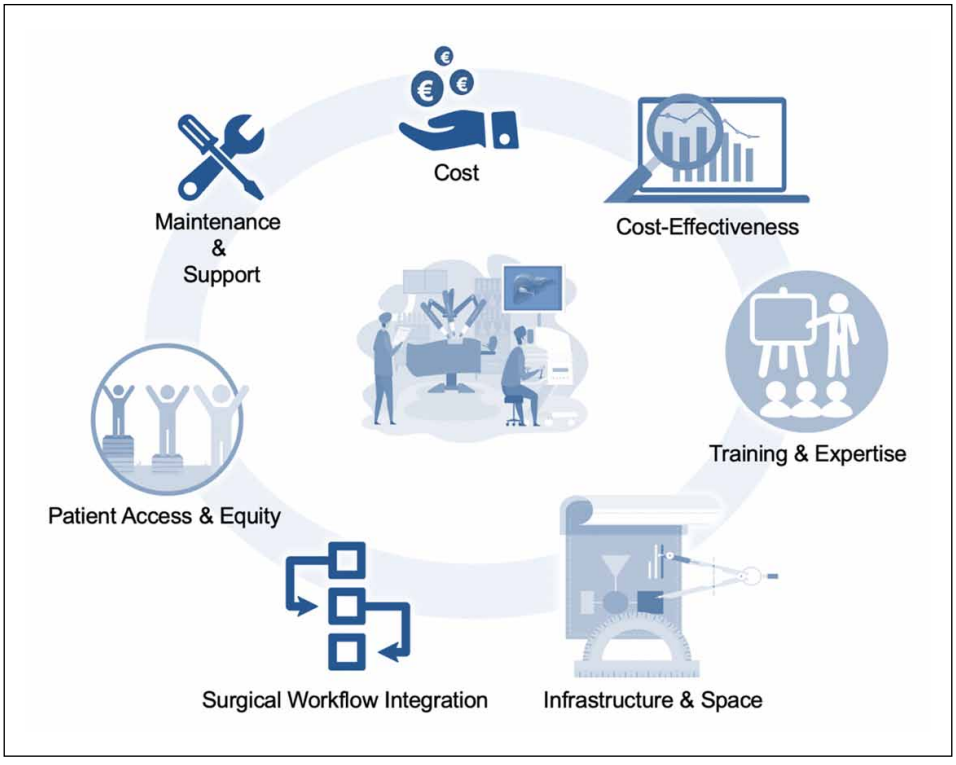

FIGURE 1. Schematic representation of the major contributing factors to a successful robotic surgical program.

strive to overcome all the aforementioned challenges, is the blueprint to the next success story in Greece's national healthcare system (Figure 1).

Ethical standards declaration: *Nothing to declare.*

Conflict of interest: *The authors declare no conflict of interest.*

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