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Editorial

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Concepts of robotic surgery in Africa: the prospects for surgical advancement in Nigeria

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Introduction

The use of robotics in surgery has seen a dramatic increase in many parts of the world and also across various surgical specialties. Procedures like prostatectomy, hysterectomy, and complex head and neck surgeries are currently being done with surgical robots [1]. As the name implies, robotic surgery is the use of advanced robotic equipment to carry out surgical procedures in a highly precise and specific manner. Surgeons enjoy a 3-dimensional (3-D) high-definition view of the surgical site with about 10-15 times magnification, giving them the opportunity to be completely immersed in the surgical field [1,2].

Robotic surgery falls under the umbrella term popularly known as Minimally Invasive Surgery (MIS), there are other forms of MIS like laparoscopy, which was invented long before robotic surgery. The use of robotics to carry out surgical procedures is one of the greatest surgical innovations of the past three decades. This invention has caused a decrease in surgical trauma and incision related complications such as surgical site infections [1], pain and hernia [2] and an overall better post surgery outcome for patients.

These robots are used to carry out laparoscopic/laparo-endoscopic surgeries, and are becoming increasingly more common in developed countries of the world. The United States of America is noted to be the country that performs the greatest number of robotic surgeries than any other country in the world [3]. In contrast, only Egypt and South Africa have majorly adopted robotic surgery and there has been no recent documented use in Nigeria [4]. However, laparoscopic procedures are used across various hospitals in Nigeria, but only in limited specialties.

The possibilities of robotic surgery becoming mainstream in Nigeria and Africa as a whole does not seem promising in the nearest future due to certain factors. The low financing of the healthcare sector in most African countries is the greatest factor responsible for the slow adoption of this innovation in most parts of Africa. Africa is a region that accounts for a disproportionate share of the global disease burden [5], but it allocates the least amount of resources to healthcare [6]. Health spending per capita in Africa was an average of $80 in 2016 compared to $400 in more developed regions [7].

Health financing in Africa is mainly from low Government spending, underdeveloped insurance schemes and donor funding [8]. In Nigeria's current budget, only about 1.17 trillion Naira was allocated to the healthcare sector, out of the total budget of 20.5 trillion Naira, constituting a meagre 5.75% of the total budget, contrary to the recommended 15% [8].

Robotic surgery is an expensive venture, as a lot of financial resources are needed to acquire these advanced machines and equally maintain them in optimal conditions. Current robotic surgical systems are very massive and takes up a lot of space in the operating

theatre. Resources are also needed to train healthcare practitioners on the usage and management of these machines. Implementing a new robotic surgical platform will cost over one million USD and an additional 3,000 to 5,000 USD per surgery [9,10]. The average cost of performing robotic surgery is 12,340 USD + 5,880 USD [11], this equates to 19.7 million Naira + 94 million Naira which is a very expensive surgery for most Nigerians, considering that out-of-pocket payment is the most common means of payment in Nigeria and other parts of Africa.

Another important factor limiting robotic surgery in Africa is the shortage of surgeons and deficient training systems. These can hinder the implementation of this innovation in Africa. The surgical residency training program in Nigeria and most parts of Africa do not have standardized training on robotics. Training often utilizes 3-D models; however, this novel technology is not easily accessible in developing/underdeveloped African countries. Remote telesurgery is a new innovation aimed at bridging the learning gap in remote areas, but factors like poor network connectivity and lack of power supply mostly compromise this learning platform, especially in the more remote areas.

The current brain drain in some African countries like Nigeria has contributed to scarcity of doctors, surgeons inclusive. The migration of surgeons out of Africa to more developed climes has worsened the already poor doctor to patient ratio. A study done in east central and southern African region reveals that there are only 1,690 practicing surgeons, yielding a regional ratio of 0.53 surgeons per 100,000 population [12].

Robotic surgery is not impossible in Africa. However, it currently remains too expensive for healthcare facilities and the patients. It is however hoped that in the nearest future, there will be more producers of these machines in the industry, who will manufacture newer generation robotics that are cheaper and affordable for use in Nigeria and other African countries alike, and the Government will be willing to allocate more resources on healthcare to facilitate innovations like robotics which is definitely more beneficial to both patients and surgeons in the long run.

Declaration of Competing Interest

The authors declare no conflicting interest.

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