

Good term paper on da vinci surgical system

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AUDIENCE ANALYSIS

The target audience is the groups of patients and their guardian with complicated ailments that require operation at the clinic. They want a surgical procedure that is safe, less painful, and takes less time to heal with minimal scarring. This population ranges in age from approximately 20 for college going teens to 80 for retired and semi-retired elderly members. The gender ratio is approximately 50% male and 50% female. All the audience is knowledgeable of normal surgical procedures and posses at least a high school diploma, though many adults have a college degree. The group comprise of many different ethnicities: approximately 40% white, 10% blacks, 30% Asian, 10% Hispanic, and 10% others.

These groups of patients have been reading about Da Vinci surgical systems in medical journals and magazines and are drawn to the idea that the procedure can save them considerable money and time in hospital beds. They are interested in the fact that the process is less painful, less scaring and safe. The surgical system uses completely new technology and procedures; we do not anticipate having any experienced users. We expect that patients who want to save on cost and time spend on hospital beds receiving medication will adopt the new surgical system while those who dislike scars will have found a perfect solution. We expect that these groups of patients will make informed conclusions on the choice of the surgical method as per this report. We also anticipate that hospital facilities and medical units will require significant capital investment to install the systems, while medical personnel will require detailed backgrounds, directions and use procedures.

EXECUTIVE SUMMARY

In the medical field, the most favorable surgical; procedure is determined by a number of factors. Among them include doctors opinion, cost, recovery period, as and support services required. There are two surgical methods in obstetrics and gynecology, traditional hand surgery and minimally invasive surgery. Hand or open surgery involves a surgical procedure where a a large incision is made to reach the required organs. Minimally invasive surgery involves laparoscopy and da Vinci surgery. Laparoscopy involves the use of tiny cameras and long surgical instruments passed through a small incision into the body. The Da Vinci Surgical System is a computer-assisted medical device used in surgery to facilitate minimal invasive approach. The Da Vinci Surgical System is used in several medical specialties and for multiple indications. This paper gives a comprehensive analysis of the da Vinci surgical system and its usefulness in conducting obstetrics and gynecology.

INTRODUCTION

This paper details the results of my research on the effectiveness of the da Vinci surgical system on obstetric and gynecology surgery. The research was based on manufacturer's publications, literature reviews, technical reports, internet sources and product reviews.

Healthcare professionals have resorted to technology to improve the delivery of services it offers. Electronics and telecommunication equipment use in medical fields ranges from simple telephone lines and fax machines to complex full-motion interactive multimedia and personal computers.

Healthcare is a rapidly evolving industry that has adopted a variety of technological entities such as interactive compressed video. The use of

existing and emerging technologies has been highly integrated in the medicine field though it has presented its own challenges. Major healthcare institutions and remote facilities have incorporated electronic and telecommunication equipments to better service delivery and minimize risks. From x-ray machines, telemedicine to Da Vinci Surgical systems start-of-the-art technology has played a vital role in medical delivery.

Using the most advanced technology in the market today, the da Vinci surgical system allows surgeons to perform complex surgery when seated at an ergonomically designed console while the patient is located a distance away.

Fig. a The da Vinci Surgery system

Da Vinci system is powered by state-of-the-art robotic technology that permits the surgeons hands movements to be detected, filtered and converted into precise movements of the EndoWrist instruments working inside the patient's body. The surgeon monitors the four interactive robotic arms using high definition 3D vision systems. The powerful lens allows the surgeon to have a view of the surgical area 10 more powerful than the human eye. In fact, the vision is so clear that the surgeon can see the vision of the suture thread. Operating through tiny incisions, the surgeon directs the robotic arms with remarkable precision and steadiness. The arms can make finer movements than a human arm and reach areas of the body than no human hand can reach.

Fig. b Surgeons console manned by Doctor Aprikian at the McGill University Health Centre

The choice of a surgery method is dependent on many factors. Among them

includes doctors opinion, patients anatomy, cost, length of the recovery period, amount of blood lost during the procedure and pain endured in the recovery period. This is way technologies such as the Da Vinci Surgical Systems are gaining momentum as the preferred mode of service delivery. Da Vinci Surgical Systems is enabled by electronic equipment, which facilitates the provision of delicate and complex surgery procedures with increased vision, precision, dexterity and control.

Da Vinci surgical system is not a kind of robotic surgery because the surgeon and the surgical staff are in control all the times. It is a robotic-assisted system that has a proven track record making it suitable for performing the same complex and delicate surgeries such as gall bladder removal and hysterectomies, but with increased precision, better vision and improved dexterity.

Open surgery is the most widely used gynecologic surgery world over. However, there are disadvantages associated with the large incisions on the abdomen area, noticeable scars, more blood loss and lengthy period of recovery. In hand surgery, the doctor does not have an enhanced vision, precision, dexterity and control as with the da Vinci surgical system.

Fig. C An operation taking place at the Boulder Community Hospital in Colorado using da Vinci Surgical System

In order to determine the effectiveness of the da Vinci surgical system, factors of patient acceptance, user functionality and performance are noted. These factors are compared on the open method and the da Vinci surgical system.

METHODOLOGY

The survey took place between January and April of 2011. The research was estimated to cost \$400.

RESULTS

This section contains the results of the survey I conducted pertaining performance, user functionality, and user acceptance of the da Vinci surgical system over open surgery method. In each analysis I compared the effectiveness of the minimal invasive system over open procedure.

Obstetrics and genecology

Effectiveness

- Bleeding and need for transfusion
- Risks of infection
- Incision and Scars

There were four obstetric and genecology respondents who have used the S and Si models of the da Vinci Surgical System. All the respondents primarily used the da Vinci Surgical System to perform hysterectomies. All of them were in agreement that the da Vinci Surgical System is suited best for performing radical hysterectomy for endometrial cancer, multiple adhesions, myomectomies to remove fibroids, early cervical cancer and adenomyosis. They reported that the 3D visualization presented a perfect view of the rear part of the uterus, making it a better surgical option than standard laparoscopic surgery. One respondent reported that he can complete sacrocolpopexies procedure in less than 3 hours compared to the average standard of 4.5 hours for the open procedure as a result of

improved 3-D vision and precision.

According to other respondent, surgeries for myomectomies, hysterectomies, and endometriosis are as much faster when performed robotically using the da Vinci Surgical System and takes an approximate of 30 minutes than when performing using open or laparoscopic procedures. The Da Vinci Surgical System as reported by some surgeons is essential for obese women with endometrial cancer and the challenges are less pronounced than open surgery. In spite of the challenges of positioning, surgeons reported that the da Vinci Surgical System is far much beneficial than open surgery. Some of the notable benefits include;

- Less bleeding
- No need for transfusion
- Zero chances of infections as compared to open surgery

Post-operative success

In analyzing post-operative success, the following factors were considered.

Time in hospital

Duration before resumption of work

Pain and medication

The respondents indicated that patient safety is directly related to surgeon's training experience. Respondents with prior experience of laparoscopic and robotic experiences found the transition to the da Vinci Surgical System less complicating and therefore post-operative success level was high.

- Less bleeding
- Less time under anesthesia
- Less hospital time of between 12-18 hours and less re-admission

- Less pain and less medication
- Earlier resumption to work after operation

When compared to hand surgery, the contrary was true. Traditional hand surgery are characterized by excessive bleeding thereby requiring blood transfusion, long times in hospital, noticeable scars, and more pain during medication period. Patients were unable to resume work immediately after operation.

User functionality

User functionality of the da Vinci machine was determined based on the probability of the system operating without failure during an operation. The life of the patient is critical when the machine fails halfway the operation. Open surgery have low chances of failure because the doctor is in control and there are no robotic devices.

There were no reported system failures when used for obstetric or gynecology operations except minor technical errors as a result of operator error. There were single instances when problems were encountered out of the following:

Reported device problems

- Cracked arm caused the instrument to fail
- Arm drifted during a procedure
- Dysfunctional arm
- The arm required servicing after the instrument failed to read

Patient acceptance

Patient who sought obstetric and gynecologic operations at the clinic opted for non-invasive surgery than the open method unless advised by the physician. Out of the 150 patients recorded during the survey period, 76% opted for the non-invasive method while 12% were advised otherwise by the physician due to their anatomy. The remaining 12% did not have a direct conclusion and needed more time at the time of survey. Previous patients who underwent surgeries using the da Vinci Surgical System reported the following general benefits.

In terms of sales, as at 2013, 2000 units of the da Vinci units had been sold worldwide. Yearly sales seemed to increase yearly showing an increasing trend of adoption globally.

- Smaller incision, less pain and fewer scars. They are able to operate confidently after the operation without worrying about the scars.

•Minimal blood loss and reduced need for transfusion

- Minimal duration of painful medications
- Minimal risks of infection
- Shorter time in hospitals, thereby saving time and money
- Quick recovery and resumption to normal daily activities
- High quality results and better patient outcomes

They were generally in support of the system due to the shortened recovery period and less pain and scarring. Most of the patients agreed to underwent surgery by using the system unless advised otherwise by the physician due to body conditions.

Cost

The cost of the da Vinci surgical system was compared to the cost of the open surgery. Data obtained indicate that the da Vinci surgery costs marginally higher than open surgery. Data for robotic hysterectomy cost the patient an average of \$8868 while that for open surgery averaged at \$6,651. The margin might be attributed to the cost of procuring the systems and annual administrative and maintenance costs. The Si version of the system is worth \$2 million while annual maintenance fees are averaged at \$250,000. In spite of the cost, data obtained revealed that robotic hysterectomies increased from 0.5% in 2007 to 12% in 2012. In the same period, open surgeries dropped but were still the common method.

CONCLUSION

When compared with open surgery, the da Vinci surgical present lots of advantages. This includes minimal bleeding, minimal time under anesthesia, fewer incisions and scars, less hospital time, quicker recovery process and faster job resumption. The device is highly usable as no major problems were encountered during use. The acceptance rate is considerable given the number of patients who choose it over the open procedure and the data from the manufacturer sales. Thus, it can be concluded that the slightly higher cost of the da Vinci operation cannot be a hindrance to its use. In my opinion, the system will prove effective if used by experienced surgeons' with sufficient time to master how to use the foot pedals, acquire effective eye-hand coordination and perform procedures without touching tissues, organs or sutures.

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Glossary

EndoWrist- Is a wristed single use instrument utilized for bipolar coagulation

and mechanical transaction of vessels

Hysterectomy- the surgical process of removing the uterus of a female

Obstetrics- The branch of medicine dealing with the care of women during pregnancy, childbirth, and recuperative period after delivery

Gynecology-Medical practice dealing with the health of the female reproductive system (uterus, vagina, ovaries)

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