



Implementation Use Technology Robotics For Help In Orthopedic Surgery Operations In Hospitals In Indonesia

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ABSTRACT. *The use of robotic technology in orthopedic surgery is growing rapidly, especially in Indonesia, where this development is expected to advance the quality of medical services and make procedures more effective and efficient. The results of a literature review show that robotic technology in orthopedic surgery can increase precision, speed up recovery time, and minimize the risk of complications. This literature review explains how the development of robot technology is being applied in Indonesia and its practice in orthopedic sanitation. This is expected to expand the application of technology in the health sector in the future even more widely.*

Key Words : *Robotics, Orthopedic surgery, Hospital*

INTRODUCTION

Since beginning introduced in the early 2000s, surgical robot technology Already useful inhelp expert surgery in do operation , so that can to do operation with more effective and control more Good as well as possible risks experienced will more low . Advantages use robotics is accessdifficult health services reachable with method conventional become more easy done If using robots. This is result in system Health services in Indonesia are changing become more modern and precise.

Implementation technology robotics in the medical world Already the more growing and indeman, not only surgery operation surgery general only , but also surgery orthopedics or part bones, muscles, joints, tendons, ligaments, and nerves. Technology robotics in surgery surgery orthopedics This very much help doctor Because surgery orthopedics This known as surgery operation difficult and more complex, as well as need average time more from 3-6 hours of surgery.

Surgery with usse robotics offer convenience, such as lack of complications, more patientsfast recover, and results more operations accurate and precise so that results post-operative become more good. In surgery orthopedics, robotics used For installation more implants right, because the robot is here will help doctor For Determine the installation location implant with right.The result is operation surgery performed will use incision as minimal as possible maybe, so risk bleeding will also occur more little. This is what causes recovery in patients more fast happen. Technology robotics used this is what can give benefits in the

medical world, because can increase efficiency operational.

Other advantages offered in use of robots in surgery orthopedics is a navigation robot. This would be very helpful in procedure replacement joints knee, where the orthopedic robot will ensure harmony optimal implant, so that comfort patient will increase, and extend age implants installed in body.

In Indonesia, the use of technology robotics in surgery orthopedics already starts. Lots introduced. Quoted from Eka Hospital BSD official website (<https://www.ekahospital.com>), as Orthopedic Center the most sophisticated in Southeast Asia with Robotic Navigation Spine Surgery technology, said that use of robots in surgery orthopedics help improvements to security patient moment do surgery bone behind with Level of accuracy placement of screws and implants reaching 99.9%.

Robot technology in surgery orthopedics create a very big opportunity in increase standard care and effectiveness long-term for hospitals. Effectiveness this is also influenced by several factors challenges, for example is needed cost more investment high, providing additional training for power medical, and integration technology to in system house the pain that has been there is

. With existence challenge this, it is expected existence collaboration between provider health services with developer technology.

Literature Review

Brian Peters *and friends* (2018) said that the demand for the use of robots in surgery is increasing and new technologies will continue to be developed. New technologies are increasingly being applied to improve the capabilities of existing systems. Several devices that have been approved by the FDA (Food and Drug Administration for surgery robotics has reviewed, such as Da Vinci Surgical System, Sensei X Robotic Catheter System, Flex® Robotic System, the Single-Port Instrument Delivery Extended Research (SPIDER), Miniature In Vivo Robot, Versius Robotic System, ViaCath System, SPORT™ Surgical System, and the Einstein Surgical Robot.

In a study conducted by Chawawat Gosrisirikul and friends (2018) currently, various efforts

are being made in the development of robots used for surgery such as the creation of consoles, robotic arms, cameras, handles, and instruments as well as to implement certain functions (e.g. haptic feedback, eye tracking). Here, the benefits and limitations of each technology are identified, and possible future developments are described.

Future research is needed to further evaluate the strengths and weaknesses of each robotic surgical device and platform in the operating room. Robotic Surgical Systems are increasingly being developed worldwide. New technologies are also increasingly being applied to improve the capabilities of existing systems (Chawawat, 2018)

In orthopedic surgery, some of the robots used are VELYS Robotic, Robotic-Assisted Surgery Systems (RAS), MAKO Robotic-Arm, Orthopedic Navigation Systems, CORI knee robot, Robotic spine surgery, Robotic spine surgery, and others.

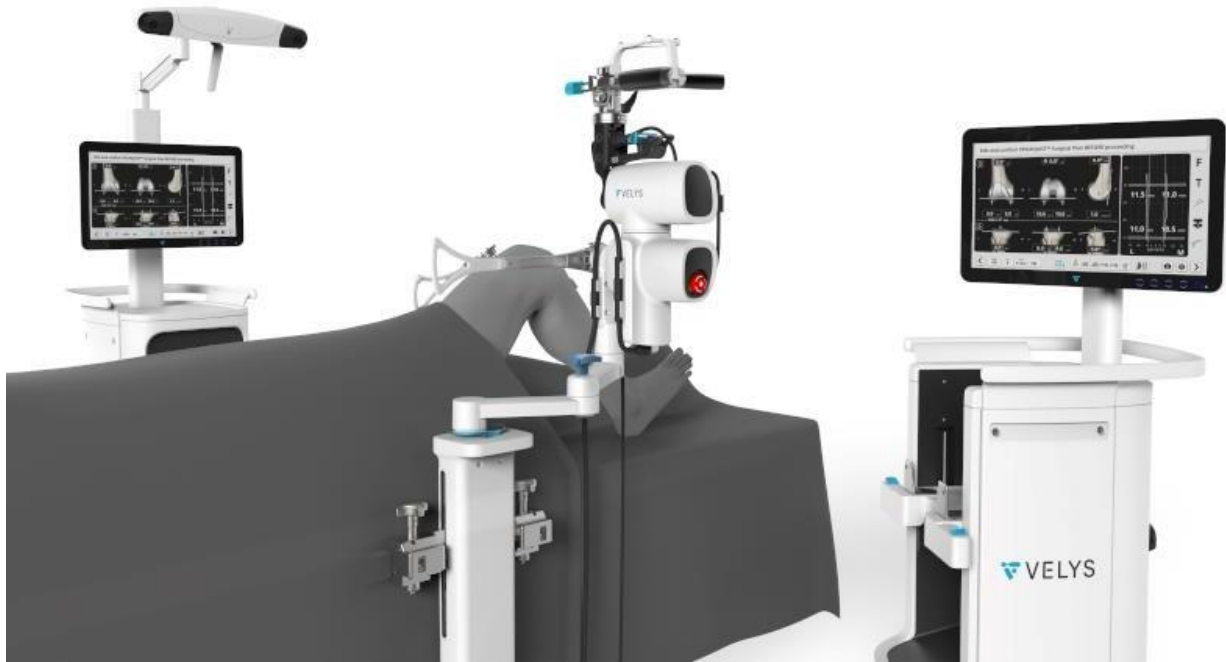


Figure 1. VELYS Robotic for operation replacement knee

Source : <https://www.injmedtech.com/en-US/product/velys-robotic-assisted-solution>
accessed on 11/30/2014

Picozzi *and friends* (2024) says that in surgery orthopedics allow procedures Actions taken more precision, especially in matter implant placement and reconstruction bones. For example in system robotics *Mako Robotic Arm* in changeover joints knees and hips give guide precision in select and install implant. This is make risk error if done manually to be decreased. Picozzi *and Friends'* (2018) research added that Orthopedic Robot always equipped with advanced technology, for example is 3D visualization as well ability in move to difficult areas of the body within reach of hand human. Finally doctor can do more procedures complex like dissect bone behind with more Good.

Another advantage of use of orthopedic robots is overcome possible tremor problems occurs on the hand humans, in particular doctor surgery when do surgery. Surgeon when walk Further Action Procedures complicated No will easy fatigue or the occurrence tremors in the hands.

This is can help improvement efficiency time procedure action and reduce duration take care hospitalization of patients.

Research methods

Studies on research will focus on study literature in the form of articles and journals related implementation use of robots for surgery orthopedics in hospitals spread across Indonesia, both in the form of robot name and application its use.

Results and Discussion

Along with development and introduction technology robotics specifically the use of robots in hospitals, has show significant progress, especially in support procedure surgery orthopedics. Use technology robotics in surgery orthopedics has develop rapidly in various countries, including Indonesia, where innovation This expected can increase quality service medical and efficiency procedure surgery.

Indonesian News Agency "Antara" in 2022 published news through page the web related How EKA Hospital in BSD, South Tangerang introduces table the first robotic surgery in Indonesia. Operation This Focus on Bones The back is aimed For increase quality service especially in surgery orthopedics, with give more precision tall so that risk complaint to patient

the more minimized. In addition, the following some navigation robots in operation surgery orthopedics owned by Gatam Institute (EKA HOSPITAL), namely :

1. Excy : Navigation Robot Sophisticated that can help repair bone scoliosis and nerve patients pinched,
2. Armour : Help Excy see condition bone in detail,
3. Jose : Help see condition bone from on down in a way comprehensive.

Peralatan Canggih dan Mutakhir Gatam Institute



Figure 2. Robotic tools in surgery orthopedics at Gatam Institute, Eka Hospital

Source : <https://www.ekahospital.com/tengah-unggulan/gatam-institute-central-ortopedi-tulang-hind> accessed on 11/30/2014

Hospital others who use use robotics For surgery orthopedics is the Saint Borromeus Hospital, which is located in Bandung, West Java. Operation This named *Robotic Knee Replacement Surgery* is operation changeover joints the affected knee inflammation joints with help robotic arm for help doctor surgery orthopedics at the moment to do action operation. This robot will help doctor For find accurate and precise incisions. The website of the Saint Borromeus Hospital also explains superiority use of robots that can help placement more implants accurate so that form anatomy joints knee in patient Back to better conditions good, result Finally is in patients will happen more recovery fast. This Hospital claim that New knee replacements are expected to last for decades (90% are still functioning after 20 years).



Figure 3. ROSA® KNEE SYSTEM at Saint Borromeus Hospital
<https://rsborromeus.com/en/robotic-knee-replacement-surgery/> accessed on 11/30/2014

ROSA® stands for Robotic Surgical Assistant. The ROSA® Knee System is a robotic surgical assistant developed by Zimmer Biomet for total or partial knee replacement and is available at the Borromeus Bone and Joint Center at Santo Borromeus Hospital, the first hospital in Indonesia to have this technology. This robotic technology allows orthopedic surgeons to create a treatment plan using a 3D model of the patient's knee, resulting in a more precise and more personalized view for each patient. Another advantage is that orthopedic surgeons can install knee implants accurately based on the unique anatomy of the patient's knee.

Apart from the Hospital above, still There is a number of House other illnesses that use robotic methods in surgery Orthopedics, including Medistra Hospital in South Jakarta, also uses Velys Robotic and become House Sick the first in Indonesia to do this operation implant knee with

robot assistance. Premiere Bintaro Hospital and Bunda Jakarta Hospital also became House sick using navigation robot For surgery orthopedics.

With this implementation technology robotics, it is expected House sick in Indonesia can increase ability they in handle various case orthopedics that require procedure precision high, at the same time make it more affordable and more efficient.

Conclusion

Implementation technology robotics on the rise quality Health services in Indonesia are one of the superior innovation own very significant benefits moreover in matter development Health technology. Use robotics in surgery give high precision and things This will make recovery in patients more fast obtained.

Technology robotics open more access wide in procedure action surgery previous orthopedics difficult done manually. Impact positive other from development technology robotics is technology This give more results promising in procedure surgery Because can allow subtraction size incision, risk infections that can minimized, and increase safety patient during procedure surgery done. In overall , implementation technology robotics at home Sick own potential big For revolutionizing the medical world in Indonesia, bringing progress in matter maintenance patients and outcomes clinical, as well as open opportunity for provision service better health sophisticated and efficient.

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