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A New Challenge for Medical Technology Update: A Review Article

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ABSTRACT

INTRODUCTION: In the health sector, the era of globalization means more trade in health services, as stated in the GATS agreement, point number 4 of the agreement regarding the entry of health professionals. Service trade in the era of globalization takes place freely. Restrictions that are protective in nature, for example through licenses issued by the government, as is done by other developing countries, however this should not be done. Liberalization in the health sector should be a whip for us, where we need to focus on improving quality or professionalism so that whatever happens in the future to face the challenges in the era of globalization, there must be assistance from all parties and improvements from all sides in order to compete.

DISCUSSION: Human needs (human need) arise naturally from humans to fulfill everything that is needed in life as a means of satisfying their needs in relation to health services. This desire is manifested in a request in the form of looking for a health service provider or provider. Parties who request and use health services as users or consumers. Health service providers are parties who can provide certain services to consumers in the form of services and goods. The formulation of needs (needs) describes the difference between what is wanted (want) and what is available or available. Solving a need implies the need for the availability of resources in such a way that what is desired becomes possible or a reality. What is there is an indication of factually and potentially available resources for problem solving. Problem solving demands scientific principles carefully and responsibly accompanied by a thorough understanding of the social, political and economic situation in which the problem occurs. Academics, professionals, scientists and engineers are required to solve problems related to the needs of society within the limits of available resources.

CONCLUSION: The description of health technology that I have presented can provide an indication that health technology is an instrument for humans to meet their needs as well as to improve the quality of life (quality of life) without leaving local culture. Without update, medical technology does not have the ability to guarantee its existence and independence (self-reliance). Therefore, every effort must be made to be able to own and master technology in order to maintain its existence in facing an unsuitable future.

KEYWORDS: Medical; Technology; Globalization

INTRODUCTION

The world of global trade will enter a new chapter in 2020 called the era of free trade. The main point in free trade is that there are no longer obstacles in carrying out international trade. On the one hand, liberalization of trade in services promises many positive impacts such as opening up markets to sell goods and services to and from abroad, increasing income, which ultimately plays a role in increasing the prosperity of developing countries [1].

The global era is the impact of competition between countries and the progress of the times. In this global era, the boundaries between countries will slowly disappear, resulting in an easy movement of goods, services, capital, people, technology, markets and all things between countries. Likewise, globalization occurs in various sectors that lead to free markets which cannot be avoided by all countries in the world. In this era of globalization, there is a shift in technology, information and so on. In the context of globalization affecting change in all sectors, including the health sector. In addition, it is revealed that currently there are quite a lot of global migration, thus complicating opportunities in the era of globalization and it is predicted that in 2020 230 million of the world's population is migrating and includes 1.5 million medical professionals [2].

Globalization will have an impact on all aspects of life, including aspects of health services. In this phase of globalization, all countries will depend on each other, which means that no single nation in the world can stand alone, even though that country or nation has become a developed country or an industrial country. These challenges, of course, will have an impact on the development of health services [3].

In the health sector, the era of globalization means more trade in health services, as stated in the GATS agreement, point number 4 of the agreement regarding the entry of health professionals. Service trade in the era of globalization takes place freely. Restrictions that are protective in nature, for example through licenses issued by the government, as is done by other developing countries, however this should not be done.

Indonesia is a country that is quite attractive to foreign countries. First, because it has a large market potential associated with a large population. Second, the current conditions for Indonesia's economic growth are promising. This seems to frighten the health profession, because of the fear to compete, as we all know the quality of our health human resources is low and the mastery of technology is also limited [4]. Liberalization in the health sector should be a whip for us, where we need to focus on improving quality or professionalism so that whatever happens in the future to face the challenges in the era of globalization, there must be assistance from all parties and improvements from all sides in order to compete [5].

DISCUSSION

A NEW CHALLENGE IN MEDICAL TECHNOLOGY

Future problems and challenges must be based on the belief that as a basic human calling is to reveal the secrets of nature and explore the sources that exist in this world [6]. Today research is not just a personal initiative but has become a collective and serious part of an increasing number to develop humanity and it is also the duty of society to maintain the survival and environment as a whole. Because technology is the only instrument to generate added value, mastery and ability to create technology are crucial issues. Mastery of science is a prerequisite for the creation of modern technology [7]. This means that humans must guarantee that in addition to existing or established technology (established technology) as well as future technology (future technology), along with the increasing human needs. To prioritize technology research that is so complex and full of cross-cutting objectives there is almost never enough money to explore every research question, opportunity and problem solving to save human life. The development of health technology requires a lot of money and the understanding that the real evidence of using investment in research is still years to come. The dynamics and currents of the technology market do not always match the facilities of existing academic institutions [8].

The influence of globalization and policies in the fields of economy, technology, culture and the environment has become a contentious issue involving both developed and developing countries. Globalization and its multidimensional complexities have affected human life in all aspects including the health sector, for example health services, financial matters and/or indirectly to income, equity, environment, and living conditions. The impact of globalization on the health sector is still difficult to assess, there are several contradictory answers depending on the point of view put forward by each person, economists usually emphasize that free trade: "increases economic well-being and thereby improves health status", and trade in health services provide economic opportunities for developing countries, but many are still doubtful and skeptical about this statement, which is contrary to this opinion states that health conditions in developing countries based on several indicators such as infant mortality, population life expectancy or life expectancy have not increased as expected in the era of globalization [9].

Medical technology, including health technology, is one of the technologies most affected by global regulations in both developed and developing countries. It is generally recognized that import liberalization and export stimulation have an effect on international trade and domestic production of health technology, however it can be said that developing countries experience more difficulties

in trade, technology transfer and use of health technology. This is due to health problems in the country, limited resources, especially human, material and insufficient production of health or medical technology. As stated by Malkin, (2008) that 95% of the needs for health technology used by hospitals in developing countries are imported from abroad. As an illustration, the results of a trend analysis research conducted by Semin et al. 2007 on the import of medical technology and export of medical technology in developing countries of Turkey have an income of more than USD 200 billion per year [9,10].

Medical technology is classified into 3 main groups: (1) Medical supplies such as suture threads for surgery, prostheses, various catheters, X-ray films, various bandages and so on. (2) medical equipment or medical devices such as clinical laboratory equipment, surgical instruments, microscopes, CT-Scan, MRI (Magnetic Resonance Imaging), USG (Ultrasonography), EKG (Electro Cardiography), electrotherapy, blood pressure measuring devices. and so on (3) medical chemicals, such as medicinal substances, vaccines, diagnostic reagents [10].

The data shows that a low export-import ratio of 8.8% means that the dependence on imports of medical technology is still large (91.2%). The high import of medical technology and the low export of medical technology are considered as indicators important which shows the increasing need for medical services in the country is still dependent on health technology products from other countries. In conclusion, imported medical technology is +91.2%, this is in accordance with what was stated by Malkin (2008), that developing countries are estimated to import the need for medical technology 95%, this may also apply to Indonesia [7,8].

Until now, there is no accurate data about the amount of medical technology imported by our country. No invention and discovery of science (discovery) is perfect from the start. All medical or health equipment must have experienced failure, repair and modification before it becomes an ideal product that is useful for improving health status. In the process of developing technology, failure can occur because in the process of innovating we do not know whether a creation or invention will be a successful product or not before we try or test it over and over again [5].

In the world of medicine or health, health services are known in the Promotive, Preventive and Curative Fields. The definition of promotive health service is an activity and / or a series of health service activities that prioritize health promotion activities. An example of a Promotive is dental and oral health education. The definition of preventive health service is an activity to prevent a health problem / disease. A preventive example is the application of fluorine to the teeth [9].

The definition of curative health service is an activity and/or a series of medicinal activities aimed at healing a disease, reducing suffering due to disease, controlling disease, or controlling disability so that the quality of the sufferer can be maintained optimally. An example of a curative is dental fillings. The definition of rehabilitative health service is an activity and / or a series of activities to return a former patient to the community so that he can function again as a member of the community that is useful to himself and the community as much as possible according to his abilities. Rehabilitative examples are the manufacture or installation of dentures. In the era of globalization, technology must be included in order to compete with other countries and survive in society. The use of promotional media in the form of pdf or comics as well as health services with an agreement to use the application is one way to be biased in facing the challenges of the globalization era [9,10].

THE STAGES OF DEVELOPING HEALTH TECHNOLOGY

Development means a process, a way of developing in order to be advanced, good or perfect. The development of health technology can be divided into 4 stages: (1) innovation; (2) development; (3) diffusion or dissemination; (4) evaluation [10].

INNOVATION

The word innovation used here indicates the creation of new tools or techniques or combinations of old tools into new configurations or for new applications (Eden, 1986). Innovation gives rise to novelty in medical science, medical practice or organization. Most innovations are the result of many small advances which individually may be insignificant but have a cumulative effect. New technology rarely develops in a single step. Modification and technology development is a continuous process. According to McKinlay describes the seven stages in medical innovation as follows: (1) promising preliminary report based on evaluation, medical innovation on some uncontrolled cases; (2) professional or organizational use or acquisition of technology; (3) public acceptance (third party); (4) observational reports and standard procedures; (5) randomized control trial; (6) complaints by professionals; (7) experienced technology losing its trust and erosion [11].

THE TECHNOLOGY DEVELOPMENT PROCESS

The technology development process is divided into: (1) emerging technology is technology that is currently being applied at the development stage in an incubator laboratory or is currently in laboratory trials; (2) new technology (new technology). The new technology is fundamentally different from the existing technology. These technologies usually show improvements in diagnosis and accuracy of diagnosis, as well as provide new therapeutic technologies. An example of a new diagnostic technology: Multislices CT (Computerized Tomograph) Scan is better than the old CT scan. New therapeutic technologies: endovascular intervention, organ transplantation, artificial organs (artificial organs), prosthetic heart valves. (3) current technology (current technology, establish

technology) is a technology that is well known, for example: MRI (Magnetic Resonance Imaging). (4) future technology, such as: microelectro mechanical systems, robotics to assist in surgery as a development of a combination of Physical Science, Engineering and Information Science, Nano-technology, Genetic Engineering and so on [10].

TECHNOLOGY DIFFUSION

Technology diffusion is a process by which technology enters and becomes part of the health care system. This phase follows the research and development stage and may also not follow a rigorous clinical trial to demonstrate patient efficacy and safety. At the beginning of the diffusion phase it is usually slow, this shows the caution of some users although it may also indicate problems in communicating information about innovations that have been developed. The studies that have been conducted show that this diffusion is influenced by decision makers and the constraints faced by individuals on decisions to use the technology. Hospitals are usually constrained by budget constraints or constraints in their use. The results of clinical trials and experience in field practice are influenced by the attitudes and behavior of physicians. If the results are positive, the diffusion is fast and will continue until a new technology replaces it. If the clinical evidence is unclear or negative it may slow diffusion or even reject the technology [2,11].

EVALUATION

Evaluation of health technology involves several factors, including: (a) therapeutic potential, (b) diagnostic and screening abilities, (c) effectiveness in society, (d) patient adherence and (e) its scope12.

POTENTIAL FOR THERAPY:

Evaluation of health technology should be linked to the ability of the new technology to improve health status directly or indirectly. In this case, what needs to be questioned is whether the new therapeutic technology is more beneficial than the harm to patients whose diagnosis is correct, treated appropriately and adheres to these treatment recommendations.

ABILITY FOR DIAGNOSIS AND SCREENING:

Technologies for diagnosis and screening are likely to be the fastest growing areas of healthcare technology, for example developments in CT scanning and MRI. Usually the technology for diagnosis and screening is associated with the benefit of therapy and for enhancing the improvement of the outcome. These can be differentiated into several levels as follows: 1) the technological capability of the diagnostic tool which shows the performance of the specifications carried out in a laboratory environment, 2) diagnostic accuracy. Technology provides information that enables health personnel to make more accurate assessments of disease severity and severity, 3) influence on service providers. Technology gives healthcare personnel more confidence in the diagnosis and therefore reduces anxiety and improves comfort, 4) therapeutic effect. Therapeutic decisions made by health professionals may change as a result of technology application, 5) patient outcomes. Will determine the useful application of technology to patients.

EFFECTIVENESS IN SOCIETY:

To determine the effectiveness of technology in society, it is necessary to involve an assessment of the amount of improvement in the degree of health that can be expected as a result of the application of specific technology in the community or affordable population. Health professional compliance is one of the components of the effectiveness of the use of technology in society, where information is needed on the extent to which the health professional complies with the technology application required for the proper application of diagnosis and management technology (prevention, palliative healing and rehabilitation). Continuing medical education is essential to ensure that doctors and health professionals are properly involved in the application of new technology.

EVALUATE PATIENT ADHERENCE:

The extent to which patients adhere to health care providers in terms of recommendations and therapy can be judged depends on the type of technology which substantially influences the amount of benefit derived from it. e. Evaluation coverage (Evaluation Coverage) Coverage here is defined as the extent to which useful technology is applied appropriately to all patients or communities who benefit from it. Scope defines whether the individual patient requires the technology or not.

SOLUTIONS FOR FUTURE NEEDS IN THE TECHNOLOGY

Developing countries such are generally still relatively poor in technology resulting from their own development. Most of the technologies that operate or are used in society are imported from other nations. From the perspective of a society that adopts technology, foreign technology transfer has an impact on 3 kinds of social processes that are different from one another: (1) transfer of technological innovation (Transfer of Technology), (2) operating technology (Operation Technology), (3) consuming technology (Consuming Technology). Technology transfer is expected to induce the ability to produce such technology as well as to maintain technology domestically. In the field of medical health, trials can be started from the laboratory level, animal experiments, limited clinical trials, randomized controlled clinical trials, and use in the wider community. If in the trial and error process there is a failure, we must move forward never backward, even though the repair takes several years, of course, at the risk of wasting more financial resources and other resources. We must be ready to face failure and ready to learn from failure without taking the risk of failure. We

will never find a better one to make products, processes and materials that are more beneficial to our nation's promotion efforts [1].

APPROPRIATE TECHNOLOGY

Appropriate health technology is often mistaken for technology that views the equipment as simple. According to the World Health Organization (1984). Appropriate health technology is methods, procedures, techniques, and equipment that are scientifically valid according to local needs and can be accepted by the wearer and can be maintained and utilized by public or state sources. provide. Barriers to appropriate health technology according to Malkin, 2008, (1) the distribution of health technology is not clear, the organization is (2) the production of local medical devices is still small, (3) users are not familiar with new equipment, lack of training to use tools - new tools. To determine whether the technology is eligible or not the Centers for Medical care and medical Services (CMS) establishes the following criteria (Clyde et al 2008): (1) technology provides a therapeutic option for a population of patients who do not respond or are not eligible for appropriate therapy available today. (2) technology provides the ability to diagnose a patient's condition that was not previously detected by currently available methods or is capable of diagnosing a patient's medical condition early [12].

There should also be evidence that the use of these tools affects patient management, (3) the use of new technologies significantly improves clinical outcomes for patients when compared with currently available technologies. The results or outcomes that are often evaluated in research on medical devices are about their ability, reduce mortality, complications associated with the use of tools, reduce the number of days spent in the hospital (length of stay), can accelerate the healing process of disease, reduce recovery time3.

There are still many obstacles to developing health technology in developing countries, therefore the rational choice is appropriate health technology with the following steps: (1) recognizing the need for technology in society by conducting market research in public and private hospitals and sectors. other health service efforts to obtain a real picture of what health technology is needed at this time, (2) understanding and formulating technological problems by making plans and developing designs, (3) seeking problem solving. In an effort to solve the problem, a model or prototype was made. A model is an imaginary image of reality that depends on the object or process described and the purpose of its use, (4) planning and evaluating alternatives, (5) choosing alternatives according to needs, (6) making a product or technological process followed by diffusion and distribution. In developing the design or design, it is necessary to collaborate between research institutions, universities, groups at universities, medical faculties, government (Ministry of Health) and entrepreneurs or industry [3].

Alliances (fellowships) and collaboration can be a way to obtain health technology at a lower cost to increase production efficiency and quality control and reach the consumer population or patients who need it. Interdisciplinary and / or multidisciplinary cooperation or partnership is mutually beneficial with good intentions and dedication as a basis for mutual learning. In order for the collaboration to be successful, each partner must make a different contribution: basic research, product design, manufacturing capacity, and distribution access. It is expected that each party in the alliance or working partner has the desire to increase competitiveness compared to before. Collaboration often fails due to a lack of commitment from all partners [13].

The dissatisfaction with technology that arises when its performance fails to meet expectations of technology may fall into nothing. Economic needs are moving research laboratories, industry, and universities together at a time of stiffer competition, as many companies are looking for cheaper ways to conduct innovative research and creating new technology. Alliances between companies, universities, and other research institutions provide a good opportunity to develop scientific discoveries, technological innovations that are translated into specific problem-solving activities in the field of technology, which can be in the form of products or processes, or improvements in product development. or processes that are beneficial to society. In the field of health technology, new technology should make an important contribution to clinical improvement and it is hoped that the cost of health services will also be lower.

5. The Need for Health Technology [14].

MEDICAL UPDATE IN THE TECHNOLOGY

RESUSCITATOR FOR INFANTS

Resuscitator for babies has been developed by Christian Olson (38 years), from a consortium of Boston Teaching Hospitals and Engineering Schools, he is a specialist in pediatrics and internal medicine, developing inexpensive and simple technology that can keep babies alive outside shelters and in rural areas. village. This tool costs USD 7. The program started after the 2004 Tsunami natural disaster in Southeast Asia. Since then approximately 500 midwives in Aceh have been trained to use the tool with good success. In addition, Olson has also made a prototype incubator whose aim is to find solutions to problems in poor countries [15].

PHOTO THERAPY

Photo therapy is a form of therapeutic technology for infants with hyperbilirubinemia using blue or white fluorescent lamps. Bilirubin absorbs light with a wavelength range of 450 to 460 nanometers (nm). The blue light outputs the most effective wavelength of light between 425 and 475 nanometers. The resistance of this lamp can function up to approximately 2000 hours. Appropriate

technology development program, blue-ray phototherapy device, which was conducted at Duke University, USA. This tool uses a row of blue LED (Light Emiting Diode). This lamp emits blue light and can function 5 - 10 times longer than standard fluorescent lamps. So this lamp can be turned on in the range of 10,000 - 20,000 hours. The source of electrical energy from this lamp uses a motorcycle battery which is charged when there is electric power. If the power goes out, the appliance can still work. This tool was made by fotogenesis medical incorporated at a price of approximately USD 62510, [16].

SHUNT DEVICE FOR THERAPY OF HYDROCEPHALUS PATIENTS

Shunt is an element or tool to divert the flow or flow through a system. This shunt tool is used to drain excess brain fluid in the brain cavity into the abdominal cavity where in the abdominal cavity the fluid will be reabsorbed into the blood circulation. The shunt device with a pump in the United States was first made by John Holter in 1956. For the first time in Indonesia, a shunt device for treating hydrocephalus patients was developed between 1974 and 1976 by Prof. Dr. dr. SK Handoyo as inventor and Sudiharto as research assistant at the Central General Hospital DR. Ciptomangunkusumo Jakarta15.

(4) Digital radiography

The research team from the Image Physics Research Group, majoring in Physics, Faculty of Mathematics and Natural Sciences (MIPA), Gadjah Mada University has invented digital radiography tools, this research team consists of four Mathematics and Natural Sciences Lecturers (Gde Bayu Suparta and friends) 2009, this finding has patent rights from the Director General of Intellectual Property Rights (Dirjen HKI), Ministry of Law and Human Rights of the Republic of Indonesia on October 19 2009. The essence of this invention is (1). invented a digital radiography system control device, this tool that converts analogue to digital technology is the only one in Indonesia., (2) The saving of electrical power is used, 20 images are taken once a picture is taken so that the dosage of X-ray usage is very low., (3)) can be assembled in the country with 70% local content, low operating costs and system costs, (4) the price is affordable for hospitals or health centers and cheap examination costs for patients. These examples are illustrations of the development of appropriate technology ranging from simple to complex [17,18].

Translational research grows out of motivation to improve or improve national health. This research begins with thinking about health needs and then involves searching for available knowledge to identify discoveries that can be used to meet those needs. The aim of translational research is to bridge the gap between discovery of science and the development of new strategies or health technologies for the diagnosis, treatment and prevention of disease, this process is usually now called translational research [19].

The reciprocal process between basic science research and clinical research (bedside research) guarantees the development and refinement of thinking and turns it into new drug technologies, diagnostic and therapeutic tools or disease prevention methods, ultimately resulting in changes in medical practice and usually requires new regulations to get approval for its use. The ultimate goal of translational research is not only to acquire new knowledge but also to promote better health. Due to the use of new health technologies there is always great uncertainty about the effect of a human intervention intestinal side effects that cannot be predicted from in vitro studies or animal models. Therefore, a clear research design is needed to assess patient safety and its benefits [20].

Human needs (human need) arise naturally from humans to fulfill everything that is needed in life as a means of satisfying their needs in relation to health services. This desire is manifested in a request in the form of looking for a health service provider or provider. Parties who request and use health services as users or consumers. Health service providers are parties who can provide certain services to consumers in the form of services and goods. The formulation of needs (needs) describes the difference between what is wanted (want) and what is available or available. Solving a need implies the need for the availability of resources in such a way that what is desired becomes possible or a reality. What is there is an indication of factually and potentially available resources for problem solving. Problem solving demands scientific principles carefully and responsibly accompanied by a thorough understanding of the social, political and economic situation in which the problem occurs. Academics, professionals, scientists and engineers are required to solve problems related to the needs of society within the limits of available resources [20,21].

CONCLUSION

The description of health technology that I have presented can provide an indication that health technology is an instrument for humans to meet their needs as well as to improve the quality of life (quality of life) without leaving local culture. Without update, medical technology does not have the ability to guarantee its existence and independence (self-reliance). Therefore, every effort must be made to be able to own and master technology in order to maintain its existence in facing an unsuitable future.

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