**The impact of computers on advances in the technology of the medical field.**

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Abstract

 This paper will analyze the impact computers have had on the medical industry. A historical outlook on how computers have been used for advancing the available technology in the medical field will be discussed within this paper. All these modern applications of computers have shown huge improvements in the speed and accuracy of medical procedures, storage and retrieval of medical records, and have broken the original limitations of medical technology. This paper will also explore future applications of computers for different areas of medical training. Different articles on such applications will be the source for this discussion as examples for the multiple possibilities computers still have to offer the medical field. The paper will conclude with a discussion on where computers have taken the medical practice and where it can improve even further.

Digital medical records

 Computers have changed how people transfer and store data all over the world, I personally store information such as my weekly schedule, financial data, past memories in the form of pictures or videos, and others in the some form of a computer. It is without question that many people, businesses, schools, and organizations rely on the fast and effective use of computers for handling their data and records, so why would the medical community be any different. This was not always the case however, medical facilities used to have medical data recorded on paper and stored in areas only accessible by a handful of people. This was of course not a very efficient system for when a doctor or nurse had to retrieve medical data for a patient, with time being wasted on finding the files in storage by hand and having to hand write all reports. It didn’t take long for computers to become the obvious solution to this inefficient practice. Studies were done to find if switching to computer storage was worth the initial effort of transferring all the original handwritten data. A study found the expected benefits of “Reduced staff time to access transcribed information — don't have to search for hard copy of files. Reduced amount of paper which in turn, reduced storage space required and costs” (Dodge, 1999). After medical facilities realized the overall benefits of applying all their records into computers, they decided one by one to take start the process of transferring the data.

 The massive transition from paper records to digital was a hugely beneficial step for the efficiency of medical practices. Medical data could now be displayed from any computer that had access to the record base. Ever since I can remember, whenever I have interacted with my doctor, they would first access my medical history from a computer and type out reports right into the computer. This personally allowed for my appointments to be quick and easy, with my doctor having little confusion for my past medical records and quickly store any new information. A study was done on tablets and their place in the medical community, they emailed a survey to multiple medical training programs and the results found that 40% of the respondents used a tablets for medical practice, the most popular reason being for the retrieval of medical records (Sclafani, 2013). This is an example of technology continuously improving the medical process of doctors. The introduction of tablets offers a more easily transportable source for medical records than larger computers attached to a wheeled stand, like ones I have seen my own doctors use for my records.

 The overall benefits of having this easily accessible medical data is not without its potential dangers also. The tradeoff of no longer having a handful of individuals able to access the medical data on stored files is that this data is now less secure. A lot of medical data is transferred across different networks to reach the computer where the information is needed quick and efficiently. The connection of these networks is referred to as the Internet and any data that is stored or transferred through it is constantly under threat of being illegally accessed by hackers (Liu, 2012). The medical community doesn’t leave such confidential medical information up to chance against cyberattacks, but use complex security programs such as installing firewalls to counter against any potential threats. These programs are another example of computers solving a problem in the medical community.

Computer applications in medical training

 The improvement of how future medical professionals are taught and trained is vital for ensuring future generations are receiving the best care for their health and wellbeing. The technology of virtual reality is a possible new and effective way to expose medical students to a variety of medical simulations. Having a student view a surgery through a virtual reality program is a much cheaper and easy alternative to attending actual surgeries. I am not saying this should be replacing live viewings entirely, but this technology would offer an effective alternative for students who don’t have frequent access to real life surgeries. A study was done to develop a virtual reality program for student to see and interact with three dimensional models made from CT and MRI scans and also run fluid flow simulations on the models. “The virtual reality system proposed here could shorten the length of training programs and make the education process more effective” (Djukic, 2013).

 Another application of computers in medical education is the development of robotic patients. These medical tools are capable of performing human functions such as breathing and a having a pulse. They can even be programed to simulate multiple medical conditions such as a heart attack, stroke, and asthma attack (Kleebauer, 2014). This use of technology gives nursing students constant access to patients to practice on before moving to actual humans.

Current computer applications in medical practices

 Any surgery is without a doubt a procedure that takes many years of education and then many more years of guidance and experience to be done safe and effectively. The introduction of robotics have offered surgeons new tools to make surgeries more precise and safe. A surgical robot known as daVinci™, has more than 18,000 robots already in use by hospitals (Bloss, 2012). A scholarly journal describes the robot’s enhanced abilities to allow “surgeons to perform endoscopic surgery remotely with the added benefits of 3D vision, control of illumination colour balance and refined motion control of the surgeon's hands for more precise patient procedures” (Bloss, 2012).

 A very delicate part of the human body is the eye, and it is no surprise that eye surgeons require a tremendously steady hand. After many years, it is natural for surgeons to lose some of the precise motor skills of their hands, which could prove risky when continuing eye surgeries. A robot was developed to counteract this risk. This robot was developed by Eindhoven University of Technology, and functions to “filters out hand tremors of the surgeon for a more precise retina repair or treatment of detached retinas” (Bloss, 2012). The reassuring use of computers have allowed such eye surgeries to be much easier for professionals to perform.

 A very unique application of computers was the development of a system to maximize the efficiency for transporting important cargo such as laundry, food, and medicine all throughout a hospital. The problem was finding a way of improving the way individuals could transfer such items through a busy hospital hallway fast and effectively. Aethon, Inc. found a solution by removing the individual person from the situation and replacing him with a specialized robot. These robots would pull carts carrying the cargo and transport it the specified areas, having the capability to easily navigate the hallways, ride the elevators, and even announce when the cart has arrived at its location (Bloss, 2012). The computers provide the perfect solution because they will follow the quickest route with constant motion and no need for breaks or any other human involved inefficiencies involved before.

Conclusion

 The introduction of computers have shown the broad spectrum of applications this technology has to offer the medical field. Computers have made medical facilities more efficient in how medical records are stored and collected. Future applications in development right now have been discussed, showing how computers can further benefit the education of medical students and nurses. The many computer systems and robots already in use by medical professionals have been shown to have significant impact on efficiently and effectively they can do their work. In conclusion, the multiple examples explored in this paper have shown the major positive impact computers have made in the medical community. Also that this impact is in no time slowing down, with faster and better technology being developed each and every day.

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