Universal Medical Database

Marymount University

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I acknowledge that the Capstone Project is an independent study project to be completed individually. On my honor, I have not received aid on my Capstone Project other than what was provided by my faculty mentor and any persons explicitly cited in my work. I further acknowledge that if I have given any aid to another student in this course, the instructor of this course was made aware of my contributions.

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Objective to the Project

The objective of the project is to have a universal medical portal for doctors and patients to access. The concept behind this portal is for patients to have complete control over their medical records. It is important that every single person has control over their medical records and can permit access to those it wishes to give them to.

However, it would be an insufficient if the portal was created solely on one person's views. I have conducted an informal survey, based off of Professor Narock's suggestion, with my family and friends. I have asked for their opinions on what would be beneficial to have in the portal (That will be discussed in Project Details). They have provided their own opinions and I have incorporated them as a table in my draft.

In my original topic submission I made the suggestion that the patients, once they leave a doctor, have to submit a request to their former doctor to relinquish his or her access to their portal. However, my peer reviewer made a better suggestion that the patient should have administrator access; therefore they can relinquish a doctors access when they are in no longer need of that medical practitioner.

The overall concept of the project is to allow everyone to have access to his or her own medical records. Which in turn, will hopefully create the pathway to a more medically responsible society. It is important that everyone knows what is medically going on in his or her own life and also decide whom he or she share or do not share the information with.

Point-of-View & Argument

My point-of-view for this project is that people need to take charge of their own health. As someone with medical issues, it is very easy for me to not know what is going on with my own health. One reason being my mother took charge of all of that and therefore I only half paid

attention. So when the time came for me to really be in charge of my own health I struggled. Another reason for my proposed medical portal is I do not have complete access to my medical records. The portals that I do have access to are not user friendly. The portals that are already out there, from my experience, are mainly set up for the practitioner's benefit. They are in medical terminology, which is fine, but I would also like my records to be in blatant terms as well.

I understand the concern people have over obtaining full access to your medical records, it is great responsibility, but it is your own health. If we allow the patients to be in control, not the doctors, then we might be leading the way to have a more healthy society. You would have up-to-date information on your health, you would not have to remember things your doctor said, it would be on the portal for you to access at anytime.

Another reason this portal would be a good idea is if you have to go to a specialist you need to have your medical records, or at least remember why you are going to the specialist and everything that goes in relation to that. If you have access to your own medical records then you could allow the specialist to see the relevant information. It would be beneficial because it would be a sure way to make sure you are not forgetting anything that might be of significance. Also, it would save time when visiting the specialist because hopefully you would grant them access in advance so when you would meet with them you can get to the heart of the visit, saving both of you time.

Faculty Advisor Summary

My faculty advisor is Professor Narock. He is an assistant professor in the Information Technology department. Professor Narock has dedicated his time to focus on the research of intelligent information systems as well as Big Data problems. As a professor at Marymount University he teaches a variety of Information Technology courses. Those courses include: Web

development, mobile app development and data science. Professor Narock's has taken his interest with Information Technology and has interwoven it with science, where he enjoys working with students in teaching them about the connections technology and science have.

Project Plan

My project plan will consist of many steps (this is all hypothetical – this is all research). As I said in the previous section, Objective of the Project, of my paper the entire point of the medical portal is to ensure that the patients have complete control and access of their medical records. I feel that in order for the portal to be successful, meaning in order to make sure people feel comfortable using the portal, I need to make sure security is top notch. The security system will consist of three separate steps, a three-step login. Step One: a username and password, but the password would be a minimum of 15 characters with a mix of upper/lower case letters, number and symbols. Step Two: a text or email will provide a six-digit code for you to input. Step Three: your social security number and your birthday. All of this is personal information, but it is unique to the person. This three-step login will help to ensure users that your information is safe from getting hacked; there is a decreased percentage. This part of the project will probably take up to a month, it is important to get this part right.

The rest is in the table below.

Task	Timeframe
Research other medial practices with medical portals. • look for security breaches • benefits of an encrypted server…	Three weeks – this can be done and I can also start working on creating the three-step login
Three-step login for the portal	1 month
Start building the foundation of the portal	1 month – in conjunction with the login system
Create multiple webpages that are responsive to the webpage and can update automatically	2 months – make sure they all work and do what they are supposed to do (test the pages as they continue to grow)
Test the entire portal once, built – input false information to make sure it all works	1 month – fix as you go, if needed

Resources

For my intended project I will need many technology sources. Thankfully, I will need to complete my project will be provided by the United States Department of Health and Human Resources. The first thing I will need a computer with a large server. Also, I will like to be able to have the information backed up to encrypted cloud storage. If, possible I would like to make sure the cloud storage would be encrypted twice. I would like to set the cloud storage to continuously backup the information once a week and when it backups up the information it will override the previous version. However, it will save the previous version for four months, in case something goes wrong.

Project Details

In the informal survey I conducted with family and friends I was able to pinpoint what they felt was important to include in the medical portal. In the table below, I have shown part of the survey what they felt was important and why.

Portal Feature	1 – 10 of Importance	Why?
Security/Security Settings	10	Want to control who sees it & what they see
Accessibility (user friendly)	8	If we cannot figure out how to use it, then we will not
Design	5	Design is a huge part of appeal, if it looks cheap people will think it is low end
Able to have input in new features – after it has been used	7	Once we start using it we find things we like and don't. We would like input in the product we're using

In The Journal of the American Medical Association (JAMA) a study was conducted which highlighted the vulnerabilities of electronic medical records. In an article published by the Los Angeles Times (Brown, 2015) is was said that almost a thousand breaches in security have affected "29 million medical records from the years 2012 to 2013." In the JAMA research the focus was put on those who had breaches have affected 500 people or more. The medical

database that they used was under The Department of Health and Human Resources. In the table below, (Liu, Musen, et. al., 2015) they show the characteristics of data breaches of medical records starting from 2010.

Table. Characteristics of Data Breaches of Protected Health Information Affecting at Least 500 Individuals Reported by Entities Covered by the Health Insurance Portability and Accountability Act

	Overall	Year of Data Breach				*P* Value[a]
		2010	2011	2012	2013	
Total No. of data breaches reported	949	214	236	234	265	.07
Total No. of records affected, in millions	29.0	5.1	11.6	3.4	9.0	.88
No. of data breaches affecting at least 1 million records	6	1	3	0	2	.37
Data breach by media type, No. (%) [95% CI]						
Portable electronic device or laptop	310 (32.7) [29.7-35.7]	77 (36.0) [29.8-42.7]	72 (30.5) [24.9-36.7]	78 (33.3) [27.5-40.0]	83 (31.3) [26.0-37.2]	.09
Desktop, email, or EMR	148 (15.6) [13.4-18.0]	32 (15.0) [10.7-20.4]	25 (10.6) [7.2-15.2]	43 (18.4) [13.9-23.9]	48 (18.1) [13.9-23.3]	
Paper	212 (22.3) [19.8-25.1]	50 (23.4) [18.1-30.0]	55 (23.3) [18.3-29.2]	52 (22.2) [17.3-28.0]	55 (20.8) [16.3-26.1]	
Network server	101 (10.6) [8.8-12.8]	16 (7.5) [4.6-11.9]	25 (10.6) [7.2-15.2]	29 (12.4) [8.7-17.3]	31 (11.7) [8.3-16.2]	
Other	178 (18.8) [16.4-21.4]	39 (18.2) [13.6-24.0]	59 (25.0) [19.9-31.0]	32 (13.7) [9.8-18.7]	48 (18.1) [13.9-23.3]	
Data breach category, No. (%) [95% CI]						
Theft	552 (58.2) [55.0-61.3]	139 (65.0) [58.3-71.1]	142 (60.2) [53.7-66.3]	141 (60.3) [53.8-66.4]	130 (49.1) [43.0-55.1]	.003
Loss or improper disposal	105 (11.1) [9.2-13.2]	24 (11.2) [7.6-16.2]	21 (8.9) [5.9-13.3]	28 (12.0) [8.4-16.8]	32 (12.1) [8.6-16.6]	
Unauthorized access or disclosure	140 (14.8) [12.6-17.2]	16 (7.5) [4.6-11.9]	39 (16.5) [12.3-21.9]	36 (15.4) [11.3-20.6]	49 (18.5) [14.2-23.7]	
Hacking or IT incident	67 (7.1) [5.6-8.9]	10 (4.7) [2.5-8.5]	20 (8.5) [5.5-12.8]	14 (6.0) [3.6-9.9]	23 (8.7) [5.8-12.8]	
Other	85 (9.0) [7.3-11.0]	25 (11.7) [8.0-16.8]	14 (5.9) [3.5-9.8]	15 (6.4) [3.9-10.4]	31 (11.7) [8.3-16.2]	
Data breach involved external vendor, No. (%) [95% CI]	273 (28.8) [25.9-31.7]	54 (25.2) [19.8-31.5]	76 (32.2) [26.5-38.5]	70 (29.9) [24.4-36.1]	73 (27.6) [22.5-33.3]	.39

Abbreviations: EMR, electronic medical record; IT, information technology.

[a] Calculated using linear regression or χ^2 tests.

(Liu, Musen, et. al., 2015)

As the table above as shown, the majority of the breaches were the result of theft. Concluding that there is a major vulnerability for medical portals that are already in use. Only proving my point that even though having a three-step login system might be annoying, it would be the most beneficial and could help prevent the thefts of electronic medical records.

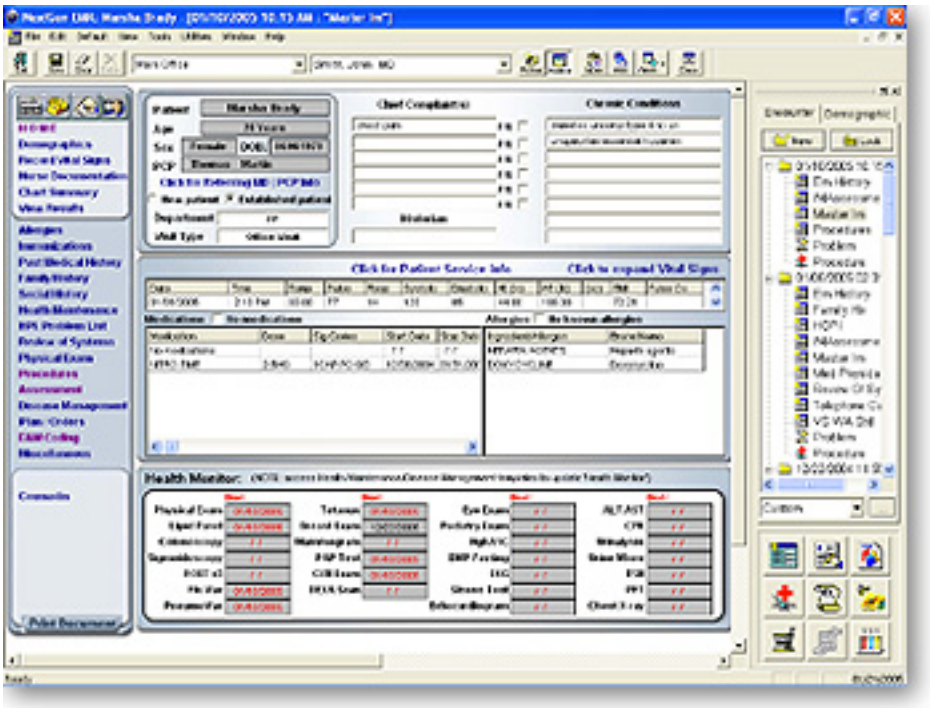
In the article, *Solutions for medical databases optimal exploitation* (Branescu et. al. 2014), it was discussed the benefits of applying the method of Online Analytical Processing (OLAP) techniques to the existing databases. The authors discussed how the techniques would

provide a performance enhancement to the technique that is already in place. The researchers write that they understand the importance of keeping medical records together and that in today's world everything is going digital and it is a competitive market. It is important that we make sure our system is responsive and continuously runs smoothly. If we maintain a system that cannot hold a great deal of traffic then it is not going to be a successful system and people will go to an alternative.

In a 2006 article, *The Effectiveness of Australian Medical Portals: Are They Meeting the Health Consumers' Needs?,* (Moon & Fisher, 2006) the authors discussed the Australian's governments shift to using the Internet to distribute medical data. The government imposed this change in order to make things more convenient for patients and to reduce the government's health budget. However, the research the paper found showed that the portals are not that effective for users. The research conducted were a series of usability tests. The tests concluded that the portals were not as usable as they should be. Even though this article was published in 2006, it is important to note that many portals available in 2015 are seen as not usable. The main issue with many, if not all, databases is that they are in medical terminologies. Most people do not understand the medical terms; if there is not a translation of what the term is then people usually just get frustrated and turn the portal off.

In the article, *Medical Groups' Adoption Of Electronic Health Records And Information Systems*, (Gun et. al. 2005) it was said that the adoption of electronic medical portals is growing slowly. In the span of ten years it still appears to be true. Many medical practices are still small and might not see the need to have a medical portal or medical practices might not have the time or resources to transition to a medical portal. There are many medical portals out there for practitioners to choose from and the chose can be overwhelming, as stated in the article. With a

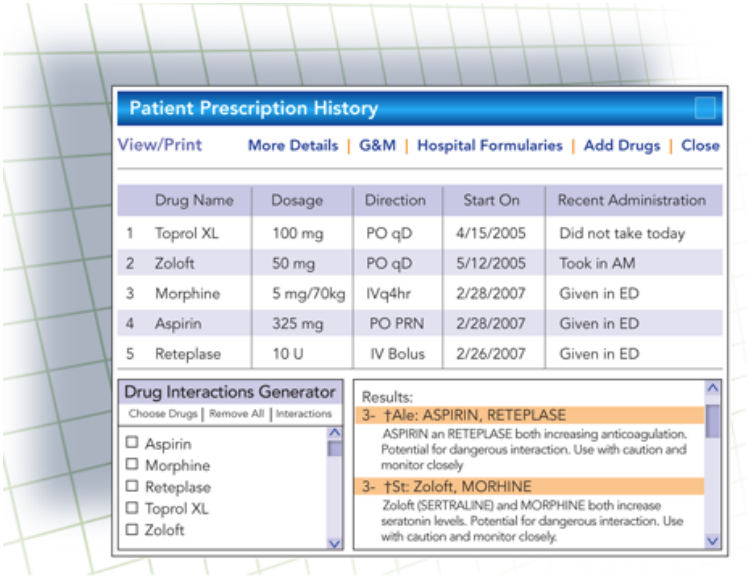
universal medical portal all of the medical practices are on a singular portal. It will make things much simpler.



(Gicomeng, n.d.)

In the image above, it shows a poor design for a medical portal. The design is very cluttered and the appearance is very dated. Many software systems used for businesses runs best on Microsoft Windows, usually on older systems. However, with my medical portal it will run on all systems and Internet browsers because it is created to be responsive to the program and system the user is using.

In terms of the design, as I touched on above, it appears to be dated. To appeal to the vast majority and make the portal simple to use, it has to have a modern a simple design. Everything has to be clear and easy to follow. The image below (Electronic Medical Records, n.d.) is a good representation of what I feel the medical portal should look like.



(Electronic Medical Records, n.d.)

Knowledge Being Applied

The main course I am taking information I have learned from would be IT 355 Software Testing, Documentation, and Quality Assurance. When I took that course I learned all about how to plan an IT project. It was a writing intensive course where I had to create many papers involving planning a project that would include time for testing. However, before I could write the paper I had to learn about the different types of testing. Also, I had to learn how to stay on schedule and keep a deadline.

This semester I am taking a computer course where the broad purpose of the class is to go over various parts of a computer, how a computer works. I feel that that course would be beneficial to me for this particular class. The class would give me a better understanding of computers and allow me to create a better portal that would be responsive to new software systems and Internet browsers.

Risk Factors

One major risk factor for this project is that it is not going to get completed. It is a very complex project that needs to be able to work on many systems. Also, it has a strong security element to it that would be very hard to complete. Also, the cloud concept that I have in mind would be tough to figure out, you have to have enough space and make sure that everything is secure.

NOTE: I need to add more references and I am not sure about the risk factors as well as the Project Details. Everything else I think I have done what you have asked.

Resources

Branescu, I., Purcarea, V., & Dobrescu, R. (2014). Solutions for medical databases optimal exploitation. *Journal of Medicine and Life*, *7*(1), 109–118.

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Gans, D., Kralewski, J., Hammons, T., & Dowd, B. (2005). Medical groups' adoption of electronic health records and information systems. *Health Affairs, 24*(5), 1323-33.

Liu, V., Musen, M., & Chou, T. (2015). Data Breaches of Protected Health Information in the United States. *JAMA,* 1471-1471.

Moon, J., & Fisher, J. (2006). The Effectiveness of Australian Medical Portals: Are They Meeting the Health Consumers' Needs?. *BLED 2006 Proceedings*, 42.