

**TELEHEALTH**

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## Introduction

This research paper is primarily concerned with the Telehealth; Telehealth, with the help of several technologies and tactics can able to deliver all health related services. This new technology does not limit its boundary in providing health related service only; along with that, it helps in providing health related education to the learners. Telehealth is not a specific service rather it is a way of enhancing the health related service and education. “Telemedicine” is a conventional term,



Figure 1source: <http://breckenhealth.com.au/telehealth/>

which is used previously for diagnosis disease and monitoring the disease with the help of technology (Nagel & Penner, 2016). The term Telehealth derives from the term telemedicine (Armstrong and Frueh, 2003). Previously the term is used for delivering medical facilities only; now with the help of Telehealth, students can also get all health related education. The term “Telehealth” is commonly used to describe a wide range of health education, diagnosis and management of health care. The field includes

- Counseling
- Home health
- Disaster management
- Consumer and professional education (Core principles on telehealth, 2009)
- Dentistry
- Physical and occupational therapy and
- Monitoring and management of chronic disease

## TASK 1

### Issues in Telehealth:

Along with several positive, Telehealth has several issues also and these issues are suppressing the financial opportunities of this Telehealth. Few issues related to healthcare care have been generates, which accompanies the transformation of health care. The barriers in Telehealth are:

- **Money:** The major barrier of Telehealth is reimbursement. Despite of several financial facilities, Telehealth has several negative factors in relation with money. Almost 90



Figure 2 sources: <http://learntelehealth.org/2014/01/new-telehealth-policy-module/>

million people are engaged with this system and they are managed care system (Fong, *et al*, 2011). 90 million people need to pay high for their job. Telehealth has been

generated to control the cost but cost of managing the entire system is high enough. On the other hand, it can be stated that the cost of medicine does not refund in this fee-for-service system and the facility of reimbursement is limited only to the areas of nonmetropolitan.

Telehealth system allows the providers to misuse the entire system of health care or they drive up the cost of the medicines (Grady, 2011). Another typical issue in this section is many technology based companies are attracted towards the health care service. They are not particularly educated about the applicability of Telehealth.

- **Regulation:** However, Telehealth is facing licensing trouble; still this issue is very minor for Telehealth. In traditional time, telemedicine only belongs to one state or single state. Due to advancement of Telehealth, the service of Telehealth does not limited to single state only. Today there is a multistate system and this system should be followed by the practices of multistate practices. In accordance with *California Law*, the doctors should treat the patients face to face. Face to face evaluation between doctor and patients are necessary and it helps in putting the providers on edge (Maheu, *et al*, 2001).
- **Lack of protocols:** In accordance with International Organization for Standardization, it has developed new protocols; this protocol is on the guideline on remote mental health services. The health care professionals should need to take a lead in developing vest practices in order to overcome cynicism of regulators (Smith *et al.*, 2002).
- **HIPAA Privacy and Security:** Since technology has become the heart of the health care service; with the help of technology, health care services can be provided to the people of remote areas. On the other hand, students from remote areas can able to avail any information on health related service. However, there is a question of data security of the service users and students. The information of the patients can be exposed at any time. This can be a posing threat for the future of Telehealth (Smith and Maeder, 2010).

### **Capabilities of Telehealth:**

Tunstall's Integrated Care Platform (ICP) solution includes the monitoring process of the patients of remote areas. Telehealth is occurring throughout remote areas of NSW. The capability of Telehealth helps in developing health related knowledge among the service users and health care professionals. It facilitates in identifying common issues and challenges at state level. The capacity of health care service can be increased with the help of this new technology. Enhancement of networking is also a positive side to this. With the help of enhanced network,

people from remote areas can able to avail service. Along with that the doctors of remote areas of NSW, can able to enhance their excellence.

Agency for Clinical Innovation has depicted that Telehealth is an innovative technology, which helps in enhancing the capability of health care service. Telehealth of clinical and nonclinical settings should follow the guidelines of the ACI (Smith, *et al*, 2012). This strategy is successful in implementing and promoting innovative models, which are helping in improving the performance and excellence of the health care professionals. With the help of Telehealth, the communication among the health care professionals can be improved through this. The developing network helps in sharing knowledge among the doctors. Doctors from one corner of the world can able to discuss about a problem with the doctors from different region.

### **Benefits of Telehealth:**

The aim of this paper is to provide service to the vulnerable old people, who are living alone in their home with zero medical facilities. Old people are still leaving alone in remote places of NSW; they need health care related service. By using Information and Communication Technologies (ICT), health related service is going to deliver over both short and long distance people (Jones & Brennan, 2002). The benefits of Telehealth are associated with rural patients and rural health care professionals. The benefits of Telehealth are:

- **Local access to specialize doctors:** Telehealth can lower the cost of treatment in local areas. Clinical management through Telehealth can able to save a good amount of money of the people of remote areas, specially the older people. It reduces the cost of parking, travel, childcare, accommodation and food. Patients with mental defects need lots of care and support and therefore, they should stay at home. Telehealth mitigates social

dislocation. Social dislocation has significant negative impact on the mind of the elder people.

- **Improved access to service:** With the help of Telehealth, vulnerable older people can use the tablets and access specialized advice. It reduces the time of transportation. At this age, people do not want to travel much; therefore, this is the best way of availing treatment while seating at home (Telehealth industry, 2008).
- **Quality of clinical service:** The quality of clinical service can be improved with the help of Telehealth. Better education and training should be provided to the health care professionals. Local clinicians can get support of the specialist through Telehealth. Telehealth helps in improving the coordination, continuity of care and management of patients.

#### **Benefits to the rural health professional:**

- ❖ Professional development: Telehealth is one of the cost and time effective alternatives; in which health care professionals can able to avail treatment related information from the specialist.
- ❖ It is enhancing provision of local service (Armstrong and Frueh, 2003)
- ❖ Increasing networking, collaboration and practical learning among the health care professionals of rural settings

## **TASK 2**

Stakeholder Map: A stakeholder is typically an individual that does have direct or indirect relation with the decision making of an organisation. The healthcare sector has recently

witnessed a significant increase of innovations that aim for enhancing the quality of individual life, life expectancy, treatment and diagnostic options. The proliferation also aims for enhancing the cost effectiveness and efficiency of a healthcare system. Stakeholders do play a significant role in this entire process. Typically, the list of stakeholders for a healthcare system would include patients, service providers, employers and finally payers. The stakeholder map for this particular condition would be drawn as mentioned below:

**Internal Stakeholders**

Internal stakeholders within a healthcare system are of great significance as these individuals participate within different activities in order to ensure smoother operations. Within the genre of healthcare and public health, internal stakeholders put their contribution into publicizing of the strategy, funding, resourcing, co-ordination and others for ensuring that organisation become internally smooth and sound. The list of internal stakeholders are mentioned below-

<b>Internal Executive</b>	<b>Internal Operations</b>
<p><b><u>Employees/Service providers:</u></b></p> <p><b><u>Director of Public Health</u></b></p> <p><b><u>Head of health information and intelligence</u></b></p> <p><b><u>Procurement</u></b></p> <p><b><u>Director of nursing</u></b></p> <p><b><u>Strategists of Public health</u></b></p> <p><b><u>Public health management analysts</u></b></p> <p><b><u>Director of services and programs</u></b></p> <p><b><u>Research scientists</u></b></p>	<p>These stakeholders does have highest influence and of great importance. Each one of these stakeholders must be fully engaged in every strategic activity of the organisation.</p> <p>These stakeholders also have a responsibility to maintain their leadership, thus they must participate in the most appropriate manner for ensuring they are being effective with their roles and responsibilities.</p>



<u>Communications</u> <u>Environment health intelligence analyst</u> <u>Public Health Manager</u> <u>Trustees</u> <u>Board Committee Members</u>	These individuals also play a significant role in developing policies and strategies for ensuring maximum effect of the medical healthcare services.
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**External Stakeholders**

These are the individuals that are more focused over contributing their individual views, personal experience and perspectives in order for addressing problems and issues that are of significant importance just as service users, patients, local community members, carers and others. The list of such external stakeholders involves the below mentioned individuals:

<b>External Executive</b>	<b>External Operations</b>
<u>Local authority</u> <u>Providers</u> <u>Acute trusts</u> <u>Patients</u> <u>Service users</u> <u>Suppliers</u> <u>Customers</u> <u>Quality assessors</u> <u>Funders</u> <u>Special interest groups</u>	<p>These stakeholders are not as entrenched in the operations of the organization and their approach to the organization is based on a role of regulatory and controlling authority.</p> <p>Rather than map the future steps of the organization they participate in analyzing each step and outlining the flaws and controlling the operations by ordering what steps the organization cannot take.</p>

<p><u><i>Link groups</i></u></p> <p><u><i>Health visitors/school nurses</i></u></p> <p><u><i>Wider public health taskforce</i></u></p> <p><u><i>Media</i></u></p>	
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**Questionnaire**

The questionnaire to be developed would incorporate 5 open ended questions that would be distributed among different stakeholders in order for gathering their responses regarding every fact they wish a change within or not.

**Question: 1.**

How far do you believe that Tele-Health can derive the solution to conventional issues related to the medical field?

**Question: 2.**

Do you believe that Tele-Health might have any adverse effect over the health condition, especially for patients at distant places?

**Question: 3.**

Do you believe that medical professionals working within the healthcare setting must be provided with special treatment sessions as training for their enhancements?

**Question: 4.**

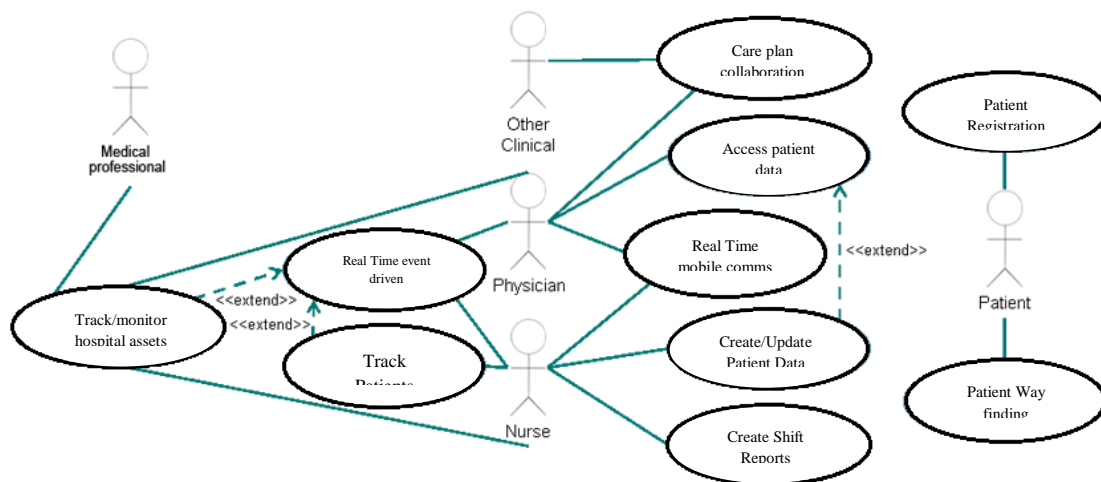
Do you believe that patients will certainly be affected positively by the Tele-Health medical services?

**Question: 5.**

Do you believe that Tele-health is the solution to the gaps that have been restricting healthcare organisations to provide their medical services?

**Use Case Diagram**

Use case model for the information system



**3 use case diagram**

**Tracking and monitoring hospital assets:** This is one of the essential tasks that must be taken care of in an appropriate manner for; this would help the management to ensure effective service delivery at every time. Lack of hospital or healthcare setting assets might lead to a situation of helplessness, on the contrast presence of all equipment and assets would help in ensuring effective and enhanced quality of treatment.

**Real Time event driven notification:** This is a form of gaining real time notification of everything that is going under within the premises of the hospital or the healthcare setting. This can be effective as, it would help the medical professionals and nurses to develop abilities for emergency preparation. Real time event driven notification refers to obtaining information from every possible source, which eventually helps in being prepared for most adverse situations.

**Track Patients:** Tracking patient would also be helpful in terms of developing a knowledge regarding the individuality of each patient and how they must be treated. This is another way of enhancing the quality of treatment for the patient. Tracking patients would be done by utilizing the information system that would as well be utilized for developing the database of patients and keeping their information.

**Care plan collaboration:** This would be done for ensuring individual patient is being provided with customized treatment solutions in accordance with their individual health conditions.

**Access patient data:** This is the type of data that would be registered at the time of the patient accessing the healthcare setting or hospital.

**Real Time mobile comms:** This is another form just as the real time event driven notification. In this process of “Real Time mobile comms”, medical professionals and nurses stay connected with one another in order to share information in the most constructive manner for ensuring high quality treatment is being offered to the patient.

**Create/Update Patient Data:** This by far is the most essential part of the entire treatment process. It is necessary for medical professionals and nurses to feed information about patients in accordance with the progress they are making. This would help the medical professionals or doctors to make certain modifications in their treatment as needed.

**Create Shift Reports:** Creating shift reports can as well be useful in terms of managing the workforce in the most constructive manner. This will help the organisation to ensure every patient is being attended at the time of their needs and requirements.

**Patient Registration:** It also is necessary to register every patient coming in the healthcare setting in order to ensure adequate flow of their information. This would as well be helpful for ensuring every medical professional is provided with the information of every patient they treat at a time.

**Patient Wayfinding:** Healthcare settings have always been inherently complex along with the decentralized manner that healthcare facilities provided their care services today, patients and their guardians need to go through a number of hallways and alleys. A well-structured Wayfinding solution is best for assisting patients and their guardians to move to the right directions.

## TASK 3

### Non-Functional Requirements

#### Critical System Qualities

There are several qualities of a cloud based solution, they are mentioned below:

- ❖ **Higher Flexibility**: Flexibility has always been the primary quality of the cloud based solution. The entire system would allow the developer/owner to automate the entire process of gathering quality events, initiating corrective actions over such events and finally providing control over document (Gray et al., 2012).
- ❖ **More emphasis over the subject, less over the software**: Cloud based solutions have been developed to assist streamline and develop entire process. However, heavy administrative responsibilities and roles especially for a healthcare organisation may shift the focus over, if the software has been configured properly. This eventually causes the organisation to divert from their principle focus. Cloud based solutions can assist a healthcare organisation to stay focused on their roles and responsibilities by eradicating administrative problems.
- ❖ **Scalability for growing alongside**: This can be defined as the ability of the software to grow simultaneously along with the business without being affected. Cloud based solution would help the healthcare organisations to grow simultaneously by managing everything that comes under the organizational responsibility.
- ❖ **Optimized organizational IT resources**: Cloud based solution ensures optimized usage of IT resources. Enterprise software has there been conventionally, organisations had no other choice but to use it, which caused draining of organizational IT resources. Cloud based solution, on the other hand can help organisations to manage every task at hand

effectively. This eventually frees organization's internal resources, which gradually helps organisations to manage everything without facing any organizational resource draining.

**System Interfaces:** It also is necessary to develop the interface of the system in a user friendly manner. Building the interface in a complex manner can be confusing and even draw sluggish results. It might take for the organisation or the management to achieve results and formulate tasks in weeks rather than hours. Properly designed interface on the other hand can be effective as this would help the organisation to manage everything in a systematic manner.

**User Interface Requirements:** The cloud would be accessed by numerous users/individuals, which raises the urge for developing a use interface that would help the organizational individuals to utilize the system in an adequate manner. Not being able to utilize the system would hamper the organizational objective achievement efforts. Developing a user friendly interface on the other hand would help every individual accessing the cloud either for feeding information or retrieving (Lamb & Shea, 2006). Users can even circulate information about patients within clouds for ensuring better treatment is being provided to the service seekers.

**System Constraints:** Besides of multiple advantages, cloud based solutions also have certain limitations, they are mentioned below:

- ❖ **Downtime:** This might be one of the worst case scenarios that cloud computing has. Practically there is not a single cloud provider that would ensure immunity from service outages. Since, cloud computing is entirely internet dependent it entirely depends upon the quality of the internet connection.

- ❖ **Privacy and Security:** Every discussion that involves sharing data and information must be secured, however cloud cannot make data secured as anything that is connected with internet is not secured (Peck, 2005).
- ❖ **Vulnerable to attack:** Clouds are pretty much accessible to anyone wishing to have peek of the data, which eventually raises the risk of being vulnerable to attacks and hacks.
- ❖ **Limited flexibility and control:** Things can be a little limited, when it comes to claiming for control over the execution or function of hosting infrastructure (Gallagher-Lepak, Scheibel and Gibson, 2009).
- ❖ **Costs associated:** Being pricey is one of the most crucial elements of cloud based solutions. However, transforming cloud system might reduce cost associated with staffs and hardware, but the ultimate price tag would end up being higher than one can ever imagine.
- ❖ **Platform dependent:** Inherent but clear dependency, which is also known as the “vendor lock-in”, has been a significant disadvantage that cloud computing has. These significant differences among vendor systems might often make things certainly impossible to transfer from one another cloud (Sandelowski, 2002). The process is not only expensive and complex but the process of migration would also expose significant data, which might raise the questions of privacy and security.

### Review of Cloud based solution in Telehealth:

For the data security of the service users, health care organizations, mainly related to Telehealth are trying to





impose cloud based solution to this. With the help of Mobile and cloud based solution, data of the customers can be secured. There are significant impacts of implementing “cloud” technologies in health care settings (Core principles on telehealth, 2009). Cloud computing refers to a particular model that permits the third party users to use the data through internet. Electronic Health Record or Electronic Medical Records are the models, which are probably appealing (Chang, Mayo and Omery, 2002).

**The Strengths of this model in nursing are:**

- Service users can have limitless access that software by using internet from any device.
- The service users are chained to a single computer only.
- Other systems can share data
- Same version of software can be accessed by all the service users of remote areas.
- Up gradation to the newer version is comparatively easier than other software
- Data security of health care system can be improved (Fong, *et al*, 2011)
- Personal IT support is provided to the system
- Investment of database management is unnecessary

**Weakness of Mobile and Cloud Based Solution:**

- ✘ There are significant risk factors associated with it, when a health care organization is adopting this new system; the organization is going to face major issues at the time of transitions
- ✘ Control of the third party is proving that there is no security in this system. The data can be manipulated by third party users. Health care organization has not control over the data (Maheu, *et al*, 2001).

- ✘ Trust on the cloud based vendor can have different meaning; therefore, Telehealth should be secured and maintained privacy.
- ✘ Data availability is another added issue to this; often health care professionals and service users are not able to avail all types of data.
- ✘ Another issue is data limitation, high chance of error, rapid response and disaster backups are the issues of cloud based solution.
- ✘ As the data are not secure then it can be availed by any one; unauthorized disclosure of the information may have negative impact on the solution.

## SDLC Approach

Pros and Cons to approaching the project using the ‘Predictive’ SDLC.

There are multiple pros and multiple cons of “Predictive” SDLC, they are mentioned below:

Pros are:

- ❖ Easy onward/backward planning along with implementation
- ❖ Tangible result at the climax of individual stage, which produces clear visibility for others and facilitates a baseline for moving forward.
- ❖ Ability to visually witness and communicate particular target delivery over scope agreed.

Cons are:

- ❖ Change- Change within the scope does have the potential to affect cost, time and quality.

- ❖ In case tasks and jobs have not been done in an appropriate manner within individual phase and have been recognized during the later stage, the complete project will certainly be adversely affected.
- ❖ Dependency- In case the project does have either internal dependencies or external dependencies (external projects, key resources etc), there can be delays since the plan has already been written or developed.

### Pros and cons of Adaptive SDLC

#### Pros:

- ❖ A realistic approach for developing software
- ❖ Does promote cross training and teamwork
- ❖ Functionality can be effectively demonstrated and rapidly developed.
- ❖ Requirements of resources are very less.
- ❖ It can be suitable for changing or fixed requirements.

#### Cons:

- ❖ This can never be effective for handling multifaceted or compound dependencies.
- ❖ There is a greater threat of sustainability, extensibility and maintainability.

The adaptive approach should be used as judged by the pros and cons of the approach as it seems that the adaptive method is more adjustable to different situation and the same framework can be applied in different situations.

## Conclusion

From the above analysis of the paper, it can be concluded that Telehealth has improved the health system of the remote places of Australia. The people from remote places, especially the old people are suffering heavily due to lack of medical facilities. On the other hand, at this age they are also not agreeing to dislocate from society (Jenkins and White, 2001). Therefore, Telehealth is considered as best possible way to promote health care.

On the other hand, health care professionals are also using this for improving their knowledge by communicating with the specialist. Health care professionals have used this therapy in order to promote health care service all over the world (Smith, *et al*, 2012). People around different countries or students from different countries can able to avail education on health related sectors without any geographic barriers. Telehealth is the mode of delivering health related services and several laws are defined in order to promote Telehealth effectively. Health care professionals should abide by all these laws before providing any health related service.

## References

*2015 International Conference on Cloud Computing (ICCC).*

Armstrong, M. and Frueh, S. (2003). *Telecommunications for nurses*. New York: Springer Pub.

Chandrasekaran, K. *Essentials of cloud computing*.

Chang, B.L., Mayo, A. and Omery, A., 2002. Evaluating quality of telehealth advice nursing. *Western Journal of Nursing Research*, 24(5), pp.583-590.

Core principles on telehealth. (2009). Washington, DC: American Nurses Pub.

Dustdar, S., Leymann, F., & Villari, M. *Service oriented and cloud computing*.

Fong, B., Fong, A. and Li, C. (2011). *Telemedicine technologies*. Chichester, West Sussex, U.K.: John Wiley & Sons.

Gallagher-Lepak, S., Scheibel, P. and Gibson, C., 2009. Integrating telehealth in nursing curricula: Can you hear me now. *Online Journal of Nursing Informatics (OJNI)*, 13(2), p.2.

Grady, J. L. (2011). The virtual clinical practicum: an innovative telehealth model for clinical nursing education. *Nursing education perspectives*, 32(3), 189-194.

Gray, L. C., Edirippulige, S., Smith, A. C., Beattie, E., Theodoros, D., Russell, T., & Martin-Khan, M. (2012). Telehealth for nursing homes: the utilization of specialist services for residential care. *Journal of telemedicine and telecare*, 18(3), 142-146.

Helfert, M., Desprez, F., Ferguson, D., Leymann, F., & Méndez Muñoz, V. *Cloud computing and services sciences*.

Huang, Z., Sun, X., Luo, J., & Wang, J. *Cloud computing and security*.

Jackson, K., Sigler, E., & Bunch, C. *OpenStack cloud computing cookbook*.

Jenkins, R.L. and White, P., 2001. Telehealth advancing nursing practice. *Nursing Outlook*, 49(2), pp.100-105.

Jones, J. F., & Brennan, P. F. (2002). Telehealth interventions to improve clinical nursing of elders. *Annual review of nursing research*, 20(1), 293-322.

Karydis, I., Sioutas, S., Triantafillou, P., & Tsoumakos, D. *Algorithmic aspects of cloud computing*.

Lamb, G. S., & Shea, K. (2006). Nursing education in telehealth. *Journal of Telemedicine and Telecare*, 12(2), 55-56.

Maheu, M., Whitten, P. and Allen, A. (2001). *E-Health, telehealth, and telemedicine*. San Francisco: Jossey-Bass.

Nagel, D. A., & Penner, J. L. (2016). Conceptualizing Telehealth in Nursing Practice Advancing a Conceptual Model to Fill a Virtual Gap. *Journal of Holistic Nursing*, 34(1), 91-104.

Peck, A. (2005). Changing the face of standard nursing practice through telehealth and telenursing. *Nursing administration quarterly*, 29(4), 339-343.

Qiang, W., Zheng, X., & Hsu, C. *Cloud computing and big data*.

Sandelowski, M. (2002). Visible humans, vanishing bodies, and virtual nursing: Complications of life, presence, place, and identity. *Advances in Nursing Science*, 24(3), 58-70.

Smith, A. and Maeder, A. (2010). *Global telehealth*. Amsterdam: IOS Press.

Smith, A., Armfield, N. and Eikelboom, R. (2012). *Global telehealth 2012*. Amsterdam: IOS Press.

Smith, C. E., Cha, J. J., Kleinbeck, S. V., Clements, F. A., Cook, D., & Koehler, J. (2002). Feasibility of in-home telehealth for conducting nursing research. *Clinical Nursing Research*, 11(2), 220-233.

Telehealth industry. (2008). [Ottawa]: The Branch.

Ten Hompel, M., Rehof, J., & Wolf, O. *Cloud computing for logistics*.

Zhang, Y., Peng, L., & Youn, C. *Cloud computing*.