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Abstract

Many studies have attempted to understand the utilization and adoption of patient portals and its effects on healthcare delivery and clinical services. However, it is still unclear whether the use of an online patient portal has any impact on the usage of emergency departments or urgent care centers. In this research, we analyzed three years of cumulative data of patients' portal usage and the number of visits to emergency departments and urgent care centers. We investigated the relationship between the frequencies of E-visits and visits to emergency department and urgent care centers. We also analyzed the effect of age, gender, race, ethnicity, number of medical problems, and patient portal usage statistics, on the utilization of healthcare facilities. The dataset used in this research was provided by a leading national healthcare provider, and it includes more than 1,142,691 patient records.

Keywords

Healthcare portals, health informatics, technology utilization, big data.

Introduction

A patient portal is a secure application accessible via the internet that allows patients to communicate with their healthcare provider (HIMSS 2014). Patient portals tethered to electronic health records (EHRs) generally enable patients to access their medical records, schedule appointments, pay bills, and refill prescriptions (Emont 2015). Some patient portals also include a problem list, list of medications, allergy list, test results, and links to personalized health information (Bates and Wells 2012). One of the most valuable and advanced features of a patient portal is the ability to treat a patient for non-urgent health conditions using an E-Visit function (Padman et al. 2009). The ability to complete and submit basic information for designated non-urgent episodic illnesses and to receive an online evaluation from a healthcare provider is a convenient and less expensive method of healthcare delivery. It has been found that there is a 40 percent decrease in office visits by patients who signed up for patient portal and E-Visits (Adamson and Bachman 2010).

The adoption of a patient portal by a healthcare provider benefit patients by increasing access to healthcare delivery. There are also significant regulatory, financial and non-financial benefits for a healthcare provider. The adoption and the use of a patient portal helps providers to fulfil the requirements created by the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 (Meng et al. 2015). The use of the patient portal by a provider is also linked with financial incentives created by the HITECH Act. According to a market research report in 2013, 50 percent of U.S. hospitals and 40 percent of US physicians in ambulatory care settings had installed some type of patient portal (Frost and Sullivan 2013). The adoption of the patient portal by hospitals and physician is expected to increase significantly in upcoming years. It is highly important for healthcare providers to understand the impact of utilization of the patient portal on patient encounters at emergency departments and urgent care centers.

Some studies have attempted to understand the utilization and adoption of patient portals and its effects on healthcare delivery and clinical services. It is still unclear whether the use of an online patient portal has any impact on the usage of Emergency Department (ED) or Urgent Care Center (UCC) (Goldzweig et al. 2013). This study aims to determine the relationship between the utilization of the patient portal's E-Visit function, and its effects on emergency department and urgent care center usage. The study will also analyze the patients' characteristics to understand the reasons for utilizing the patient portal or E-Visits function.

Research Implications

The research has number of implications for healthcare practice. The most important one is the understanding of utilization of the patient portal, specifically E-Visits, and its effects on emergency departments and urgent care centers. The research will illustrate whether the use of E-Visits has any positive or negative effect on the emergency department or urgent care center in terms of usage, hospital charges, and patient's access to healthcare delivery. The research will also explore patient characteristics, and determine what characteristics influence the utilization of the E-Visit function, emergency department or urgent care center. The identification of these characteristics can help healthcare providers target their efforts for education and delivery of healthcare resources.

Another important implication can be cost savings for patients as well as healthcare providers. Since a large portion of all emergency department visits in the U.S. are for non-urgent conditions (Uscher-Pines et al. 2013). By encouraging utilization of the patient portal and E-Visits function, costs associated with emergency departments for non-urgent conditions can be reduced. Additionally, patients can eliminate travel costs by utilizing the patient portal's E-Visits function.

Literature Review

The impact of utilization of a tethered patient portal on clinical services such as emergency departments and urgent care centers has a been critical research question for a decade. A number of studies have attempted to understand the utilization of such resources and how such utilization affects health care resources and facilities including emergency departments and urgent care centers (Meng et al. 2015; Palen et al. 2012). It is not clear whether the use of tethered patients' portals result in increased use or decreased use of emergency departments and urgent care centers (Goldzweig et al. 2013; Meng et al. 2015). Prior studies examining the association on online messaging with the use of other health care services report conflicting results; some studies show no change while others reveal reduced use of office visits or telephone calls (Katz et al. 2004; McGeady et al. 2008).

The study conducted by Meng et al. (2005) assessed the association between secure patient-clinician email use and clinical services. The authors found that the patients who initiated the secure email services with clinicians used the same level of clinical services over the longer term. They observed no difference between patients who did and did not use the secure patient-clinician email in utilization of office visits, scheduled telephone visits, emergency department visits, after-hours clinic visit, and hospitalization over a larger timeframe. A study performed by Palen et al. (2012), found contradicting results. The study found that by providing online access of medical records to the patients had significantly increased the use of clinical services such as office visits, after-hour visits, emergency department encounters, and hospitalization.

A systematic review of literature on health portals revealed that there is insufficient evidence that patient portals have any impact on patient health outcomes, cost or utilization of other health care services (Goldzweig et al. 2013). Previous studies do not assess the effects of individual portal functions, such as, requesting an E-Visit using a patient portal. This research will focus the individual function as well as the combined functions provided by a patient portal. Moreover, our research will be using a big dataset containing 1 million records of patient.

Data & Methodology

The dataset used in this research is provided by one of the largest health systems in the nation. It was a limited dataset that was stripped of the protected health information (PHI) and it was reviewed by a privacy board as well as it received an IRB approval. The dataset is comprised of 1,142,691 patient records which include patient demographics (age, gender, race, ethnicity), problem list, insurance providers, patients' primary residence zip code, patients' primary healthcare provider's name and zip code, hospital charges, statistics of usage of the patient portal, number of emergency department visits, and urgent care center visits for last three years. The statistics of usage of the patient portal is comprised of number of variables such as the number of E-Visits, number of advises, number of appointments scheduled – confirmed – cancelled using the patient portal, and the number of times a patient renews a medication using the patient portal.

The patient portal used in this study also provides the functionality of E-Visit to the patients. As explained earlier, an E-Visits can only be scheduled for non-urgent conditions. This portal provides E-Visits functionality for medical conditions such as pink eye, back pain, diarrhea, sunburn, heartburn, breast feeding mastitis, urinary problems, cough, sinus problems, insect bite, rash, acne, and other medical conditions which are not life threatening and do not need immediate medical attention.

In the sample data set, the number of patients who requested at least one E-Visit over last three years are 43,561 (3.81%), with a maximum number of 157 E-Visits by a single patient. These numbers show that the E-Visit is a significant new method of healthcare delivery and it is a viable option for certain kinds of patients with non-life threatening illnesses.

To understand the impact of E-Visits on the utilization of emergency department and urgent care center, we will conduct multiple linear regression twice. First time having emergency department visits as target variable with E-visits and all other variables as independent variables. Second time having urgent care center visits as target variable with E-visits and all other variables as independent variables. By doing this, we can understand the impact of E-visits on emergency department and urgent care centers. This method will also explain the effects of patient characteristics on the utilization of healthcare facilities.

We also aim to explore the patient characteristics affecting the utilization of the healthcare delivery. We will understand the relationship between patients' demographics (age, gender, race, ethnicity), disease types, problems and geographic locations. The exploration of characteristics will be done by using proportionality analysis, correlation analysis and cluster analysis of the patient population.

Preliminary Findings

The preliminary findings from the data reveal interesting insight about the factors effecting the usage of E-Visits, visits to the emergency department and urgent care centers. For instance, the male and female patient population have a significantly different number of E-Visits. The proportion of female population in the data is approximately 52.31% but the proportion of sum of E-Visits by females is 75.97% which is significantly larger as compared to male population, as shown in Table 1.

Sex	Number of Records (%)	Sum of E-Visits (%)	Sum of Urgent Care Visits (%)	Sum of Emergency Department Visits (%)
Female	597,793 (52.31)	124,362 (75.97)	454,007 (57.77)	338,447 (56.55)
Male	544,898 (47.68)	39,336 (24.03)	331,813 (42.23)	260,088 (43.45)

Table 1. Gender vs. Percentage of visits in each category

We have also found that some age groups have higher percentage of E-Visits than other age groups. The patient population between the age of 31 and 60 years have requested higher number of E-Visits compared to other age groups. The proportion of sum of E-Visits are highest at the age of 36 years compared to all other ages. The patients aged 36 years old have the highest proportion of E-Visits for total patients compared to the proportion of emergency department visits and urgent care visits for the same age. Table 2 presents a comparison of E-visits, emergency department visits and urgent care center visits in each age group.

Age (group)	Number of Records (%)	Sum of E-Visits (%)	Sum of Urgent Care Visits (%)	Sum of Emergency Department Visits (%)
0 – 5	98,406 (8.61)	3,965 (2.42)	74,384 (9.47)	43,762 (7.31)
6 – 10	75,351 (6.59)	1,826 (1.12)	52,762 (6.71)	21,901 (3.66)
11 – 20	137,553 (12.04)	2,770 (1.69)	100,689 (12.81)	46,434 (7.76)
21 – 30	163,459 (14.30)	21,718 (13.27)	152,226 (19.37)	105,649 (17.65)
31 – 40	145,693 (12.75)	37,651 (23.0)	128,991 (16.41)	93,522 (15.63)
41 – 50	119,810 (10.48)	27,913 (17.05)	88,512 (11.26)	66,310 (11.08)
51 – 60	144,113 (12.61)	30,247 (18.48)	81,852 (10.42)	66,188 (11.06)
61 – 70	125,082 (10.95)	23,757 (14.51)	58,670 (7.47)	55,650 (9.30)
71 – 80	74,673 (6.53)	10,297 (6.29)	28,393 (3.61)	44,151 (7.38)
81 & Above	58,551 (5.12)	3,554 (2.17)	19,341 (2.46)	54,968 (9.18)

Table 2. Age Groups vs. Sum of Total Visits in each category

Several factors affect the utilization of resources. The aim is to analyze each of the factors and the effect on the utilization of healthcare resources using various techniques such as correlation analysis and clustering techniques to categorize and cluster the patient population based on the utilization of healthcare services.

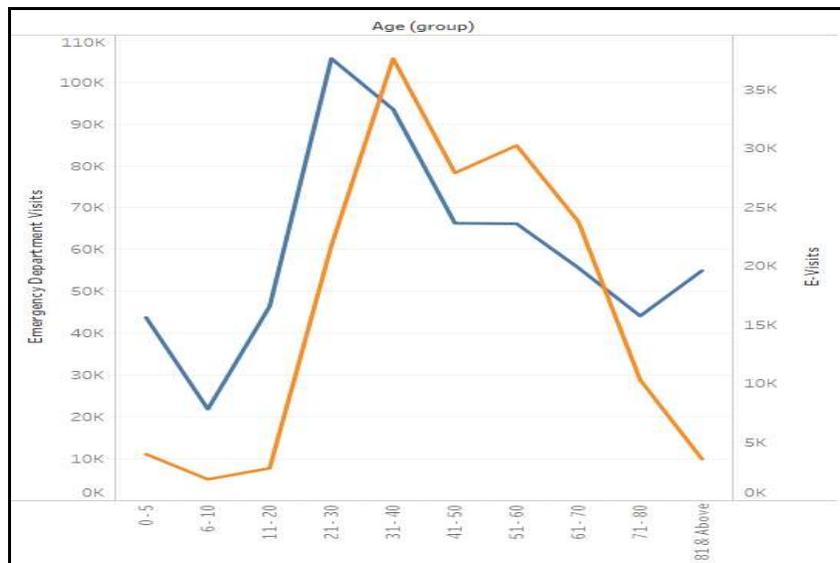


Figure 1. □ Sum of E-Visits (Orange) & Sum of ED Visits (Blue) by Age Group

Expected Contribution

The research will contribute to the theory of health informatics and healthcare practice in several ways. The research will identify the impact of E-Visits on emergency departments and urgent care centers. The research will also clarify the ambiguity present in understanding the utilization of patient portals and its effects on emergency centers and urgent care centers. This research will also explore the patient's characteristics, such as, demographics, health problems, disease types and location, to find out if these have any impact on utilization of healthcare facilities. This research will be highly valuable for healthcare providers as well healthcare informatics researchers.

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