Development of a Health IT Integration Model May Help Alleviate the Burden of Unnecessary ED Visits, While Decreasing Cost and Improving Patient Care.

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Abstract

Visits to the Emergency Department (ED) have become increasingly more common over the past 10 years and are projected to increase. There are approximately 120 million ED visits each year, 28 million of which are pediatric patients. The increase in visits, paired with the decreasing number of EDs, has caused physicians, patients and payers to all feel the burden. Literature has consistently shown that 40-60% of ED visits by adults are non-emergent and therefore unnecessary. This trend is represented among the pediatric population as well. We draw attention to the excessive number of unnecessary pediatric ED visits, explore the effects it has on an already burdened health care system, identify current solutions and suggest the idea of a sophisticated Health IT Integration Model that would help alleviate this problem.

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Number of ED Visits

Emergency Department (ED) visits have been dramatically increasing over the past 10 to 15 years, rising by 28% between 1995-2008 (1, 2, 3). There are now almost 120 million ED visits each year, an increase from 96.5 million in 1995 to 119.2 million in 2006 (3). The rise in ED visits is complicated by a concurrent 10% decrease in the number of hospital EDs, resulting in an even greater increase in the patient load of individual EDs (3). Among patients visiting the ED, the most common age groups to present (per capita) were the elderly (over 75) and the very young (less than12 months of age). Pediatric patients accounted for nearly 25% of all ED visits, nearly 28 million visits each year (4). One out of four children visited a hospital ED at least once during 2005 (5). Younger children (up to age 4) represented the highest percentage of visits and were about 2.5 times more likely to visit the ED than older children (5).

Unnecessary Visits

Although the number of visits to the ED by the pediatric population is high, it is more alarming that, like their adult counterparts, a great deal of their visits have been found to be nonurgent or medically unnecessary. Literature has consistently shown a high percentage of ED visits by adult patients are unnecessary, some studies indicate up to 60% (6, 7, 8). Recent studies have found at least 1/3 up to more than 1/2 of the nearly 30 million ED visits by pediatric patients are for nonurgent reasons (9, 10, 11, 12). In California, the National Center for Health Statistics found that only 14% of the ED visits made by Medicaid and Children's Health Insurance Program (CHIP) beneficiaries in 2008 were for immediate or emergent conditions (13). Unnecessary ED visits are not only costly, but they also exacerbate overcrowding, increase wait times, and adversely affect the ability to identify true emergent cases. As a result, these unnecessary visits negatively affect patient care.

Cost Associated With Unnecessary Visits

Unnecessary ED visits cost payers an estimated $14 billion each year and have been identified as one of the major sources of waste in the health care system (14). Medicaid alone spent $8 billion on unnecessary visits in 2003 (15). These costs are only direct costs from treatment and do not take into consideration the indirect costs of unnecessary ED visits, such as lost days of work/school, finding childcare, cost to employers, etc. Obtaining care in an ED is costly and treating patients there for something more appropriately treated in a primary care physician's (PCP) office is a clear demonstration of how utilization of inappropriate resources can increase cost. An average ED visit costs $1,049, and the average cost of a visit to a primary care physician's office is $153 (16). The cost of treating an ear infection in the ED is nearly four times greater than the cost of treatment by the patient's pediatrician.

Overcrowding

With the recent decrease in hospital EDs nationwide and the all-time high in patient visits, overcrowding has become a serious issue that threatens patient safety and is now a well-recognized public health concern. ED overcrowding leads to increased mortality and morbidity, treatment delays, patient dissatisfaction and is an immense financial burden (17, 18). Survey studies have confirmed that ED overcrowding causes delays in diagnosis and treatment, decreased quality of care and poor patient outcomes (19,4). Ambulance diversion to less crowded EDs is a specific consequence of overcrowding. In 2003, ambulances were diverted 501,000 times. These diversions can result in longer transit times for patients, which can be detrimental in the case of a true emergency, and the other, less crowded EDs may not have the ability to offer the most optimal services (1).

Stated Reasons for Presenting to ED Unnecessarily

To formulate a solution, identifying the source of the rise in unnecessary ED visits is paramount. An association has been shown between both uninsured and insured patients seeking care in the ED during evening and weekend hours when their pediatrician's office is not open (20, 21). Multiple studies have attempted to identify the reasons that parents give when they bring their children to the ED for nonurgent care. Berry et al found that parents indicated that they went to the ED for nonurgent care during regular office hours because of referral by the PCP, better efficiency in the ED, dissatisfaction with their PCP, perceived higher quality of care in the ED, long waits to see their PCP, and PCP communication problems (21).

Common complaints/Medical Reasons for unnecessary ED visits:

The most commonly reported unnecessary medical reasons for presenting to the ED are sore throat, ear infection, upper respiratory infection and fever, with fever being most commonly reported, especially for children under one year of age (22, 23, 24). Fever phobia is a well-established phenomenon reported in the 1980s by Schmitt and still greatly affects EDs today. Visits to the ED for fever have been shown to usually be unnecessary, expensive and contribute to the problem of overcrowding (25, 24). The ED treatment of simple, straight-forward illnesses such as sore throat, ear infection and upper respiratory infection treated is an example of improper use of resources. Insurance providers such as Blue Cross and Blue Shield have begun to educate their carriers and employers on the cost of using unnecessary utilization of the ED through a poster campaign that explicitly compares the cost to treatment by PCP. (12).

Impact on patient care:

Patients presenting unnecessarily to the ED are potentially compromising their health. Unlike PCPs, ED physicians are not trained to provide counseling, preventative care, and anticipatory guidance. Routine pediatric care, such as administering immunizations and/or performing well-child checks, does not

typically occur during ED visits, and therefore, if patients do not follow up with their PCP, it is possible that the ED visit could result in worse overall health for the child (26). Pediatricians form strong bonds with their patients to establish rapport and trust with the families. These ongoing relationships facilitate open communication, improve compliance, and lead to a better overall health experience for the patient. Pediatricians have easy access to their patients' medical histories, previous responses to treatment, and insight into family dynamics, all of which contribute to determining the most appropriate treatment plan. In testimony before the U.S. Senate, Peter Cunningham of the Center for Studying Health System Change stated that if patients with nonurgent needs went to their primary care provider rather than the ED, "this would not only improve the quality of care by ensuring that patients have a primary care physician to see for their nonurgent health problems and coordinating care with specialists and other providers, but it is also likely to generate additional cost savings by reducing unnecessary or redundant utilization." (27). Patients presenting to the ED for something more appropriately treated by their pediatrician forego the opportunity of receiving valuable patient care, including anticipatory guidance, which is best delivered by their child's primary care provider.

Worsens Current Physician/Nurse Shortage

The nationwide shortage in medical staff, specifically physicians and nurses, also contributes to the immense strain on the health care system and exacerbates the problem of ED overcrowding. Without a significant transformation in our current system, the situation is grim. ED visits are projected to continue to rise and the physician shortage will worsen. The Association of American Medical Colleges projects that the physician shortage will reach 63,000 by 2015 and will increase, with estimates of 91,500 in 2020 and 130,600 in 2025. The American Medical Association has made similar predictions, estimating the physician shortage to rise to more than 130,000 by 2025 (28, 29, 30). Nursing shortages

are estimated to be just as grim, with predictions as high as 285,000 by 2020 and increasing to 500,000 by 2025 (31, 32).

Current Efforts to Decrease the Amount of Unnecessary Visits

To reduce unnecessary ED visits, some managed care systems, such as Kaiser Permanente, and even some insurance companies, offer round-the-clock telephone nurse helplines so that patients can call for medical advice rather than present to the ED unnecessarily. Another effort in upstate New York extensively studied the use of telemedicine; basically an Internet doctor's visit. McConnochie et al investigated whether access to more cost-effective telemedicine would decrease unnecessary visits to the ED. More than 6,500 telemedicine visits over a seven-year period were observed and it was found that children whose parents had access to the telemedicine option utilized the ED 22.2% less often than their counterparts who did not have access to telemedicine (22).

Local efforts to decrease unnecessary ED visits have grown in popularity. A program in North Carolina, The Medical Home and Emergency Department Communication Initiative of North Carolina, focuses on educating families about the importance of calling their child's PCP before presenting to the ED. Educational materials that "focused on the three most-common reasons for pediatric ED encounters - ear infections, fever and colds, and upper respiratory infections" inform parents when to use their PCP rather than the ED for care (33). Another program out of Indianapolis, Project Health, provides free care to low-income uninsured adults if they "make all reasonable attempts to avoid using the ER for nonurgent care." This program reduced unnecessary ED visits by their patients (34). The South Side Healthcare Collaborative, a program offered by the University of Chicago Medical Center's emergency department, educates patients who rely on the ED for primary care about the benefits of having an primary care provider. Since 2005, advocates have helped connect over 13,000 patients with a regular health care provider (35). Similarly, patients who call in to the Louisville Metro Emergency Medical

Services with minor issues (earache or a mild stomachache) are referred to a nurse on site who explores the problem further and then directs the patients to the most appropriate setting for care: ED, physician office, or urgent care (36). A program launched in 2011, the Indianapolis-based WellPoint Emergency Room Program and Education Campaign, offered financial incentives and utilized tools such as Google Maps to help redirect patients with nonemergent issues to appropriate settings. When the pilot study concluded, it was found that the participants were more than twice as likely to seek care for nonurgent matters at appropriate settings than those who did not participate (37).

Current Efforts AREN'T ENOUGH:

Current efforts to decrease unnecessary ED visits have shown promise, but not at the scale to make the significant impact our health care system requires. Our health care system is wasteful, redundant, and in desperate need of transformation. There is an obvious need for innovation, where technology partners with the provider, patient, and payer, empowering them to work together to decrease costs, increase resource availability, and ultimately, improve the quality of patient care. We propose harnessing the power of technology to improve the patient experience while decreasing costs for payers, we and believe it is an attainable goal.

Our Solution (Introducing the Health IT Integration Model, AltaVitas Technology)

AltaVitas is fostering a technological breakthrough and offering a possible solution that will decrease costs, while increasing the quality of patient care and overall health and wellness of the patient. The Health IT Integration Model aggregates multidimensional health data to efficiently and effectively compute personalized medical care. Upon the standardization and normalization of electronic health records (EHR), the cultivation of personal health record (PHR), incorporation of genetic health information along with input of established health norms and trends, latest research, current guidelines, protocols, expert medical advice, and sophisticated algorithms, etc., a model like ours would create a

uniform health database that provides personalized medical care, focused on prevention. The benefits of a Health IT Integration Model are theoretically limitless. Discussed here are a few examples of the benefits that could materialize if this project were developed successfully.

Use Case of Health IT Integration Model

Our Health IT Integration Model would not simply be a compilation of EHR, but rather a sophisticated device that delivers personalized healthcare. By combining the varied elements of personal history and established trends and protocols, our system can deliver personalized care to patients. Interventions may occur earlier than is currently possible. For example, the Health IT Integration Model may identify developmental delays earlier, which would allow a treatment plan to be implemented sooner. Patients with a chronic condition could be alerted earlier if maintenance therapy is no longer adequate, potentially keeping the disease process under control and the patient out of the hospital. Asthma in children and diabetes in adults are examples of chronic conditions that can be managed better with an alert-based system. If a child is not responding well to their albuterol treatment (parent logs frequent nighttime coughing or excessive use of inhaler), an alert would suggest a visit to their PCP, where perhaps an inhaled corticosteroid would be prescribed. This may prevent the child from presenting to the ED with a significant asthma exacerbation that may require hospitalization. For children and adults alike, the comorbidities associated with diabetes could be drastically reduced with early intervention and tight glucose control.

The Health IT Integration Model can address the most common reasons pediatric patients present unnecessarily to the ED (sore throat, ear infection, upper respiratory infection and fever. The model could help alleviate anxiety associated with a sick child by offering education and also serve as an Internet helpline to guide a parent through the decision-making process, assisting them in determining if the child needs to go to the ED or an urgent-care facility, or if they can wait until the morning to see a

PCP. In this sense, the model partners with both health care professionals and parents to improve the wellness of the child while also decreasing costs.

Benefits of a Unified Nationalized Health Database/ Current Recruiting of Physicians to Use EHR

A uniform health database has the potential to decrease healthcare spending tremendously, while improving patient care by not only Increasing efficiency in both the outpatient and inpatient settings, but also by decreasing the morbidity and mortality associated with medical errors. Hospitals often repeat tests, imaging or procedures because previous results are either unavailable or inaccessible. This is costly, timely and also exposes patients to unnecessary testing, some of which is invasive or dangerous. Patients often have difficulty providing accurate medical histories and reporting prior hospitalizations, procedures and medications. Administrative staff spends a great deal of their day locating or recovering records from other clinics and hospitals. There is a current movement to encourage physicians and hospitals around the nation to adopt some form of EHR and they are even being offered incentives for implementation. Many obstacles exists for physicians in private practice as well as in hospitals in adopting an electronic health record (EHR) system, though most agree that the benefits are abundant and worth the effort. Transitioning to EHR has been encouraged over the past few years and recently federal regulations have been adopted to provide an incentive to induce health care providers to make the conversion. The American Recovery and Reinvestment Act of 2009 authorizes the Centers for Medicare & Medicaid Services to provide financial incentives to eligible professionals and hospitals that demonstrate “meaningful use” of a certified EHR technology. The U.S. Department of Health and Human Services announced earlier this month that more than 41,000 physicians and nearly 2,000 hospitals have already received more than $3.1 billion in incentive payments for what it considers to be “meaningful use” of EHR. Meaningful use, as defined by Dr. David Blumenthal, national coordinator for health information technology, U.S. Department of Health &

Human Services is, “in the long-term, when EHRs are used by health care providers to improve patient care, safety, and quality.” (38). Google, the Internet icon, attempted to create personal health records by having users input their medical-related data into their personal Google Health Account. This project began in 2008 and it was recently announced that Google would discontinue the service in January 2012. In its official blog, Google explained the service would no longer be available because they “observed that Google Health is not having the broad impact that we hoped it would“ (39). The AMA has taken EHR to the next level and recently announced it teamed with AT&T to provide “an advanced collaborative care and Healthcare Information Exchange platform” that will increase caregiver collaboration by connecting the users of, AMAGINE™, AMA’s physician community portal to AT&T Healthcare Community Online, exemplifying the technologic innovation already in action.

Obtaining PHR Through Mobile Health Apps)

With a Health IT Integration Model like the one proposed, patients would be recruited to become involved in their own health through their mobile devices. It is becoming customary for people to use their mobile devices in various ways during the course of their daily lives. People are already comfortable paying bills, reading magazines, watching movies, surfing the web, etc.—all on a mobile device, such as a tablet or smartphone. Tracking and logging of everyday health issues on mobile devices will build the PHR component of the Health IT Integration. With the wide dispersion of smartphones and other connected devices and the increasing availability of mobile broadband and network services, it is predicted that mobile health will play an increasingly greater role in health care throughout the world (40). The Group Speciale Mobile Association (GMSA) reported Janine Vos, Executive Director of mHealth stating that, “by 2017, mobile technology will be a key enabler of healthcare delivery . . . (it) offers the ability to deliver highly effective, scalable and affordable healthcare beyond the confines of a hospital or doctor’s surgery (40).” RNCOS, a global market research and

information analysis company, published a report that focused on the growth of mobile health and the key role it will play in various areas of healthcare delivery in the near future, predicting that education and awareness, remote data collection, remote monitoring, disease and epidemic outbreak tracking, and diagnostic and treatment support (41) will be major areas of growth. In a recent report, 'Touching Lives through Mobile Health: Assessment of the Global Market Opportunity', S. Vishwanath et. al predict that mobile technology will play a significant role in the next few years in transforming how medical care is delivered (48). The report estimated that the mobile health market will grow exponentially, leading to a revenue opportunity of US $23 billion by 2017 (48). There are currently over 10,000 health-related apps available. A recent report from UK-based Juniper Research estimated there will be a total of 44 million downloads of health-related apps in 2012 and 142 million downloads by 2016 (42).

Bridging PHR With EHR and Beyond

The AMA has recently emerged into the mobile health market and just launched a new app, *Weigh What Matters*. This app assists patients in reaching and maintaining a healthy weight by calculating BMI, establishing healthy diets, creating physical activity goals, and generating progress reports that the users can view and email to their physicians (43). Using mobile health will enable patients to receive personalized alerts and interactions, recommendations, and patient education at all times of the day, every day, at little or no extra cost. Tailored health care will be accessible at the patient's fingertips, promoting personal accountability and providing quality care whenever it's needed. Creating a system incorporating the PHR that can be retrieved from health apps engages the user, and as C.J. Wang and A.T. Huang explain in their article, *Integrating Technology Into Health Care, What Will It Take?* "it is imperative to have some engaging aspect for the patient, some sort of fun or fulfillment needs to be derived from incorporating this modality in their everyday life. "(44) Wang and Huang mention social support features, such as the "like" feature in Facebook, as being a potentially important engagement

component that will excite both patients and clinicians, promoting a team-like relationship between the patient and provider. In an article in the New York Times, R. Stross discusses how Health Tap, a web-based company that hosts a question and answer forum for users and physicians, has attempted to engage its physician users through gamification (45). Physicians earn points by supplying short answers to posts, which allow the physicians to move to higher levels and earn awards once they have answered a preset amount of posted questions. Google Health relied on patients to input their health data and the lack of widespread adoption reflects either the difficulty or disinterest on the part of the user to take on the task of data input. Engaging both physicians and patients are tactics that will create a system with all the players (physician, patient and payer) on the same team, succeeding and thriving.

Multifaceted Team, Varying Fund of Knowledge/Expertise Required for Endeavor:

Succeeding at developing such a system requires the organized interaction of numerous experts from many fields of study. In their article, C.J. Wang and A.T. Huang suggest "designers, clinicians, engineers, and psychologists will need to work together on the heuristics of empowering and engaging patients and clinicians in the system (44)." Recruiting a diverse group of experts that will offer creative and effective measures, encouraging the public and the medical field to become involved is paramount to our success.

Bringing the System back to the Specific Problem of Unnecessary ED visits

But how can a Health IT Integration Model can help relieve the burden of unnecessary ED visits? Studies have already shown that alternative delivery methods have effectively cut costs without compromising the quality of care received (22, 33, 34, 35, 36, 47). In upstate New York, it is estimated that millions would be saved annually with just a small reduction in the amount of unnecessary ED visits. It is estimated there would be an annual savings range from $8.1 million to $10.7 million with a 5% reduction and a $40.5 million to $53.5 million savings with a 25% reduction. Shifting all potentially

avoidable ER visits to a PCP could offer a savings opportunity in the range of $161.8 million to $214.2 million annually (46). The 24-hour help lines that were proven effective by P. Cunningham showed a return of a $1.70 by reducing nonurgent ER and doctor visits for every $1.00 invested (47). A Health IT Integration Model could serve as the 24-hour help line, educate the public on unnecessary ED visits and the value of seeing their PCP, assist with anticipatory guidance, and offer recommendations, among other valuable services. This system could also help manage both acute and chronic illnesses more effectively, decreasing the need for emergent care. The Health IT Integration Model has the ability to drastically revamp our current health care system, and reducing unnecessary ED visits is just one example of what it has to offer.

Concluding Remarks on a Health IT Integration Model:

The numerous benefits discussed all improve patient care while cutting costs. And because of improved efficiency, there will be additional time for counseling and anticipatory guidance, and an added focus on preventative care. Our multidimensional health data model promotes preventative care through personalized recommendations and alerts, increases patient accountability and delivers better patient care; this provides better health and wellness to patients and will result in lower cost to all—the patient, physician and payer. Technology has already provided remarkable advancements in many industries and the medical field is ready to harvest its energy. A broken health care system now has a chance at repair.

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