Contribution of Zia Uddin, PhD in the Hospital Administration's Healthcare Projects

During the last 44 years of my employment in hospitals (now all part of Ascension Michigan), I had the opportunity to contribute in several hospital administration healthcare projects.

The following are the three most significant healthcare projects completed by me, that have a potential of saving millions of dollars and also save human lives in America.

Physician Tool for Laboratory Testing

Presently, most of the physicians order laboratory tests almost without restriction for both in-patients and out-patients. Since the cost of esoteric tests has sky-rocketed, this practice has become a topic of conversation in many cost-containment forums. Fifty years ago there were approximately 100 commonly requested clinical and anatomic pathology tests. Today, the number has grown to >8000 tests, primarily due to extensive research, especially in the molecular and genetic areas. It is estimated that the current $60-70 billion cost of laboratory tests in the USA shall grow 100% in the next ten years.

We have seen cost-containment directives evolve over the last decades that include Diagnosis Related Groups (DRG), education of physicians, practice standards (length of stay peer view), physician profiling, ordering frequency limits, computerized physician order entry (COPE) system, clinical pathways and guidelines, managed care programs, e.g. Health Maintenance Organizations (HMO) and Accountable Care Organizations (ACO), order-entry pop-ups for authorization by the pathologist, etc. All these cost-containment plans initiated during the last several years had limited success.

Two solutions proposed by me for the cost-containment of the laboratory tests are:

Building of an informatics structure to support utilization management.

Organization of the physician education program starting from the residency level.

A review of our research and computerized solution of the cost-containment has been mentioned in the College of American Pathologists publication (CAP Today, 2015, Volume 29, No. 1, pp53). An account of the same is also published in the Ascension Michigan publication (Update and Innovations, St. John Providence Health System, Summer 2015). U.S. Copyright application is approved and applied for U.S. Patent.

Clostridium difficile Infection Control in Hospitals

Clostridium difficile (CD) is gram-negative, spore forming, obligate anaerobic bacillus. A recent study indicated >600,000/year reports of *Clostridium difficile* infection (CDI) in America, >15,000 deaths/year primarily due to the recurrence (25-45%) of CDI and the economic cost to the hospitals was >$4.5 billion/year. Several infectious diseases physicians had recommended prevention strategies against CDI in hospitals, but all were labor intensive to execute thus financially not feasible in most of the hospitals.

Our procedure is not labor intensive, therefore economically feasible in all hospitals. A computer program was designed to track the steps that are part of CDI control plan. Each step is marked with a date and timestamp, whenever the caregiver performs the task and marks it as complete. The historical information is saved in the database for future references in the form of reports. The solution works independent of or in conjunction with the electronic medical record (EMR) and can also push the data back to patient record in the form of HL7 message. The care giver can put special notes pharmacy, laboratory, etc., which can be viewed in the respective department user's login. The tracker is configurable with task scheduling, alerts/notifications in case of missed schedule. It also has capability built in to report any information required by the administration/management of the hospital for review, email and print.

We have developed a web-based solution using Microsoft technologies like NET, SQL Server and is also designed to be hosted ob cloud platform or local environment. Cloud version is very handy in case the hospital administration prefers to run this with minimal hardware. The functionally doesn't differ with the method of access of this solution..

We have filed an application for the U.S. copyright and patent.

Artificial Intelligence to Enforce Compliance-Hand Hygiene

Monitoring hand hygiene adherence serves multiple functions, e.g., system monitoring, incentive for performance improvement, outbreak investigation, staffing management and infrastructure design.

Four levels of hand hygiene (inadequate, basic, intermediate, and advanced) currently exist. Advanced hand hygiene promotion and optimal hand hygiene practices have been envisaged for helping to embed a culture of safety in the healthcare.

We have an evidence based solution to achieve the "advanced" hand hygiene promotion and practice program. Our solution records the videos using a motion sensor camera, of persons and their actions, calculates the duration of their actions and alert if the duration is less than

the defines values. All the hand washes are recorded using ingress protection (IP) cameras, also called "network cameras." We have designed proprietary cloud-based software that saves huge hardware costs.

We have applied for U.S. Copyright and Patent.

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