



Attitude of Iranian physicians and nurses toward a clinical decision support system for pulmonary embolism and deep vein thrombosis

Zhila Agharezaei^a, Kambiz Bahaadinbeigy^{b,*}, Shahram Tofghi^c,
Laleh Agharezaei^d, Ali Nemati^e

^a Medical Informatics Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

^b Research Center for Modeling in Health, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

^c Health Management Research Center, Baghiatallah University of Medical Sciences, Tehran, Iran

^d Research Center for Health Services Management, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran

^e Department of Internal Medicine, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran

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ABSTRACT

This research project sought to design and implement a computerized clinical decision support system (CDSS) that was able to identify patients who were at risk of pulmonary embolism (PE) and deep vein thrombosis (DVT), as well as produce reminders for prophylactic action for these diseases. The main purpose of the CDSS was to attempt to reduce the morbidity and mortality caused by embolism and thrombosis in patients admitted to hospitals. After implementation of this system in one of the large educational hospitals of Iran, a standard questionnaire was used, and interviews were conducted with physicians and nurses to evaluate the performance of the designed system for reducing the incidence of pulmonary embolism and thrombosis. From physicians and nurses' point of view, a system which assists the medical staff in making better decisions regarding patient care, and also reminds pulmonary embolism and thrombosis preventive procedures with timely warnings, can influence patient care quality improvement and lead to the improved performance of the medical staff in preventing the incidence of pulmonary embolism and thrombosis.

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1. Introduction

One of the most important advances in healthcare industry in the past 25 years has been the developments in

information and communication technology [1]. The performance quality improvement of healthcare institutes through the application of clinical decision support systems is the result of the widespread application of information technology in healthcare, which, if employed properly, will

* Corresponding author. Tel.: +98 9134416109; fax: +98 3412114562.
E-mail address: kambiz.bahaadini@gmail.com (K. Bahaadinbeigy).

Each Risk Factor Represents 1 Point	Each Risk Factor Represents 2 Points
<input type="checkbox"/> Age 41-60 years <input type="checkbox"/> Minor surgery planned <input type="checkbox"/> History of prior major surgery <input type="checkbox"/> Varicose veins <input type="checkbox"/> History of inflammatory bowel disease <input type="checkbox"/> Swollen legs (current) <input type="checkbox"/> Obesity (BMI >30) <input type="checkbox"/> Acute myocardial infarction (< 1 month) <input type="checkbox"/> Congestive heart failure (< 1 month) <input type="checkbox"/> Sepsis (< 1 month) <input type="checkbox"/> Serious lung disease incl. pneumonia (< 1 month) <input type="checkbox"/> Abnormal pulmonary function (COPD) <input type="checkbox"/> Medical patient currently at bed rest <input type="checkbox"/> Leg plaster cast or brace <input type="checkbox"/> Other risk factors_____	<input type="checkbox"/> Age 60-74 years <input type="checkbox"/> Major surgery (> 60 minutes) <input type="checkbox"/> Arthroscopic surgery (> 60 minutes) <input type="checkbox"/> Laparoscopic surgery (> 60 minutes) <input type="checkbox"/> Previous malignancy <input type="checkbox"/> Central venous access <input type="checkbox"/> Morbid obesity (BMI >40)
Each Risk Factor Represents 3 Points <input type="checkbox"/> Age over 75 years <input type="checkbox"/> Major surgery lasting 2-3 hours <input type="checkbox"/> BMI > 50 (venous stasis syndrome) <input type="checkbox"/> History of SVT, DVT/PE <input type="checkbox"/> Family history of DVT/PE <input type="checkbox"/> Present cancer or chemotherapy <input type="checkbox"/> Positive Factor V Leiden <input type="checkbox"/> Positive Prothrombin 20210A <input type="checkbox"/> Elevated serum homocysteine <input type="checkbox"/> Positive Lupus anticoagulant <input type="checkbox"/> Elevated anticardiolipin antibodies <input type="checkbox"/> Heparin-induced thrombocytopenia (HIT) <input type="checkbox"/> Other thrombophilia Type_____	Each Risk Factor Represents 5 Points <input type="checkbox"/> Elective major lower extremity arthroplasty <input type="checkbox"/> Hip, pelvis or leg fracture (< 1 month) <input type="checkbox"/> Stroke (< 1 month) <input type="checkbox"/> Multiple trauma (< 1 month) <input type="checkbox"/> Acute spinal cord injury (paralysis)(< 1 month) <input type="checkbox"/> Major surgery lasting over 3 hours
	For Women Only (Each Represents 1 Point) <input type="checkbox"/> Oral contraceptives or hormone replacement therapy <input type="checkbox"/> Pregnancy or postpartum (<1 month) <input type="checkbox"/> History of unexplained stillborn infant, recurrent spontaneous abortion (≥ 3), premature birth with toxemia or growth-restricted infant
	<input type="button" value="Determine Risk Level"/> <input type="button" value="Cancel"/>

Fig. 1 – Classification of pulmonary embolism and deep vein thrombosis risk factors.

bring major advantages such as improved planning, reduced costs, reduced medical errors, and improved service quality [2]. The Institute of Medicine (IOM) has recommended the application of IT-based systems, including clinical decision support systems, as a solution for healthcare quality problems in healthcare environments [3].

CDSS is, in fact, an application which provides information for a safe patient care. The information includes evidence-based standards and guidelines, procedures and protocols, regulations and suggestions for care, drug references, calculation instruments, and links to the library database as well as digital and Internet references. The CDSS reminds the user to employ care standards (e.g. preventive care for pre-labor RH, administration of preventive aspirin for patients with coronary artery disease, subcutaneous influenza and heparin vaccination), or otherwise, provides him/her with warnings concerning possible risks such as allergies and tests of platelet

count [4-7]. The most important point of CDSS is to help clinicians with patient care. This would happen through inserting the required data and information into the system and, then, extracting the decision support tool formulated within the programming of the system [8-10]. The new methodology of these systems is comprised of a combination of the user's knowledge and the stored knowledge in the system's database to upgrade and improve decision making and patient care. Clinical decision support systems pave the way for a quicker and more localized diagnosis, and increase the efficacy of medication prescription; they, furthermore, lessen the need for specialist consultation, and thus, reduce medical expenses [6,11].

Pulmonary embolism is the third most common cause of mortality in all age groups, with more prevalence in adults. Despite the advances in the medical diagnosis and treatment, the rate of the diagnosed cases is indeed much less than

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