



SHAKEIT: A PIONEERING MOBILE APP BY DR. SUNIL KUMAR ENHANCING AWARENESS ON DEEP VEIN THROMBOSIS

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ABSTRACT

Public awareness about deep vein thrombosis is still enormously lacking. Even ancillary healthcare workers and patients admitted to the hospitals are not aware. In a novel mobile application designed and popularized by Dr. Sunil Kumar of Neshoba County General Hospital of Philadelphia, Mississippi, ShakeIt, the app is improving health literacy, empowering patients to become aware of this unpredictably developing fatal condition. ShakeIt is an important health app and is critical in improving health behavior to prevent development of blood clots in the deep veins of the legs. By reinforcing the simple information of shaking the legs and body parts, the simple approach of the app is appealing to everyone. The true incidence of deep vein thrombosis remains unknown, as many of the subjects remains undiagnosed. Dr. Sunil Kumar has remained a pioneer in the field of patient care for management of deep vein thrombosis and pulmonary embolism.

KEYWORDS : Deep vein thrombosis, pulmonary embolism, health literacy, aviation DVT, comorbidity

Perspective

Those of us who have taken the red eye flight from the East to the West Coast, apart from its discomfort associated with the lack of sleep, are mostly unaware about one potentially life-threatening risk. The long hours of immobility due to the sardined posture hamper the circulation of blood throughout the body. Long ago, this risk was identified by NASA and termed the "economy class syndrome" [1]. With less movement of the lower limbs and the relatively fixed pelvis, the column of blood faces challenge to negotiate against gravity back to the heart. Sluggishness of blood flow alters the rheology, rendering the blood cells "sticky". Clot, thus formed, can stay in situ or break from its incipient location in the leg veins and migrate to heart and the lungs. This pulmonary embolism (PE) resulting from the lower leg deep vein thrombosis (DVT) can result in cataclysmic outcomes, including unpredictable sudden death. One well-known case was that of former Vice President Dan Quayle, who developed pulmonary embolism in 1994 after a series of cross-country airplane flights. DVT has affected the famous and the celebs, including Zsa Zsa Gabor, David Bloom and Serena Williams. The condition isn't only limited to air travel. It was described first in 1940 by British physicians who noticed a rise in pulmonary embolism among people sitting in crowded air-raid shelters during the London "Blitz."

Our leg muscles perform as an artificial heart, pushing the blood in the veins towards the heart as the leg muscles contract whenever we move. It is lack of constant movement that promotes blood clot within a few hours. These clots are initially small and often do not cause any symptoms because the body is able to break them down and dissolve them. But as the clots grow, they can shed small clots called 'emboli' that are carried through the bloodstream to the heart and onwards to the lungs where they can block one of the major arteries in the lungs, which causes sudden death. This clot is called a pulmonary embolus and it is the frequent cause of sudden death in air travelers after a long-haul flight. Australians are highly susceptible, as any flight out of the continent to mainland Europe or Americas is a whopping 24 hours or more (remember the death of Jonah Lomu!). The Australian cricket captain Steve Waugh once suffered from this condition. In addition, obesity causes increased pressure in the abdomen, which may further reduce the ability of the calf-muscle pump to return the blood from the legs.

Early and accurate diagnosis of VTE (venous thromboembolism) is significant for preventing deaths and achieving favorable long-term outcomes [2]. Because these events can often be silent and with presentation which can confuse even the most seasoned clinician, it is vital that all healthcare providers be aware of situations that put patients at risk, and provide appropriate tests, prophylaxis, and treatment. According to the call to action, much is known about

effective prevention and treatment of VTE, yet this evidence is not applied consistently and systematically in healthcare settings. Part of the difficulty lies in the complexity of the presentation of VTE itself, as it occurs in many healthcare settings and, therefore, is diagnosed/managed by several classes of providers (e.g., hematologists, surgeons, obstetricians, emergency physicians, primary doctors). Yet, there is virtually no national consensus by practitioners and hospitals on the best way to approach this condition and how to effectively prevent it. Furthermore, subjects with a documented incidence have a very high (nearly 30%) mortality rate within few months of the first occurrence.

Patients with pulmonary embolism develops sudden shortness of breath; sometimes, they have chest pain mimicking acute heart attack. However, the subjects with pulmonary embolism may not have any symptom at all. This may occur in greater than half of all with a morbid clot in the pulmonary vasculature. This creates huge diagnostic dilemma. On one hand, the asymptomatic patients need to be identified. On the other hand, the commonly recommended preventive technique of anticoagulation can bring in unnecessary complications. Computerized tomographic pulmonary angiography (CTPA), the most commonly recommended imaging technique, is invoked clinically; however, this technique is expensive, exposes patients to radiation and the contrast agents injure the kidneys (causing contrast nephropathy) [3]. In the era of conservative medicine, the physician is inclined to empirically use the imaging technique, leading to the escalation of the costs of health care. Pioneering work by Dr. Sunil Kumar has brought this issue into discussions at the national forefront [3]. Dr. Kumar, the Medical Director of Neshoba County General Hospital, had a distinguished career in orthopedics in India and the United Kingdom, before he chose to contribute robustly to primary care medicine after serving his Chief Residency in Family Medicine at Genesys Medical Center. Bone-injured patients are immobile for prolonged periods of time with high risk of pulmonary embolism. Dr. Kumar's expertise in managing these patients makes him a reliable resource of triaging, identifying which of these patients to image. Based on his years of experience while pursuing his MRCS in England, Dr. Kumar introduced this cost conscious but high-quality care to the United States and has been lauded in his efforts which conform with the national missions set by the Joint Commission [4].

The Joint Commission advocates anticoagulating every patient who are in the hospital. Anticoagulating the patients increase the risk of bleeding. These patients already have other comorbidities, which complicates the clinical course. Furthermore, the anticoagulation must continue for three months. The patients are already on several medications; adding anticoagulants and monitoring the coagulation profiles even further complicates the recovery course.

To ease these all, Dr. Kumar has emerged as a national leader to tackle DVT/PE, one of commonest cause of hospital related deaths globally. His original invention of a patient education tool is pioneering in obtaining health literacy and increasing en masse consciousness about deep vein thrombosis and pulmonary embolism. The design of the Mobile Application Shakelt is a novel tool that is motivating everyone to become conscious of these fatal conditions, which can affect anyone who is routinely flying for few hours or staying immobile for any reason. This app is currently available on the Android platform and downloadable from the Google Playstore [5]. Awareness of VTE is highly important; numerous publications from Centers for Disease Control (CDC) have highlighted that because many healthcare providers and individuals at risk are unaware of the signs and symptoms of VTE, opportunities for providing primary prevention and preventive prophylaxis are oftentimes missed [6,7].

While the concept of human mobility is taken for granted, not all of us are lucky. Patients with stroke, Parkinson's disease, elderly people, all have their challenges. Other pioneers like Robert (Bob) Cooley have enhanced the concept of constantly moving in his now classic "The Genius of Flexibility" [8]. Dr. Kumar's App, simple and elegant, empowers the common man to be conscious about this dangerous health condition. The simplicity of the App is appealing. The app simply instructs the subjects to continuously move the legs and other body parts to externally stimulate the circulatory process. The American Medical Community has taken cognizance and is receiving wide publicity.

Economy class syndrome is more common today because of two factors, the increase in the number of frequent flyers and airline deregulation. Seat pitch, the distance from one airline seat to the one in front of it, is currently no longer regulated by the Civil Aeronautics Board (CAB), which was abolished with deregulation. Airlines moved seats closer together to fit more passengers on planes to enhance their business revenue. Seat pitch in the economy class now runs between 28-31 inches, whereas the ideal distance should be 40 inches. Well-known risk factors for developing deep vein blood clots increase an air traveler's risk for economy class syndrome. These include a history of blood clots, cancer, prolonged bed rest following orthopedic surgery, recent treatment involving general anesthesia, estrogen therapy, obesity, cigarette smoking and inflammatory bowel disease. Long car travel can equally predispose to this condition.

Making passengers aware of DVT and the measures that help prevent it should be as compulsory as the pre-flight briefing. Unfortunately, airlines are resistant to this because they are afraid to acknowledge publicly that flying could be a health risk for some people. Passengers should also know that DVT can strike up to 30 days following a flight. One of the reasons why aviation DVT is so elusive is that it can take a very mild form which the body can cope with, or it can be fatal. DVT can happen in such a mild form that a passenger may have suffered from it without even knowing. Dr. Kumar's pioneering contributions in creating mass level awareness is truly commendable.

I am personally advocating the use of this app developed by Dr. Kumar for my patients, significant number of whom are obese African-Americans. They carry high risk of thromboembolism. Researchers have demonstrated an increased risk of VTE among the African American persons who have sickle cell trait; additionally, teenage pregnancies are higher in these communities [9]. We have introduced this App to many young patients as well. Teenagers and young adult women on oral contraceptives are at high risk for developing PE. This grassroots level work and contribution of Dr. Kumar is changing health behavior and is massively impacting conservation of the costs of healthcare. Many of these subjects who are at risk developing thromboembolism are on Medicaid or health uninsured. Many of the acquired risks such as obesity, advancing age, air travel, and chronic diseases are increasing in the US population, suggesting that we can anticipate observing increasing

numbers of people affected by VTE. Supporting education and outreach activities to provide health promotion and wellness programs for people affected by clotting disorders at both the community and national level is a key need of the hour. We need many more physicians like Dr. Kumar in the community to bring about a positive change in the healthcare system. Dr. Kumar's multiple contributions in primary care and travel medicine address outstanding global medical problems. His breakthrough advances in digital health informatics have a huge public health impact and because of his influential work, Dr. Sunil Kumar deserves the laurel of "Physician Extraordinaire".

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