Original Research Paper

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DIAB MEDS AND DMHEART.COM: PIONEERING HIGH-QUALITY HEART CARE AND PATIENT EMPOWERMENT IN DIABETES BY DR. NAWAL SINGH SHEKHAWAT

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Concomitant use of multiple prescription drugs ('polypharmacy') is increasingly common, with 10% of the population and 30% of older adults in the United States taking five or more drugs simultaneously. Similarly, high prevalence is reported in other countries (e.g., the United Kingdom, Sweden, China, Brazil, and India. The prevalence of polypharmacy is driven by high rates of comorbidities (in the United States in 2012, 26% of all adults, and 61% of adults over 65 years of age had two or more chronic conditions) and exacerbated by clinical practices enabling over-prescription and insufficient monitoring. Drug-related morbidity has become a substantial healthcare burden: in the United States, adverse drug reactions are prevalent (causing 4 hospitalizations per 1000 people each year), serious (among top 10 common causes of death), and expensive (with associated annual costs estimated at US$30billion to US$180billion).

Exposure to multiple drugs puts patients at additive risk of each single drug's potential adverse outcomes. In a study of an elderly cohort, the strongest predictor of a potentially harmful medication was the number of drug prescriptions. But drugs can also interact to increase risk beyond 'the sum of the parts', either by canceling an intended drug action, enhancing existing risks, or creating new risks. It's estimated that over 20% of adverse drug reactions are due to underlying drug interactions, and that risk of drug interaction increases with the count of drugs taken. However, despite increasing awareness of morbidity related to polypharmacy, multi-drug exposure patterns remain somewhat poorly characterized.

29.1 million people in the U.S. had diabetes with 1.7 million new diabetes cases among people aged ≥20 years, per the National Diabetes Statistics Report, 2014. Since people with diabetes have an increased cardiovascular disease (CVD) risk, lipid management along with other risk factors is a particular focus in this population. The 2013 guidelines from the American College of Cardiology and the American Heart Association (2013 ACC/AHA) and the 2016 American Diabetes Association Standard of Medical Care in Diabetes (2016 ADA) provided updated guidance on high blood cholesterol treatment recommendations and the eligibility determination for diabetic adults. If the 2013 ACC/AHA guidelines had been in effect from 2005 through 2012, 88% of diabetic adults would have been eligible for cholesterol-lowering medication. Current guidelines (2013 ACC/AHA and 2016 ADA) potentially increased the number who are now eligible for HMG-CoA reductase (statin) therapy. Since eligibility for cholesterol-lowering medication among diabetic adults focuses predominantly on low-density lipoprotein cholesterol (LDL-c) levels; in the age of polypharmacy, it is important to understand how lipid profile levels differ among U.S. adults with and without diabetes.

Lipid levels have consistently been associated with cardiovascular events risk. Although LDL-c levels tend not to be higher among diabetic than non-diabetic adults, dyslipidemia and lipid levels associated with CVD presents differently among diabetic adults. Triglyceride (TG) levels tend to be greater among diabetic adults and studies have found that TG, as well as non-high-density lipoprotein (non-HDL-c) or total cholesterol (TC)/high-density lipoprotein (HDL-c) ratio, are better coronary heart disease predictors than LDL-c when compared to non-diabetic adults.

Cholesterol-lowering medication use among diabetic adults has demonstrated to lower CVD incidence and all-cause mortality. However, it may be appreciated that all of these necessitates use of multiple medications, which increases risk of hypoglycemia and falls, especially in frail individuals. Dr. Nawal Singh Shekhawat of Baptist Health Center in Conway, Arkansas, has brought *Diab Meds*, a novel smartphone application for diabetic patients (available freely in the Google Playstore) to negotiate through their list of medications, which surely is always greater than five in number and has to be taken at different times during the day.

A better understanding of how lipid profile levels differ among diabetic adults while accounting for cholesterol-lowering medication use is needed to demonstrate the burden and distribution of diabetic dyslipidemia in the U.S. and to identify potential opportunities for improvement. Since cholesterol management guidelines have historically emphasized the need for medication use among diabetic adults, understanding how lipid profile levels differ may provide insight on differentiating increased CVD (cardiovascular disease) risk in this group. Between the determinants of polypharmacy increased age can be highlighted as a major one as aging is characterized by the presence of multiple independent chronic diseases in the same individual, a fact that is almost always accompanied by multiple drug use. Factors that contribute to the development of polypharmacy are the lower thresholds for treating risk factors in preventative medicine, the new drug treatments that are now available for managing many chronic illnesses, and the new indications for older drug treatments. Thus, *Diab Meds* is an essential tool in the patients' personal medication management strategies. The use of the app is also a motivator for increased adherence and compliance with the medications.

With the changing demographics and an increase in the older population in the last few decades, multimorbidity has become an important public health issue globally. The rising prevalence of multimorbidity leads to the application of multiple disease-specific guidelines and targeting disease-specific goals. This consequently results in high treatment burden and polypharmacy (defined as the chronic coprescription of multiple drugs). According to the Prescribing Cost Analysis in England, the total number of items dispensed in England in the year 2015 was 1.08 billion, which corresponds to ~19.9 medications per patient in comparison with 962 million in 2011 (~18.3 medications per patient). Polypharmacy has been associated with an increased risk of hospitalization, functional decline, cognitive impairment, non-adherence, adverse drug reactions and drug–drug interactions (ie, escalation or suppression of the effects of a drug in the presence of another drug), which further raise the risk of hospitalization.

Falls can cause serious injuries and are associated with considerable morbidity and mortality, especially in the elderly. It has been estimated that 5% of falls result in fractures and fall-induced injuries are the fifth leading cause of death in elderly adults, accounting for over 80% of injury-related admissions to hospital of people older than 65 years and costing the National Health Service (NHS) and social care around £6 million per day or £2.3 billion per year. Data from the USA report the costs to be about $20 billion. Previous studies have predominantly found an association between

polypharmacy and falls, with some studies reporting no association. Most of these studies have mainly been limited by the small sample sizes, selective study populations, inadequate adjustments for confounders or cross-sectional analyses, making them subject to reverse causation. Furthermore, there is no standardized definition of polypharmacy, making it difficult to interpret the results and translate these into clinical guidelines. The new guidelines on the management of multimorbidity advocated by the National Institute for Health and Care Excellence have made some recommendations to tackle polypharmacy; however, these guidelines elaborate on patients with 10–14 prescribed medications. Nevertheless, risks for adverse events like falls may be high even in patients prescribed lower than 10 drugs. The prompt for hypoglycemia with most diabetic medications except metformin in the app *Diab Meds* is very welcoming. Though simple, it is a highly important component of health literacy and self-care in diabetes. Dr. Shekhawat's thoughtful approaches in this regard is a pioneering contribution to upliftment of self-care of individuals with diabetes in the community. Dr. Shekhawat is passionate about increasing health consciousness in subjects with diabetes, especially regarding management of heart function. He has vigorously utilized communication technology to increase patient awareness about important clinical conditions. For example, the website *dmheart.com* educates us about diabetic heart diseases, the very reason why polypharmacy is needed for the individuals with diabetes, associated with other comorbidities like high blood pressure and hyperlipidemia. *Diab Meds* and *dmheart.com* nails home the message in a straightforward fashion.

Additional Reading

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