

Complexity of drug therapy and its implications for quality of diabetes care

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Abstract

Diabetes is a leading cause of mortality, morbidity and disability around the globe. In the past two decades, diabetes care has grown more complex as patients have received multi-component care. Recent studies have illuminated the complexity of drug therapy in patients with diabetes. A high level of drug utilization in diabetes patients has serious implications for quality of care, in terms of coordination of care, drug safety and access to care. Practitioners, researchers, payers and policy makers should be aware of these implications and incorporate the complexity of diabetes care into practice guidelines, benefit design and policy formulation to improve the quality of care.

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INTRODUCTION

Diabetes is a leading cause of mortality, morbidity and disability around the globe. In the United States alone, 25.8 million adults and children (8.3% of the population) have diabetes, and a further 79 million adults (1/3 of the adult population) have pre-diabetes. Diabetes contributed to 231 404 deaths in 2007 and diabetes care cost \$174 billion in 2010 in the US^[1]. According to earlier research, diabetes ranks as the 8th most costly condition in financial terms, 2nd in causing impairment of the activities of daily life (ADL)/instrumental activities of daily life (IADL), 3rd in hospital bed days, and 8th in work-loss days in the US^[2]

DATA AND ANALYSIS

Diabetes is a progressive condition. As the disease progresses, patients are frequently diagnosed with chronic complications including cardiovascular disease, nephropathy, dyslipidemia, coronary heart disease, retinopathy, and neuropathy. Even more concerning is that newly diagnosed diabetes patients are often found to have signs of these complications^[3]. The position statement by the American Diabetes Association recommends a variety of medications for those complications. These include, *angiotensin-converting enzyme inhibitors* (ACE inhibitor) or angiotensin receptor blockers (ARBs) to treat cardiovascular disease and nephropathy, statins for dyslipidemia, aspirin for those at increased cardiovascular risk, and β -blocker to treat coronary artery disease^[4]. Studies have also reported increased risk of cancers at multiple sites in diabetes patients although the link remains unknown. Some authors have suggested that

cancer should be considered as one complication of diabetes. As their diabetes progresses, patients take more and more drugs concurrently to prevent or treat these complications.

A study on the trends in complexity of diabetes care in the United States indicated that during the decade from 1991 to 2000, the standard of care for diabetes mellitus evolved to require more intensive management of glycemia, blood pressure and cholesterol level^[5]. Another study on the complexity of medication regimen and test ordering suggested that from 1995 to 2003, diabetes care grew more complex. The largest change was in the number of patients receiving multi-component of diabetes care as the percentage of patients on cholesterol lowering drugs, blood pressure lowering drugs, and the percentage of patients receiving cholesterol and urine microalbumin tests all increased significantly^[6].

A recent study further illuminated the complexity of drug therapy in patients with diabetes. The study was based upon 2189 adult diabetes patients, comprising a nationally representative sample of 17.5 million diabetes patients in the US. The study found that a total of \$56.1 billion was spent on prescription drugs by diabetes patients in the US in 2006. In 2006, each diabetes patient had an average of 46 prescriptions, totaling \$3161 of drug expenditure, including \$1061 out-of-pocket expenditure. The top 5 drug classes were antidiabetic agents (24.1% of total drug spending), lipid lowering drugs (13.4%), analgesics (4.4%), proton pump inhibitors (3.8%) and ACE inhibitors (3.7%). On average a diabetes patient used 3.52 (standard deviation = 1.76) classes of drugs within the 10 drug classes with the highest utilization^[7].

DISCUSSION

The high level of drug utilization in diabetes patients has serious implications for quality of care. The uppermost concern is the coordination of care. Diabetes patients are cared by and referred to a number of physicians with different specialties. For example, in addition to visiting primary care physicians, they may also rely on care from endocrinologists and cardiologists. Previous research has suggested different treatment patterns among those specialties, and specialty care plays a critical role in caring for diabetes patients^[8]. Thus, further research is warranted on a model to guide patients through the complex care system which may be fragmented and can result in serious conflicting treatment priorities. The research development model of a medical home, aligning the traditional gatekeeping role of primary physicians and a set of care settings, may be promising in this respect.

Another key concern arising from the complexity of drug therapy in diabetes patients is drug safety. Since diabetes patients are taking many drugs for diabetic complications and other acute conditions concurrently, there is a significant risk for drug-drug interactions. Despite the high risk of drug interactions in elderly patients, the prevalence of these interactions is not well documented^[9].

In addition, reports suggest that patients are increasingly using herbal medicines, whose safety and efficacy are not well understood. Furthermore, patients often take those herbal medicines without the knowledge by their primary care physicians. There is an urgent need to study the safety issues which impact the various drug therapies of diabetes patients, and to discern and develop systematic ways to improve patient safety.

A third major concern regarding the complexity of drug therapy for diabetes patients is the access to pharmacotherapy. While in recent decades there has been a substantial improvement in insurance benefit design around the globe, particularly in the US, out-of-pocket payments for prescription drugs, particularly the newer, more expensive brand-name drugs, remains a concern. Because diabetes patients purchase a large number of prescription drugs and they are often significantly constrained by their economic means due to disability and advanced age, research to investigate affordability and access to multiple lines of drug therapy for these patients is much needed.

Last but not least, the role of regulatory authorities in approving and discrediting drugs warrants careful examination. In the case of rosiglitazone, studies have found that it was associated with increased risk of heart attack in diabetes patients. However, although it was suspended by European Medicines Agency, it was allowed to remain in the market by the US FDA. The development of a surveillance system on drug safety at the national level and quick actions by regulatory agencies would greatly facilitate data collection and improve patient safety.

CONCLUSION

In summary, the implications of the complexity of drug therapy on quality of care for diabetes patients cross the boundaries between specialty care, drug safety, and health benefit design. It is likely that these issues are interrelated. For example, an insurance plan may mandate a gatekeeping primary care physician and, as a result, referral arrangements for specialty care can be better coordinated. Research is much needed to investigate the comparative effectiveness of various care models to improve the overall well-being of diabetes patients.

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