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Self- management of diabetes mellitus during the Covid-19 pandemic: Recommendations for a resource limited setting

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ABSTRACT

Background and aims: The COVID-19 pandemic has challenged both institutional and self-management of diabetes. The ongoing social distancing and lock downs have negatively impacted to access to care and self-management.

Methods: This is a narrative review of diabetes management in a resource limited setting during the ongoing COVID-19 pandemic. Electronic databases, namely; Pubmed, CINAHL, EMBASE and Google Scholar were searched for literature. Search terms were “corona virus”, “COVID-19”, “diabetes self-care”, “diabetes self-management education”, “DSME”, “diabetes self-management”, “diabetes self-care in low income countries” and “diabetes management in Zimbabwe”.

Results: This paper suggests a culturally tailored educational plan on diabetes self-management of diabetes in a limited resource country, Zimbabwe, amid the ongoing COVID-19 pandemic. Components of health education comprised general preventive measures, medications, diet, physical activity, self-monitoring of blood glucose, stress management, foot care, smoking and drinking and preventing complications of diabetes mellitus.

Conclusions: We have reemphasized the need for self-care, social support and a collaborative, patient-centered approach to care amid the ongoing COVID-19 pandemic.

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1. Introduction

The first imported COVID-19 case in Zimbabwe was reported on 21 March 2020 while local transmission started on 24 March 2020 [1]. About half (454) of the 926 COVID-19 cases reported in Zimbabwe from 20 March to 9 July were recent returnees from neighbouring countries, notably, South Africa and Botswana. From 1 April to 22 July, over 12,650 Zimbabwean migrants returned to Zimbabwe from neighbouring countries. As of today (1 August 2020), about 1,500 returnees are quarantined [1]. Many of the reported cases, a month ago, were imported rather than locally transmitted. As of today (1 August 2020), there are 3382 confirmed cases of COVID 19 and 79 deaths have been recorded in Zimbabwe. Local transmission cases have risen steeply in the last 4 weeks resulting in an exponential increase in reported cases and deaths. This is in a country with an estimated 9.7% population with diabetes mellitus (DM) [2].

Diabetes mellitus is generally a major risk factor for the development of severe pneumonia and sepsis due to virus infections. Data from studies conducted early on during the COVID-19 pandemic suggests the risk for death from COVID-19 to be up to 50% higher in people with DM than those without [3]. Although the pathophysiological mechanisms are still not understood, it has been observed that most severe and fatal cases with COVID-19 have occurred in the elderly or in patients with underlying CVDs, diabetes, chronic lung and renal disease, hypertension, and cancer [4–7]. Findings of an earlier meta-analysis revealed that prevalent cardiovascular metabolic comorbidities with COVID-19 were hypertension (17.1%, 95% CI 9.9–24.4%) and cardio-cerebrovascular disease (16.4%, 95% CI 6.6–26.1%), followed by DM (9.7%, 95% CI 6.9–12.5%). Patients with DM or hypertension in this report, had a 2-fold increase in risk of severe disease and requirement for intensive care unit (ICU) admission. Patients with DM are immunocompromised hosts because they have a dysfunction of immunity related to capability against infection [8]. The course of the infection is also more complicated, probably due to the said defects in immunity. These include alterations in proliferation of T cells and macrophages and impairment in natural killer cells and B cell

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function. This results in abnormal innate and adaptive immunity [8,9].

Maintaining good glycemic control is an effective approach to prevention of COVID-19 transmission in diabetic patients [10,11]. However, in Zimbabwe, like in many other countries, the imposed social distancing and lock downs to curb spread of the Sars-Cov-2 virus have resulted in challenges in both institutional and self-management of DM. Many people with DM have difficulties accessing medications, healthcare, fresh food, and being physically active because of confinement [10]. It is very vital that health care workers (predominantly nurses and doctors in Zimbabwe) be involved in disseminating appropriate and accurate information to facilitate self-care in people with DM amid the COVID-19 pandemic. In countries with high prevalence of diabetes, such as India, the COVID-19 pandemic has challenged the physician-centered approach of DM care that is primarily based on routine clinic visits [10]. The prevalence of DM in Zimbabwe is 9.7% [12] and DM ranks 6th among leading causes of death having accounted for 3.02% of total deaths in Zimbabwe in 2018 [13]. It is also worrying that more than 60% of cases of DM in most low income countries, Zimbabwe included, are undiagnosed [14]. There is therefore, a significant proportion of the population more at risk of both diabetic complications and infection with the Sars-Cov-2 virus. The purpose of this review, therefore, is to document a culturally appropriated self-management plan for people with DM in resource limited settings during the ongoing COVID-19 pandemic.

2. Methodology

Electronic databases, namely; Pubmed, CINAHL, EMBASE and Google Scholar were searched for literature. Search terms were “corona virus”, “COVID-19”, “diabetes self-care”, “diabetes self-management education”, “DSME”, “diabetes self-management”, “diabetes self-care in low income countries” and “diabetes management in Zimbabwe”. Articles selected mainly focussed on self-management of diabetes mellitus.

3. Results

Literature review focussed on health education to promote self-management amid the COVID-9 pandemic. Components of health education comprised, medications, diet, physical activity, self-monitoring of blood glucose, stress management, foot care, smoking and drinking general preventive measures.

3.1. Medications

People with DM are bound to miss physician's appointments and routine clinic visits for fine-tuning of anti-diabetic medications among other things, due to the imposed lockdowns. This can result in sustained periods of unattended to hyperglycemia and probably hypoglycemia [10]. This is the time to be utilising telemedicine for optimum health of people with diabetes. Health care workers need to scale up health education on drug interactions of medications for diabetes. There is so much information circulating on home remedies and probable cures for COVID-19 [10]. The current buzz on social media about hydroxychloroquine is one such example. Patients should be made aware of contraindications of hydroxychloroquine (diabetic retinopathy or seizure history) to prevent inappropriate use of the drug as an anti-diabetic amid the COVID 19 pandemic [10]. DM educators could help patients access anti-diabetic medications via online stores. Though teleconsultations could ensure medication adherence, this might only be possible to very few individuals who can afford health care from private institutions. Currently government institutions are paralysed by

strikes, lack of resources and shortage of staff as more and more people self-isolate at home after contact with people with COVID-19. Some health insurance companies have introduced the Medic-Express™ service where prescription refill requests are made online then medications are delivered in homes. Unfortunately, very few people can afford the service. It is also advisable that patients start the process of prescription refill 2 weeks before medications run out to ensure continuity of therapy.

3.2. Self-monitoring of blood glucose (SMBG)

Good glycemic control reduces the risk and severity of any infection including COVID-19. More frequent self-monitoring of blood glucose levels is required during this pandemic. Good glycemic control may also lessen chances of superimposed bacterial pneumonia [15]. A recent study from China during the COVID-19 pandemic has shown that elderly subjects with type 2 DM experienced worsening of glycemic control manifesting as higher fasting blood glucose [16]. The impact of social distancing, quarantine and lockdown on lifestyles would have probably led to worsening of glucose control [10]. Earlier studies in people with DM conducted in Zimbabwe have revealed that patients generally do not afford meticulous SMBG [17,18]. However, for patients on oral hypoglycemic agents with acceptable control, measuring fasting and post-prandial capillary blood glucose once or twice a week is acceptable. This will be far much better than not monitoring blood glucose at all. Unfortunately, people on insulin with poor glycemic control or recurrent hypoglycemia, require SMBG at least 4 times/day. This is a challenge as glucose strips are generally very expensive with very few people affording them. One suggestion around this problem reported in a study conducted in Zimbabwe [17] is to subsidise the price of glucose testing strips or even to make them freely available to people with DM.

3.3. Diet

Restriction in food supplies during the lockdown might force people with DM to alter their dietary habits that were earlier associated with good glycemic control [19]. Attention to nutrition and adequate protein intake is important [6]. There is generally high consumption of carbohydrate rich foods in resource limited settings, Zimbabwe included. The daily carbohydrate intake should be approximately 50–60% of the total calorie intake [20]. Pure water should be preferred over fruit juice, aerated beverages and sugar syrups which are also very expensive [21]. Patients should keep well-hydrated at all times. Fats should provide not more than 30% of total daily caloric requirements and ideally three teaspoons of polyunsaturated oil per day (eg from groundnut/cottonseed/olive oil) should be used in cooking. Protein intake should be 1 g/kg/day, but should be less (0.8 g/kg/day) in people with renal problems (diabetic nephropathy and macroalbuminuria) [21]. Telehealth delivered dietary interventions targeting dietary patterns have been shown to improve diet quality, fruit and vegetable intake and dietary sodium intake [22]. Patients with access to nutritionists are therefore, encouraged to keep regular touch with them. It is also advised to make use of general messages from authentic organisations such as the Ministry of Health and Child Care of Zimbabwe, the World Health Organisation (WHO), and the Centres for Disease Control (CDC).

3.4. Physical activity

Physical activity is a part of routine DM self-care. Unfortunately, lockdown and social distancing have restricted outdoor physical activities of people with diabetes. There are other alternative

physical activity programs that can be undertaken within the safe confines of home. Regular exercise training has been advocated as part of numerous practice guidelines, including the ADA, the American College of Sports Medicine, the American Heart Association (AHA), and the Canadian Diabetes Association [23]. Exercise has been shown to improve immunity, though it might be prudent to be careful and avoid crowded places like gymnasias or swimming pools [15]. Regular physical activity helps to reduce back pain, constipation, bloating and swelling. It increases energy and improves mood, promotes restful sleep, minimises weight gain and reduces post prandial hyperglycemia [24]. Intensity and type of physical activity should be individualised according to ability and fitness level and caution must be exercised for patients with co-existing heart diseases and history of hypoglycemia. Continuous monitoring of blood glucose to check blood glucose in type I diabetic patients during exercise is important because of the risk of hypoglycemia [19].

3.5. Foot care

Patients with DM should continue with routine foot care practices. However, findings from various studies conducted in Africa have revealed a general neglect of foot care in people with diabetes [14,25–27]. Recommended foot care practices in diabetic patients include regular inspection of feet, wearing appropriate footwear, avoiding risks such as sharp instruments and abrasives, and regular physical examination of feet for peripheral vascular disease (PVD) and peripheral neuropathy (PN) [28]. Diabetic foot care practices also include daily foot inspection of injuries, callosities and edema, foot wash with lukewarm water and mild soap, thorough foot drying especially between toes, and foot protection with comfortable, well-fitting shoes. It is important to avoid direct heat, heating pads and hot water bottles to the feet, hot pavements, hot sandy beaches and limitation of exposure to cold with simple devices like warm socks [27]. Application of a thin coat of petroleum jelly, cutting the nails straight across after a sock with warm water, avoidance of caustic antiseptics, wearing footwear at all times, daily exercises to promote circulation, discontinuation of smoking, early reporting of all injuries and blisters and avoidance of self-medication for foot problems are good self-care practices [27]. Careful inspection of the diabetic foot on a regular basis is one of the easiest and most effective ways to prevent foot complications. The purpose of the inspection is to identify early warnings signs of nerve damage or minor injuries that could lead to ulcers later on.

3.6. Stress management

Patients should utilise telecommunication in discussing psychological issues with their caregivers during these times. Caregivers should also inquire about the mental health of patients. Social support can also help in alleviating the distress imposed by the COVID-19 disease and its multifaceted effects on populations. These include physical, psychological, social and even spiritual problems. Health care workers need to be on the fore front of health educating people especially in the face of a lot of fake news circulating unabated. Psychological stress can be alleviated by voluntarily giving up the feeling of being locked up in homes and in return spend quality time loved ones [10]. It is also advisable to intentionally minimize watching, reading or listening to news about COVID-19 [30].

3.7. Smoking and drinking

Unhealthy habits of smoking, drinking and betel chewing should be avoided. Studies have confirmed that nicotine, found in

cigarettes renders insulin ineffective and people with DM who smoke need larger doses of insulin. They are also at high risk of heart and kidney disease, poor blood flow in the legs and feet that can lead to foot infections, ulcers, and possible amputation of toes or feet; retinopathy and peripheral neuropathy [31].

3.8. Complications

People with DM and their caregivers should be made aware of the common symptoms of diabetic ketoacidosis (shortness of breath, breath that smells fruity, nausea and vomiting and very dry mouth) [32] and hypoglycemia and measures to prevent them. Signs and symptoms of hypoglycemia are shaking, anxiety, sweating, chills, clamminess, irritability, confusion, tachycardia, dizziness, hunger, nausea, pallor, drowsiness, malaise, blurred vision, tingling or numbness in the lips, tongue, or cheeks, headache, lack of coordination, nightmares and seizures [33]. Hypoglycemia can be a major deterrent to comprehensive DM care amid the ongoing pandemic [10]. The current period of distress imposed by the COVID-19 pandemic can also perpetuate hypoglycemia. Stressful situations have also been shown to precipitate hypoglycemic episodes in people with type 1 and type 2 diabetes [34]. Skipping of meals should be discouraged as this predisposes to hypoglycemia. People with DM are really encouraged to stay with caregivers in case such complications occur. Patients and caregivers should be educated about measures to take at home in an unfortunate situation of hypoglycemia. In case of a hypoglycemic attack, one should eat or drink 15–20 g of fast-acting carbohydrates such as (soft drinks, honey or sugary candy). For those with resources, recheck blood sugar levels 15 min after treatment and if they are still under 70 mg/dL (3.9 mmol/L), eat or drink another 15–20 g of fast-acting carbohydrate, and recheck the blood sugar level again in 15 min. Repeat these steps until the blood sugar is above 70 mg/dL (3.9 mmol/L). Have a snack or meal once blood sugar is normal to stabilize it and replenish the body's glycogen stores [3,34]. Patients are advised to keep a stock of glucose (energy drink, sweets or sugar) at home. It should be emphasised that a regular meal be taken following termination of an episode of hypoglycemia with oral carbohydrate.

4. Conclusion

People with DM are at a higher risk of contracting COVID-19 and of having worsening symptoms if they do contract the disease. Prevention is mainly through meticulous diabetes self-care in addition to general prevention practices for COVID-19. It is very important to reemphasise health education on glycemic control to minimize the devastating effects of COVID-19 among populations.

Declaration of competing interest

The authors declare no conflict of interest.

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