

Review Article

# Comparing Type 2 Diabetes Logbooks in Selected Countries

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**Abstract**

**Context:** According to the wide range of patients with type 2 diabetes and their unique characteristics, the process of treatment should be personalized for them. The most important step towards treatment and care of them is preparing daily reports by patients in logbooks. Diabetes organizations and associations have provided various logbooks for diabetic patients, with different structures.

**Evidence Acquisition:** In this review study, articles and documents relating to type 2 diabetes logbooks were collected from relevant databases. From 60 articles, 28 titles including 23 articles related to type 2 diabetes and five logbooks from various diabetes organization were selected. The criterion for the selection was the validity of the organization offering the logbooks. Then, their data elements were compared.

**Results:** The findings showed that the data elements of blood glucose, physical activity, meal and medication are fundamental data to record in type 2 diabetes logbooks. However, different organizations have considered different data elements for their logbooks and the number of their data elements is different from each other. In addition, few logbooks included all data elements.

**Conclusion:** To achieve the best results from personalization of care in type 2 diabetes patients, it is necessary to record measurable self-care behaviors so that the process of the disease is completely controllable. Therefore, it is necessary for diabetes logbooks to have all these necessary elements so that the physician would make decisions based on sufficient data and the process of treatment would come in effective.

**Keywords:** Type 2 Diabetes, Logbook, Healthcare Personalization

## 1. Context

Accounting for around 90 percent of cases of diabetes, type 2 diabetes is considered as a serious condition in societies. The disease is developed mainly due to overweight and lack of sufficient physical activity. The age range associated with the development of type 2 diabetes is generally middle age and old age [1]. However, its incidence has recently been increasing among the youth and children [2, 3].

The adverse effects of type 2 diabetes include lower limb amputation, blindness,

kidney failure and development of cardiovascular diseases [4-6] as well as cognitive disorders, such as Alzheimer's disease and vascular dementia [7], and lower life expectancy down to 10 years [8]. On the other hand, mortality in people suffering from type 2 diabetes is 50 percent more than others [9].

Because of a high variety of patients with type 2 diabetes and its side effects, there are a lot of differences in their amount of consumption of medications, their blood glucose response to medications, and occurrence of side effects during the treatment process [9]. Therefore, each

diabetic patient has his/her own characteristics and the treatment process should be personalized for him/her. To this end, preparing a personal report by the patient is the main measure to be adopted in line with this. The data are collected in the patient's logbook.

The logbook of type 2 diabetic patients should include at least blood glucose level, physical activity per day, daily meal and consumed medications [10,11]. Using the logbook helps patients share their own treatment by recording their conditions and effectively managing their disease. By observing their blood glucose patterns, the patients can monitor blood glucose fluctuations during physical activity, and of food or special medications. Meanwhile, by observing the logbook, physicians can monitor their patients' full conditions and make proper decisions on their treatment. In addition, determining the dose of medication using the logbook is achieved with higher level of accuracy by the physicians and thus response to treatment will be more effective. Therefore, the logbook will result in better management of type 2 diabetes and boosts the quality of caring provided for the patients [12-16].

Various diabetes organization and associations worldwide have designed and distributed logbooks, each having its own structure and data elements. The aim of this study is to compare logbooks of type 2 diabetes patients in selected countries. This is a review study, which investigated documents and articles related to type 2 diabetes logbooks. To find documents relating to the research topic, the following key terms were searched in Google: diabetes, logbook, type 2 diabetes logbook, logbook, log diabetes data. In addition, the term "diabetes logbook" was also searched in Google Scholar database and in PubMed. Finally, 60 articles and documents relating to the searched key term were found. Then, their topics were investigated in terms of thematic relevance. Logbooks and articles that were specifically related to type 1

diabetes were excluded from the study. Through this procedure, 40 articles and documents were divided into two groups of articles (30 topics) and logbooks (10 cases). From among 30 articles, 23 articles that were relevant and valid were selected. In addition, five logbooks relating to diabetes institutes worldwide were selected that included American Diabetes Association (ADA), Canadian Diabetes Association (CDA), Diabetes UK, Diabete-ezy, and US Integrated Diabetes Services.

## 2. Evidence Acquisition

### 2.1. American Diabetes Association (ADA)

As a charity and non-for-profit institute, the ADA has been active in the area of fighting diabetes and adverse effects of the disease since 1940. It is a network consisting of more than one million active candidates, 500 thousand diabetic patients and their families as well as 16 thousand healthcare specialists [17].

Being available to the public through its website, the ADA's logbook is a simple notebook for recording information, including two main elements of blood glucose level and medication. In the medication part, there is a section titled "comments", in which sudden decrease and increase in blood glucose level and states relating to it are recorded [18].

### 2.2. Canadian Diabetes Association (Diabetes Canada)

Established in 1953, the Canadian Diabetes Association changed its name to Diabetes Canada in 2017. With more than 150 active members, the goal of this association is to help diabetic patients have a healthier life, prevent adverse effects of diabetes and find treatment. Providing information on diabetes and its complications is also among the important measures of this association [19].

In 2013, the CDA published Self-Monitoring of Blood Glucose (SMBG) guideline, based on which it introduced the

diabetes logbook. The logbook is available through the website of Diabetes Canada. Data elements in this report include blood glucose levels before and two hours after meal, list of medications and medication supplements (based on dose, consumption hour and reason for prescription). In this logbook, the medications have been provided in the form of a list and are separate from the main table of recording blood glucose levels. The part relating to “comments” is also considered for recording issues relating to the disease, sudden increase or decrease in blood glucose, etc. [20].

### 2.3. Diabete-ezy

Founded by Elissa Renouf, Diabete-ezy produces products for diabetes and distributes them worldwide. Its aim is to help diabetic patients to manage their disease. In its website, this institute has posted a logbook for daily records by type 2 diabetes patients and it is the only logbook sold through the online store of British Diabetes Association. The data elements existing in it include blood glucose level, meal, physical activity and medications. For the comfort of the patients, the logbook is published in pocket size and also includes the patients’ personal information [21].

### 2.4. Diabetes Digital Media Ltd

As part of the London-based Diabetes Digital Media Ltd, the website diabetes.co.uk started its activity in 2002. Known as the largest society for diabetes in Europe, the media has more than one million diabetic members and its main activity is focused on providing electronic treatment, news and information on

diabetes, evidence-based educational programs, newsletters, and a huge network of patients, which all aim at improving the health of patients with diabetes.

The data elements existing in the logbook introduced by this association include blood glucose level, meal and comments. According to the explanations provided for using this logbook, the part on comments is focused on the medications, physical activity and diseases in order to investigate their effect on blood glucose and inform the patients of the information [22].

### 2.5. Integrated Diabetes Services

The Integrated Diabetes Services was founded by Gary Scheiner in 1955 in the US. Its main aim was to help patients cope with their diabetes problems and manage them [23]. The institute consists of a multi-specialty team of trained individuals in the area of diabetes and all the physicians there are themselves suffering from diabetes.

The type 2 diabetes logbook of this institute has the data elements of blood glucose, physical activity and comments. The structure of this book has a rotating pattern, the main aim of which is to record the patient’s data at various hours of the day during a week and examine the patient’s blood glucose level at all times [24].

## 3. Results

Research findings indicate that various organizations and association have presented different logbooks for diabetic patients and have considered a particular structure in each logbook. In general, the data elements existing in diabetes logbooks of various organizations and association are according to Table 1.

**Table 1.** Comparing logbooks of various diabetes associations based on data elements

Data Elements / Name of Association	Blood Glucose	Medication	Meal	Physical Activity
American Diabetes Association	✓	✓	-	-
Canadian Diabetes Association	✓	✓	-	-
Diabete-ezy	✓	✓	✓	-
UK Diabetes Digital Media Ltd	✓	✓	✓	✓
US Integrated Diabetes Services	✓	-	✓	✓

Comparing the logbooks shows that the four data elements of blood glucose, medication, meal and physical activity, which exist in different logbooks, are not found identically in all logbooks. The data element “blood glucose” is found in all logbooks and other elements of medication, meal and physical activity are not found in some logbooks. In other words, some institutes have only used simple logbooks for recording essential and primary elements while some others, including Diabetes Digital Media Ltd, have used all data elements in their logbooks (Table 1). As it was seen, some data elements are shared in type 2 diabetes logbooks while others are different.

The most important data element shared in all logbooks is blood glucose, as it is necessary to measure blood glucose on a daily and regular basis for patients with type 2 diabetes, who are consuming drugs (both using insulin and using other oral medications to reduce blood glucose levels) [25]. This measurement will also help significantly decrease A1C hemoglobin level and rate of hospitalization [26], since it helps the patient constantly monitor blood glucose levels.

The second data element shared in logbooks is recording medications or the insulin dose (for patients dependent on insulin). Many of these logbooks have a special section for recording medications. Otherwise, they have considered a section under the title of comments for recording medications.

It is highly important to record medications in these logbooks. Patients with type 2 diabetes might consume various medications along with diabetes medications, which might raise the issue of drug interaction and affect response to treatment [27]. Recording the medications consumed by patients in the logbook helps the treatment team be aware of all the medications the patients consume and thus prevent any drug interaction with diabetes medications.

Another difference in these logbooks is in recording meals. This data element must be

carefully examined because of its importance and effect on blood glucose. However, it is not independently available in some logbooks. Recording the meals in the logbook helps the physician to change the dose of the medication in case the dose of the medication or the dose of the insulin is not sufficient for each meal or to provide the patient with a different diet.

Another data element that exists independently in a limited number of logbooks is physical activity. This is while regular physical activity plays a significant role in type 2 diabetes and results in a better control of blood glucose and postpones the development of diabetes in vulnerable individuals. Decreasing fat, controlling blood pressure, improving cardiovascular diseases, improving the quality of life and reducing the risks of diabetes to 58 percent in vulnerable populations are considered as other benefits of exercise for controlling type 2 diabetes. The National Institutes of Health and American College of Sports Medicine too recommend regular physical activity for all patients with diabetes [28] and [29]. Therefore, recording physical activities in logbooks helps better control and manage diabetes and the effect of exercise has been seen on the patients' blood glucose levels. Furthermore, blood glucose fluctuations during exercise might happen to some patients with type 2 diabetes. Therefore, blood sugar should be measured and recorded before, during or after a physical activity [30], which is not taken into account in many logbooks and has only been restricted to the section on comments.

#### 4. Conclusion

Since the range of type 2 diabetes patients is highly extensive, it can include individuals for whom only diet and exercise have been prescribed or individuals for whom only medication or medication and insulin have been prescribed. In addition, many of them have other diseases besides diabetes. Therefore, logbooks should be

comprehensive enough for these patients and should include the minimum necessary cases that cover the whole needs by these patients.

Therefore, considering the study conducted and the investigation into various logbooks, the four data elements of blood glucose, medications, physical activity and meal are the most important cases that must all be available in the logbooks of type 2 diabetes patients so that every patient can enter data based on his/her conditions and the views of the physician. Providing data by the patient as required by the physician will facilitate the process of treatment and result in the achievement of the best results from personalization of the care.

### Conflict of Interest

The authors declare no conflict of interest.

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