

**AVAILABILITY AND ACCESSIBILITY OF INSULIN  
AND INSULIN SUPPLIES AMONG INSULIN-  
DEPENDENT PATIENTS IN YEREVAN, ARMENIA**

**Master of Public Health Thesis Project Utilizing Professional Publication  
Framework**

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Yerevan, Armenia  
October 2005

## Acknowledgment

I would like to express my deepest gratitude to my advisors Dr. Michael Thompson and Dr. Robert McLean for their continuous support and insightful comments on my research.

I would also like to thank Dr. Grace Sullivan and Dr. Varduhi Petrosyan for their assistance and input in the project.

I am very grateful to Dr. Armenian and all my teachers for creating a unique opportunity for participation in this program.

My thanks to endocrinologists working at the Yerevan district polyclinics and diabetic clinic for kind cooperation. Also I am very thankful to International Diabetes Federation for assistance during the project.

My special thanks to my friends whose everyday support has been very important for me during the whole time of my study.

I am also grateful to my family, and especially my mother, who has always been by my side with their patience and valuable support.

## **Abstract**

Diabetes is one of the most common non-communicable diseases in the world and is reaching epidemic proportions worldwide. The availability of insulin and insulin supplies is known to be compromised in many countries, leading to early complications and premature death caused by the progression of the disease. Nowadays, patients with diabetes in Armenia constitute a distinct group of population, qualified as having a “special disease.” This status entitles diabetes patients to free-of-charge drug supplies, catered by polyclinics, or other ambulatory institutions, under a state guarantee.

**Objectives:** The study aims at assessing accessibility/availability of insulin and insulin supplies and thus, determining the barriers to availability of insulin and insulin supplies among insulin-dependant diabetes patients in Yerevan, Armenia. There are no official data on the extent of insulin and insulin supplies availability and accessibility among the insulin-dependent diabetes patients in Armenia. The study will help to understand the current situation of insulin and insulin supplies availability and fill the research gap in this area.

**Study Methods and Design:** The study employs descriptive cross-sectional design. Key informant interviews have been conducted with two endocrinologists. Seventy patients diagnosed with diabetes from twelve polyclinics and diabetic clinic of Yerevan participated in the study. Interviewer-administrated questionnaire has been used to collect information from the sample diabetes patients. The study has been reviewed and approved by the Institutional Review Board Committee of the College of Health Sciences at American University of Armenia.

**Results:** The data analysis has indicated that 68.6% of the surveyed diabetes patients experienced insulin interruption during the last one year. Among the major reasons for the interruption were “occasional” absence of insulin in polyclinics/diabetic clinic, insufficient amount of insulin provided to patients, and the deficiency of the needed type of insulin. The

data have revealed low levels for self-monitoring of blood glucose and self-management of glucose testing in urine by patients. In particular, 47.1% did not perform blood glucose testing, while 91.4% have skipped urine glucose testing at home. The main reason for low self-testing is the lack of device, special strips, as well as inadequate level of appropriate patient knowledge.

**Conclusion:** The study has revealed that there are often interruptions in insulin provision among the diabetes patients and lack of insulin supplies leading to low self-monitoring.

Based on the results of the study, it is recommended to design and conduct studies among the primary-level physicians and other stakeholders, with following recommendations on drug distribution policy improvement. To increase the knowledge on diabetes self-management educational programs should be arranged and provided to diabetes patients.

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# 1. Background Information

## 1.1 General Overview

Diabetes is one of the most common non-communicable diseases in the world and is reaching epidemic proportions worldwide (1). Diabetes can now be found in almost every population in the world, and epidemiological studies predict that without effective prevention and control programs diabetes will continue to spread and increase globally (2). It is one of the major causes of the death in most developed countries, being ranked as the fourth or fifth main cause of death in these countries. At the same time there is considerable evidence to suggest that its incidence is increasing in many developing countries (3, 4).

Currently there are 194 million people with diabetes worldwide, or 5.1 % of the adult population. Predictions suggest that the total number of diabetics is expected to reach 333 million by 2025 if nothing is done to change it (1, 3). The number of people with diabetes will increase by 42% (from 51 to 72 million) in industrialized countries and by 170% (from 84 to 228 million) in industrializing countries between 1995 and 2025 (5). The regions with greatest potential increases are Africa and Asia where diabetes rates can rise by two or three times compared with current rates. Annually 3.2 million people worldwide die from the diabetes complications, or in other words, six people per minute (6).

According to the World Health Organization diabetes is characterized by the hyperglycemia and disturbances by the carbohydrate, fat and protein metabolism that are associated with absolute or relative deficiencies in insulin action and/or insulin secretion (7). Diabetes tends to get passed on genetic basis, but factors other than heredity, such as obesity, lack of appropriate diet, insufficient physical activity also play a role in the development of the disease (8).

There are two types of diabetes. Type 1 diabetes is characterized by the marked inability of the pancreas to produce insulin. The peak age of type 1 diabetes is mainly childhood and adolescence, but it can occur at any age. Type 2 diabetes or adult onset, is the most common form of diabetes. Type 2 diabetes is characterized by peripheral insulin resistance with an insulin-secretory defect that varies in severity. Type 2 diabetes typically occurs in individuals older than 40 years who have a family history of diabetes (9, 10). Both types of diabetes are spreading across the world. Type 1 diabetes accounts for about 10% of the total prevalence, but at the same time it should be mentioned that incidence is increasing with the annual rise of about 3% in many countries. Type 2 diabetes accounts for about 90% of all cases and shows most growth in the developing countries (3).

Both types of diabetes increase the risk of serious complications. Cardiovascular diseases account for 50-80% of death of diabetes patients. About 50% of diabetics develop diabetic neuropathy. Diabetic retinopathy is developed in the latter stage of disease and leads to blindness in 2% of cases, and visual impairment in 10% of cases. Diabetes also leads to serious kidney diseases, leg and foot ulcers and other forms of micro- and macrovascular diseases (8, 11).

Diabetes is also a social problem because its consequences, such as death and disability lead to enormous economical losses. "Estimates of the global cost of diabetes based on economic studies reveal that diabetes accounts for 2-3% of the total health care budget in every country; therefore, an increase in diabetes incidence and prevalence translates into a significant economic impact" (12).

Along with the rise in the incidence of diabetes, the alarming trend is that the disease is affecting younger age groups. The increase in the proportion of people over 65 with diabetes is observed in the developed countries. But in the developing countries most new cases are occurring in people between 44 and 65 years of age (1, 3). Type 2 diabetes is also

emerging in children and adolescents worldwide. It is considered to be a global public health problem as the earlier development of the disease will lead to the onset of complications at earlier age (3). The increase in diabetes in developed countries has been linked to changes in lifestyle and aging of the population on average. In the developing countries the main predisposing factor is heredity (2, 13).

Once diabetes has developed, adequate care and treatment should be made available to all. This means essential medical treatment and education should be provided. Diabetes cannot be cured, but it can be controlled. Diet, physical activity, and insulin via injection or an insulin pump are the basic therapies for type 1 diabetes. These patients are dependent on exogenous insulin to sustain their lives. Healthy eating, physical activity, and blood glucose testing are the basic management tools for type 2 diabetes. However, if the blood glucose level remains too high after this for a few months, then tablets or/and insulin injections are advised to reduce the glucose level in addition to diet and exercise. Insulin can be used alone or in addition to tablets. About 40% of persons with type 2 diabetes require insulin injections (2, 3, 9,10).

The discovery of insulin by Frederick Banting and Charles Best in 1921 transformed insulin-dependent diabetes from a fatal, to a treatable disease. Before this discovery, everyone with type 1 diabetes died within a few years after diagnosis (14). The goal of diabetes management is to keep blood glucose levels as close to the normal range as possible (15). Thus, constant and timely provision of the insulin-dependent diabetes patients with insulin, including both type1 diabetics and type 2 diabetics who become insulin-dependent, is essential.

Today, almost 85 years after the discovery of insulin, there is evidence that people with diabetes still die because they do not get the medication they need. Sadly, insulin is not always available to or affordable for, those people who need it (2, 14). Striking inequalities in

access to medical care among people with diabetes in the world were highlighted today by the World Health Organization (WHO) and the International Diabetes Federation (IDF) (16, 17). Recognizing this problem of unavailability, IDF established a Task Force on Insulin to undertake it. The Task Force has carried out three surveys on the access to and availability of insulin in IDF member countries in 1992, 1997 and 2002 years (16, 17, 18). The “Access to Insulin” survey, conducted in 1997 in 120 countries, revealed that only 48 countries could offer insulin to people who needed it permanently in urban areas. The chronic lack of access to insulin was more common in Africa. The lack of access to syringes and needles was apparent in Africa, and South and Central America. These problems were least common in Europe. According to “Access to Insulin” survey in 1997 up to 20% of people with type 1 diabetes did not always have access to all the insulin they required. It showed that a number of different factors combined to make insulin inaccessible or unavailable to many people with diabetes who required it for survival. (16). Survey conducted by IDF in 2002 also displayed several important points (18):

- many people in developing countries do not access insulin because they cannot afford it;
- animal insulin is considerably cheaper in those countries where both human and animal insulin are available;
- blood glucose test strips appear to be even less accessible than insulin for the same reason of affordability;
- taxes are still a significant factor affecting the price of insulin, and other diabetes supplies in a large number of countries even though WHO essential drugs guidelines state that there should be no taxes on insulin

Unavailability of insulin and insulin supplies (syringes, needles, blood glucose monitoring device, special strips) can mean different things in different situations. According to the Central and Eastern Europe Project, IDF Survey in 1997, as well as studies conducted

in Africa the most quoted factors are affordability/availability, distribution, and transportation (16, 19, 20). Other barriers include storage, taxation, and inappropriate healthcare, lack of epidemiological data, lack of diabetes education, local health beliefs, and failure of prescription (19, 20).

## **1.2. Situation in Armenia**

According to the latest available data there are about 49 000 registered patients with diabetes in Armenia, out of which 7 000 are diagnosed with type 1 diabetes and 42 000 with type 2 diabetes (2, 11). Insulin-dependent patients account for 8-10% of the total number of type 2 diabetes patients. However, according to the Head of State Endocrine Center the real number of people with diabetes exceeds the official numbers approximately 2 times (11). Over the past 15 years the morbidity rates of the diabetes has been increasing. In the period from 1988 to 1995 it can be accounted by the tragic earthquake, hard socio-economic and political situation in the country (21). Mortality rate from diabetes has been increasing progressively in Armenia since mid-1980 and is currently considered as one of the highest in the European Region. The figure for Armenia has increased by a factor of almost four in 1981–1998. Over this period of time the incidence and prevalence recorded for diabetes has been comparatively low. This disagreement could be due to errors in coding the causes of death, as well as a high level of mortality among diabetes patients (21, 22).

Nowadays, in Armenia patients with diabetes constitute one of the groups of the population with special diseases, provided with the free of charge drug supply under the state guaranteed services at the polyclinic-ambulatory institutions (23). Hard socio-economic situation in Armenia results in the lack of available funds for health care and pharmaceutical supply, which in turn led to lack of essential drugs, purchased by the Ministry of Health for core state programs, such as diabetes, tuberculosis (24, 25).

In 1999 year survey on availability of insulin and insulin supplies was conducted including data from countries of Central and Eastern Europe. Out of 16 countries eight post-Soviet countries including Armenia, were participating in the survey. Results presented in this project are not specified by the country; however, out of key findings of this survey following are important to be mentioned (2, 19):

- fifty percent of countries reported that “large numbers” of persons with diabetes could not obtain insulin when they needed;
- many of the countries provided free insulin to children up to the age of 18 years. However once 18 years of age, they were then faced with the problem of not being able to afford ongoing supplies;
- all countries reported very poor compliance to monitoring, that is less than 25% of persons with diabetes performed any method of monitoring;
- 75% of the countries still use and rely on animal insulin

There are no official data on the extent of insulin and insulin supplies availability and accessibility among the insulin-dependent diabetes patients in Armenia. According to unofficial sources the insulin supply has been improved during the last year. However, there are no studies that confirm or reject this statement. The present study will help to understand the current situation of insulin and insulin supplies availability and fill the research gap in this area.

### **1.2.1 The Health Sector in Armenia**

The Armenian health care system, and its drug supplies, was centrally managed by state in the Soviet era and health facilities received regular allocations of operating and capital expenses in the annual budgets of the central and municipal governments (26).

Since late 1995, the health care system of Armenia has been completely decentralized. In 1996 the Medical Care Act was adopted, which legalized funding from a variety of sources (such as the state budget, municipal budgets, medical insurance and direct payment by the patient). It has the purpose to allow the cost-sharing by the patients and consequently to raise some funds for the drugs and equipment, as well as for staff salaries.

Although population is no longer provided with free health care all hospitals and polyclinics are legally responsible to continue free of charge services to those parts of the population covered by the state's basic health care package (22, 24, 25, 27).

### **1.2.2. Government Health Expenditures and Drug Supply**

The health system during the Soviet era and starting from independence until early 1996 was compulsory and tax based with funding for health care being drawn from general taxation. The entire population had access to a comprehensive range of medical services free at the point of access. However, starting from independence, in 1991, governmental income fell sharply while the costs of health care mounted. In 1999 the state health budget was 1.7% of Gross Domestic Product GDP and accounted for approximately 25% of total health care expenditures. An additional 15% of health care expenditures were contributed by humanitarian aid, and the remaining 60% by private out-of-pocket payments. Ministry of Health purchases drugs for core republican programs, i.e. the treatment of diabetics and tuberculosis patients and distributes essential drugs is provided by humanitarian aid programs (which are believed to contribute 40% -45% of all pharmaceuticals consumed) (22, 24, 25,26).

From March 1996 universal coverage of the population has been abandoned. The resources allocated to health care by the state are only sufficient to provide care for the most vulnerable population groups and groups with special diseases (diabetes, tuberculosis, etc.) All treatment not covered by the state is paid out-of-pocket with prices set independently by

each hospital or polyclinic (23, 24, 25.). According to state resolution # 396, June 8, 1999, provision of pharmaceutical drugs to socially vulnerable groups of population and groups with special diseases (diabetes, tuberculosis, etc.) is performed on free of charge or privilege basis (28). According to state resolution # 318, March 4, 2004 (23):

- the provision of the essential pharmaceutical drugs, medical attributes and substances for the policlinics is accomplished on the basis of per capita annual financing;
- the distribution of the pharmaceutical drugs on the free of charge or privilege basis according to resolution N#396 is done by district general practitioner/family doctor or by the narrow specialists in the case of specific diseases

Persons included to receive the Basic Benefits Package are to receive free pharmaceuticals when treated as inpatients. In practice due to insufficient state funds even these patients must often pay out-of-pocket. Outpatients who are covered are to pay only a nominal sum towards the cost of drugs; however in reality they often pay the full cost. All other patients (i.e. all those not part of a vulnerable group) have to pay for the full cost of pharmaceuticals. However the price of pharmaceutical drugs is unjustly high. There is no alternative mechanism of drug reimbursement and established compulsory insurance system. All these lead to the financial inaccessibility of pharmaceutical drugs in Armenia (25, 26).

## **Objectives**

The specific aims of the study are defined as following:

- to assess accessibility/availability of insulin and insulin supplies among insulin-dependant diabetes patients in Yerevan, Armenia
- to determine the barriers to availability of insulin and insulin supplies among insulin-dependant diabetes patients in Yerevan, Armenia

## Research Questions

What is the prevalence of the insulin-dependent diabetes patients, who have lack of insulin and insulin supplies in Yerevan, Armenia?

What are main barriers to accessibility/availability of insulin and insulin supplies among insulin-dependent diabetes patients in Yerevan, Armenia?

## 2. Methods/Materials

### 2.1. Study Design

Since the purpose of the study is to define the prevalence of the insulin-dependent diabetes patients who experience lack of access/availability of insulin and insulin supplies and find main barriers leading to this phenomenon student –investigator used the descriptive cross-sectional design (29).

### 2.2. Study Population

The *target population* for this study was insulin-dependent diabetes patients, in particular type 1 diabetes patients and type 2 diabetes patients who are in need of insulin, in Yerevan, Armenia.

The *survey population* was identical to target population.

The *inclusion criteria* for participation in the study are as follows:

- Patients with type 1 diabetes above age of 18, with a diagnosis of more than one year old,
- Patients with type 2 diabetes above age of 18, using insulin for more than one year,
- Resident status for Yerevan,
- Accessibility via phone within the geographical area of coverage

### *Sample Size Calculation*

The sample size of the study was determined using one-sample proportion formula (29)

$$n = z_{1-\alpha/2}^2 p (1-p)/d^2$$

Using the information from “Access to Insulin” survey conducted by IDF in 1997 the prevalence of diabetes patients who lack required insulin was considered, as 20% ( $p = 0.2$ ). The least difference desirable to detect was estimated as  $d=0.10$ . With 80% power and alpha error of 0.05, the sample size was calculated as 62.

### **2.3. Study Protocol**

Diabetes patients are served by polyclinics within a specified geographical area, as well as by a special diabetic clinic. There are twenty nine polyclinics which have been offering ambulatory services to the local population above the age of 18 years in the city of Yerevan. These polyclinics are located throughout the twelve Yerevan districts. Public sources provide official data on the number of insulin-dependent patients above the age of 18 who are served by polyclinics within the Yerevan city.

The survey used a multistage Simple Random Sampling (SRS) stratified by districts. Thus, one polyclinic has been selected from each district by SRS. The staff endocrinologist from each of the selected polyclinics, as well as the diabetic clinic has supplied a list of insulin-dependent diabetes patients, both the type 1 and type 2 requiring insulin. The number of the diabetes patients to be selected from each polyclinic and the Yerevan diabetic clinic was calculated as proportionate to the total number of insulin-dependent diabetes patients attached to the specific polyclinic/diabetic clinic. Student-investigator used the SRS strategy to select participating patients from the entire lists submitted by polyclinics. The objective was to fulfill the pre-defined quota for the number of patients calculated for each polyclinic. Hence, this step has been repeated until the targeted number of responses was received.

The ratio of type1 diabetes patients to type 2 patients in need of insulin within the

resident population in Yerevan is about 1:1 (1670:1613). In order to ensure a representative sample, the investigator had each sub-sample derived from each polyclinic/diabetic clinic to maintain the same proportion of type1 diabetes patients to type 2 requiring insulin, i.e. 1:1. Thus, the sample size has been increased to 70.

## **2.4. Survey Methods**

### *Qualitative*

A key informant interview was conducted with the endocrinologists of Polyclinic #5 and Diabetic Clinic in order to reveal the problems related to diabetes management and insulin supply from the physicians' point of view (Appendix 1, Appendix 2). This exercise has been also helpful during the development stage of the questionnaire.

### *Quantitative*

The student-investigator conducted telephone interviews with diabetes patients. The phone contact information for diabetes patients was obtained from the polyclinics/diabetic clinic, where the patients are registered. The interview with the patient was conducted only once and lasted for approximately 5-10 minutes. Interviews were held during August 1-15, 2005. As a rule, interviews were scheduled around 5:00 pm.

The selection of the phone interview technique is due to the following several reasons. First, according to the polyclinic endocrinologists, diabetes patients rarely visit polyclinics. If/when the patient is not able (or doesn't have time) to make a personal visit to the polyclinic, his/her relatives report to the polyclinic to receive the drugs to be disbursed. Thus those patients for whom a face-to-face meeting at a polyclinic's premises is feasible are not representative of the diabetic population of interest. Second, face-to-face/self-administered interviews at patients' houses were considered unfeasible due to a large dispersion of the target population within all twelve districts in the city of Yerevan, which imposed additional logistical constraints. Self-administered interview technique was considered inappropriate

because a significant number of diabetes patients were physically unable to complete the questionnaire. Thus, considering the specificity of the population studied, as well as the time and resource limitations, the phone interview technique has been selected.

## **2.5. Study Instrument**

The study instrument was the interviewer-administrated questionnaire (Appendix 3, Appendix 4). The questionnaire was developed based on the questionnaire used in the “Diabetes in Tanzania: Insulin Supply and Availability” study and key informant interview results obtained from that study (20). The questionnaire was developed in English and then translated into Armenian.

The pre-test of the questionnaire was done by interviewing three type 1 diabetes patients and five type 2 diabetes patients requiring insulin. The pre-test was conducted by phone.

Participants for the pre-test were randomly selected from the available list of insulin-dependent patients. Appropriate changes were then made after the pre-test.

The questionnaire comprises 29 questions and consists of three main domains, including Socio-Demographic Characteristics, Insulin Supply, and Diabetes Management. The socio-demographic section of the questionnaire includes questions on gender, age, educational level, employment status, monthly income, and diabetes history. The insulin Supply and Diabetes Management parts reflect on practices and knowledge of the participants. Practice questions include questions on provision source of insulin, frequency of glucose monitoring, frequency of physician visits, experience of interruption in insulin and insulin supply provision, and difficulties encountered in management of diabetes. Knowledge questions were designed in the way so that to reveal the knowledge of diabetes patients on what their insulin dose per day is and what the normal blood glucose level is.

The questionnaire includes both open-ended and closed-end types of questions. Open-ended questions are mainly used in Insulin Supply and Diabetes Management sections and

aimed at uncovering the possible reasons for the gaps in availability/accessibility of insulin and insulin supplies.

### **3. Ethical Considerations**

The study was reviewed and approved by the Institutional Review Board committee within the College of Health Sciences at the American University of Armenia. Student-investigator presented a permission letter to the heads of the 12 polyclinics and diabetic clinic to seek their authorization for obtaining contact information of patients (Appendix 5). An oral consent form, developed in appropriate format and comprehensible language (8<sup>th</sup> grade level), was presented to patients (Appendix 6, Appendix 7). Although the collected data included the information on patients' names and phone numbers, that information was not entered into computerized database and was not analyzed. The study possessed no risk associated with the participation in this study.

### **4. Data Entry/Analysis**

The data was entered into SPSS 12.0 statistical software. Single entry with further range checking was done to ensure accuracy of the entered information. The analysis was performed in SPSS 12.0 and MS Excel statistical software. Statistical Analysis included descriptive statistics.

### **5. Results**

#### *Socio-Demographic Characteristics*

Overall, the investigator contacted 75 diabetes patients. Seventy patients participated in the study while only 5 patients refused to participate due to reluctance and lack of time. Of 70 participants, 35 were type 1 diabetes patients with a diagnosis of more than one year old, while the other 35 were type 2 diabetes patients using insulin for more than one year.

The sample population was presented mainly by women and the mean age of survey participants was 52, 4 years with the range from 18 to 75 years old (Table 1). As should be expected according to diabetes etiology, the mean age of type 1 diabetes patient was less than for type 2 diabetes patient in need of insulin (Table 2). The major diagnostics mode, typical for 36 patients (51, 4%) was the presence of diabetes symptoms (Fig.1). Although in their majority the diabetes patients had either higher education or vocational degrees, more than two-thirds (68, 6%) were unemployed (Table 1). Only 24 (or 34, 3%) participants of the sample population indicated their total monthly household income, which for about half of them amounted to 50,000-75,000 AMD (\$100-149) (Table 3).

#### Insulin Supply

For the main provision source of insulin, 31 patients (45, 7%) used both polyclinic/diabetic clinic and pharmacy, while only 25 patients (35, 7%) received their insulin supplies from polyclinic/diabetic clinic (Table 4). 24 participants (34, 3%) indicated that they encountered some difficulties/discomforts when receiving insulin in polyclinic/diabetic clinic. These included long lines at the disbursing counters and time-consuming paperwork (Table 5). No difficulties/discomforts were encountered at pharmacies.

With regard to insulin interruption, 48 patients (68.6%) pointed to the cases when their insulin supply was interrupted during the last one year. At the same time 22 patients (31.4%) reported that they did not have cases of insulin interruption during the last one year. The reasons for insulin interruption discussed by patients were as follows: first, the «*periodical*» insulin shortage in polyclinic/diabetic clinic; second, insufficient amounts of insulin provided to the patient; and third, the lack of the particular type of insulin (Table 6). Table 7 presents the frequency distribution of different activities following insulin interruption for 48 patients. The majority of these patients (72.9%) indicated that they

purchased insulin from a pharmacy. Other means included the receiving insulin from abroad, referring to the relative/friend for help, and taking alternative medicine. Only 4 patients (8.3%) stated that they were taking no particular action to remedy the lack of insulin (Table7).

Based on responses received from patients with regard to their dose of insulin, the data analysis demonstrated that 21.4% of them were unaware of what their dose of insulin was (Figure 2). This fact is reflected in the statement made by one of the interviewed endocrinologists, who said that *“we frequently deal with patients who do not know or forget their insulin doses.”*

### Diabetes Management

Data analysis showed that 21 diabetes patients (30% of the sample) were unaware of levels for normal blood glucose. The remaining 70% of the sample indicated different ranges for normal blood glucose level, which, however, fell within the accepted standards (Fig. 3).

Self-monitoring of blood glucose level at home was performed by 37 patients (52, 9%) out of 70 diabetes patients. The frequency distribution of these readings is provided in Table 8: one third of the patients (32, 4%) performed self-monitoring of blood glucose level in the deteriorating health condition. At the same time 33 patients (47.1%) did not perform self-monitoring of their blood glucose level at home. The main reason for this was attributed to the lack of a device for blood glucose self-monitoring (Table 8). People who did not monitor their blood glucose level at home were asked about their frequency of visits to polyclinic/diabetic clinic to take these readings. The data analysis revealed that most of these patients (63.6%), took these readings at polyclinic/diabetic clinic once per month and 7 (21.2%) patients did not take the readings at all (Table 9).

Self-monitoring of glucose level in urine at home was performed only by 6 patients

(8.6%), while the remaining 64 patients (91.4%) did not monitor glucose level in urine because of several reasons. The two major reasons for low urine glucose self-testing were the lack of special strips for glucose monitoring in urine (53.1%) and the lack of awareness on this method for monitoring (40.6%) (Table 10). In fact, for these 26 patients the question on glucose monitoring in the urine was quite unexpected.

Fifty-nine patients (83.4%) received from their endocrinologist recommendations for regular outpatient visits, while the remaining 11(15.7%) patients did not receive any recommendation from their physician (Table 11). As for compliance with the physician recommendations, the distribution was as follows: of 59 patients provided with a recommendation 33 (55.9%) followed it, while 26 (44.1%) patients did not. The main two reasons for no compliance were the lack of trust and the decision to refer to the physician only in the case of acute health issues. Other reasons included physical impairment of patients, lack of time and financial resources, as well as dismissive attitude of patients to their disease (Table 12).

Patients mentioned the refrigerator as the main storage place for insulin (Table 13).

Patients also reported some difficulties related to their diabetes management and indicated a few aspects in need of substantial improvement. Most of the sample population quoted financial issues (78, 6%), health issues (51, 4%), as well as certain difficulties with diet management (44, 3%) (Table 14). According to the patients, there is an acute need for regular home visits by district nurses, specialized diabetes shops, and an opportunity to have free general health check-ups.

## **6. Discussion**

Insulin has been declared by WHO as an essential drug. According to various literature sources, the availability of insulin and insulin supplies in developing countries is known to be compromised: these countries cover 84% and about 65% of the world's

population and diabetic population respectively; however, they use only 30% of the world's total insulin produced each year (20).

In Armenia, patients with diabetes constitute a so-called special-disease population group, which is provided with the free-of-charge drug supply under the state guarantee at the polyclinic-ambulatory institutions (23). As mentioned above, the main purpose of this project was to find out if there was a lack of insulin and insulin supplies in Yerevan, Armenia and try to explore what could have caused this shortage.

The study participants included both type 1 diabetics and type 2 diabetes patients requiring insulin. Participants are registered patients, who are served by twelve polyclinics and a diabetic clinic of the city of Yerevan. The mean age for the population studied was 52, 4 years, with majority of the interviewees being females. Most of the surveyed population is educated, which implies that they could be potentially part of the active workforce in the market. However, the study revealed a high unemployment rate among interviewed diabetes patients (68.6%). This can be explained by various factors such as age, quality of life, and disability. The majority of the participants had difficulty with specifying their monthly expenditures.

The availability of insulin and insulin supplies in Armenia was studied in 2000-01, under the framework of the respective Central and Eastern European Project, covering overall 15 countries. Results presented in this project are not specified by the country; however, the half of the surveyed countries reported a "large number" of people with diabetes as not having access to insulin. The main reason for that was allegedly the cost of the drug: either as a direct expense for the patient or indirect expense for the government. This has particularly become a case for the countries of the former Soviet bloc, which, along with general economic collapse experienced change in the cost of the insulin and other supplies (19).

The provisional source of required insulin for diabetes patients in Armenia are polyclinics/diabetic clinic. It should be noted that insulin is distributed free of charge under the state guaranteed services (23). The results of this study show that only 35.7% of surveyed diabetes patients obtain their insulin from polyclinic/diabetic clinic only. In addition to the polyclinics and the diabetic clinic, a pharmacy was an additional provisional source of insulin for 50% of patients. Also, the relatives/friends' assistance is considered crucial, making up one more sources for insulin for 18.6% of patients.

Study results indicate that 31.4% of patients indicated no cases of insulin interruption over the past year. This means that 68.6% of the diabetes patients experienced insulin interruption over the past year. The irregular disbursement of insulin by polyclinics/diabetic clinic, insufficient amount of distributed insulin, lack of the particular type of insulin were the main reasons for insulin interruption mentioned by diabetes patients of Yerevan city. 73% of patients who experienced insulin interruption stated that they would buy insulin from a pharmacy and 8.3% of the surveyed would take no action in case of interruption. The remaining portion of patients in the sample would refer to relatives/friends living in Yerevan or abroad to obtain insulin.

Individual therapy for insulin injection costs more than the average monthly income in Armenia (30). According to the World Bank, Armenia is considered a “low -income” country with a GNP per capita less than \$785 (2). The cost of human insulin of (U40)/100 ml in Armenia is about \$10. The approximate annual insulin cost per capita in Armenia is \$146, which accounts for 20% of the GNP per capita. Thus, it is not feasible for many people to afford the insulin, especially since most patients rely on themselves and relatives. Therefore, the interesting finding of the study is the fact that despite the hard socio-economic situation in Armenia, the diabetes patients can afford purchasing insulin. At the same time, according to the Central and Eastern Europe Project, Georgia, placed at the

bottom of the scale of the “Lower Middle -Income” countries reported that about 50% -70% of diabetics are unable to afford the cost of the drug (2).

The next important concern of diabetes patient is that the process of receiving insulin in the polyclinics is a very time-consuming procedure. It is inconvenient for both working and physically disabled patients. Some patients even stated that they would prefer purchasing insulin from pharmacy instead of waiting in the lines. The availability of needles and syringes has not been assessed by this study, however, according to the Central and Eastern Europe Project, Armenia reported that the total supply of the needles and syringes was less than the required amount (2).

According to various sources in the literature and results of key informant interviews, the effective glycaemic control allows accurate adjustment for medications and prevents main diabetic complications, and is therefore cost-effective (2,15). Self-monitoring of glucose level in the blood is one of the essential components of the diabetes care. As one of the interviewed endocrinologists emphasized, *“by monitoring their glucose level the patient becomes an active participant in diabetes management and thus, helps his/her physician understands better what he/she needs”*. The interviewed endocrinologists mentioned that the lack of monitoring could be considered a potential barrier to adequate insulin supply. The surveyed diabetes patients in Yerevan encountered a serious problem on affordability of self-monitoring. This study reveals that 47% of the surveyed patients do not monitor their own blood glucose level. The major reason for this has been the affordability of testing device and testing supplies because of the high cost. Those patients who did not perform self-monitoring attended the polyclinic/diabetic clinic to take these readings. However, the majority of them had readings taken only once per month, while only 10% of the entire surveyed population did not opt for testing, whether self-administered at home or performed at a polyclinic.

The urine testing is an additional tool for blood glucose testing in diabetes management. The investigation on the reliability of urine glucose testing for metabolic control has showed that it provides reliable information for diabetics who can not afford the cost of blood glucose monitoring (2, 20). Although this method of diabetes management is less expensive than blood glucose monitoring, 91.4% of the surveyed diabetics did not monitor the glucose level in urine. The lack of monitoring strips due to the cost was the main reason for poor compliance, followed by the patients' unawareness on this method. Thus, despite the fact that blood glucose monitoring is a more expensive method and hence should be less preferable for low -income population, a higher percent of the surveyed population uses it (53% for blood glucose testing versus 8.6% for urine glucose testing). This is an anticipated controversy, since as one of the interviewed endocrinologists summarized it: “all in all, *the situation with self-monitoring is the worst in Armenia. Most of the patients who own a blood glucose testing device did not purchase it; rather received it from relatives/friends living abroad. And the majority of diabetics are not able to afford neither a blood glucose testing device nor urine glucose testing strips*”.

According to an endocrinologist, regular outpatient visits for a general check-up at least once per month are required: “*just providing more insulin is not enough, you should follow up with patients and adjust the insulin dose based on special measurements, as well as daily working schedule, eating patterns, and general feeling of the patient*”. A disease like diabetes and its outcome mainly depend on the self-consciousness of patient and his/her physician. However, as the data showed, 44% of patients did not follow a physician's advice, mainly because of the lack of trust and pervasive habit to call on a doctor only in the cases of urgency. At the same time, there is a distinct group of patients (16%) who did not even receive from their physicians any recommendation on following up.

This study has also demonstrated that 21.4% of the surveyed patients did not know

what their insulin dose was. According to an endocrinologist “*patients do not adequately manage the received amount of insulin if they do not know their doses.*” Self-monitoring and management of diabetes poses a problem to 30% of patients who do not know what their normal blood glucose level is. Considering that most of the surveyed patients have at least secondary-level education, it is assumed that patients’ lack of knowledge on essential diabetes issues is a result of relatively careless approach taken by the doctor personnel. At the same time, only 17% of the surveyed patients stated that they needed more information about the diabetes care. The major problems in diabetes management cited by the patients were either financial or health-related, closely followed by difficulties with diet management.

Every effort should be made to improve the insulin access, control of diabetes and patient education in order to avoid the early complications and premature death, caused by the progression of the disease. It is important to keep in mind that the high morbidity and premature mortality rates can lead to major medical, economic, personal and social problems.

## **7. Study limitations**

This study has several limitations, especially as pertinent to interpretation of its results. First, the phone interview technique poses a few problems. Those who are deprived of a phone facility were automatically excluded from the study. At the same time, it is important to note that 80% of the Yerevan population has access to phones which thus minimizes the potential bias. However, the city residents may be difficult to reach over phone due to potentially wrong numbers, busy lines, or unavailability of a contact person for the phone. The phone interview technique also poses a threat when the questionnaire includes open-ended questions, since the accuracy of the answers to open-ended questions can be diminished due to shorter answers by the interviewee as compared to a face-to-face

interview. Also, as the interviews were conducted by only one student-investigator there is a risk for an interviewer bias. Finally, since the study relies on self-reported data, the recall bias poses a potential threat.

## **8. Conclusion and Recommendations**

The study has revealed that there are often interruptions in insulin provision among the diabetes patients and lack of insulin supplies leading to low self-monitoring. There are no official data on the extent of insulin and insulin supplies shortage among the diabetes patients. The well-developed data system for pharmaceutical drug distribution creates a basis for the evaluation of the effectiveness of the distribution system and steps to improve it. The study has also displayed lack of knowledge regarding diabetes self-management among the patients.

The following recommendations are proposed:

- Design and conduct studies among the primary-level physicians and other stakeholders, such as government officials responsible for state regulations in healthcare for diabetes, aimed at assessing insulin and insulin supplies availability/accessibility
- Improve the policy and system of pharmaceutical drug distribution based on suggestions and feedback received from physicians and other stakeholders, such as the government.
- Conduct educational programs on diabetes self-management, targeting the most vulnerable diabetes patients.

### **List of appropriate journals where the work might be published**

1. American Journal of Public Health
2. Journal of American Diabetes Association
3. “Medicinskaya Nauka Armenii”, Armenia

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## TABLES/FIGURERS

**Table 1: Socio-Demographic characteristics of sample population**

<b>Mean age <math>\pm</math> SD</b>	52.4 $\pm$ 13.9
<b>Gender</b>	
<i>Male</i>	25 (35.7%)
<i>Female</i>	45 (64.3%)
<b>Education Status</b>	
<i>Higher</i>	26 (37.1%)
<i>Vocational</i>	25 (35.7%)
<i>School</i>	19 (27.1%)
<b>Employment Status</b>	
<i>Employed</i>	22 (31.4%)
<i>Unemployed</i>	48 (68.6%)

**Table 2: Patients characteristics by diabetes type**

	<b>Mean age <math>\pm</math> SD</b>	<b>Mean age at the moment of being diagnosed with diabetes <math>\pm</math> SD</b>	<b>Mean number of years to become insulin -dependent <math>\pm</math> SD</b>
Type 1 diabetes patients	43.0 $\pm$ 12.0	23.0 $\pm$ 10.0	-
Type 2 diabetes patients	62.0 $\pm$ 7.0	46.0 $\pm$ 8.0	11.5 $\pm$ 6.7

**Table 3: Frequency distribution of household income**

<b>Household income per month</b>	<b>Frequency, n(%)</b>
< 25 000 AMD (<\$ 50)	1 (1.4)
25 000 – 49 999 AMD (\$ 50 - 99)	6 (8.6)
50 000 – 74 999 AMD (\$ 100 - 149)	13 (18.6)
75 000 – 99 999 AMD (\$ 150 - 199)	4 (5.7)
Do not know	31 (44.3)
Miss the question	15 (21.4)

**Table 4: Provision sources of insulin**

*(multiple responses are permitted)*

<b>Provision sources</b>	<b>Frequency, n(%)</b>
Polyclinic and pharmacy	31 (44.3)
Polyclinic only	20 (28.6)
Polyclinic and help of relatives/friends	10 (14.3)
Diabetic clinic only	5 (7.1)
Polyclinic, pharmacy and help of relatives/friends	3 (4.3)
Diabetic clinic and pharmacy	1 (1.4)

**Table 5: Presence of difficulties/discomforts encountered in the process of insulin obtainment** (*multiple responses are permitted*)

<b>No</b>	46 (65.7%)
<b>Yes</b>	24 (34.3%)
<b>Encountered difficulties/discomforts</b>	<b>Frequency, n(%)</b>
<i>Time-consuming process</i>	13 (54.1)
<i>Long queues</i>	6 (25.0)
<i>Disrespectful attitude</i>	4 (16.7)
<i>Disrespectful environment</i>	4 (16.7)

**Table 6: Presence of insulin interruption in the last one -year and the main reasons for insulin interruption** (*multiple responses are permitted*)

<b>No</b>	22 (31.4%)
<b>Yes</b>	48 (68.6%)
<b>Reasons for insulin interruption</b>	<b>Frequency, n(%)</b>
<i>“Periodical” absence of insulin</i>	26 (54.2)
Not enough amount of insulin	15 (31.3)
No needed type of insulin	7 (14.6)

**Table 7: Activities taken by the diabetes patients in case of insulin interruption** (*multiple responses are permitted*)

<b>Activities</b>	<b>Frequency, n(%)</b>
Buy insulin from pharmacy	35 (70.8)
Nothing	4 (8.3)
Alternative medicine	3 (6.3)
<b>Other</b>	<b>13 (27.1)</b>
<i>receiving from abroad</i>	7 (14.6)
<i>help of relatives/friends</i>	4 (8.3)
<i>borrow from pharmacy</i>	2 (4.2)

**Table 8: Presence of self-monitoring of blood glucose level and main reasons for no self-monitoring** (*multiple responses are permitted*)

<b>Yes</b>	37 (52.9%)
<b>No</b>	33 (47.1%)
<b>Reasons for no self-monitoring</b>	<b>Frequency, n(%)</b>
Did not have device	25 (75.8)
Did not have strips	3 (9.1)
Physically not able	3 (9.1)
Do not aware	2 (6.1)

**Table 9: Frequency distribution of polyclinic visits for blood glucose testing<sup>†</sup>**

<b>Rate of visits</b>	<b>Frequency, n(%)</b>
Once a month	21 (63.6)
Do not do visit	7 (21.2)
Once a week	3 (9.1)
When feels bad	2 (6.1)

<sup>†</sup>distribution among 33 patients who do not perform self-monitoring at home

**Table 10: Presence of self-monitoring of urine glucose level and main reasons for no self-monitoring (multiple responses are permitted)**

<b>Yes</b>	7 (8.6%)
<b>No</b>	64 (91.4%)
<b>Reasons for no self-monitoring</b>	<b>Frequency, n(%)</b>
Do not have special strips	34 (53.1)
Do not aware	26 (40.6)
Do not need	4 (6.3)

**Table 11: Frequency distribution of the outpatient visits recommended by the physician**

<b>Recommendation by the physician</b>	<b>Frequency, n(%)</b>
Every month	48 (68.6)
2-3 times per month	9 (12.9)
Every week	2 (2.9)
No recommendation	11 (15.7)

**Table 12: Presence of compliance with the physician recommendation and main reasons for no compliance<sup>†</sup> (multiple responses are permitted)**

<b>Yes</b>	33 (55.9%)
<b>No</b>	26 (44.1%)
<b>Reasons for no compliance</b>	<b>Frequency, n(%)</b>
Do not trust	12 (20.3)
Only in case of health problem	12 (20.3)
Physically not able	9 (15.3)
Do not have time	5 (8.5)
Do not have money	4 (6.8)

<sup>†</sup>distribution among 59 patients received the recommendation

**Table 13: Storage places of insulin**

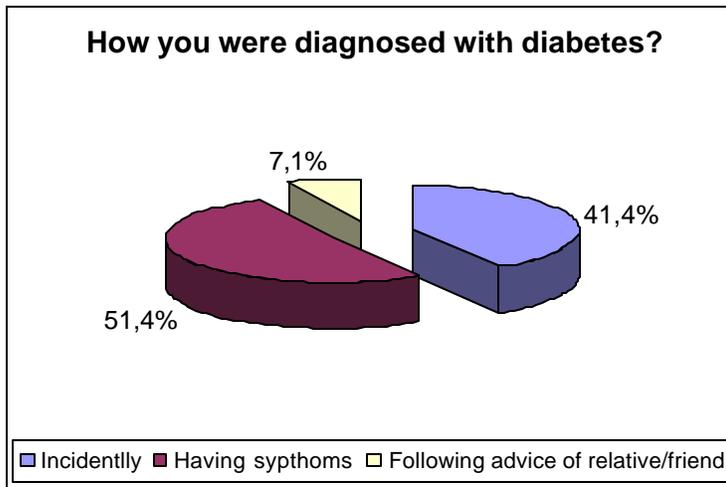
Fridge	61 (87.1%)
Box	8 (11.4%)
Bag	1 (1.4%)

**Table 14: Difficulties encountered in diabetes management**

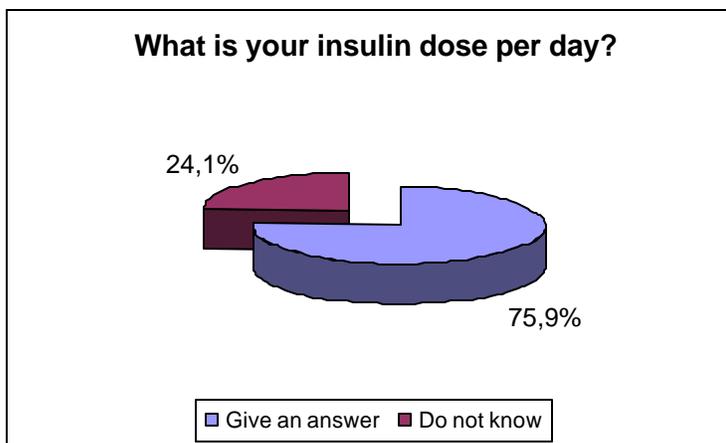
*(multiple responses are permitted)*

<b>Mentioned difficulties</b>	<b>Frequency, n(%)</b>
Financial problems	55 (78.6)
Health problems	36 (51.4)
Diet management	31 (44.3)
Lack of knowledge	12 (17.1)
Social stigma	6 (8.6)

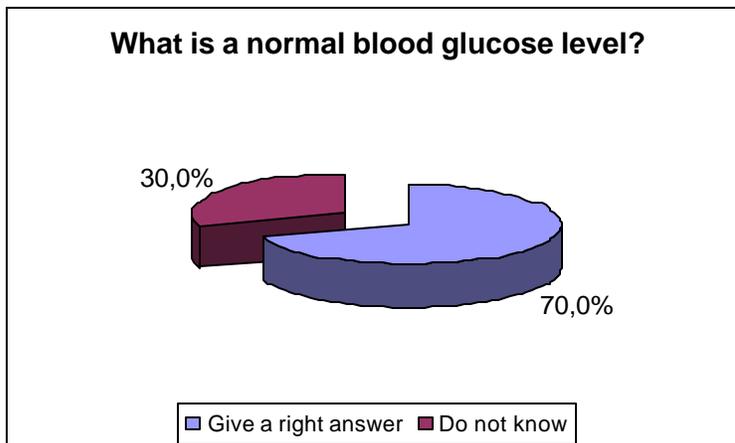
**Figure 1: Diagnostics modes of diabetes**



**Figure 2: Awareness of diabetes patients about their insulin dose**



**Figure 4: Awareness of diabetes patients about normal blood glucose level**



## **APPENDIX 1: English Version of In-depth Interview Guide**

1. What is diabetes management scheme for insulin-dependent diabetes patients?
2. What are the main components of insulin-dependent diabetes patients' self-management?
3. What are the main challenges faced by diabetes patients during their self-management nowadays in Armenia?
4. How do you appraise the situation of insulin accessibility /availability for diabetes patients in Armenia through last year and what are potential barriers to insulin availability in Armenia?

## APPENDIX 2: Armenian Version of In-depth Interview Guide

1. *Բնակչության չափերի մասին հարցնելու նպատակով հարցնում ենք Ձեր համայնքի մասին, ինչպես նաև հարցնում ենք Ձեր համայնքի մասին:*
2. *Ձեր համայնքի մասին հարցնելու նպատակով հարցնում ենք Ձեր համայնքի մասին, ինչպես նաև հարցնում ենք Ձեր համայնքի մասին:*
3. *Ձեր համայնքի մասին հարցնելու նպատակով հարցնում ենք Ձեր համայնքի մասին, ինչպես նաև հարցնում ենք Ձեր համայնքի մասին:*
4. *Բնակչության չափերի մասին հարցնելու նպատակով հարցնում ենք Ձեր համայնքի մասին, ինչպես նաև հարցնում ենք Ձեր համայնքի մասին:*

### APPENDIX 3: Armenian version of the Questionnaire

Ենթացիկ-Ֆակտորի և ինտենսիվի ինդեքսներ

1. Սերը ձեր հանդեպ

/1/ շատ ինտենսիվ

/2/ Բացարձակ

2. Սերը ձեր հանդեպ \_\_\_\_\_

3. Բնական հարգանքներով հարգելու ասում

/1/ շատ ինտենսիվ ինտենսիվ ինտենսիվ

/2/ ինտենսիվ ինտենսիվ ինտենսիվ

/3/ հարգանքներով ինտենսիվ ինտենսիվ

/4/ Հարգելի հարգելի /Ներքին էնթուզիստ

/5/ Ներքին ինտենսիվ ինտենսիվ

4. Ծննդյան տարի և միջին ինտենսիվ ինտենսիվ, ինտենսիվ էնթուզիստ \_\_\_\_\_

5. ասում ինտենսիվ ինտենսիվ

/1/ շատ

/2/ չ

6. Օրինակ ինտենսիվ ինտենսիվ և ինտենսիվ էնթուզիստ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ

Այնպես ասում

/1/ 25 000 ինտենսիվ ինտենսիվ (<\$ 50)

/2/ 25 000– 49 999 ինտենսիվ (\$ 50 - 99)

/3/ 50 000– 74 999 ինտենսիվ (\$ 100 - 149)

/4/ 75 000– 99 999 ինտենսիվ (\$ 150 - 199)

/5/ 100 000 ինտենսիվ ինտենսիվ (>\$ 200)

/6/ Ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ

7. ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ

8. Բնական ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ

/1/ ինտենսիվ ինտենսիվ

/2/ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ

/3/ Ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ

/4/ ինտենսիվ (Ինտենսիվ) \_\_\_\_\_

9. ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ

/1/ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ

/2/ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ

10. ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ \_\_\_\_\_

Բնական ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ

11. Բնական ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ ինտենսիվ \_\_\_\_\_

12. àñi »ÒÇó± »ù áou Ó»éu μ»ñáou Ò»½ ³ ÝÑñ³ Á»Bi ÇÝéáóÉÇÝÁ (ÝB»ù máÉáñ ÑÝ³ ñ³ í áñ  
i ³ ñμ»ñ³ ÍÝ»ñÁ)

/1/ äáÉÇÍÉÇÝÇÍ ³ /ÐÇí ³ Ý¹³ Ýáó

/2/ »Ö³ i áóÝ

/3/ Çëä³ Ýë»ñ

/4/ ² ÙÉ (ÝB»ù) \_\_\_\_\_

13. áou ³ éÝái »É± »ù áñ· ç ³ ÝÑ³ ñÙ³ ñáóÁáóÝÝ»ñÇ Ñ»i ÇÝéáóÉÇÝÇ Ó»éu μ»ñÙ³ Ý  
ÁÝÁ³ óuáóÙ

/1/ ² Ùá- ³ ÝóÝ»ÉÑ³ ñó 14

/2/ àã - ³ ÝóÝ»ÉÑ³ ñó 15

14. °Á» ³ Ùá, ÈÝ¹ñáóÙ »Ù ÝB»ù ÇÝãÇçÇÝ± »Ý »Ö»É ¹ñ³ Ýù

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15. Ò»ñ ÇÝéáóÉÇÝÁí ³ ä³ Ñ³ í í ³ Í áóÁáóÝÁ »ñμ·Çó» ÁÝ¹Ñ³ í í »±É ç

/1/ ² Ùá- ³ ÝóÝ»ÉÑ³ ñó 16

/2/ àã - ³ ÝóÝ»ÉÑ³ ñó 18

16. °Á» ³ ÙÝ Á¹Ñ³ í í »É ç, ÈÝ¹ñáóÙ »Ù ÝB»ù Á¹Ñ³ í Ù³ Ý ÑÇÙÝ³ í ³ Ý ä³ i x³ éÝ»ñÁ

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17. ÁÝ¹Ñ³ í Ù³ Ý ¹ »áúáóÙ, ÇÝãÇçÇÝ± »Ý »Ö»É Ò»ñ · áñí áóáóÁáóÝÝ»ñÁ

/1/ ¶Ý»É »ù ÇÝéáóÉÇÝ ¹ »Ö³ i ÝÇó

/2/ ÇÙ»É »ù äáÉÇÍÉÇÝÇÍ ³ /ÑÇí ³ Ý¹³ Ýáó

/3/ ú· i ³ · áñí »É »ù ³ Éi »ñÝ³ i Çí máóÁáóÙ

/4/ àã ÙÇ · áñí áóáóÁáóÝ á»ù Ó»éÝ³ ñí »É

/5/ ² ÙÉ (ÝB»ù) \_\_\_\_\_

**Þ³ ù³ ñ³ ÙÇÝ ¹Ç³ μ»i Ç ÈÝ³ ÙùÇ Í³ ½Ù³ Í»ñáóÙÁ**

18. àñÝ± ç ³ ñÙ³ Ý · Éáóí á½Ç Ù³ Í³ ñ¹³ ÍÁ ÝáñÙ³ ÙáóÙ \_\_\_\_\_

19. áou Í³ i ³ ñáóÙ± »ù ÇÝúÝáóñáóÙÝ Ò»ñ ³ ñ³ ÙÝ · Éáóí á½Ç Ù³ Í³ ñ¹³ ÍÇ ä³ ñμ»ñ³ Í³ Ý  
á³ ÷ áóÙÝ»ñ i Ý³ ÙÇÝ ä³ ÙÙ³ ÝÝ»ñáóÙ

/1/ ² Ùá- ³ ÝóÝ»ÉÑ³ ñó 21

/2/ àã - ³ ÝóÝ»ÉÑ³ ñó 22

20. °Á» ³ Ùá, ÇÝã± Ñ³ x³ È³ Í³ ÝáóÁáóÙ μ »ù Í³ i ³ ñáóÙ ³ Ù¹ á³ ÷ áóÙÝ»ñÁ

/1/ úñí ³ ÁÝÁ³ óuáóÙ ÙÇ ù³ ÝÇ ³ Ý· ³ Ù

/2/ úñÁ Ù»Í ³ Ý· ³ Ù

/3/ ² Ù»Ý 1-2 úñÁ Ù»Í

/4/ Þ³ μ³ Á³ Í³ Ý Ù»Í ³ Ý· ³ Ù

/5/ ² ÙÇéÁ Ù»Í ³ Ý· ³ Ù

/6/ i ³ i ÇÝú³ ½· ³ óáóáóÁáóÝ ¹ »áúáóÙ

21. °Á» áá, ÈÝ¹náóÙ »Ù Ýß»ù ¹ñ³ ÑÇÙÝ³ Ì³ Ý ǎ³ ì ×³ éÝ»ñÁ

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22. °Á» áóù ÇÝùÝáóñóÙÝ ǎ»ù Ì³ ì³ náóÙ³ ñ³ ÌÝ · ÉáóÍ á½Ç Ù³ Ì³ ñ¹³ ÌÇ ǎ³ ÷ áóÙ, ÇÝǎ± Ñ³ ×³ È³ Ì³ ÝáóÁÙ³ Ùμ »ù³ Ìó»ÉáóÙ ǎáÉÇÍÉÇÝÇÍ³ /ÑÇÍ³ Ý¹³ Ýáó³ ñÙ³ Ý · ÉáóÍ á½Ç Ù³ Ì³ ñ¹³ ÍÁ èì áó · »Éáó Ýǎ³ ì³ Íáí

- /1/ Þ³ μ³ Á³ Ì³ Ý 2-3³ Ý · ³ Ù
- /2/ Þ³ μ³ Á³ Ì³ Ý Ù»Í³ Ý · ³ Ù
- /3/ ² ÙÇéÁ Ù»Í³ Ý · ³ Ù
- /4/ ǎ»Ù Ñ³ ÝÓÝáóÙ³ Ý³ ÈÇ½Ý»ñ
- /5/ Ì³ ì³ ÇÝù³ ½³ óáÓáóÁáóÝ¹ »ǎùáóÙ

23. áóù Ì³ ì³ náóÙ± »ù ÇÝùÝáóñóÙÝ Ù»½áóÙ · ÉáóÍ á½Ç Ù³ Ì³ ñ¹³ ÌÇ ǎ³ ÷ áóÙÝ»ñ ì³ Ý³ ÌÇÝ ǎ³ ÌÙ³ ÝÝ»ñáóÙ

- /1/ ² Ìá – ³ ÝóÝ»É Ñ³ ñó 25
- /2/ ǎǎ – ³ ÝóÝ»É Ñ³ ñó 24

24. °Á» áóù ÇÝùÝáóñóÙÝ ǎ»ù Ì³ ì³ náóÙ Ù»½áóÙ · ÉáóÍ á½Ç Ù³ Ì³ ñ¹³ ÌÇ ǎ³ ÷ áóÙÝ»ñ, ÈÝ¹náóÙ »Ù Ýß»ù ¹ñ³ ÑÇÙÝ³ Ì³ Ý ǎ³ ì ×³ éÝ»ñÁ

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25. ÆÝǎǎÇèÇ± Ñ³ ×³ È³ Ì³ ÝáóÁÙ³ Ùμ Ñ³ Ù³ Ó³ ÌÝ Ò»ñ μÁÍÇ ÈáñÑñ¹Ç áóù ǎ»ì ù ç ³ Ìó»É»ù ǎáÉÇÍÉÇÝÇÍ³ /¹Çéǎ³ Ýè»ñ/ÑÇÍ³ Ý¹³ Ýáó Ò»ñ ÑÇÍ³ Ý¹áóÁÙ³ Ý ÑèÍ áÓáóÁÙ³ Ý Ýǎ³ ì³ Íáí

- /1/ °ñ»ù³ ÙÇéÁ Ù»Í
- /2/ ² ÙÇéÁ Ù»Í
- /3/ ² ÙÇéÁ 2-3³ Ù · ³ Ù
- /4/ ² Ù»Ý ß³ μ³ Á
- /5/ ǎ»Ù èì³ ó»É³ Ì¹ ǎÇèÇ ÈáñÑáóñ¹ μÁÍÇ Í áÓÙÇó (³ ÝóÝ»É Ñ³ ñó 27)

26. áóù Ñ»ì áóÙ± »ù Ò»ñ μÁÍÇ ÈáñÑáóñ¹ÇÝ

- /1/ ² Ìá – ³ ÝóÝ»É Ñ³ ñó 28
- /2/ ǎǎ – ³ ÝóÝ»É Ñ³ ñó 27

27. °Á» áá, èì áñ · ÝÍ³ ÍÝ»ñÇó áñáÝù± »Ý¹ñ³ ÑÇÝÙ³ Ì³ Ý ǎ³ ì ×³ éÝ»ñÁ (Ýß»ù μǎÉáñ ÑÝ³ ñ³ Í áñ ì³ ñμ»ñ³ ÍÝ»ñÁ)

- /1/ Á³ Ù³ Ý³ ÌÇ èÓáóÁáóÝÁ
- /2/ ùÇÝ³ Ýè³ Ì³ Ý ÙÇçáóÝ»Ç èÓáóÁáóÝÁ
- /3/ ÁÍÇ Ñ³ Ý¹»ǎ³ Ýí èì³ ÑáóÁáóÝÁ
- /4/ ² Ìó»ÉáóÙ »Ù ǎáÉÇÍÉÇÝÇÍ³ ÙÇ³ ÌÝ áñ · ç³ éáÓÇ³ Ì³ Ý ÈÝ¹Çñ áóÝ»Ý³ Éáó¹ »ǎùáóÙ
- /5/ ùÇ½ÇÍ³ ǎ»è Ç ÍÇ×³ ÌÇ ǎ»Ù
- /6/ ² ÌÉ (Ýß»ù) \_\_\_\_\_

28. àñì »Ó± ç ǎ³ Ñí áóÙ Ò»ñ ÇÝéáóÉÇÝÁ

- /1/ á³ ñ³ Í áóÙ, è»ÝÙ³ Ì³ ÌÇÝ ǎ³ ÌÙ³ Ý»ñáóÙ
- /2/ è³ éÝ³ ñ³ ÝáóÙ
- /3/ ² ÌÉ (Ýß»ù) \_\_\_\_\_

29. êi añ· ÝBí³ Í ÇÝãÇeÇ± ¹Áí³ ñáoÃláóÝ»ñÇ Ñ»i »ù³ eÝái »É Ò»ñ ÑÇí³ Ý¹áoÃú³ Ý  
 ÈÝ³ ÙùÇ í³ ½Ù³ Ì»ñãÙ³ Ý ÁÝÃ³ óúóáÙ (Ýß»ù μαÉñ ÑÝ³ ñ³ í añ í³ ñμ»ñ³ í Ý»ñÁ)
- /1/ Þñç³ á³ í Ç í »ñ³ μ»ñÚáoÝúÁ
  - /2/ ùÇÝ³ Ýè³ Ì³ Ý áñáμÉ»ÙÝ»ñ
  - /3/ ² éáÕç³ Ì³ Ý ÈÝ¹ÇñÝ»ñ
  - /4/ Ç»i³ ÙÇ á³ Ñá³ ÝáoÙ
  - /5/ àã μ³ í³ ñ³ ñ³ i »Õ»ÍáoÃláóÝ»ñ ÑÇí³ Ý¹áoÃú³ Ý ÈÝ³ ÙùÇ Ì³ ½Ù³ Ì»ñãÙ³ Ý  
 Ù³ èÇÝ
  - /6/ ² ÙÉ (Ýß»ù)\_\_\_\_\_

**ÞÝáñÑ³ Ì³ ÉáoÃláóÝ Ù³ èÝ³ ÍáoÃú³ Ý Ñ³ Ù³ ñ**

## **APPENDIX 4: English Version of the Questionnaire**

### **QUESTIONNAIRE FOR PATIENTS WITH INSULIN-DEPENDENT DIABETES**

#### **Demographic Characteristics**

1. Sex (*please indicate*)

/1/ Male

/2/ Female

2. How old are you? \_\_\_\_\_

3. Please state your highest level of education

/1/ Incomplete secondary (less/equal 8 years)

/2/ Complete secondary (10 years)

/3/ Professional technical

/4/ Institute/university

/5/ Postgraduate degree

4. How many people live in your household, including you? \_\_\_\_\_

5. Are you employed/self-employed?

/1/ Yes

/2/ No

6. What is your household income per month?

/1/ Less than 25 000 AMD (<\$ 50)

/2/ 25 000 – 49 999 AMD (\$ 50 - 99)

/3/ 50 000 – 74 999 AMD (\$ 100 - 149)

/4/ 75 000 – 99 999 AMD (\$ 150- 199)

/5/ More than 100 000 AMD (>\$ 200)

/6/ Do not know/Difficult to answer

7. When were you diagnosed with diabetes? \_\_\_\_\_

8. How were you diagnosed?

/1/ Incidentally

/2/ You had symptoms of diabetes

/3/ Advised by a friend or relative to seek medical care

/4/ Other (*please specify*) \_\_\_\_\_

9. Were you insulin dependent from the moment of diagnosis?

/1/ Yes – please go to *the question 11*

/2/ No – please go to *the question 10*

10. When did you become insulin dependent? \_\_\_\_\_

#### **Insulin Supply**

11. What is your dose of insulin per day now? \_\_\_\_\_

12. Where do you obtain your insulin? (*Check all that apply*)

- /1/ Polyclinic/Hospital
- /2/ Pharmacy
- /3/ Diabetic clinic
- /4/ Other (please specify) \_\_\_\_\_

13. Did you encounter with any difficulties/discomforts while obtaining insulin?

- /1/ Yes – please go to *the question 14*
- /2/ No – please go to *the question 15*

14. If yes, please specify what they were

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15. Was your insulin supply ever interrupted during the last year?

- /1/ Yes – please go to *question 16*
- /2/ No – please go to *question 18*

16. If it was interrupted, please indicate main reasons of the interruption

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17. If it was interrupted, what did you do? (*Check all that apply*)

- /1/ Buy more from the pharmacy
- /2/ Go to polyclinic/hospital
- /3/ Take alternative medicine
- /4/ Nothing
- /5/ Other (*please specify*) \_\_\_\_\_

### **Diabetes Management**

18. What is a normal blood glucose level? \_\_\_\_\_

19. Do you monitor your own blood glucose level at home?

- /1/ Yes – please go to *question 20*
- /2/ No – please go to *question 21*

20. If you do, how often do you take readings?

- /1/ Several times per day
- /2/ Once a day
- /3/ Every 1-2 days
- /4/ Once a week
- /5/ Once a month
- /6/ When feels bad

21. If you do not get your readings at home, please indicate possible reasons for that

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22. If you do not, how often do you come to the polyclinic/hospital to get your readings taken?
- /1/ 2-3 times per week
  - /2/ Once a week
  - /3/ Once a month
  - /4/ I do not get my readings taken
  - /5/ When feels bad
23. Do you test your urine for glucose at home?
- /1/ Yes – *please go to question 25*
  - /2/ No – *please go to question 24*
24. If you do not test your urine for glucose at home, please indicate possible reasons for that
- 
- 
25. What is the frequency of outpatient visits for a check-up recommended by your physician?
- /1/ To visit polyclinic/hospital/diabetic clinic every 3 months
  - /2/ To visit every month
  - /3/ To visit 2-3 times per month
  - /4/ To visit every week
  - /5/ There are no recommendations done by physician (*please go to question 28*)
26. Do you follow your physician's instructions?
- /1/ Yes – *please go to question 28*
  - /2/ No – *please go to question 27*
27. If no, which of the following are the main reasons for that? (*Check all that apply*)
- /1/ I do not have a time
  - /2/ I do not have financial resources
  - /3/ I do not trust physician
  - /4/ I do not, I only come to polyclinic/hospital if I have a problem
  - /5/ I am not able physically
  - /6/ Other (*please specify*) \_\_\_\_\_
28. Where is your insulin kept?
- /1/ In a box at home, at room temperature
  - /2/ In a fridge
  - /3/ Other (*please specify*) \_\_\_\_\_
29. Which of the following difficulties do you encounter with the management of your diabetes?
- /1/ Social stigma
  - /2/ Financial problems
  - /3/ Lack of knowledge of diabetes management
  - /4/ Diet management
  - /5/ Health problems
  - /6/ Other (*please specify*) \_\_\_\_\_

***Thank you for your time and cooperation***

**APPENDIX 5: Armenian Version of Permission Letter**

“ՊնՇ. ան Ս՝ն՝ի՝ օՇ” մածԱ՛՛յի նա՛ՅՇ ի Կն՛ն՛Յ՛  
ձ՝ նա՛Յ՛ Է.2 . ՊնՇ. անՍ՝ ԿՇՅ՛

Ծ՝ Ծ՝ Ծ՝ Կն՝ ՍՇՅ՛ 2 Եա՛ՕՇ՝ ձ՝ Նա՛օ՛ԱՍ՝ Կ՛  
ՍՇՇ՛ա՛ՅՇ ÷ա՛Է՛1՝ի՛ Կ՛  
Պն՛ն՛ն՛ Է՛ ԷՇի՛ Կ՛ՇՕ

Ծ՝ ՍՇ շի՛ ԿՇ 2 Ս՛նՇի՛ՍՇ ԿՇ Ծ՝ ՍՇ Է՛ն՝ ն՝ ԿՇ Ծ՝ Կն՝ ՍՇՅ՛ 2 Եա՛ՕՇ՝ ձ՝ Նա՛օ՛ԱՍ՝ Կ՛ ՍՇ ի՛ա՛օ՛Է՛ր ՝ի՛ Շ  
»ն՛ի՛նա՛ն՛ ի՛ա՛օ՛ն՛Շ օ՛օ՛՛ Կա՛Օ՛ա՛օ՛՛՛՛՛՛ Էա՛օ՛՛ Կ՛Կ՛ Չ՛ի՛նի՛ ա՛Ս՛ ԿԱ՛, անձ՛»՛ 1՛ ԵԱ՛Կ՛ օՇ ՍՇ ՍՇ Է  
ի՛ի՛ Կ՛նա՛օ՛ ի՛ Բ՛ ՍՇ ն՝ ՍՇՅ՛ 1Շ՛ ՍՇ ի՛ Շ՛ ի՛ն՝ ՍՇ նա՛Օ՛ Ն՛ի՛ Կ՛ Կա՛օ՛ ձ՛օ՛Ա՛օ՛Կ՛: Ա՛»՛ՇՇՇՇ Ա՛ՍՇ Կ՛ ի՛  
”Բ՛ ՍՇ ն՝ ՍՇՅ՛ 1Շ՛ ՍՇ ի՛ ա՛ Շ՛Կա՛օ՛ԷՇ՛Կ՛ Է՛ՍՇ Է՛ ՆՇի՛ Կ՛ Կ՛Կ՛նՇ Շ՛Կ՛ՍՇ ի՛ Կ՛նՇ Կ՛ . Կ՛ ՆՇ ի՛ ձ՛օ՛Ա  
օ՛ն՛՛ Կ՛ ՍՇ Օ՛ Ս՛ա՛օ՛՛”:  
2 Ս՛ Ն՛ի՛ Կ՛ Կա՛ ձ՛օ՛ԱՍ՝ Կ՛ Կ՛ ձ՛ ի՛ Կ՛Կ՛ ի՛ ձ՛օ՛Է՛ա՛օ՛՛՛՛՛ ԷՇն՛»՛ Բ՛ ՍՇ ն՝ ՍՇՅ՛ 1Շ՛ ՍՇ ի՛ ա՛ Շ՛  
Շ՛Կա՛օ՛ԷՇ՛Կ՛ ի՛ Է՛ՍՇ Է՛ ՆՇի՛ Կ՛ Կ՛Կ՛նՇ (18 ի՛ Կ՛ ն՛ի՛ Կ՛ՇՕ՛ ՍՇ ն՛Օ՛ն՛) . Շի՛ »ԷՇՍՇ»՛ն՛ . ան՛ի՛ Կ՛ ի՛ Կ՛  
ՍՇ ՍՇ»՛ն՛ Բ՛ ՍՇ ն՝ ՍՇՅ՛ 1Շ՛ ՍՇ ի՛ Շ՛ Կ՛ՍՇ ի՛ Կ՛նՇ Կ՛ . ան՛ի՛ Կ՛ օ՛սա՛օ՛՛:  
Ծ՛ ի՛ Կ՛ Կա՛ ձ՛օ՛ԱՍ՝ ԿԱ՛ Կ՛ Շ՛ ի՛ օ՛»Էա՛օ՛ Կ՛ ձ՛ ի՛ Կ՛ա՛ ձ՛ Ծ՝ ԾՇ ԾՇ Ծ՝ Կն՝ ՍՇՅ՛ 2 Եա՛ՕՇ՝ ձ՝ Նա՛օ՛ԱՍ՝ Կ՛  
ՍՇ ԱՇԿ՛Ա՛ Է՛Կ՛նա՛օ՛ ի՛ Աա՛օ՛Է՛ ի՛ Է՛ Ծ՝ ԾՇ ԾՇ օ՛օ՛՛ Կա՛Օ՛ա՛օ՛՛՛՛՛ Էա՛օ՛՛ Կ՛Կ՛ Չ՛ի՛նի՛ ա՛Ս՛ ԿՇՅ՛ Օ՛ն՛  
ձ՛ա՛ԷՇի՛ԷՇ՛Կ՛ ի՛ Սա՛օ՛ Է՛ ձ՛ Է՛ ն՛ի՛ ա՛Օ՛ Բ՛ ՍՇ ն՝ ՍՇՅ՛ 1Շ՛ ՍՇ ի՛ ա՛ ՆՇի՛ Կ՛ Կ՛Կ՛նՇ Ն՛ի՛ ՆՇ նօ՛ Կ՛նա՛օ՛՛  
Կ՛ Կ՛ օ՛՛»Է՛ Էա՛օ՛՛ Ա՛ ի՛ Կ՛ ԿՇ Ծա՛օ՛ԷՇ – Ս՛. Է՛ի՛ Է՛ Կ՛ ՍՇՇ՛»՛նՇ ԱԿ՛ օ՛սա՛օ՛՛: Ծ՛ նօ՛ Կ՛նա՛օ՛՛  
ի՛ Կ՛ օ՛ի՛ օ՛ի՛ ՍՇ ՍՇ ՍՇ ի՛ Կ՛. Կ՛ ՍՇ ի՛ ի՛ Շ 10-15 նա՛ձ՛»:

ի՛ Կ՛ Է՛ ի՛ ԲԿն՛ն՛ ի՛ Է՛ »Կ՛

Պն՛ն՛ն՛ Է՛ ԷՇի՛ Կ՛  
Ծ՝ Կն՝ ՍՇՅ՛ 2 Եա՛ՕՇ՝ ձ՝ Նա՛օ՛ԱՍ՝ Կ՛ ՍՇՇ՛ա՛ՅՇ 1ա՛օ՛՛Կ՛ ,  
2 Եա՛ՕՇ՝ ձ՝ ՆՇ ի՛ Կ՛ . Շի՛ ձ՛օ՛Ա՛օ՛Կ՛նՇ ՍՇ ն՛Օ՛ն՛ . ա՛օ՛՛ 1ձ՛նա՛օ՛Շ ÷ա՛Է՛1՝ի՛ Կ՛

## **APPENDIX 6: English version of Study Consent Form**

**American University of Armenia  
Institutional Review Board /Committee on Human Research  
College of Health Sciences Subcommittee for Student Theses**

### CONSENT FORM TEMPLATE

**Title of Research Project:** *Availability and accessibility of insulin and insulin supplies among insulin -dependent patients in Yerevan, Armenia.*

#### **Purpose of the study**

As a part of Master of Public Health Program at American University of Armenia graduate student is conducting a cross-sectional study in the field of Public Health. The main purpose of the study is to assess insulin and insulin supplies accessibility/availability among insulin-dependant diabetes patients and to explore the barriers to insulin and insulin supplies availability. Type 1 diabetes patients diagnosed more than one year and type 2 diabetes patients using insulin more than one year, have been selected to participate in the study. Participants are selected randomly based on the insulin-dependent list of patients obtained from the district polyclinics. Phone interview technique has been used in the study. The interview will take place only once and last 5-10 minutes.

#### **Risks/Discomforts**

There is no risk associated with the participation in this study. Participants need to devote 5-10 of their time to answer the questions during interview.

#### **Benefits**

You will not get any direct benefits from this study. However, information provided will help to explore the current situation of the insulin and insulin supplies availability and reveal potential barriers to insulin and insulin supplies availability. In addition, this study will contribute to the further research in this field and to the development of appropriate policy to regulate and control the insulin and insulin supplies availability for insulin-dependent diabetes patients.

#### **Confidentiality**

Although the research will obtain your name and contact information from the district polyclinic in order to conduct the interview, your name will not be recoded on the questionnaire. A code will be assigned to the questionnaire and no individual can be identified from the information provided in the questionnaire. Information obtained from the interview will be accessible only to student-investigator, principal-investigator and co-investigator of this study. The summary report of the study will be presented both on paper and presentation at American University of Armenia, Public Health department.

#### **Voluntariness**

Your participation in the study is voluntary. You can refuse to participate in the study. You are free not to answer to the questions if you consider them sensitive or inappropriate. You can stop the interview at any time and withdraw from the study. Your refusal to participate or your withdrawal from the study at any time will not affect medical care you receive.

**Whom to contact**

The name of student-investigator is Susanna Mkrtchyan, Public Health student at American University of Armenia. In case of questions you may have about the research study you can contact the persons in charge listed below. If you are interested in the results of the study you can contact the researcher in the future and researcher will tell anything new they learn from the study. Below are listed contacts of the persons who are in charge of the study.

Michael Thompson (e-mail): [mthompso@aua.am](mailto:mthompso@aua.am)

Robert McLean (e-mail): [mclean@creighton.edu](mailto:mclean@creighton.edu)

The persons in charge of the study will answer your questions.

If you want to talk to anyone about the research study because you feel you have not been treated fairly or think you have been hurt by joining the study you should contact Teaching Associate, Yelena Amirkhanyan (374 1) 51 25 68, American University of Armenia, Department of Public Health.



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